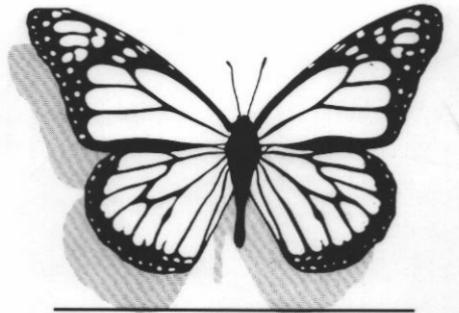


Université du Québec à Montréal

**Congrès annuel conjoint 1991
Société d'Entomologie du Canada
Société d'Entomologie du Québec
Entomological Society of Ontario
20 au 23 octobre 1991**



**Joint Annual Meeting 1991
Entomological Society of Canada
Société d'Entomologie du Québec
Entomological Society of Ontario
October 20-23, 1991**

**Hôtel Ramada Renaissance
Montréal, Québec**

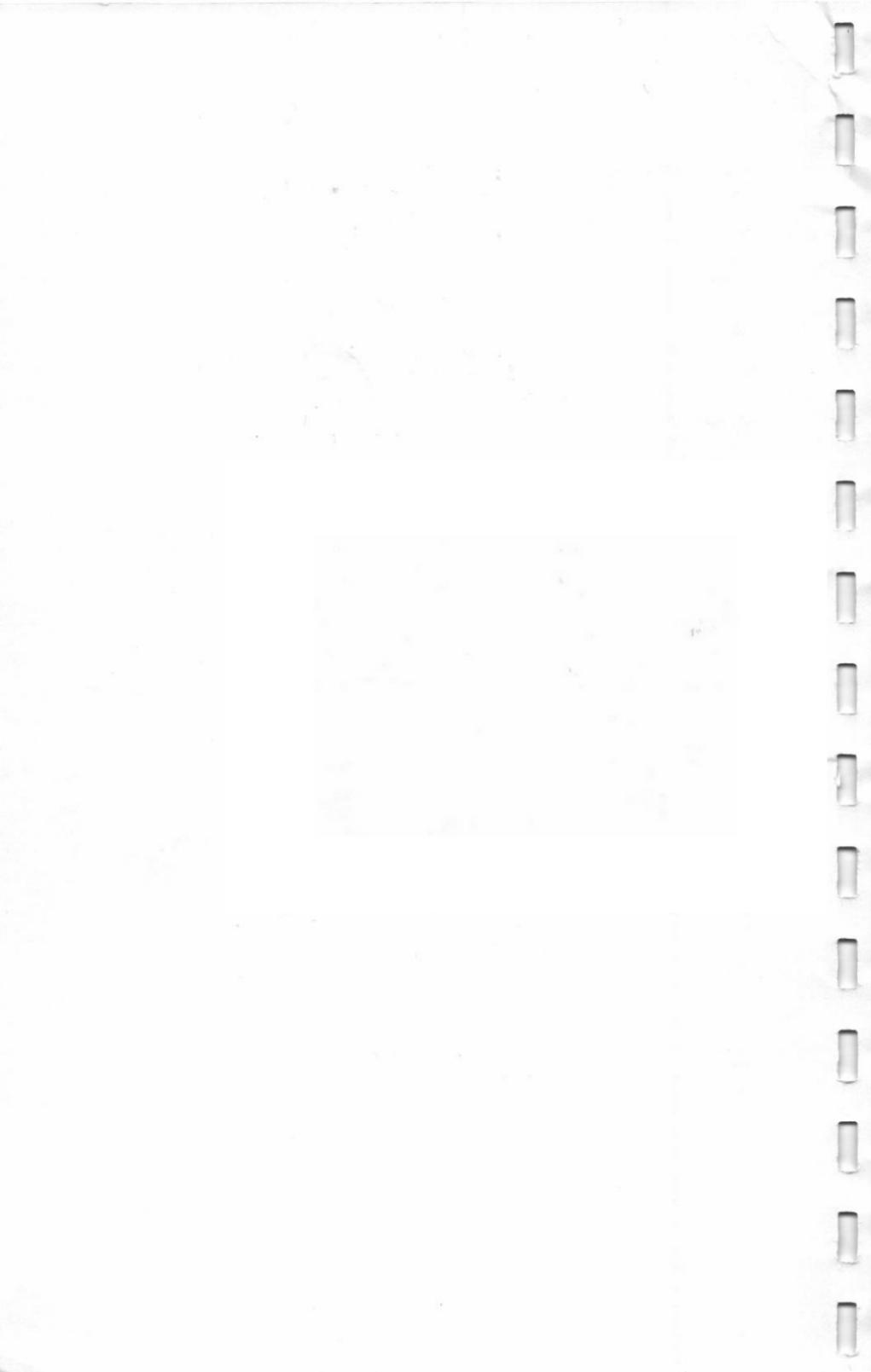


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Programme scientifique/Scientific Program	D. Coderre
Session des posters/Poster session	M. Roy
Logistique du congrès/Local Arrangements	Y. Mauffette
Finances/Finance	Y. Mauffette
	N. J. Bostanian
	C. Vincent

Résumé des activités de la réunion/
Summary of meeting schedule

Samedi 19 octobre/Saturday October 19

9h00-17h30 Conseil d'administration S.E.C./E.S.C. Board Meeting
Des Pins

Dimanche 20 octobre/Sunday October 20

9h00-17h30 Conseil d'administration S.E.C./E.S.C. Board Meeting
Des Pins

15h30-18h00 Groupe de discussion sur les relations insectes-plantes/
Plant-insect interactions group meeting
Org. Caroline Bolter
UQAM X-10210

17h00-21h00 Inscription/Registration
Foyer

19h00-20h30 S.E.C rencontre les étudiants/Students meet the board
Restaurant Bodega

19h00-20h00 E.S.O. board meeting (outgoing)
Salon 218

19h00 à 22h00 Conseil d'administration, S.E.Q.
Salon 219

Lundi 21 octobre/ Monday October 21

8h30-13h00 Inscription/Registration
Foyer

9h00-10h15 Cérémonies d'ouverture/Opening ceremonies
Présentation des prix/Award presentations
Discours, Médaille d'Or/Gold Medal Address
Parc 2

10h30-12h00 Symposium: "Entomologie et Société"/"Entomology and Society"
(A la mémoire de/In memory of Dr K.McE. Kevan)
Parc 2

13h00-17h00 Session de posters-Exhibits/Poster Session-Exhibits
Parc 1

13h30-16h45	Symposium: Apprentissage chez les insectes/Learning in insects Parc 2
13h30-16h45	Entomologie agricole 1/Agricultural Entomology 1 Colonnade
13h30-16h45	Entomologie forestière 1/Forest Entomology 1 St-Laurent
16h45-18h00	Réunion d'affaires de la S.E.Q. Remise des décorations S.E.Q. Des Pins
17h00-18h00	E.S.O. General Meeting Prince Arthur
19h15	Départ du Ramada pour l'Insectarium/Departure from Ramada to Insectarium Lobby
20h00-22h00	Cocktail et visite de l'Insectarium de Montréal/ Cocktail and visit of Insectarium de Montréal Commémoration, 40e anniversaire de la S.E.Q. Conférence du patrimoine/Heritage lecture Insectarium de Montréal
21h30	Retour hâtif au Ramada Renaissance/ Early return to Ramada Renaissance
22h45	Retour au Ramada Renaissance/ Return to Ramada Renaissance

Mardi 22 octobre/Tuesday October 22

8h30-12h00	Biosystématique et Evolution/Biosystematics and Evolution Des Pins
8h30-12h00	Symposium: Résistance au froid chez les insectes/ Insect Cold-hardiness Parc 2
9h00-11h35	Symposium: Arthropodes des tourbières/Peatland Arthropods Colonnade
10h00-17h00	Exhibits Parc 1

13h30-15h00	Symposium: Résistance au froid chez les insectes/ Insect Cold-hardiness Parc 2
13h00-16h30	Symposium: Arthropodes des tourbières/ Peatland Arthropods Colonnade
13h30-16h30	Entomologie forestière 2/Forest Entomology 2 Des Pins
17h00-19h00	Réunion d'affaires de la S.E.C./E.S.C. General Meeting Des Pins
19h00	Banquet Parc 2

Mercredi 23 octobre/Wednesday October 23

8h00-9h00	E.S.O. New Board Meeting Salon 222
8h00-12h00	Entomologie agricole 2/Agricultural Entomology 2 Prince Arthur
8h00-10h15	Entomologie agricole 3/Agricultural Entomology 3 Des Pins
8h45-12h00	Reproduction et génétique/Reproduction and genetics Parc 2
10h30-12h15	Entomologie microbienne/Microbiological Entomology Des Pins
12h15	Clôture du Congrès/Closing Ceremonies Parc 2
12h30-14h00	Conseil d'administration de la S.E.C./E.S.C. Board Meeting Colonnade

Locaux

La majorité des activités du congrès se dérouleront à l'Hôtel Ramada Renaissance, située au 3625 du Parc. Certaines activités sont prévues à l'Université du Québec à Montréal (UQAM), pavillon Ste-Catherine Ouest, 515 Ste-Catherine O., au Restaurant Bodega, 3456 du Parc et à l'Insectarium de Montréal, 4581 Sherbrooke E.

Audio visuel

Chaque salle de conférence est pourvue d'un projecteur à diapositives 35 mm, d'un carrousel et d'un rétroprojecteur. Une salle de visionnement contenant un projecteur 35 mm, un carrousel et un écran, est également à la disposition des conférenciers qui voudraient vérifier leurs diapositives, de 8h00 à 17h00 tous les jours. Nous demandons à tous les conférenciers de placer leurs diapositives dans un carrousel, de l'identifier à leur nom et de le remettre au projectionniste 15 minutes avant le début de la session. **Rooms**

Programme pour les conjoints

Les informations pertinentes aux activités prévues pour les conjoints seront disponibles dans le Foyer de l'Hôtel Ramada Renaissance.

Rooms

The most meeting activities will be held at Hotel Ramada Renaissance, 3625 du Parc. Some activities are scheduled at Université du Québec à Montréal (UQAM), Pavillon Ste-Catherine Ouest, 515 Ste-Catherine O., at Restaurant Bodega, 3456 du Parc and at Insectarium de Montréal, 4581 Sherbrooke E.

Visual aids

Each conference room is equipped with a 35 mm slide projector, carousel and an overhead projector. A preview room containing a 35 mm projector, carousel and screen will be open daily from 8h00 to 17h00 for the convenience of speakers who wish to check their slides. Speakers are asked to put their slides in the carousel, to label it and give it to the projectionist 15 minutes before the beginning of the session.

Accompanying person's program

Information will be available at the Registration Desk in the Foyer of Hôtel Ramada Renaissance.

Lundi 21 Octobre/Monday October 21**Salle: Parc 2****Cérémonies d'ouverture/Opening Ceremonies**

9h00-10h15

Mot de Bienvenue/Introduction and Welcome

C. Vincent (Comité organisateur/Organizing committee)
D. de Oliveira (Société d'Entomologie du Québec)
M. Sears (Entomological Society of Ontario)
J.E. Laing (Société d'Entomologie du Canada/Entomological Society of Canada)

Présentation des Prix/Award Presentations

Prix C. Gordon Hewitt Award
Murray B. Isman, Dept. of Plant Sciences, U.B.C.

Médaille d'Or/Gold Medal Award
Roger G.N. Downer, Dept. of Biology, Univ. of Waterloo

Discours, Médaille d'Or/Gold Medal Address:
R.G.N. Downer: "Entomology, Society and Canada"

Lundi 21 Octobre/Monday October 21**Salle: Parc 2**

Symposium: Entomologie et Société/Entomology and Society
(En mémoire de/in memory of Dr K. Mc E. Kevan)

Organisateurs/Organizers: C. Vincent, J.-P. Bourassa

Modérateur/Chairman: J.-P. Bourassa

10h30 Arthropods and human behaviour. S.B. Hill

11h00 L'entomologie à l'ère de l'interdisciplinarité. B.J.R. Philogène

11h30 La recherche en entomologie et la politique/
Entomological research and politics. E.J. Leroux & J.J. Cartier

Lundi 21 Octobre/Monday October 21**Salle: Parc 2****Symposium: Apprentissage chez les Insectes/Learning In
Insects****Organisateurs/Organizers: C. Vincent, B.D. Roitberg**

Modérateur/Chairman: B.D. Roitberg

14h00 The cellular basis of learning. J.J.B. Smith

14h30 Application of learning to pest management. R.J. Prokopy

15h00 Learning in parasitoids in a tritrophic context. L. Vet

13h30 Learning to accept hosts and mates: vive la différence? B.D.
Roitberg

15h30 Evolution of learning and instinct: lessons from parasitoids. D. Papaj

Lundi 21 Octobre/Monday October 21**Salle: Colonnade****Entomologie agricole I/Agricultural Entomology I**

Modérateur/Chairman: Mark Sears

13h30 Trap cropping for control of the Striped Cucumber Beetle, *Acalymma vittata* Fab. A. Radin & F. Drummond13h45 The importance of tillage regime for cultural control of root maggots (*Delia* spp.) in canola. L.M. Dosdall, M.J. Herbut & N.T. Cowle

14h00 Exclusion fences: A new technique for managing cabbage flies and other low flying crop pests. R.S. Vernon & J. R. Mackenzie

14h15 Effect of molt duration on efficacy and crop protection of insecticides for control of cutworms. J.R. Byers & B.D. Hill

14h30 Echantillonnage séquentiel d'*Artogeia rapae* (L.) et *Plutella xylostella* (L.) pour un contrôle chimique et biologique de ces insectes. S. Belloncik & G. Mailloux14h45 Etude du développement de *Rhopalosiphum padi* sur son hôte primaire *Prunus virginiana*. M. Chagnon & C. Cloutier

15h00 Pause/Break

- 15h15 Contribution à la sélection d'écotypes d'*Azolla* tolérants à *Rhopalosiphum nymphaeae* (Homoptera: Aphididae). T. Hance, Ph. Lebrun, D. Nibelle, C. Van Hove & G. Van Impe
- 15h30 Dispersal of the pea aphid parasitoid, *Aphidius ervi* Haliday. B. Deneka & P.A. Mackay
- 15h45 Interspecific competition between the aphid parasitoids, *Aphidius ervi* and *Praon occidentale*. T.P. Danyk & M. Mackauer
- 16h00 Evaluation of neem. *Azadirachta indica* for the control of aphids (Homoptera: Aphididae). D.T. Lowery & M.B. Isman
- 16h15 Patterns of host-plant selection relative to larval predation for *Pieris rapae* attacking cultivated crucifers. H. Damman
- 16h30 The Quebec Plant Pest Warning Service: a major cooperative effort in entomology. M. Letendre

Lundi 21 Octobre/Monday October 21

Salle: St-Laurent

Entomologie forestière I/Forest Entomology I

Modérateur/Chairman: P.J. Albert

13h30 Notes on the biology and control of the black army cutworm in Newfoundland. R.J. West

13h45 Effect of the juvenile hormone analog Fenoxy carb on lipid metabolism of the spruce budworm *Choristoneura fumiferana*. H. Mulye & R. Gordon

14h00 Predicting gypsy moth egg hatch by use of simulation models. D.R. Gray, J.A. Logan & F.W. Ravlin

14h15 Is delayed budbreak a defensive response of white spruce to early-season defoliation? D. Quiring

14h30 Conservation of parasitoids in the management of budworm populations. V.G. Nealls, K. van Frankenhuizen & B.L. Cadogar

14h45 Applying the IDS method to remove seeds infested with the Douglas-fir seed chalcid, *Megastigmus spermotrophus* Wachtl. J.D. Sweeney, Y.A. El-Kassaby, D.W. Taylor, D.G.W. Edwards & G.E. Miller

15h00 Pause/Break

15h15 Préférence alimentaire de la livrée des forêts entre les feuillages d'érables à sucre sains et déperis. F. Lorenzetti, Y. Mauffette & E. Baucé

15h30 Effects of forestry practices on carabid assemblages in lodgepole pine forests in western Alberta. D.W. Langor, J. Niemelä & J.R. Spence

15h45 The effect of habitat structural complexity on the foraging success of *Trichogramma minutum* (Riley). J. Luklanchuk & S.M. Smith

16h00 Collection criteria for initiating mass-reared populations of *Trichogramma*. S.M. Smith & Z. Wang

16h15 Flight propensity and host acceptance by *Trichogramma minutum*. E. Forsse, R.S. Bourchier & S.M. Smith

16h30 Preliminary evaluation and development of an "all-Canadian" botanical insecticide. M.I. Isman & G.H.N. Towers

Mardi 22 Octobre/Tuesday October 22

Salle: Parc 2

Symposium: Résistance au froid chez les Insectes/Insect Cold hardiness

Organisateurs/Organizers: H.V. Danks, D. Coderre

Chairmen: H.V. Danks, D. Coderre

8h30 Introduction H.V. Danks

8h35 Ecological aspects of insect cold-hardiness. H.V. Danks

9h05 Physiological aspects of insect cold-hardiness. R. Ring

9h35 To freeze or not to freeze: biochemical aspects of insect cold-hardiness. K.B. Storey

10h05 Pause/Break

10h30 The role of cold injury in winter survival. W.J. Turnock

11h00 Relationships of cold-hardiness with insect diapause. I. Hodek

11h30 Applied aspects of insect cold-hardiness. P. Fields

Mardi 22 Octobre/Tuesday October 22

Salle: Colonnade

Symposium: Arthropodes des tourbières/Peatland Arthropods

Organisateurs/Organizers: S.A. Marshall, A.T. Finnamore

Modérateur/Chairman: A.T. Finnamore

9h00 Introduction. S.A. Marshall & A.T. Finnamore

9h05 The chemistry hydrology and vegetation of Canadian peatlands.
D. Vitt

9h35 Distribution of aquatic insects in subarctic peatlands. D.J. Lewis

9h50 The Odonata of northern cordilleran peatlands. S.G. Cannings &
R.A. Cannings

10h05 Pause/Break

10h20 The beetle fauna of a mature spruce-sphagnum bog, Algonquin Park,
Ontario: ecological implications of the species composition.
M.W.P. Runtz & S.B. Peck

10h35 Why are there so few ground beetles in bogs of the American
northeast ? H. Främb

10h50 Reproductive biology and habitat associations of *Nicrophorus*
(Coleoptera : Silphidae) of the Mer Bleue Bog. C.W. Beninger

11h05 Food supply, water content, and man made destruction as factors for
the distribution of beetles in European bogs and peatlands.
D. Mossakowski

11h20 Peatland Sphaeroceridae of Canada. S.A. Marshall

Mardi 22 Octobre/Tuesday October 22

Salle: des Pins

Biosystématique et Evolution/Biosystematics and Evolution

Modérateur/Chairman: C. Guertin

8h30 A cladistic analysis of the supra-generic lineages in the North-American Crambinae (Lepidoptera:Pyralidae). B. Landry

**8h45 Status of casebearer systematics in North America
(Lepidoptera:Coleophoridae). J.-F. Landry & B. Wright**

**9h00 Systématique du genre *Brochymena* (Heteroptera: Pentatomidae).
M.-C. Larivière**

9h15 Do two respiratory filaments a species make? S. Burgin

9h30 Stable Fly Sci Fi. F. Hunter

**9h45 Advances in the systematics of *Trichoclinocera* (Diptera: Empididae).
B. Sinclair**

**10h00 Eucharitid parasites of ants: classification and correlations.
J.M. Heraty**

10h15 Pause/Break

10h30 Historical development and uses of CNC. P.T. Dang

**10h45 Nearctic - Neotropical connections in the genus *Rachispoda* (Diptera:
Sphaeroceridae). T.A. Wheeler**

**11h00 Mitochondrial DNA and species phylogenies in the *Papilio glaucus* and
P. troilus species groups (Lepidoptera: Papilionidae). F. Sperling**

11h15 How old is the Cedar Lake Amber? E.M. Pike

**11h30 Reset your watches gentlemen: fossil water-striders (Hemiptera:
Gerridae) show the clock is slow. J.R. Spence, N. Møller Andersen &
M.V.H. Wilson**

Mardi 22 Octobre/Tuesday October 22

Salle: Colonnade

**Symposium: Arthropodes des tourbières (suite)/Peatland
Arthropods (cont.)**

Organisateurs/Organizers: S.A. Marshall, A.T. Finnamore

Modérateur/Chairman: S.A. Marshall

13h00 Evolution of the leafhopper genus *Limotettix* in bog habitats
(Homoptera: Cicadellidae). **K.G.A. Hamilton**

13h15 Hymenoptera of Wagner Bog, a boreal spring fen. **A.T. Finnamore**

13h30 Oribatida (Acari) of peatland habitats in Canada. **V.M. Behan-Pelletier & B. Bissett**

13h45 Changes in grounddwelling spider fauna (Arachnida: Araneae) of a
North German raised bog disturbed by human influence. 1964-65 and
1986-87: A comparison. **H.-B. Schikora**

14h00 Ground-living spiders, opilionids and pseudoscorpions of bogs in
Quebec. **S. Koponen**

14h15 Peatland Spiders in eastern Canada. **C.D. Dondale & J.H. Redner**

14h30 Spiders of the Parkland peatlands. **R.E. Leech & B. MacDonald-Leech**

14h45 Peatland spiders from southern and northern Manitoba taiga.
C.W. Aitchison-Benell

15h00 General discussion

Mardi 22 Octobre/Tuesday October 22

Salle: des Pins

Entomologie forestière II/Forest Entomology II

Modérateur/Chairman: C. Cloutier

13h30 Influence of several biotic and abiotic factors on the distribution and
abundance of *Zeiraphera canadensis*. **D. Ostaff**

13h45 Is food quality a concern for eastern spruce budworm? **S.A. Vescio**

- 14h00 Costs and benefits associated with dispersal by *Zeiraphera canadensis* larvae on white spruce. **A.L. Carroll**
- 14h15 Influence of larval competition on oviposition site selection by larch cone maggots. **M. McClure**
- 14h30 Impact de la tenthredine du mélèze sur les populations de mélèze larinin au Nouveau-Québec. **I. Tailleux & C. Cloutier**
- 14h45 Larch sawfly, snowshoe hare browsing and eastern larch growth responses. **C. Cloutier & I. Tailleux**
- 15h00 Effect of ovarian development on the response of the larch cone fly, *Strobilomyia laricis*, to colours. **A. Chau**
- 15h15 Pause/Break
- Ecologie des Insectes/Insect Ecology**
- 15h30 Flightlessness on islands: fact or fiction. **D. Roff**
- 15h45 Stability in subpopulations of the goldenrod gallmaker, *Eurosta solidaginis*: density perturbation experiments. **N. Cappuccino**
- 16h00 Distribution and community effects of the exotic ground-beetle *Pterostichus melanarius* (Ill.) in Alberta. **J. Niemelä & J.R. Spence**
- 16h15 Bet hedging by two *Cephenemyia* spp. (Oestridae) attacking and larvipositing on deer models. **J.R. Anderson**

Mardi 22 Octobre/Tuesday October 22

Salle: Parc 2

Symposium: Résistance au froid chez les Insectes (suite)/Insect Cold-hardiness (cont.)

Organisateurs/Organizers: H.V. Danks, D. Coderre

Modérateur/Chairman: H.V. Danks

13h30 Cold-hardiness in the russian wheat aphid, *Diuraphis noxia* (Mordvilko). **R. Butts**

13h45 Cold-hardiness in a high arctic moth. **O. Kukal**

14h00 Cold hardiness and cold storage of *Phytoseiulus persimilis* and *Amblyseius cucumeris* (Acarina : Phytoseiidae). **W.D. Morewood**

14h15 Ovarian diapause in *Drosophila melanogaster*. K.D. Williams & M.B. Sokolowski

14h30 Résistance au froid de *Anaphes* sp. (Hymenoptera: Mymaridae), parasitoïde des oeufs de *Listronotus oregonensis*. G. Bolvin, T. Hance & L. Traoré

14h45 Remarques finales/Closing remarks

15h00 Pause/Break

Écologie des diptères/Diptera Ecology

Modérateur/Chairman: C.J. Lucarotti

15h15 Microhabitat selection of larval *Simulium venustum/ verecundum* (Diptera: Simuliidae) cytotypes. J.W. McCreadie & M. Colbo

15h30 Assessment of responses of the black fly, *Simulium arcticum* (IIS-10.11) to host-related odours. J.F. Sutcliffe & J.A. Shemanchuk

15h45 Autogeny studies in *Culex tarsalis* from Southern Manitoba. R.A. Brust

16h00 Chironomid generic assemblages as a function of the aquatic habitat. M.H. Colbo & J.W. McCreadie

16h15 Dispersion and interspecific associations amongst aquatic insects colonizing artificial substrates in the Canagagigue River. J.E. Rutherford

16h30 Effects of substrate composition on the vertical distribution of *Aedes aegypti* larvae. R.H. Paul & D.J. Lewis

16h45 Relative efficiencies of wet and dry extraction techniques for sampling immature stages of peatland Diptera. P.E.K. McElligott

Mercredi 23 Octobre/Wednesday October 23

Salle: Prince Arthur

Entomologie agricole II/Agricultural Entomology II

Modérateur/Chairman: G. Boiteau

8h00 Movement of adult Colorado potato beetles, *Leptinotarsa decemlineata* (Say), on slanted surfaces. Y. Pelletier

8h15 Predicting the body temperature of adult Colorado potato beetle (*Leptinotarsa decemlineata* (Say)). Y. Pelletier

- 8h30 Control of the Colorado potato beetle with vacuum collectors: entomological and mechanical considerations. **G. Bolteau & G. Misener**
- 8h45 Field biology of the Colorado potato beetle on Horsemettle. **J.T. Mena, F. Drummond & D.L. Haynes**
- 9h00 Impact of potato flea beetle, *Epitrix cucumeris*, on yield of Russet Burbank potatoes in Manitoba. **S.F. Pernal & N.J. Holliday**
- 9h15 The European corn borer: A potential pest of potatoes grown on Prince Edward Island. **J.G. Stewart**
- 9h30 The impact of a citrus limonoid on susceptibility of Colorado potato beetle to *Beauveria bassiana*. **R. Bowdish & E. Groden**
- 9h45 Effects of limonin, an antifeedant, on the Colorado potato beetle. **K.D. Murray, E. Groden, F. Drummond, A.R. Alford, R. Storch & M. Bentley**
- 10h00 Pause/Break
- 10h15 Reducing the risk: predicting emergence of alfalfa leafcutter bees and parasites. **K.W. Richards & G.H. Whitfield**
- 10h30 Biology of *Osmia ribifloris*, an exotic leafcutter bee, in Maine blueberry fields. **C. Stubbs, T. Goodman, E. Osgood & F. Drummond**
- 10h45 Honey bees pollinate blueberries??? **K. MacKenzie**
- 11h00 The impact of *Acarapis woodi* Rennie on honey bees in northern temperate climates. **C.D. Scott-Dupree & G.W. Otis**
- 11h15 Caste determination in a primitively eusocial sweat bee, *Halictus ligatus*. **M.H. Richards & L. Packer**
- 11h30 Behavioural change in sweat bees: a phylogenetic approach. **L. Packer**
- 11h45 Biology of the strawberry root weevil, *Otiorhynchus ovatus* (Linn.) on woody ornamentals in southern Ontario. **J. Brandt**
- 12h00 Lutte biologique d'*Hoplocampa testudinea* (Hymenoptera: Tenthredinidae) à l'aide des nématodes entomopathogènes. **G. Bélair & C. Vincent**

Mercredi 23 Octobre/Wednesday October 23**Salle: des Pins****Entomologie agricole III/Agricultural Entomology III**

Modérateur/Chairman: G. Boivin

- 8h00 Genetic improvement of the phytoseiid mite *Amblyseius fallacis* for pyrethroid resistance. **H.M.A. Thistlewood, D.J. Pree & L.A. Crawford**
- 8h15 Overwintering parasitoids of the spotted tentiform leafminer and the apple blotch leafminer in Missouri. **R.S. Gagné & B.A. Barrett**
- 8h30 Population dynamics and parasitism of the western tentiform leafminer on three host plants. **R. McGregor**
- 8h45 Confusion sexuelle de la tordeuse du pommier à l'aide de phéromone - essais au champ. **J.-P. Deland, B.Judd & B. Roitberg**
- 9h00 Pheromone-based mating disruption program for control of Codling Moth in British Columbia. **G. Judd, M. Gardiner & D.Thomson**
- 9h15 Résistance de la Tordeuse à bandes obliques, *Choristoneura rosaceana* Harris (Lepidoptera: Tortricidae) à trois insecticides. **S. Bellerose, C. Vincent & J.-G. Pilon**
- 9h30 Micro-habitats du charançon de la prune en verger de pommiers et implications pour la lutte. **G. Choulnard, S.B. Hill & C. Vincent**
- 9h45 The activity and residues of cyhalothrin in apple orchards. **N. Bostanian & A. Bélanger**
- 10h00 Haemocytic response to fungal invasion in the carrot weevil, *Listronotus oregonensis*. **T. Searle**
- 10h15 Hôtes alternatifs de *Anaphes* n. sp. et *A. sordidatus* (Girault) (Hymenoptera: Mymaridae), parasitoïdes des œufs du charançon de la carotte. **S. Côté & G. Boivin**
- 10h30 Pause/Break

Entomologie microbienne/Microbiological Entomology

Modérateur/Chairman: M. Arella

- 10h45 Susceptibilité de la tordeuse des bourgeons de l'épinette
Choristoneura fumiferana (Clemens) à deux différentes viroses cytoplasmiques. S. Belloncik, F. Kendrgl, R. Athanassious, L. Tao, C.J. Chen, Z.X. Wang & J.W. Chen

- 11h00 Baculovirus host-specificity is not determined at the level of entry into the host cell. J.- L. Wolff, M.M.C. Yu & D.B. Levin

- 11h15 Characterization of a baculovirus that infects grasshoppers, locusts, and termites. M.M.C. Yu, D.B. Levin

- 11h30 Use of Lecontvirus for control of redheaded pine sawfly, *Neodiprion lecontei*. J. Cunningham

- 11h45 Contributions des cultures cellulaires d'insectes dans l'évaluation de l'efficacité et des modes d'action de bioinsecticides. S. Belloncik

Mercredi 23 Octobre/Wednesday October 23

Salle: Parc 2

Reproduction et génétique/Reproduction and genetics.

Modérateur/Chairman: J.N. McNeil

- 8h45 Effects of phototoxin, alpha - T, on detoxification enzymes of the *Ostrinia nubilalis*. R. Feng, A.E.R. Downe & J.G. Houseman

- 9h00 A DNA marker to identify biotypes of the biological control agent, *Trixys pallidus*. O.R. Edwards, M.A. Hoy

- 9h15 Genetic diversity patterns in the sumac gall aphid. R. Foottit, P.D.N. Hebert & T.L. Finston

- 9h30 Mate-carrying and sexual size dimorphism in waterstriders (Gerridae). D.J. Fairbairn

- 9h45 Choix de la zone thermique par la femelle de *Forficula auricularia* (Dermoptères: Forficulidae) au cours du développement des œufs. F. Bourgouin, J. Gingras & J.-C. Tourneur

- 10h00 Le fonctionnement ovarien de la population de Montréal de *Forficula auricularia* L. (Dermatera: Forficulidae). J.-C. Tourneur, J. Gingras & M. Vancassel

10h15 Pause/Break

10h30 Does *Choristoneura rosaceana* male spermatophore affect female reproductive success? **A. Bouchard & J. Delisle**

10h45 What factors influence mating time of spruce budworm, *Choristoneura fumiferana*? **J. Delisle**

11h00 Importance of host plant pollen on the calling behaviour of sunflower moths held under different photoperiodic conditions. **J.N. McNeil & J. Delisle**

11h15 Comportement d'appel de deux souches de la légionnaire d'automne, *Spodoptera frugiperda*, sous différentes températures. **E. de Lima & J. N. McNeil**

11h30 Sperm use pattern in *Pseudaletia unipuncta*. **L. Svärd**

11h45 Paternal investment of European corn borer males, *Ostrinia nubilalis* (Hübner) (Lepidoptera: Pyralidae): its impact on longevity and reproductive performance of their mates. **L. Royer & J.N. McNeil**

Session de Posters/ Poster Session

Modératrice/Chairperson: **M. Roy**

Développement d'outils pour le diagnostic des virus de la granulose et de la polyédrose nucléaire de la tordeuse des bourgeons de l'épinette. **M. Arella, A. Merzouki, M. Nadeau, P. Tijssen & S. Belloncik.**

Usurpation of host behavior by a braconid wasp. **J. Brodeur & L.E.M. Vet**

A desiccation stress protein in *Tenebrio molitor*. **C.-P. Chen, L.A. Graham, W. Bendeng & V.K. Walker**

Dormancy in a Tropical Savannah. **H. Chiasson & S.B. Hill**

Isolation de *Bacillus* ssp. à partir de *Lygus lineolaris* (P. de B.). **J.-C. Côté & S. Fréchette**

The impact of soil community characteristics on the longevity of *Beauveria bassiana*. **T. Dunn & E. Groden**

Deux types de populations de *Forficula auricularia* L. (Dermoptera: Forficulidae) au Canada. **J. Gingras, J.-C. Tourneur & M. Vancassel**

Évaluation de la toxicité de l'insecticide bactériologique *Bacillus thuringiensis* var. *san diego* sur *Coleomegilla maculata* Timb. (Coccinellidae) et son impact sur l'efficacité de prédation. **S. Giroux, D. Coderre, J.C. Côté & C. Vincent**

Variation in carbohydrates of white spruce needles and feeding behavior of the spruce budworm. **C. Guertin & P.J. Albert**

Influence du stress hydrique sur la survie et le développement du charançon du pin blanc. **R. Lavallée, Y. Maufette & P.J. Albert**

Invasion of *Aedes aegypti* ovaries by *Coelomomyces stegomyiae*.
C.J. Lucarotti

Lutte biologique contre le doryphore de la pomme de terre à l'aide des nématodes entomopathogènes, en sol organique, au Québec. **P. Martel, G. Béclair, J. Belcourt & S. Chagnon**

Forensic Entomology in Ontario. **D.E. Morris**

Analysis of the hemolymph of the Colorado potato beetle (*Leptinotarsa decemlineata* (Say)). **Y. Pelletier & C. Clark**

Insects on your fork??? **Y.H.J. Prévost**

Actographies pour l'étude de l'activité du charançon de la prune, *Conotrachelus nenuphar* (Herbst) (Coleoptera: Curculionidae). **G. Racette, C. Vincent & S.B. Hill**

The development of an ELISA for detecting *Beauveria bassiana* infection in the Colorado potato beetle. **S. Rao & E. Groden**

Effect of chemical pesticides on the mortality and predatory efficacy of *Coelomegilla maculata* Timb (Coccinellidae). **C. Roger, D. Coderre & C. Vincent**

Abondance et importance des tordeuses nuisibles dans les vergers du Québec. **M. Roy & C. Vincent**

Effects of *Beauveria bassiana* on parasitoid emergence from Colorado potato beetles (*Leptinotarsa decemlineata*). **T. Searle & W.N. Yule**

Toxicité de cristaux purifiés de *Bacillus thuringiensis* var. *kurstaki* HD-1 chez les larves de tordeuse à bandes obliques, *Choristoneura rosaceana* (Lepidoptera: Tortricidae). **C. Vincent, J.-C. Côté, S. Bellerose, B. Panneton & Y. Chung**

Biology of *Harpalus rufipes* in Maine. **J. Zhang & F. Drummond**

Résumés/Abstracts

Altchison-Benell, C. W. Department of Zoology, University of Manitoba
Winnipeg, Man. R3T 2N2

Peatland spiders from southern and northern Manitoba taiga.

Taiga peatland spiders from southern and northern Manitoba, collected mainly in pitfall or pan traps, are compared. Numerically the dominant families in the South are Lycosidae, Clubionidae and Erigonidae, while in the North are Lycosidae, Gnaphosidae and Erigonidae. Twenty-five species are common to both areas.

Anderson, J. Dept. Entomol. Sci., University of California, Berkeley, CA 94720

Bet hedging by two *Cephenemyia* spp. (Oestridae) attacking and larvipositing on deer models.

Females of *C. apicata* and *C. jellisoni* attracted to baited deer models larviposited only once per encounter. Insect adhesive on the muzzle and lips and in nostrils of models revealed that *C. apicata* deposited its larvae only on the lips, whereas *C. jellisoni* sprayed its larvae directly into nostrils.

Arella, M., A. Merzouki, M. Nadeau, P. Tijssen & S. Belloncik.
Institut Armand Frappier, 531, boul. des Prairies, Laval, Qué. H7V 1B7

Développement d'outils pour le diagnostic des virus de la granulose et de la polyédrose nucléaire de la tordeuse des bourgeons de l'épinette.

La tordeuse des bourgeons de l'épinette (*Choristoneura fumiferana*) est le plus important ravageur des forêts de conifères de l'Est de l'Amérique du Nord. Le degré d'implication de certains pathogènes naturels dans le déclin des populations larvaires est encore mal connu à cause de l'absence de systèmes de détection simples et fiables. Pour pallier à ce problème, nous avons utilisé des techniques de biologie moléculaire (hybridation, réaction de la polymérisation en chaîne) pour déterminer l'incidence des virus de la granulose et de la polyédrose nucléaire dans les populations de la tordeuse échantillonnées à plusieurs sites au Québec.

Behan-Pelletier, V. & B. Bisnett. Biosystematics Research Centre, Research Branch, Agriculture Canada , Ottawa, Ont. K1A 0C6

Oribatida (Acari) of Peatland habitats in Canada.

Oribatid mites are associated with both terrestrial and aquatic habitats in peatlands, and we compare their species richness in these habitats. Species diversity in the aquatic habitats consists primarily of members of the genera *Limnozetes* and *Hydrozetes*. Data on diversity and ecology of *Limnozetes* species indicate that these are indicators of peatland conditions.

Bélair, G. & C. Vincent. Station de Recherches, Agriculture Canada,430 Boul. Gouin, Saint-Jean-sur-Richelieu, Qué. J3B 3E6

Lutte biologique d'*Hoplocampa testudinea* (Hymenoptera: Tenthredinidae) à l'aide des nématodes entomopathogènes.

En pétri, *Steinerma carpocapsae* (Weiser) race DD 136, *S. carpocapsae* race All, *S. feltiae* (Filipjev) et *Heterorhabditis bacteriophora* Poinar ont causé 100% de mortalité larvaire 72 heures après le traitement. Dans des pots de 20 cm disposés sous des pommiers nains, un seul traitement au sol avec 40 ou 80 *S. carpocapsae* race All/cm² ont causé une mortalité de 39.1% en 1990. Des quadrats de 50 x 50 cm disposés sous des pommiers nains et traités au printemps 1989 émergeaient respectivement 22 et 25 hoplocampes adultes avec des applications au sol de 40 et 80 *S. carpocapsae* race All/cm², tandis que 78 adultes ont émergé des quadrats traités avec de l'eau.

Bellerose, S.¹, C. Vincent.² & J.-G. Pilon.¹

¹ Département de sciences biologiques, Université de Montréal,C.P. 6128, Montréal, Qué. H3C 3J7.

² Station de Recherches, Agriculture Canada,430, Boul. Gouin, Saint-Jean-sur-Richelieu, Qué. J3B 3E6

Résistance de la Tordeuse à bandes obliques, *Choristoneura rosaceana* Harris (Lepidoptera:Tortricidae) à trois insecticides.

A l'aide d'une méthode utilisant des disques de nitrate de cellulose traités de solutions insecticides, nous avons déterminé si une population de tordeuses à bandes obliques collectée dans la région de St-Joseph-du-lac en 1990 présentait une résistance à trois insecticides utilisés dans les vergers de pommiers du Québec. Aux doses recommandées, les mortalités chez la population susceptible (Québec) étaient de 82.5, 92.5 et 80.0% avec la cyperméthrine, l'azinphosméthyl et le phosmet. Chez la population résistante (Saint-Joseph-du-lac), les mortalités étaient respectivement de 2.5, 7.5 et 5.0 % pour les mêmes insecticides.

Belloncik, S., Centre de recherches en virologie, Institut Armand-Frappier, UQAM, 531 boul. des Prairies, Laval, Qué. H7V 1B7

Contributions des cultures cellulaires d'insectes dans l'évaluation de l'efficacité et des modes d'action de bioinsecticides.

La pathogénicité et diverses interactions d'insecticides microbiens avec l'insecte-hôte ainsi qu'avec les conditions environnementales sont classiquement caractérisées *in vivo* chez l'insecte-hôte. Les travaux menés dans notre laboratoire qui seront présentés et discutés ont permis, par l'utilisation de cultures cellulaires, la purification et l'amplification de souches de virus de polyédroses cytoplasmiques (CPV). Des travaux de propagation en culture cellulaire nous ont permis d'élucider certains phénomènes de persistance et de propagation du CPV démontrés chez l'insecte-hôte. Par ailleurs le comportement du virus répandu lors d'une lutte biologique sous diverses conditions de température a été analysé. Notamment, les effets sur la réplication virale d'expositions de cellules à des variations de températures optimales et non optimales ont été étudiés. Il a ainsi été montré que le rayonnement ultra-violet solaire ne serait pas le seul responsable de l'inactivation de l'activité virale lors d'applications de virus dans les pays chauds. D'autre part la réplication partielle du CPV à 4°C démontrée par une synthèse uniquement d'ARN pourrait corroborer les observations faites chez l'insecte quant à un effet positif de cette basse température sur l'évolution de l'infection virale. Enfin, des antagonismes entre des toxines bactériennes et fongiques démontrés seront analysés en fonction des interactions possibles entre pathogènes lors d'une lutte biologique à grande échelle.

Belloncik, S.¹ & G. Mailoux.²

¹ Centre de recherches en virologie, Institut Armand-Frappier, 531 boul. des Prairies, Laval, Qué. H7N 4Z3

² MAPAQ, St-Bruno, Qué.

Echantillonnage séquentiel d'*Artogeia rapae* (L.) et *Plutella xylostella* (L.) pour un contrôle chimique et biologique de ces insectes.

A. rapae et *P. xylostella* peuvent causer annuellement d'importants dommages aux plantations de choux dans la province de Québec nécessitant le développement de méthodes de contrôle efficaces de ces insectes. Ces méthodes devraient contribuer à diminuer le nombre des traitements chimiques prophylactiques et intégrer l'utilisation de produits biologiques vu la résistance accrue des insectes aux produits chimiques. A cet effet, une méthode d'échantillonnage binomial et séquentiel nécessitant l'observation d'un maximum de 30 plants a été développée. L'efficacité de traitements chimiques et d'un virus de la granulose pour contrôler et réduire les dommages de ces insectes a été étudiée en utilisant cette méthode d'échantillonnage et en effectuant un traitement lorsque 57% des plants échantillonnes étaient infestés par une larve d'un ou l'autre de ces deux insectes. Les résultats obtenus ont démontré que le nombre de traitements insecticides nécessaires

se réduit à 2 ou 3 par année pour obtenir une récolte de 95% ou plus de plants commercialisables au marché frais. Le virus ne peut à lui seul protéger adéquatement à court terme la culture. Cependant les résultats préliminaires tendent à démontrer que l'addition de virus à l'insecticide chimique pourrait améliorer la protection à long terme des choux contre ces insectes.

Bellonci, S.¹, F. Kendrgi¹, R. Athanassious¹, L. Tao², C.J. Chen,² Z.X. Wang² & J.W. Chen².

¹Centre de recherche en virologie, Institut Armand-Frappier, 531 boul. des Prairies, Laval, Qué. H7N 4Z3

²Institute of forestry , Beijing, People's Republic of China

Susceptibilité de la tordeuse des bourgeons de l'épinette *Choristoneura fumiferana* (Clemens) à deux différentes viroses cytoplasmiques.

Le virus de la polyédrose cytoplasmique (CPV) de la tordeuse des bourgeons de l'épinette (TBE) n'a pas fait l'objet d'étude précise quant à ses effets insecticides. Les CPV possèdent cependant toutes les caractéristiques d'agents de contrôle à long terme d'un insecte: ils sont très infectieux, persistants, ont un effet débilitant, agissent en synergie avec des agents chimiques et microbiens dont les NPV et *Bacillus thuringiensis* et réduisent la résistance de l'insecte aux conditions environnementales telle l'hibernation. Ainsi, le CPV de *Dendrolimus spectabilis*, autre insecte ravageur des forêts, a été commercialisé au Japon et donne actuellement d'excellents résultats quant au contrôle de *Dendrolimus* en Chine. Nous nous sommes donc intéressés, dans une première étape, à connaître les effets à long terme chez la TBE des CPV seuls ou en mélange avec d'autres agents microbiens. A cet effet, des larves de l'insecte ont été contaminées *per os* ou par injection intrapéritonéale par le CPV endogène aux populations de la TBE et par le CPV de *Dendrolimus*. Les observations des insectes infectés quant à la mortalité larvaire ont été complémentées par des colorations spécifiques, d'observations en microscopie électronique et de caractérisations d'ARN viral par électrophorèse sur gel d'agarose. Les deux types de CPV se sont révélés virulents pour la TBE avec dans certains cas le développement d'une infection mixte. L'évaluation de la virulence et de la stabilité génomique de ces deux types de CPV lors de la réPLICATION chez la TBE est en cours. Des résultats obtenus quant à l'induction de CPV endogène chez une population de la TBE soumise à un stress seront aussi discutés.

Beninger, C.W. University of Ottawa, Dept. of Biology, Ottawa, Ont. K1N 6N5

Reproductive biology and habitat associations of *Nicrophorus* (Coleoptera: Silphidae) of the Mer Bleue bog.

Relative abundance of congeneric *Nicrophorus* sampled with pitfall traps varies significantly between habitats and seasons. *N. sayi* Laporte breeds in

mature forest habitat while *N. orbicollis* Say and *N. tormentosus* Weber occur in all habitats sampled. *N. defodiens* Mannerheim and *N. vespilloides* Herbst are found in forest and bog habitats respectively and did not reproduce outside of these habitats.

Bolteau, G. & G. Misener. Agriculture Canada, Research Station, P.O. Box 20280, Fredericton, N.B. E3B 4Z7

Control of the Colorado potato beetle with vacuum collectors: entomological and mechanical considerations.

Commercial vacuum insect collectors have been developed to control pests in crops. Recent studies suggest that a significant number of Colorado potato beetles remain attached to the plant after a single pass of the machine. The force required to remove the beetles from a potato leaf was also examined.

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¹ Station de Recherches, Agriculture Canada, 430 Boul. Gouin, Saint-Jean-sur-Richelieu, Qué. J3B 3E6

² Unité d'Écologie et de Biogéographie, Université Catholique de Louvain, Place Croix du Sud, 5, 1348 Louvain-La-Neuve, Belgique.

Résistance au froid de *Anaphes* sp. (Hymenoptera: Mymaridae), parasitoïde des œufs de *Listronotus oregonensis*.

La survie au froid des larves de *Anaphes* sp. a été établie de 0 à -25°C. A -5°C, plus de 50% d'émergence est obtenue après 15 jours alors qu'à -23°C, aucune larve n'a survécu plus de 2 heures. Le point de cristallisation des œufs de *L. oregonensis* augmente avec le développement de l'embryon alors que celui des œufs parasités par *Anaphes* reste constant à environ -22.9°C.

Bostanian, N.J. & A. Bélanger. Station de recherches, Agriculture Canada, 430 boul. Gouin, St-Jean-sur-Richelieu, Qué. J3B 3E6

The activity and residues of cyhalothrin in apple orchards.

A 3-year study showed that cyhalothrin had biological activity against tarnished plant bug and the European red mite when it was applied in early spring. These observations along with the effects of this compound on predacious mites and residues on foliage and the finished fruit will be discussed.

Bouchard, A.¹ & J. Dellisle².

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2Forêts Canada, Région du Québec, 1055 rue du PEPS, C.P. 3800, Ste-Foy, Qué. G1V 4C7

Does *Choristoneura rosaceana* male spermatophore affect female reproductive success?

The size of the spermatophores transferred by *Choristoneura rosaceana* males decreases significantly on successive matings. A study was undertaken to examine if this decrease was associated with a decline in females fecundity or fertility and preliminary data suggest that there are only minor effects under controlled conditions. Tethered virgin females were used to examine to what degree spermatophore size varied under field conditions and results of this ongoing experiment will be compared with those obtained under laboratory conditions.

Bourgouin, F., J. Gingras & J.-C. Tourneur. Université du Québec à Montréal, Département des Sciences Biologiques, C.P 8888, succ A, Montréal, Qué. H3C 3P8

Choix de la zone thermique par la femelle de *Forficula auricularia* (Dermaptères: Forficulidae) au cours du développement des oeufs.

Certaines observations de la littérature montrent qu'en fin de développement la femelle de *Forficula auricularia* place ses œufs au point le plus chaud du terrier. La présente étude vise à démontrer que la femelle choisit une zone thermique particulière pour ses œufs au cours de leur développement et à comparer deux populations provenant de régions à régime thermique différent: Deux-Montagnes (Qué.) et Vancouver (C.B.). L'étude a démontré que dans le sol, les femelles de Deux-Montagnes plaçaient leurs œufs entre 2 et 6°C à la ponte et près de 10°C à l'éclosion. En conditions expérimentales, elles choisissent des températures significativement plus basses que celles de Vancouver. Cette différence entre les populations d'une espèce non indigène en Amérique du Nord semble révéler une préadaptation aux conditions naturelles de leur milieu d'origine.

Bowdish, R. & E. Groden. Dept. of Entomology, University of Maine, Orono, Maine, 04469

The impact of a citrus limonoid on susceptibility of Colorado potato beetle to *Beauveria bassiana*.

Topical applications of *Beauveria bassiana* were applied to 3rd instar Colorado potato beetle larvae which were then fed on limonoid treated foliage, untreated foliage, or starved. Mortality was evaluated after 10 days. Exposure to limonoid did not significantly increase mortality of infected larvae.

Brandt, J. University of Toronto, Faculty of Forestry, Toronto, Ont. M5S 1A1

Biology of the strawberry root weevil, *Otiorhynchus ovatus* (Linn.) on woody ornamentals in southern Ontario.

The strawberry root weevil, *Otiorhynchus ovatus* (Linn.), is a serious pest of woody ornamentals in southern Ontario. A study was undertaken both in the field and in the laboratory to gain fundamental information on the biology of *Otiorhynchus ovatus*. Information gained includes insect development, adult longevity, oviposition, and larval and adult disbursement.

Brodeur, J. & L.E.M. Vet. Department of entomology, Agricultural University, P.O. Box 8031, 6700 EH Wageningen, The Netherlands

Usurpation of host behaviour by a braconid wasp.

Parasitism by insect parasitoids generally results in the host's genetic death, thus modifications in host characteristics are often considered to be towards the improvement of the parasitoid's fitness. Here we report on host behaviour manipulation being extended beyond the physical association between the parasitoid and its host. Following *Cotesia glomerata* egression from *Pieris* spp. hosts, moribund caterpillars remain on the pupating parasitoids, spin a web over the parasitoid's cocoon mass, and divert aggressive reactions. These dying hosts are viewed as a 'functional extension' of the parasitoid that may contribute to parasitoid survival.

Brust, R.A. Department of Entomology, University of Manitoba, 214 Animal Science/Entomology Building, Winnipeg, Man. R3T 2N2

Autogeny studies in *Culex tarsalis* from Southern Manitoba.

Autogeny in *Culex tarsalis* is regulated by environmental conditions to which pupae, and possibly young adults, are exposed. Under natural conditions, the percentage of autogenous females declines rapidly to zero after August in Winnipeg. In the laboratory, the critical photoperiod for autogenous expression at 24°C is approximately 13 hours light/day.

Burgin, S. Zoology Department, Brandon University, Brandon, Man. R7A 6A9

Do two respiratory filaments a species make?

The purpose of this study was to determine whether *S. johannseni* Hart and *S. duplex* Fredeen were specifically distinct. Morphological characteristics of the larvae, pupae and adults were compared as were the larval polytene chromosomes of each species. Consequently, the relationship between these two simuliids should be more clearly defined.

Butts, R. Agriculture Canada, Research Station, P.O . Box 3000, Main, Lethbridge, Alta. T1J 4B1

Cold-hardiness in the russian wheat aphid, *Diuraphis noxia* (Mordvilko).

The Russian wheat aphid (RWA) is considered to be a freezing susceptible insect. In western Canada and the northwestern U.S. the level of infestation, and the severity of damage in spring cereals will depend in part on the ability of RWA to tolerate cold temperatures and survive the winter. Overwintering populations were monitored in the 2 fields in Alberta, Canada from 1989-91. Aphids were not able to overwinter in 1989 or 1991 but did survive in 1990. Laboratory and field populations of RWA were tested for tolerance freezing and pre-freezing temperatures. Supercooling points of below -25°C were determined for each instar and there appeared to be no difference between laboratory and field populations. However, sampling indicated that mortality in the field occurred at temperatures much higher than the supercooling points. Mortality at temperatures above the supercooling point was studied in the laboratory. Aphids were maintained in chambers at -1, -5, -10, -15, and -20°C. At 1°C, 100% mortality occurred after 25 days, whereas at -20° C, 100% mortality was reached in less than 48 hrs. Reproduction and longevity of survivors were investigated. The possible consequences of RWA's tolerance to cold temperatures are discussed.

Byers, J.R. & B.D. Hill. Agriculture Canada Research Station, P.O. Box 3000, Main, Lethbridge, Alta. T1J 4B1

Effect of molt duration on efficacy and crop protection of insecticides for control of cutworms.

Acceptable efficacy of insecticides is delayed if a substantial proportion of the population is molting at the time of application. Up to 50% of larvae in field populations sampled prior to treatment were molting. Molting comprises a surprisingly large temporal component of larval development and its effect on behavior, including response to insecticides, has largely been ignored.

Cannings, S.G.¹ & R.A. Cannings.²

¹ Royal B.C. Museum, Dept. Environmental Biology

² University of Guelph, Guelph, Ont.

The Odonata of northern cordilleran peatlands.

The peatlands of the northern Cordillera of North America (consisting of the mountain ranges and intermontane lowlands and plateaus of British Columbia, Alberta, Northwest Territories, Yukon and Alaska) support a distinctive Odonata fauna. Forty species in 6 families and 12 genera are typical of northwestern peatlands and 11 other species are occasional inhabitants of these environments. Of the 40 species, 8 (20%) are peatland obligates and 4 (10%) almost always occur in such habitats. The remaining 28 (70%) are generalists and live in a wide range of aquatic habitats; nevertheless, they are often common inhabitants of, or are even dominant in, peatland environments. The fauna is dominated by the genera *Aeshna* and *Somatochlora*, with 11 and 10 species respectively. It is also dominated by species restricted to Boreal regions (25 species, 62.5%), 4 (10%) of which have Holarctic distributions. The remainder of the fauna consists of 8 species (20%) ranging transcontinentally in Transition Zone forests south of the Boreal Forest, 5 (12.5%) restricted to the Cordillera, and 2 (5%) with wide distributions in North America. Notes and maps summarize our knowledge of biogeographical information and previously unpublished records are listed. Significant southerly range extensions for species such as *Coenagrion interrogatum*, *Aeshna septentrionalis*, *A. sitchensis*, *A. subarctica*, *Somatochlora septentrionalis* and *Leucorrhina patricia* are reported. Ecological and natural history data are outlined for each species. There do not appear to be any clear differences between the faunas of bogs and fens; dragonflies seem to respond to the habitat's form and structure rather than to its acidity or nutrient levels. Distinctive species associations result. A better understanding of the preferences of these dragonflies for different peatland microhabitats must await detailed research on oviposition behaviour and larval ecology.

Cappuccino, N. Département des Sciences Biologiques, UQAM, C.P. 8888,
Succ. A, Montréal, Qué. H3C 3P8

Stability in subpopulations of the goldenrod gallmaker, *Eurosta solidaginis*:
density perturbation experiments.

Populations of *Eurosta solidaginis* fluctuate little. To examine this apparent stability, I manipulated densities of 20 subpopulations and monitored subsequent mortality. I observed a greater increase in survivorship in subpopulations whose densities were more severely decreased. Such density-dependent changes in survivorship could allow subpopulations to return to pre-manipulation levels.

Carroll, A.L. Dept. Forest Resources, University of New Brunswick,
Fredericton, N.B. E3B 6C2

Costs and benefits associated with dispersal by *Zeiraphera canadensis* larvae
on white spruce.

Due to acropetal bud development, newly-emerged *Zeiraphera canadensis* larvae colonize small buds in the lower crown. However, 2nd and 3rd instar larvae disperse to larger apical buds in the upper crown as they become available. Field experiments from 1989 to 1991 evaluated the effect of this behaviour on reproductive fitness.

Chagnon, M. & C. Cloutier. Université Laval, Ste-Foy, Québec.

Etude du développement de *Rholosiphum padi* sur son hôte primaire *Prunus virginiana*.

Dans le cadre d'une recherche sur la migration des pucerons, une étude du développement de *Rhopalosiphum padi* sur son hôte primaire au Québec a été réalisée. Les spécimens ont été récoltés sur *Prunus virginiana* dans différentes régions biogéographiques. Les résultats sont considérés en regard des facteurs qui affectent l'apparition de la forme ailée.

Chau, A. Faculty of Forestry, University of Toronto, 33
Willcocks, Toronto, Ont. M5S 1A1

Effect of ovarian development on the response of the larch cone fly,
Strobilomyia laricis, to colours

The response of *Strobilomyia laricis*, to colour traps covered with tangle trap was examined under field conditions. Females caught on the traps were dissected. The stage of development of their ovarian chamber and their mating status were recorded. The influence of the mating status and the ovarian development on the response to colours will be discussed.

Chen, C.-P., L.A. Graham, W. Bendeng & V.K. Walker.
Department of Biology, Queen's University, Kingston, Ont. K7L 3N6

A desiccation stress protein in *Tenebrio molitor*.

The abundance of a desiccation stress protein (dsp28) increases after desiccation and cold stress in the hemolymph of *Tenebrio*. This novel protein appears to have thermal hysteresis activity and can be regulated by juvenile hormone. The dsp28 gene has been isolated; it has no significant homology to known proteins.

Chiasson, H.¹ & S.B. Hill².

¹ Le Groupe H.C., 15460 rue Diane, St-Augustin, Qué. J0N 1J0

² Collège MacDonald, 21111 Bord du Lac, Ste-Anne de Bellevue, Qué. H9X 1C6

Dormancy in a Tropical Savannah.

Studies were undertaken in the Republic of Guinée, West Africa on the period (dry season) of arrested development of the rice stem borer, *Diopsis longicornis* Macquart. Dispersal, feeding and egg-laying behaviour of the diopsid on rice as well as on secondary hosts were determined. Results indicate that the reproductive cycle of *D. longicornis* follows the programmed pathway of diapause rather than the way of quiescence which is the immediate response to adverse conditions.

Chouinard, G.¹, S.B. Hill¹ & C. Vincent².

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² Station de Recherches, Agriculture Canada, 430 boul. Gouin, St-Jean-sur-Richelieu, Qué. J3B 3E6

Micro-habitats du charançon de la prune en verger de pommiers et implications pour la lutte.

En 1987-1988, ~ 20-30 charançons de la prune *Conotrachelus nenuphar* (CP), marqués avec un radioisotope, ont été relâchés au printemps dans 2 cages placées au-dessus de 4 pommiers semi-nains dans un verger expérimental de Frelighsburg, Qué. La position et les habitats occupés par les CPs ont été notés alors que les cages étaient balayées à plusieurs reprises, à l'aide d'une sonde à scintillation, jusqu'à 22 j après la nouaison. Le sol a constitué l'habitat principal (54% des observations). La fréquence maximale d'observation du CP dans les arbres a été entre 18h et minuit. Le nombre de CPs au sol a été fortement relié ($r^2 = 0.955$) au produit de la température et de l'humidité relative de l'air. Les passages d'un arbre à l'autre ont été observés surtout entre les stades "pleine floraison" et "nouaison" (0.1 changement d'arbre/jour/CP). Au moment d'entrer dans les arbres pour la première fois (entre le stade "bouton

"rose" et le début de la floraison), une grande partie des CPs fut observée au repos au sol à la base du tronc des pommiers. Ce comportement pourrait être mis à profit dans l'élaboration d'un piège efficace pour dépister le CP à ce stade critique.

Cloutier, C. & I. Tailleux. Département de biologie, Centre d'Études Nordiques, Université Laval, Québec, Qué. G1K 7P4

Larch sawfly, snowshoe hare browsing and eastern larch growth responses.

Trees can react protectively to various types of herbivory occurring successively, but it is not known if an integrated response is possible when different challenges occur simultaneously. In the Grande Rivière de la Baleine basin, Québec, subarctic stands of eastern larch were strongly affected by an outbreak of the larch sawfly *Pristiphora erichsonii* that erupted in 1984-1985, and gradually subsided thereafter. At a heavily attacked site near Lac Bienville, a cycle of increased winter browsing of larch by snowshoe hare was found to coincide roughly with the sawfly defoliation, trees were found to exhibit renewed apical growth in 1989-1990 as a direct response to browsing by hare 3-6 years before. These observations suggest that even after repeated defoliation by the larch sawfly, eastern larch reacts to snowshoe hare browsing by rebuilding the lost crown parts, i.e. in a way that is favorable to renewed infestation by the insect defoliator.

Colbo, M.H. & J.W. McCreadie. Dept. of Biology, Memorial University, St-John's, Newfoundland A1B 3X9

Chironomid generic assemblages as a function of the aquatic habitat.

Community structure of larval chironomids was examined from 3 aquatic habitats (spring, streams, seeps) in central and eastern Labrador. Multiple comparison, correlation and cluster analyses were used to detect difference in generic richness and composition among habitats.

Côté, S.¹ & G. Bolvin².

¹ Département d'Entomologie, Campus Macdonald de l'Université McGill, 2111 Lakeshore, Ste-Anne de Bellevue, Qué. H9X 1C0

² Station de Recherches, Agriculture Canada, 430 Boul. Gouin, Saint-Jean-sur-Richelieu, Qué. J3B 3E6

Hôtes alternatifs de *Anaphes* n. sp. et *A. sordidatus* (Girault) (Hymenoptera: Mymaridae), parasitoïdes des œufs du charançon de la carotte.

Le parasitisme des œufs par une nouvelle espèce de *Anaphes* et par *A. sordidatus* est le principal facteur biotique de mortalité du charançon de la carotte (*Listronotus oregonensis* (Le Conte)) au Québec. Par des

échantillonnages de plantes et des élevages de différentes espèces de charançon, quatre nouveaux hôtes de *A. sordidatus* et *A. n. sp.* ont été découverts. Certains de ces hôtes pourraient être utiles en tant que réservoir de parasitoïdes dans un programme de lutte biologique contre le charançon de la carotte.

Côté, J.-C. & S. Fréchette. Station de recherches, Agriculture Canada,
430 boul. Gouin, Saint-Jean-sur-Richelieu, Qué. J3B 3E6

Isolation de *Bacillus* ssp. à partir de *Lygus lineolaris* (P. de B.)

La punaise terne, *Lygus lineolaris* (P. de B.) est un ravageur important de nombreuses cultures fruitières et légumières ainsi que des légumineuses fourragères. Une partie de nos efforts est orientée vers la recherche d'agents de contrôle biologique contre la punaise terne. Nous avons récolté des punaises ternes, décédées de cause inconnue, à partir desquelles des bactéries aérobiques, en forme de bâtonnets, gram-positives et capable de sporuler ont été isolées. La caractérisation de ces bactéries est en cours.

Cunningham, J. Forestry Canada, Forest Pest Management
Institute, P.O.Box 490, Sault Ste. Marie, Ont. P6A 5M7,

Use of Lecontivirus for control of redheaded pine sawfly, *Neodiprion lecontei*.

An intensive research program was initiated in 1976 to develop a nuclear polyhedrosis virus of redheaded pine sawfly as a viral insecticide and a product called Lecontivirus was registered in 1983. Between 1976 and 1990, 590 red pine and jack pine plantations with a combined area of 4 855 ha were treated with Lecontivirus in Ontario and Quebec.

Damman, H., Department of Biology, Carleton University, Ottawa, Ont. K1S 5B6

Patterns of host-plant selection relative to larval predation for *Pieris rapae* attacking cultivated crucifers.

Success of herbivorous insects depends both on their ability to assess nutritional quality and exposure to natural enemies on a plant. *Pieris rapae* L. did not consistently prefer nutritious to non-nutritious crucifer varieties. An inability to respond to differential exposure to enemies further weakened the relationship between oviposition and larval success.

Dang, P.T. Biosystematics Research Station, Agriculture Canada, Ottawa, Ont. K1A 0C6

Historical development and uses of CNC.

Historical development and uses of the CNC as the basis for a wide spectrum of biological studies are documented. Concern over the future of the CNC are expressed. Remedies for safeguarding the integrity of the CNC are proposed, including a redefined mandate, a clarification of its official status, and attempts to obtain support from various government departments and non-government institutions.

Danks, H.V. Biological Survey of Canada (Terrestrial Arthropods), Canadian Museum of Nature, P.O.Box 3443, Station D, Ottawa, Ont. K1P 6P4

Ecological aspects of insect cold-hardiness.

Insects use many ecological or behavioural means of avoiding unfavourable winter conditions, choosing among a wide range of sites that differ according to regional, habitat and microhabitat factors. Wide spatial and temporal variations in temperature occur among and within most habitats. Sheltered habitats are warmer in winter, but because they warm up slowly in spring by no means all species use the deepest sites available. Even in cold regions, some insects remain active during winter, especially beneath snow and in unfrozen aquatic habitats. Some other species become dormant in the same habitats they use in summer. However, most species move to microhabitats that are protected beneath plant material and snow cover. Such sites are precisely chosen by the different species, but little detailed experimental evidence about how the choices are made is available, although light, temperature, moisture and other (though not exclusively) because the supply of precisely suitable microsites is restricted. Therefore, ecological adaptations related to winter survival are complex. Winter habitats and habitat choice have not been adequately characterized. Detailed ecological studies are required at the same time as work on the physiological adaptations for cold-hardiness.

Danyk, T. & M. Mackauer Centre for Pest Management, Dept. of Biological Sciences, Simon Fraser University, Burnaby, B.C. V5A 1S6

Interspecific competition between the aphid parasitoids, *Aphidius ervi* and *Praon occidentale*.

Experiments were conducted under controlled and seminatural conditions to examine competition between two sympatric parasitoid species. *A. ervi* became dominant over time when both species were simultaneously introduced into population cages, which supports similar field observations. This suggests *A. ervi* is better in exploiting their hosts.

de Lima, E. & J.N. McNeil. Département de Biologie, Université Laval, Ste-Foy, Qué. G1K 7P4

Comportement d'appel de deux souches de la légionnaire d'automne, *Spodoptera frugiperda*, sous différentes températures.

La légionnaire d'automne, *Spodoptera frugiperda*, est composée de deux souches qui sont génétiquement différentes. Nous avons comparé le comportement d'appel (émission de la phéromone sexuelle) des femelles soumises à différentes conditions de température pendant le développement de la pupe et de l'adulte. Les résultats seront discutés en rapport avec l'isolement reproducteur et la biologie saisonnière des deux souches.

DeLand, J.-P.¹, B. Judd² & B. Roltberg¹.

¹ Simon Fraser University, Burnaby, B.C. V5A 1S6

² Station de Recherche d'Agriculture Canada, Summerland, B.C.

Confusion sexuelle de la tordeuse du pommier à l'aide de phéromone - essais au champs.

Différents composés phéromonaux ainsi que différentes concentrations de phéromone ont été comparés par rapport à leur efficacité à décroître la capacité de la tordeuse du pommier à s'orienter en direction d'un point d'émission de sa phéromone spécifique. Les essais ont eu lieu en verger dans la Vallée de l'Okanagan.

Dellisle, J. Forêts Canada, Région du Québec, 1055, rue du PEPS, C.P. 3800, Sainte-Foy, Qué. G1V 4C7

What factors influence mating time of spruce budworm, *Choristoneura fumiferana*?

Under laboratory conditions the hour at which peak mating of the spruce budworm occurs is affected by temperature and female age. However, when traps baited with different-aged virgin females, or synthetic pheromones lures were placed in the field on 10 consecutive nights, peak capture always occurred between 20:30 and 21:00 regardless of female age and ambient temperature conditions. The divergence in the two date sets will be discussed with respect to other cues that may determine mating time in this species.

Deneka, B. & P.A. Mackay. Dept. of Entomology, University of Manitoba, Winnipeg, Man. R3T 2N2

Dispersal of the pea aphid parasitoid, *Aphidius ervi* Haliday.

Dispersal of the pea aphid parasitoid, *Aphidius ervi* Haliday, from overwintering sites in perennial alfalfa to annual field peas, was investigated. Several sampling techniques were employed to determine the life stage dispersing and quantify the extent and pattern of parasitoid dispersal into peas, as well as their impact on pea aphid populations.

Dondale, C.D. & J.H. Redner. Biosystematics Research Centre, Ottawa, Ont. K1A 0C6

Peatland spiders in eastern Canada.

A census of spiders is tabulated for a number of peatland sites in Southern Ontario and Quebec. The relationship between the spider faunas of these peatlands and the faunas of Canada's more extensive northern peatlands is discussed.

Dosdall, L.M., M.J. Herbut & N.T. Cowle. Alberta Environmental Centre, P.O. Box 4000, Vegreville, Alta. T0B 4L0

The importance of tillage regime for cultural control of root maggots (*Delia* spp.) in canola.

Results will be presented of a study to evaluate the potential of four different tillage regimes (no tillage, fall tillage, spring tillage, and tillage in both spring and fall) for reducing the survival of root maggots (*Delia* spp.) in canola (*Brassica rapa* cv. Tobin and *B. napus* cv. Alto).

Dunn, T. & E. Groden. Department of Entomology, University of Maine, Orono, Maine 04469

The impact of soil community characteristics on the longevity of *Beauveria bassiana*.

Conidia were sprayed on soil in plots with 3 levels of pH and 2 levels of nitrogen and soil moisture. Soils were sampled and plated on a selective media to determine the number of active colony forming units. Contact slides were used to sample micro-organisms within the soils.

Edwards, O. & M.A. Hoy. Entomology Dept., University of California-Berkeley, 201 Wellman Hall, Berkeley, CA 94720

A DNA marker to identify biotypes of the biological control agent *Trioxys pallidus*.

A PCR-based DNA-fingerprinting technique has been used to distinguish individuals from a laboratory-reared colony of the walnut aphid parasite, *Trioxys pallidus*, from field-collected individuals. Methods for DNA preparation and fingerprinting analysis of individual wasps are presented as well as results of mode of inheritance tests.

Fairbairn, D.J. Department of Biology, Concordia University, 1455 de Maisonneuve Boul. West, Montreal, Québec H3G 1M8

Mate-carrying and sexual size dimorphism in waterstriders (Gerridae).

Prolonged mating during which females carry males is common in insects. The hypothesis that costs associated with mate-carrying select for female-biased size dimorphism is investigated through a comparative study of waterstriders (Gerridae), and through a series of experiments assessing the cost of mate-carrying in *Gerris remigis* Say.

Feng, R.¹, A.E.R. Downe¹ & J.G. Houseman².

¹ Biology Department, Queen's University, Kingston, Ont. K7L 3N6

² Biology Department, University of Ottawa, Ottawa, Ont. K1N 6N5

Effects of phototoxin, alpha - T, on detoxification enzymes of the *Ostrinia nubilalis*.

The effects of phototoxin alpha - T on detoxification enzymes in the European corn borer, *Ostrinia nubilalis*, were determined by measuring components of the polysubstrate monooxygenase (p-450) system and glutathione S-transferase. In corn borers fed on a diet with alpha - T, the level of cytochrome b5, and the activities of NADH-cytochrome C reductase, O-demethylase and glutathione S-transferase were significantly increased when compared to untreated controls. The activities of NADPH oxidase and N-demethylase were decreased in treated corn borers and no effect were observed on the levels of cytochrome p450, NADPH-cytochrome C reductase, and NADH oxidase at the dosage of alpha - T used.

Fields, P. Agriculture Canada, Research Station, 195 Dafoe Road, Winnipeg R3T 2M9

Applied aspects of insects cold-hardiness.

Alternatives to insecticides are needed because many of these chemicals are detrimental to non-target species (beneficial insects, fish, birds, and mammals) and the occurrence of resistance in pest populations to the more intensively used insecticides. One alternative to the traditional broad spectrum pesticides is the use of low temperatures, which have been employed extensively to control microbial pests. However, low temperatures is used only to a limited degree to control insect populations, chiefly on stored commodities. There are two main ways that insects populations can be controlled with low temperature. One way is to lower the temperature below the insect's development threshold or it's lower lethal temperature. The possible manipulation of overwintering habitats, so that pests are exposed to lower temperatures, will be discussed. The second way is to reduce the insect's cold tolerance or prevent it from becoming cold acclimated. This requires a through knowledge of the physiological and biochemical mechanisms that enable insects to survive low temperature. One example of this method, the use of ice-nucleating bacteria to increase the supercooling point of stored-product insects, will be presented.

Finnamore, A.T. Provincial Museum of Alberta, 12845 102 Ave., Edmonton, Alta. T5N 0M6

Hymenoptera of Wagner Bog, a boreal spring fen.

Over 1300 species of wasps have been collected from a spring fen west of Edmonton, Alberta, Canada. The diversity of the Hymenoptera is considered with respect to other groups known from the site. The wasp fauna of Wagner is compared to that of other peatlands in Ontario. The ecological roles and the composition of the Hymenoptera at Wagner are examined.

Footitt, R.¹, P.D.N. Hebert² & T.L. Flinston².

¹ Biosystematics Research Centre, Agriculture Canada, Research Branch, CEF, Ottawa, Ont. K1A 0C6

² Department of Zoology, University of Guelph, Guelph, Ont. N1G 2W1

Genetic diversity patterns in the sumac gall aphid.

The aphid *Melaphis rhois* has a life cycle which involves sumac (*Rhus typhina*) and moss as alternate hosts. There is a spring migration to sumac where a gall is formed. Allozyme surveys in Ontario and Quebec established that there was a low level of genetic diversity, that there were frequent heterozygote deficits and pronounced gene frequency divergence among populations,

indicating restricted gene flow. The results suggest an interaction between host plant characteristics, aphid dispersal and aphid genetic systems.

Forsse, E., R.S. Bourchier & S.M. Smith. Faculty of Forestry,
University of Toronto, 33 Willcocks St., Toronto, Ont. M5A 3B3

Flight propensity and host acceptance by *Trichogramma minutum*

There is a inverse relationship between flight propensity of *Trichogramma minutum* and host acceptance. Selection for flight propensity of *T. minutum* results in changes in host acceptance and fecundity on differing hosts. Selection for flight propensity may allow better targeting of *T. minutum* for inundative releases.

Främba, H. Section of Evolutionary Biology, Universität Bremen, FB 2
Postfach 33 04 40, D-2800 Bremen 33, Germany

Why are there so few ground beetles in bogs of the American Northeast?

Between 1985 and 1989 the carabid assemblages of a raised peat bog in East Sweden and of 5 inland and coastal raised bogs in New York state and Maine were studied. The principal methods of investigation were pitfall trapping, mark-release-recapture at enclosures, and various hand sampling techniques. Depending on the local climatic conditions, the bogs in Sweden and in the States are of different types. On the former, especially, the spatial alternation of hummocks and hollows in the central part is very pronounced, while in the latter quite uniform *Sphagnum*-mats are prevailing. Most dominant in Swedish pitfall catches were the bog specific *Agonum ericeti* (Panzer), and the two hygrophilous species *Pterostichus diligens* (Sturm) and *P. rhaeticus* Heer. In America, *Bembidion quadratum* Notman, *B. versicolor* Leconte, *Agonum mutatum* Gemminger & Harold, and *A. darlingtoni* Lindroth were common at similar sites. The numbers of carabids were conspicuously scarcer in the American peat bogs than in the Swedish one. There, within the ombrotrophic area species numbers (20) were 3 to 4 times, and individual numbers (0.14 per trap day) 3 to 5 times as high as at the corresponding American bog sites. This phenomenon might be due to the presence and quality of appropriate hibernating localities. The results indicate that most carabids hibernate on dryer hummocks with dwarf shrub communities and stunted pine trees among *Polytrichum*-mosses and ground litter. Thus, the extensive absence of hummocky situation on the examined American bogs might be a crucial factor limiting the populations of carabid beetles.

Gagné, R. & B.A. Barrett. University of Missouri/Columbia, Dept. of Entomology, 1-87 Agriculture Building, Columbia, Missouri, 65211

Overwintering parasitoids of the spotted tentiform leafminer and the apple blotch leafminer in Missouri.

The identity and relative abundance of the hymenopterous parasitoids that overwinter on *Phyllonorycter blancardella* and *P. crataegella* in Missouri apple orchards were determined. Mined leaves were obtained from the following management sites: commercial, semi-abandoned, abandoned, and mating disruption blocks. The dominant endoparasitoid was *Pholetesor omigis*, and the dominant ectoparasitoid was *Sympiesis marylandensis*.

Gingras, J.¹, J.-C. Tourneur¹ & M. Vancassel.²

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² Laboratoire d'Ethologie, Université de Rennes, France.

Deux types de populations de *Forficula auricularia* L. (Dermaptera: Forficulidae) au Canada.

En Europe, deux types de populations de *F. auricularia* originaires de milieux climatiques contrastés ont déjà été décrites: populations dont les femelles produisent deux cohortes, originaires de milieux à climat tempéré doux, et populations dont les femelles ne produisent qu'une cohorte, originaires de milieux de montagne à climat tempéré froid. Les deux types de populations ont été introduits en Amérique du nord et se retrouvent, l'une à Vancouver, l'autre à Montréal. Ces populations semblent posséder des caractères qui les rendent préadaptés au milieu où elles ont été introduites. Des caractères, déjà identifiés, qui varient de l'un à l'autre type de population, sont décrits.

Glroux, S.¹, D. Coderre¹, J.-C. Côté² & C. Vincent².

¹ Département des Sciences Biologiques, Université du Québec à Montréal, C.P. 8888, succ. A, Montréal, Qué. H3C 3P8

² Station de recherche, Agriculture Canada, 430 Boul. Gouin, Saint-Jean-sur-Richelieu, Qué. J3B 6Z8

Susceptibilité de la coccinelle maculée *Coleomegilla maculata* Timb (Coccinellidae) à la formulation commerciale "M-One" de l'insecticide bactériologique *Bacillus thuringiensis* var. *san diego*

Préparé à partir de cristaux contenu dans la bactérie *Bacillus thuringiensis* var. *san diego*, le produit M-One™ constitue une nouvelle alternative de lutte biologique contre le doryphore de la pomme de terre *Leptinotarsa decemlineata* (Say). Des bio-essais en laboratoire ont été effectués afin de déterminer si la coccinelle maculée adulte *Coleomegilla maculata* Timb., un de ses prédateurs importants, est affectée par ce produit. L'action insecticide chez le doryphore

a été confirmée. L'efficacité de prédation de la coccinelle maculée adulte sur des œufs traités avec 0,01 et 1 fois la concentration recommandée par le fabricant, n'a pas été affectée. Le nombre d'œufs attaqués diminue cependant de moitié s'ils sont traités avec 10 fois cette concentration. La consommation de pollen contaminé avec M-One™ durant dix jours par la suite, n'a eu aucun effet létal même à 10 fois la concentration recommandée. Les résultats d'un test de préférence effectué avec la concentration 10 X indiquent un effet de répulsion observé dès les premières heures du bio-essai.

Gray, D., J.A. Logan & F.W. Ravlin. Dept. of Entomology, V.P.I. & S.U. Blacksburg, VA 24061-0319

Predicting gypsy moth egg hatch by use of simulation models.

Reliable predictions of gypsy moth egg hatch are of primary importance in sterile egg release programs and in initializing larval development models used to synchronize spray applications with maximum instar abundance over a diverse geographic area. Models of gypsy moth egg phenology and hatch are discussed.

Guertin, C. & P.J. Albert. Université Concordia, Département de Biologie, 1455 de Maisonneuve Ouest, Montréal, Qué. H3G 1M8

Variation in carbohydrates of white spruce needles and feeding behavior of the spruce budworm.

Variation in foliar carbohydrates of white spruce [*Picea glauca* (Moench) Voss.] were monitored during the period corresponding to the larval development of the eastern spruce budworm [*Choristoneura fumiferana* (Clem.)]. The white spruce sugar extracts were then used to compare the Feeding Preference and Feeding Rate of the 3rd and 6th budworm larval stages.

Hamilton, K.G.A. Biosystematics Research Centre, Ottawa, Ont., K1A 0C6

Evolution of the leafhopper genus *Limotettix* in bog habitats (Homoptera: Cicadellidae).

One new subgenus *Dryola* and 13 new Nearctic species of *Limotettix* are described, and the 80 known world species are arranged phylogenetically. The genus evidently evolved in the New World from fen-inhabiting descendants fed on *Eleocharis*. Their bog - inhabiting descendants fed on various sedges, but later species transferred to ericaceous plants. Adaptation to ericaceous plants permitted invasion of drier habitats, with subsequent radiation on other semiwoody plants, principally Compositae and *Symporicarpas*.

Hance, T.¹, Ph. Lebrun¹, D. Nibelle¹, C. Van Hove² & G. Van Impe¹.

¹ Unité d'Écologie et de Biogéographie, Université Catholique de Louvain, Place Croix du Sud, 5, 1348 Louvain-La-Neuve, Belgique.

² Unité de Botanique, Université Catholique de Louvain, Place Croix du Sud, 5, 1348 Louvain-La-Neuve, Belgique.

Contribution à la sélection d'écotypes d'*Azolla* tolérants à *Rhopalosiphum nymphaeae* (Homoptera: Aphididae).

Rhopalosiphum nymphaeae est un ravageur préoccupant des fougères aquatiques de genre *Azolla*, largement cultivées dans les Pays en développement. Une étude comparative des paramètres démographiques du puceron réalisée sur 12 espèces et écotypes d'*Azolla* a permis d'en proposer le classement en fonction du potentiel de croissance des populations du ravageur.

Heraty, J. Department of Biology, Carleton University, Ottawa, Ont. K1S 5B6

Eucharitid parasites of ants: classification and correlations.

The Eucharitidae (Hymenoptera: Chalcidoidea) are parasitoids of ants pupae. A phylogenetic analysis of the Oraseminae and Eucharitinae results in a new classification. The phylogeny is highly correlated with the ant hosts and the biogeographic history of the group in southeast Asia is postulated.

Hill, S.B. Macdonald College of McGill University, 21 111 Lakeshore, Ste-Anne de Bellevue, Qué. H9X 1C0

Arthropods and human behaviour

Entomologists, and indeed everyone, have relationships with arthropods. These are specific to the person, the arthropod species or stage, and they change with time and space. The nature of these relationships is determined primarily by our past experiences, some of which are culturally related and some unique to one's family of origin. Because most of these experiences were never adequately processed, they were recorded in our subconscious in association with information (especially feelings and images) required for their eventual processing. However, most of us never return to this material to process it. All of our present actions are significantly determined by this subconscious material, largely in ways that involve projection, symbolism and transference. As scientists, attached to the mythology of objectivity, we live under the illusion that we know why we do what we do, but in reality our awareness and freedom is severely limited by this subconscious programming. The progress of science and of entomology will eventually require us to include

our own subconscious as a subject for investigation and as a factor in all experiments.

**Hodek, I. Inst. of Entomology, Academy of Sciences, Ceske Budejovice,
Czechoslovakia**

Relationships of cold-hardiness with insect diapause.

Winter diapause partially coincides in time with the period of cold-hardiness. In diapause of adult insects the maturation of female gonads is stopped, the reserves are accumulated in the fat body, the level of metabolism is substantially lowered, the gut is evacuated, the sexual behaviour of males is precluded. The complex of these changes (so called "diapause adaptive syndrom") increases cold-hardiness. This led to a simplified assumption that the diapause is a prerequisite for cold-hardiness. Some of the changes associated with "diapause syndrom" may be retained even if the diapause is terminated and the potential for development is restored. Thus, paradoxically, "diapause syndrom" may, at least partially, outlive the diapause. Several findings indicate that cold-hardiness need not be linked to diapause. (1) Cold-hardiness is often most intensive after the end of diapause, when, however, some traits of "diapause syndrom" persist. (2) Most arctic insects do not enter diapause as the delay due to induction and termination of diapause would shorten the short season available. The experimental analysis shows that both the persisting traits of "diapause syndrom" and the acclimation by temperature decrease are essential for cold-hardiness.

**Hunter, F. Zoology Department, Brandon University, Brandon, Man. R7A
6A9**

Stable Fly Sci Fi.

A fourth genetic mutant in *Stomoxys calcitrans*, subcostal vein incomplete (sci), has been identified. The trait shows incomplete penetrance, occurring in only one wing or in both wings. After 17 generations of selective inbreeding the frequency of sci increased to 0.71. Possible genetic mechanisms for sci are discussed.

Isman, M.¹ & G.H.N. Towers².

¹ Dept. of Plant Science, University of British Columbia, Vancouver, B.C.V6T 1Z4

² Dept. of Botany, University of British Columbia, Vancouver, B.C.V6T 1Z4

Preliminary evaluation and development of an "all-Canadian" botanical insecticide

Tall oil pitch, a byproduct of the pulp and paper industry, is being developed as a botanical insecticide/antifeedant. A derivative of pine resin, the pitch contains as much as 50% pimarane-type diterpenes by weight. Toxicity of this material against a number of different insect species will be presented, as well as results of laboratory bioassays aimed at identifying the active principles. Preliminary evaluations of efficacy based on field trials against insect pests on cabbage and roses will also be reported.

Judd, G., M. Gardiner & D. Thomson. Research Station, Agriculture Canada, Summerland, B.C. V0H 1Z0

Pheromone-based mating disruption program for control of Codling Moth in British Columbia.

Large scale field trials revealed that when used under prescribed conditions, in conjunction with vigilant orchard sanitation, pheromone-based mating disruption will control codling moth damage as effectively as conventional insecticides. Dynamics of codling moth populations in orchards treated with pheromone, and feasibility of eradication from these orchards, will be discussed.

Koponen, S. Centre d'études nordiques, Université Laval, Ste-Foy, Qué. G1K 7P4

Ground-living spiders, opilionids and pseudoscorpions of bogs in Quebec.

Spider communities on different types of *Sphagnum* bogs in Quebec are presented. Material was collected using pitfall traps in three main areas: 1) temperate and boreal bogs near Québec City, 2) forestline area bogs near Schefferville, 3) forest tundra bogs near Kuujjuarapik (Great Whale). Typical peatland spiders are listed and their distribution is discussed. Also species found on partly dried bogs near Québec City are dealt with. Data on bog-inhabiting opilionids and pseudoscorpions are given.

Kukal, O. Department of Biology, University of Victoria, P.O. Box 1700, Victoria, B.C. V8W 2Y2

Cold-hardiness in a high arctic moth.

Ginaephora groenlandica (Lepidoptera: Lymantriidae) requires 14 years to complete its life cycle in the high arctic, where it survives high rates of parasitism, low temperatures, xeric conditions, seasonal photoperiod and short growing season. Development of pupae, adults and early instars comprises only 5% of the 14-years life cycle and is dependent on energy stored by late instar, the only phases capable of overwintering. These larvae have evolved the following behavioral and physiological mechanisms to survive the adverse arctic conditions: 1) temporal avoidance of parasitoids, 2)

thermoregulatory behaviour, 3) low maintenance metabolisms and growth rate, 4) cryoprotectant metabolism, and 5) tissue responses to extreme temperature changes.

Landry, B. Département de Biologie, Université Carleton, Ottawa, Ont. K1S 5B6

A cladistic analysis of the supra-generic lineages in the North-American Crambinae (Lepidoptera: Pyralidae).

Using adult morphological characters on 58 taxa, a phylogeny of the North American Crambinae was constructed with Hennig 86. New characters support the monophyly of the Crambini as traditionally viewed. The relationships of the Crambini to other major lineages are discussed.

Landry, J.- F.¹ & B. Wright².

¹ Centre de Recherches Biosystématiques, Agriculture Canada, Edifice K. W. Neatby, Ottawa, Ont. K1A 0C6

² Nova Scotia Museum, Halifax

Status of casebearer systematics in North America (Lepidoptera: Coleophoridae).

North American casebearers have not been revised as natural groups in modern times. 140 species are presently described, but at least 400-500 species exist. The host plant of about 100 species is known, but details of life histories remain poorly known. Several introduced species have become pests, some in the past decade, or have the potential to become pests.

Langor,D.W.¹, J. Niemelä² & J. R. Spence².

¹ Forestry Canada, 5320-122nd St., Edmonton, Alta. T6H 3S5

² Dept. of Entomology, University of Edmonton

Effects of forestry practices on carabid assemblages in lodgepole pine forests in western Alberta

Carabid abundance was comparable or higher while species richness was lower in mature, natural stands than in reforested stands. Beetle faunas grouped in a similar analysis according to stand age. Hypotheses for differences in carabid assemblages are discussed. Some species may be lost due to habitat changes and forest fragmentation.

Larivière, M.- C.Centre de Recherches Biosystématiques, F. E. C., Agriculture Canada, Ottawa, Ont. K1A 0C6

Systématique du genre *Brochymena* (Heteroptera: Pentatomidae).

L'auteure reconnaît 2 sous-genres et 24 espèces et discute des caractères diagnostiques, de la distribution, des affinités chorologiques, des relations évolutives et de l'histoire naturelle de ces taxons.

Two subgenera and 24 species are recognized; diagnostic characters, distribution, chorological affinities, evolutionary relationships, and natural history are discussed.

Lavallée, R.¹, Y. Maufette² & P.J. Albert³.

¹ Forêts Canada, Ste-Foy, Qué. G1V 4C7

² Département des Sciences Biologiques, Université du Québec à Montréal, C.P. 8888, succ. A, Montréal, Qué. H3C 3P8

³ Université Concordia, Département de Biologie, 1455 de Maisonneuve Ouest, Montréal, Qué. H3G 1M8

Influence du stress hydrique sur la survie et le développement du charançon du pin blanc.

Pour plusieurs insectes défoliateurs, il est démontré qu'un stress hydrique peut favoriser leur nutrition et leur survie. Peu de travaux ont cependant démontré l'effet du stress hydrique sur le développement d'insectes corticoles. L'objectif de cette étude était de démontrer l'effet d'un stress sur le développement de *Pissodes strobi*. En 1989 et 1990, des flèches terminales de pin blanc attaquées par le charançon ont été coupées et placées en milieu sec ou humide pour étudier les performances du charançon du pin blanc. Les résultats démontrent que la survie et le poids sont négativement affectés par un stress hydrique.

LeRoux, E.J. & J.-J. Cartier.

La recherche en Entomologie et la Politique/Entomological Research and Politics

Entomological Research has had a successful record of performance in Canada for more than 100 years serving crop and animal protection needs of the Nation's primary resource industries. The growth, evolution and development of this on again-off research has been closely linked to Governments and fluctuating economies. Downturns in support, experienced from time to time, have had negative impact on the research carried out, the technology transferred and the researchers carrying out the research. This paper examines: (a) the parameters involved in the present Government-Research dialogue; (b) the methods of response by this Society to the downsizing of its scientific cadre; (c) the urgency of public demands made on

the profession fot major increases in non-pesticidal methods of pest control that would be compatible with environmental safety; (d) the basis for possible private sector support for entomological research; (e) the pros and the cons of certification for Canadian entomologists.

Depuis plus de cent ans, la recherche entomologique au Canada a réussi à développer des méthodes de protection des plantes et des animaux contre les ennemis naturels dans les secteurs primordiaux des industries primaires de la nation. Cependant, la croissance, l'évolution et le développement du secteur recherche furent liés de près aux fluctuations des budgets gouvernementaux assignés aux diverses lois et politiques, aux changements de gouvernements et aux cycles de l'économie. Ces régressions plus ou moins périodiques ont eu un impact négatif sur la recherche, le transfert de technologie et les chercheurs eux-mêmes. Notre communication portera donc sur les points suivants: (a) les facteurs qui animent le dialogue entre le gouvernement et le secteur recherche; (b) les réactions de notre société face à la réduction des effectifs entomologiques; (c) l'éveil de l'opinion publique et les demandes toujours croissantes soumises aux entomologistes pour développer des méthodes de lutte compatibles avec l'intégrité de l'environnement; (d) les conditions requises pour amener le secteur public à investir dans la recherche entomologique; (e) le pour et le contre sur la question d'un certificat de compétence pour les entomologistes canadiens.

Letendre, M. Service de phytotechnie de Québec, MAPAQ,Complexe scientifique, 2700 Einstein, Ste-Foy,Qué, G1P 3W8

The Quebec Plant Pest Warning Service: a major cooperative effort in entomology.

Since its implementation in 1975, the Quebec Plant Pest Warning Service has been a major source of information in crop protection for the agricultural community in Quebec. Based on research data and field observations gathered by various collaborators, as well as on forecasting and information dissemination programs involving both federal and provincial government agencies, the QPWS has been providing farmers and extension agents with timely informations on pest phenology and abundance, on the available means of control measures. By such actions, the program is aiming at a rational and safe use of pesticides and at the adoption of integrated pest management by the agricultural community.

Lewis, D. Dept. of Entomology, McGill University (Macdonald Campus), 21 111 Lakeshore Road, Ste-Anne-de-Bellevue, Qué. H9X 1C0

Distribution of aquatic insects in subarctic peatlands.

There is considerable variation in the seasonal and spatial distribution of aquatic insects in subarctic peatlands. Insects are more abundant at sites that have more vegetation, less water and loose soils than at sites with

opposite characteristics. Generally, grass and sedge-dominated sites are more productive than those with mosses.

Lorenzetti, F., Y. Mauffette & E. Baucé Groupe de Recherche en écologie forestière, Département des Sciences Biologiques, Université du Québec à Montréal, C.P. 8888, Succ. A, Montréal, Qué. H3C 3P8

Préférence alimentaire de la livrée des forêts entre les feuillages d'érables à sucre sains et dépériss.

La préférence alimentaire de la livrée des forêts a été testée dans le cadre d'une étude sur les effets du dépérissement des érables à sucre sur le développement larvaire de cet insecte. Les larves ont été placées individuellement pendant 6 heures dans des pétris contenant alternativement 4 disques du feuillage d'un arbre sain et 4 disques du feuillage d'un arbre dépéri. Au troisième stade, aucune préférence n'a été observée, mais aux quatrième et cinquième stades, les larves ont préféré de façon significative le feuillage de l'arbre dépéri. Ces résultats indiquent que la livrée peut distinguer entre le feuillage d'un arbre stressé et celui d'un arbre non-stressé.

Lowery, T. & M.B. Isman. Dept. of Plant Science, University of British Columbia, Vancouver, B.C. V6T 1Z4

Evaluation of neem, *Azadirachta indica*, for the control of aphids (Homoptera:Aphididae).

Field applications of neem, *Azadirachta indica* A. Juss., to pepper and cabbage reduced aphid populations from 70% to 100%, while sprays were less effective on strawberry and lettuce. Aphid numbers decreased in a dose-dependant manner as neem concentrations increased from 0.5% to 2.0%. Counts of larval predators and parasitoid mummies suggested there was no apparent reduction in numbers of aphid natural enemies.

Lucarotti, C.J. Forestry Canada - Maritime Region, P.O. Box 4000, Fredericton, N.-B. E3B 5P7

Invasion of *Aedes aegypti* ovaries by *Coelomomyces stegomyiae*.

Aedes aegypti larvae, infected with *Coelomomyces stegomyiae* can pupate and eclose to produce infected adults. Fungal hyphae penetrate the ovaries in association with epithelial cells involved in tracheole production during ovarian expansion and maturation. After a blood meal, infected mosquitoes have 46% lower 20-hydroxyecdysone titres and negligible levels of vitellogenin compared to healthy females. *C. stegomyiae* hyphae, in the ovaries, mature to resting sporangia in response to increased titres of 20-hydroxyecdysone which follow a blood meal. In the absence of a blood meal, maturation of hyphae to resting sporangia was induced by injection of 20-hydroxyecdysone.

Luklanchuk, J. & S. Smith. Faculty of Forestry, University of Toronto,
Earth Sciences Centre, 33 Willcock St., Toronto, Ont. M5S 3B3

**The effect of habitat structural complexity on the foraging success of
Trichogramma minutum (Riley).**

The effect of structural complexity of the host habitat on the searching behavior of *Trichogramma minutum* (Riley) is being investigated in the laboratory. Female parasitoids was more successful at finding host eggs on structurally simple paper models than on complex ones. Older females found significantly more egg masses than younger ones.

MacKenzie, K. Dept. of Entomology, Comstock Hall, Cornell University,
Ithaca, N.Y., 14853-0999 USA

Honey bees pollinate blueberries???

Highbush blueberry growers commonly rent honey bees for pollination. Yet, honey bees were found to collect little, if any, blueberry pollen. Fruit resulting from honey bee visits to bloom are compared to those from virgin bloom and open visitation. Effects on fruit set, fruit size and date of harvest are discussed.

Marshall, S.A. Department of Environmental Biology, University of Guelph, Guelph, Ont. N1G 2W1

Peatland Sphaeroceridae of Canada.

Sixty species of the acalyprate family Sphaeroceridae are recorded from Canadians peatlands, largely on the basis of pan trap samples from peatlands in southern Ontario, the Yukon, and Alberta. Fifteen species are identified as characteristic of peatlands and their distributions and relationships are discussed. Southern peatland populations of several of these species are interpreted as relict populations in peatlands serving as postpleistocene refugia. Some species are so far known only from peatlands along the postglacial fringe.

Martel, P.¹, G. Bélar¹, J. Belcourt¹ & S. Chagnon².

¹ Station de recherches, Agriculture Canada, 430 boul. Gouin, Saint-Jean-sur-Richelieu, Qué. J3B 3E6

² Régie des assurances agricoles du Québec, 3100 boul. Laframboise, St-Hyacinthe, Qué. J2S 4Z4

Lutte biologique contre le doryphore de la pomme de terre à l'aide des nématodes entomopathogènes, en sol organique, au Québec.

Des essais ont été menés afin d'évaluer la virulence des nématodes entomopathogènes *Steinernema carpocapsae* et *Heterorhabditis bacteriophora* envers le doryphore de la pomme de terre, *Leptinotarsa decemlineata*. Dans des essais en boîtes de Petri, la mortalité des larves de 3^e et de 4^e stades causée par *S. carpocapsae* et *H. bacteriophora* était de 100% après 6 jours. Dans des essais en pots, aucune émergence des adultes n'a été observée après une application au sol de 160 nématodes/cm² de l'une ou l'autre des espèces expérimentées. En plein champ, un traitement effectué avec *S. carpocapsae* (120 nématodes/cm²) au moment où les larves de première génération descendent au sol pour la pupaison a réduit de 80% l'émergence des doryphores adultes.

McClure, M. Dept. Forest Resources, University of New-Brunswick, Fredericton, N.-B. E3B 6C2

Influence of larval competition on oviposition site selection by Larch cone maggots.

The potential influence of intra and interspecific competition on two sympatric cone maggot species of Tamarack was investigated in the field. High mortality occurred when egg densities exceeded one per cone and suggested that females should avoid ovipositing in occupied cones. Egg distribution for two years supported these predictions.

McCreadie, J. & M. Colbo. Dept. of Biology, Memorial University, St. John's, NFLD, A1B 3X9

Microhabitat selection of larval *Simulium venustum/verecundum* (Diptera: Simuliidae) cytopypes

Microhabitat selection of sublacustrine *S. venustum/verecundum* cytopypes was examined using preference curves. Microhabitats were defined by water depth, velocity and orientation to outlets. EFG/C *venustum* occupied a microhabitat distinct from that of ACD *verecundum*. Differences in substrate preference were also found.

McElligott, P.E.K. Département d'entomologie du Collège Macdonald,
21111 Lakeshore Road, Sainte-Anne-de-Bellevue, Qué. H9X 1X0

Relative efficiencies of wet and dry extraction techniques for sampling immature stages of peatland Diptera.

Peat samples were collected biweekly in 1991 from four locations in a fen near Schefferville, Quebec. A dry extraction technique, employing large Berlese funnels, was used to extract macroinvertebrates from 40x40x5 cm substrate samples. Heat from 60 watt bulbs was used to gradually dry each sample, causing the invertebrates contained therein to migrate downward through a screen into a funnel. Invertebrates were also extracted from 10x10x10 cm substrate samples using a wet extraction technique. Each sample was suspended in a water bath in which a temperature-oxygen gradient had been established; invertebrates migrated out of the sample into the water bath along the gradient. More invertebrates per unit area were collected using the wet extraction method, however dry extraction proved a much more effective technique for obtaining larvae of many peatland Diptera (e.g. Tabanidae, Empididae, Tipulidae). This is largely a consequence of the larger volume of substrate sample which could be handled by the dry extraction method.

McGregor, R. Dept. of Biological Sciences, Simon Fraser University,
Burnaby, B.C. V5A 1S6

Population dynamics and parasitism of the western tentiform leafminer on three host plants.

The Western Tentifora Leafminer (Lepidoptera: Gracillariidae) attacks several tree fruit species in British Columbia. Severe infestations are economically damaging, although hymenopterous parasitoids often maintain densities below damaging levels. Seasonal dynamics and parasitism of this insect in apple, pear and cherry orchards will be discussed regarding the potential for biological control.

McNeil, J.N. & J. Dellsie. Département de Biologie, Université Laval, Ste-Foy, Qué. G1K 7P4

Importance of host plant pollen on the calling behaviour of sunflower moths held under different photoperiodic conditions.

While the presence or absence of pollen has a significant effect on the age at which virgin sunflower moths initiate calling (pheromone emission) at 25°C, 16L:8D, it was of little importance at 25°C, 12L:12D. The ecological importance of accelerated maturation under short photoperiodic conditions in the absence of pollen will be discussed.

Mena, T.J., F. Drummond & D.L. Haynes. Dept. of Entomology, University of Maine, Orono, Maine, 04469

Field biology of the Colorado potato beetle on Horsenettles.

Horsenettles, *Solanum carolinense*, was the host plant for the CPB in Kalamazoo, Michigan when farmers stopped growing potatoes. Based upon weekly sampling, the population dynamics and its natural enemies are presented.

Morewood, D. University of Victoria, Dept. of Biology, P.O. Box 1700, Victoria, B.C., V8W 2Y2

Cold hardiness and cold storage of *Phytoseiulus persimilis* and *Amblyseius cucumeris* (Acarina : Phytoseiidae).

Temperature/mortality curves confirm that both species are freezing intolerant, with mean supercooling points ranging from -19.4°C to -27.1°C. Mortality increases rapidly with length of exposure to -12.5°C. Cold storage of *P. persimilis*, but not *A. cucumeris*, appears feasible for up to 6 weeks at 7.5°C with no adverse effects on subsequent longevity or fecundity.

Morris, D.E. Department of Entomology, Royal Ontario Museum, 100 Queen's Park, Toronto, Ont. M5S 2C6

Forensic Entomology in Ontario.

The Royal Ontario Museum is cooperating with the Metropolitan Toronto Police to bring forensic entomology on stream as a routine part of police investigative procedures. Requirements for developing such a programme are discussed with respect to forensic entomology in Ontario.

Mossakowski, D. Dept. of Evolutionary Biology, University of Bremen, P.O. Box 33 04 40, D-2800 Bremen, Germany

Food supply, water content, and man made destruction as factors for the distribution of beetles in european bogs and peatlands.

Large areas of the north western parts of Germany were covered by raised bogs in former times. They include different habitats which can be interpreted as natural states of succession. The most important differences are due to water and nutrient content. There is a second series of states which are man-made. Drainage and peat-digging lead to a drastic reduction of the specific bog insect fauna and an increase of those species living on heathery habitats. A system of the diverse moorland habitats and the pattern of distribution of characteristic beetle species are presented. For instance, there are species like *Agonum ericeti*, *Mycetophorus bergrothi*, and *Myllaena kraatzii* which only live on ombrotrophic raised bogs or on regenerating peat areas with similar

conditions as undisturbed natural bogs. There are very few species which are exclusively found on oligotrophic ground but a higher number of species is distributed independently on the mineral contents of the peaty ground. Most species belong to the families of carabid, staphylinid, helodid, and chrysomelid beetles. Regional differences are to be found in many species; e.g. *M. bergrothi* can be found elsewhere in the more northern countries and *Cymindis vaporariorum*, a species of peaty ground in northern Germany, can be found on hummocks of raised bogs as well as on dry grassland in southern regions. The key factors are numerous which cause the pattern of distribution. Beside the classical ones like temperature, humidity, and acidity there are discussed food supply, water content, and man-made destructions.

Mulye, H. & R. Gordon. Department of Biology, Memorial University of Newfoundland, St. John's, T.-N. A1B 3X9

Effect of the juvenile hormone analog Fenoxy carb on lipid metabolism of the spruce budworm *Choristoneura fumiferana*.

Treatment of sixth-instar *Choristoneura fumiferana* larvae with Fenoxy carb impaired lipid metabolism, as reflected by altered lipid concentrations in the hemolymph and fat body. In treated insects, the capacity of the fat body to incorporate radiolabelled precursors into lipids was severely reduced.

Murray, K.D.¹, E. Groden¹, F. Drummond¹, A.R. Alford¹, R. Storch¹ & M. Bentley².

¹ Dept. of Entomology, University of Maine, Orono, Maine, 04469

² Dept. of Chemistry, University of Maine, Orono, Maine, 04469

Effects of limonin, an antifeedant, on the Colorado potato beetle.

In field and laboratory tests we have shown that limonin, a chemical extracted from grapefruit seeds, acts as an antifeedant against the Colorado potato beetle. It slows adult colonization, reduces oviposition and causes larval mortality, indicating its potential as an effective alternative for potato beetle management.

Nealls, V., K. van Frankenhuyzen & B.L. Cadogar. Forestry Canada, P.O.Box 490, Sault Ste. Marie, Ont. P6A 3M7

Conservation of parasitoids in the management of budworm populations.

Parasitized spruce budworms are less likely to acquire a lethal dose of Bt. We examined the consequences of this phenomenon under field conditions. The results show that the strategic use of Bt can conserve parasitoids. This contributes to the true integration of natural and imposed mortality in budworm management programs.

Niemelä, J. & J. Spence. Department of Entomology, University of Alberta, Edmonton, AB T6G 2E3

Distribution and community effects of the exotic ground-beetle *Pterostichus melanarius* (Ill.) in Alberta.

Pterostichus melanarius is common in and around Edmonton. Macropters increased from 20% in Edmonton to 60-70% in populations 70 km from the city suggesting that flight has been important in range expansion. Enclosure experiments showed that *P. melanarius* does well in mixedwood forest and that it has a slight negative effect on native species.

Ostaff, D. Dept. Forest Resources, University of New Brunswick, Fredericton, N.B. E3B 6C2

Influence of several biotic and abiotic factors on the distribution and abundance of *Zeiraphera canadensis*.

The influence of abiotic and biotic factors on the distribution and abundance of all developmental stages of the spruce bud moth were studied for three years using a life-table approach. Results indicate that bud moth population dynamics are largely influenced by its host plant.

Packer, L. Dept. of Biology, York University, 4700 Keele St., North York, Ont. M3J 1P3

Behavioural change in sweat bees: a phylogenetic approach.

Sweat bees are well known for their diverse social behaviour and nest architecture. This presentation will concern evolutionary change in both these types of behaviour for a particular subgenus of sweat bee - *Evylaeus*. Conclusions concerning behavioural change will be based upon a phylogeny obtained by cladistic analysis of electrophoretic data.

Papaj, D. Dept. of Biological Sciences, Univ. of Arizona, Tucson, AZ

Evolution of learning and instinct: lessons from parasitoids

Contemporary biologists often portray learning as an evolutionary advanced trait, but early naturalists actually considered learning to be the ancestral condition and instinctive behavior to be derived. The latter argument was based in part on the observation that learning reduces moment-to-moment variability in behavior. Using learning in parasitoids, the notion that learning is associated with an increase in the consistency of behavior will be critically examined. Using simulation models, we will also evaluate the role of this phenomenon in the evolution of learned and instinctive behavior.

Pelletier, Y. Agriculture Canada Research Station, P.O. Box 20280, Fredericton, N.-B. E3B 4Z7

Predicting the body temperature of adult Colorado potato beetle (*Leptinotarsa decemlineata* (Say)).

A predictive model of the body temperature of Colorado potato beetle was built. Air temperature, irradiance and wind speed were the driving parameters. The model was validated by measuring the body temperature of beetles in the field.

Pelletier, Y. Agriculture Canada Research Station, P.O. Box 20280, Fredericton, N.-B. E3B 4Z7

Movement of adult Colorado potato beetles, *Leptinotarsa decemlineata* (Say), on slanted surfaces.

The reaction of Colorado potato beetles to a slanted surface was analyzed. Negative geotaxis was observed on slopes of more than 10 degrees. The response of beetles to light and slope stimuli, the sequence of leg movements and the effects of slopes on speed were also studied.

Pelletier, Y. & C. Clark. Agriculture Canada Research Station, P.O. Box 20280, Fredericton, N.-B. E3B 4Z7

Analysis of the haemolymph of the Colorado potato beetle (*Leptinotarsa decemlineata* (Say)).

Haemolymph from the Colorado potato beetle at larval, pupal and adult stages was analyzed for concentrations of magnesium, calcium, potassium, sodium, chloride, phosphate, citrate, pH and osmolality. Variations in the concentrations of some ions were observed between stages and a saline solution for the adult stage was formulated.

Pernal, S. & N.J. Holliday . Department of Entomology, 214 Animal Science Bldg., University of Manitoba, Winnipeg, Man. R3T 2N2

Impact of potato flea beetle, *Epitrix cucumeris*, on yield of Russet Burbank potatoes in Manitoba.

Caged potato plants were exposed to different densities of *E. cucumeris*. In the absence of earlier *Leptinotarsa decemlineata* injury, flea beetles caused an overcompensatory yield increase at low densities, and a linear yield reduction at higher densities. Previous *L. decemlineata* feeding inhibited the overcompensatory response and caused a steeper linear yield reduction.

Philogène, B.J.R. Université d'Ottawa, 550 rue Cumberland, pièce 213,
Ottawa, Ont. K1N 6N5

L'Entomologie à l'ère de l'interdisciplinarité

La fin du siècle dernier a été caractérisée par la création du premier département universitaire d'Entomologie à l'Université Cornell. Si les Etats-Unis ont conservé et dans certains cas renforcé leurs départements d'Entomologie, le Canada a plutôt eu tendance à intégrer cette discipline dans les sciences biologiques, agricoles et forestières. À la veille du vingt et unième siècle l'étude des insectes se fait plutôt au sein de disciplines diverses, ce qui souligne d'une part, que les insectes sont un matériel de choix pour l'étude de la biologie fondamentale, d'autre part que le terme entomologiste ne décrit plus vraiment les activités scientifiques des spécialistes des insectes.

Pike, E. Dept. of Biological Sciences, University of Calgary, Calgary, AB,
T2N 1N4

How old is the Cedar Lake Amber?

Cedar Lake (Manitoba) amber is assumed to have originated from the Medicine Hat amber deposit, of Upper Cretaceous age. Infra Red Absorption spectra indicate that it is a composite deposit, possibly including some Medicine Hat amber pieces is uncertain unless spectra are compared with spectra from deposits of known age.

Prévost, Y.H.J. School of Forestry , Lakehead University, Thunder Bay,
Ont.
P7B 5E1

Insects on your fork???

Insects as dietary fats and proteins are uninteresting to the majority of Canadians, but when prepared as gourmet dishes, they draw attention. Over the last fifteen years, I have prepared honey bee brood, *Apis mellifera*, house crickets, *Acheta domesticus*, mealworm larvae, *Tenebrio molitor* among others for open houses, receptions and dinner parties, where the famished have devoured the insect dishes to the last tibia. This activity has increased the awareness of some about the possible use of insects as food and that food as we know it, is not readily available worldwide.

Prokopy, R.J. Department of Entomology, University of Massachusetts,
Fernald Hall, Amherst, MA 01003

Application of learning to pest management.

Consideration will be given to how learning in pest insects might affect accurate sampling of pest insect populations in a crop and how learning might influence the success of various tactics of pest management. These will include cultural control through habitat management, control through host plant resistance, behavioral control and genetic control. Current knowledge (still rather primitive) suggests that pest learning could be either advantageous or disadvantageous to presently-employed management tactics. In either case, pest managers might benefit by recognizing the potential impact of pest learning on components of the pest management process.

Quiring, D. Dept. Forest Resources, University of New Brunswick, Fredericton, N.B. E3B 6C2

Is delayed budbreak a defensive response of white spruce to early-season defoliation?

I tested two hypotheses explaining why delayed budbreak occurs in the trees previously subjected to herbivory by evaluating dates of budburst on non-defoliated branches of white spruce and adjacent ones naturally or artificially defoliated. Results suggest delayed budbreak is caused by localized resource deficiencies and not defensive responses to herbivory.

Racette, G.¹, C. Vincent² & S.B. Hill¹.

¹ Département d'Entomologie, Collège Macdonald, Ste-Anne de Bellevue, Qué. H9X 1C0

² Station de recherches, Agriculture Canada, 430 boul. Gouin, St-Jean-sur-Richelieu, Qué. J3B 3E6

Actographes pour l'étude de l'activité du charançon de la prune, *Conotrachelus nenuphar* (Herbst) (Coleoptera: Curculionidae).

Deux modèles d'actographe ont été mis au point pour étudier l'activité du charançon de la prune *Conotrachelus nenuphar* (Herbst) (Coleoptera: Curculionidae) en insectaire. La technique repose sur le comportement de thanatose des adultes. Durant leur période d'activité, les adultes grimpent sur les parois des cages et se laissent tomber dans le fond. Les vibrations ainsi produites sont captées par un microphone ou une aiguille de phonographe. La période et la fréquence de ce comportement procurent une mesure de leur activité. Ces appareils ont permis de déceler une activité printanière nocturne. Toutefois, à la nouaison, l'activité se prolonge durant toute la journée.

Radin, A. & F. Drummond. Department of Entomology, University of Maine, Orono, Maine, 04469

Trap cropping for control of the Striped Cucumber Beetle, *Acalymma vittata* Fab.

Using a preferred cucurbit host plant (*Cucurbita maxima* cv. 'NK530') as a trap crop for striped cucumber beetle, 85% of the beetles were found on squash in 50%: 50% cucumber : squash field plots. The highly aggregative behavior of this beetle makes this a promising method for control.

Rao, S. & E. Groden. University of Maine, Department of Entomology, Orono, Maine 04469

The development of an ELISA for detecting *Beauveria bassiana* infection in the Colorado potato beetle.

An enzyme-linked immunosorbent assay (ELISA) was developed using as the antigen *B. bassiana* blasto-spores grown in the liquid culture. After purification of the antibodies, assay results have been positive for hemolymph extracted from infected larvae and negative for hemolymph from uninfected larvae.

Richards, K. & G.H. Whitfield. Research Station, Agriculture Canada, P.O. Box 3000, Main, Lethbridge, Alta. T1J 4B1

Reducing the risk: predicting emergence of alfalfa leafcutter bees and parasites.

The effect of temperature on development and adult emergence of the alfalfa leafcutter bee and one of its parasites is presented. Degree-day accumulations are presented to help reduce the risk during incubation and increase the knowledge and flexibility in decision-making by beekeepers.

Richards, M. & L. Packer. Department of Biology, York University, 4700 Keele St., North York, Ont. M3J 1P3

Caste determination in a primitively eusocial sweat bee, *Halictus ligatus*

Gyne-producing pollen balls of the primitively eusocial sweat bee *Halictus ligatus* are considerably larger than worker-producing pollen balls. Furthermore, gyne pollen balls contain proportionately more nectar relative to the dry weight of pollen than do worker pollen balls. Female larvae may use these proportions as nutritional cues to worker-like or queen-like reproductive behaviour following emergence.

Ring, R.A. Department of Biology, University of Victoria, Victoria, B.C. V8W 2Y2

Physiological aspects of insect cold-hardiness.

R.W. Salt had established many of the important principles of insect cold-hardiness by 1961. During the ensuing three decades the subject of insect cryobiology began to widen and diversify. Consequently, many physiological aspects were developed and elucidated, such as the use of multicryoprotectant systems in insects; the importance of low cooling rates in survival; the discovery of intrinsic nucleating agents in many species; the discovery of thermal hysteresis proteins which act much in the same fashion as antifreeze glycoproteins in arctic and antarctic fish; the intermediary metabolism and enzyme kinetics of some species of overwintering insects; a rapid cold-hardening process; and the role of vitrification (i.e. glassy-state formation) in overwintering survival. One aspect of physiology that I am currently investigating is the subject of water relations in overwintering insects, since the physiology of the hibernating insects is to a great extent the physiology of body water at low temperatures. The water content of cold tolerant insects is often considerably reduced in preparation for overwintering. In species that overwinter in diapause this partial dehydration is actively controlled and is an integral part of the physiology of diapause induction. Furthermore, many overwintering insects survive in xeric microhabitats that are exposed to very low temperatures, thus the relationship between cold tolerance and desiccation resistance is of some relevance to insect cryobiology. This paper discusses some similarities and differences between cold tolerance and desiccation resistance. Both are water-related problems and are often coincidental.

Roff, D. Department of Biology, McGill University, 1205 Dr. Penfield Ave., Montreal, Qué., H3A 1B1

Flightlessness on islands: fact or fiction ?

Darwin advanced a hypothesis to explain the evolution of flightlessness on islands. A theoretical analysis of Darwin's hypothesis suggest that such an association is unlikely. Comparison of the incidence of flightlessness on islands and continental regions shows that islands do not have higher than expected frequencies.

Roger, C.¹, D. Coderre¹ & C. Vincent².

¹ Département des sciences biologiques, Université du Québec à Montréal, C.P.8888, succ A, Montréal, Qué. H3C 3P8

² Station de recherche, Agriculture Canada, 430 Boul. Gouin, Saint-Jean-sur-Richelieu, Qué. J3B 6Z8

Effect of chemical pesticides on the mortality and predatory efficacy of *Coleomegilla maculata* Timb (Coccinellidae).

Four chemical pesticides were applied topically on adult *Coleomegilla maculata* in laboratory. The highest toxicity (LC50) was obtained with malathion, followed by cypermethrin and carbaryl. No significant mortality was observed for

benlate. The effect of sublethal (LC20) doses on predation efficacy was evaluated. Benlate significantly reduced the predation efficacy of adult *C. maculata*.

Roltberg, B.D. Centre for Pest Management and Behavioural Ecology Research Group, Simon Fraser University, Burnaby, B.C. V5A 1S6

Learning to accept hosts and mates: Vive la différence?

I use current theories on the ecology of learning to explore the adaptive nature of learning for two problems that insects frequently face: (a) prey (or host) selection and (b) mate choice. First, I provide an overview of Learning Ecology that focuses on such variables as: (a) within and among patch consistency, (b) patch longevity and (c) behavioural plasticity. Second, I use dynamic optimization (deterministic) and computer simulation (stochastic) models to examine learning in host and mate selection. Two important conclusions arise: (a) Mate and host selection can be considered within a common framework. To date these two areas of study have been widely disparate; (b) The consequences of learning can be of greater impact in mate learning but this depends upon how well inherited knowledge tracks the environment.

Roy, M.¹ & C. Vincent².

¹ Service de phytotechnie de St-Hyacinthe, 3300, rue Sicotte, C.P. 480 St-Hyacinthe, Qué. J2S 7B8

² Station de recherche, Agriculture Canada, 430 Boul. Gouin, Saint-Jean-sur-Richelieu, Qué. J3B 6Z8

Abondance et importance des tordeuses nuisibles dans les vergers du Québec.

Des essais de dépistage à l'aide de pièges à phéromones, portant sur quatre espèces de tordeuses, *Archips argyrospilus* (Walker), *Argyrotaenia velutinana* (Walker), *Choristoneura rosaceana* (Harris) et *Platynota idaealis* (Walker) ont été conduits de 1976 à 1991 dans les principales régions pomicoles du Québec. A la récolte, l'évaluation des dommages causés aux fruits a permis d'évaluer la performance des programmes de protection mis en place contre ces ravageurs. Le but de cet exposé est de mettre en évidence l'importance et l'évolution des différentes espèces de tordeuses dépistées dans les vergers québécois depuis quinze ans.

Royer, L.¹ & J.N. McNell².

¹ Université McGill, 845 Sherbooke ouest, Montréal, Qué. H3A 2T5

² Département de Biologie, Université Laval, Ste-Foy, Qué. G1K 7P4

Paternal investment of European corn borer males, *Ostrinia nubilalis* (Hübner) (Lepidoptera: Pyralidae): Its impact on longevity and reproductive performance of their mates.

We compared the life-time reproductive performance and the longevity of European corn borer (ECB) females mated once with males of different previous mating experiences to test the hypothesis that the number of matings males may acquire, as well as their reproductive success is, in some way, limited by their investment. Despite the fact that the reproductive output of ECB male increased directly with the number of matings acquired during his life, males having access to a virgin female each night of the 10 day period only mated an average of 3.8 ± 0.5 times. The volume of the spermatophore transferred to each subsequent female decreased, resulting in a direct diminution of the life-time fecundity and fertility of successive virgins mated to the male. Moreover, females mated with males that had mated at least three previous times did not lay their whole contingent of eggs. This apparent diminution of male contribution did not significantly affect the female longevity. Our results suggest that sperm, as well as accessory gland secretion production, of ECB males are limited.

Runtz, M.W.P. & S.B. Peck. Dept. Biology, Carleton University, Ottawa, Ont.

The beetle fauna of a mature spruce-sphagnum bog Algonquin Park, Ontario: ecological implications of the species composition.

The beetle (Coleoptera) fauna of a black spruce-tamarack (*Picea mariana* - *Larix laricina*) bog in Algonquin Provincial Park was sampled in 1986. Pan and emergence traps yielded 5734 beetles representing 30 families. The abundance and ecological implications of individual species are discussed, and related to Pleistocene bog beetle "communities". Ptiliidae were the most abundant and Staphylinidae were the most diverse. Few of the species collected are considered bog-specific. The faunal composition suggests that the bog is in a late-succession phase and that some of the components of the bog fauna are derived from adjacent habitats.

Rutherford, J. Wilfrid Laurier University, Department of Biology, 75 University Ave. West, Waterloo, Ont. N2L 3C5

Dispersion and interspecific associations amongst aquatic insects colonizing artificial substrates in the Canagagigue river.

Trichoptera (larvae, Hydropsychidae; pupae, Hydroptilidae), *Rheotanytarsus* sp. (Diptera: Chironomidae) and Baetidae (Ephemeroptera) comprised 47-75% of individuals on mapped substrates. Nearest-neighbour analysis (Clark-Evans-Donnelly equations) revealed aggregations for all taxa on almost all test substrates. Comparison of coefficients of association based on presence-absence (ϕ_2) and abundance (I_{ai}) suggests competition for space may be important.

Schlikora, H.-B. University of Bremen, NW2, Section of Evolution Biology, Box 330440, D-2800 Bremen 33 (Germany)

Changes in grounddwelling spider fauna (Arachnida: Araneae) of a North German raised bog disturbed by human influence. 1964-65 and 1986-87: A comparison.

Ombrogenous mires (raised bogs of the atlantic type) formerly covering large parts of North German lowlands are almost completely destroyed by industrial peatquarrying and agriculture today. Only very few raised bogs remain with more or less untouched surface have been left over. Characteristic feature for most of them is, that they couldn't retain their former ecological characters, e.g. due to unfavourable effects coming from surrounding arable land. Having still a quite original vegetation in 1964, the 0.35 km² investigation area Weisses Moor, a relic of 25 km² raised bog near the city of Heide, shows considerable changes in plant composition and vegetation structure 22 years later. In order to estimate consequences on grounddwelling spider fauna known by pitfall trapping between 1964 and 1965 (a), a second examination has been done in 1986-87 (b). 68 spider species belonging to 11 families were found altogether. 12 (a) of them and 15 (b) respectively include 85% of all specimens caught at a time. Based on their activity ascertained by traps these species are regarded as dominants. Among these dominants a decrease of light-prefering hygrophilous/biotic species (a: 42%; b: 13%) can be stated. For instance typical wetland spiders like *Pardosa pullata* (Clerck) (Lycosidae) or *Antisteia elegans* (Blackwall) (Agelenidae), usually common in Central European bogs, were only found in very low specimen numbers during second investigation. Moreover catches of *A. elegans* indicate a conspicuously patchy pattern of activity now. Photophilous species in general terms (a: 75%; b: 47%) reduced in favour of hylophylous spiders prefering shady conditions, e.g. *Trochosa terricola* Thorell (Lycosidae), *Centromerus arcarius* (O.P.-Cambridge) or *Gonatium rubens* (Blackwall) (Linyphiidae). These facts may reflect altered moisture conditions as well as structural changes in bog vegetation. On species level numbers are different between both periods of time (a: 42; b: 60), but trapping results from 1986-87 show a remarkable persistance of spiders to be found during first investigation.

Scott-Dupree, C. & G.W. Otis. Department of Environmental Biology, University of Guelph, Guelph, Ont. N1G 2W1

The impact of *Acarapis woodi* Rennie on honey bees in northern temperate climates.

Honey bee colonies infested with *Acarapis woodi* Rennie, the honey bee tracheal mite, were studied during four winters in New York state. Results indicate that colonies with heavy mite infestations had significantly greater winter mortality while spring bee brood areas were negatively correlated with mite prevalence and mite-load scores.

Searle, T. Entomology Dept., Macdonald College, 21 111 Lakeshore Road, Ste-Anne-de-Bellevue, Qué. H9X 1C0

Haemocytic response to fungal invasion in the carrot weevil, *Listronotus oregonensis*.

As part of a study investigating the effects of *Metarhizium anisopliae* on the carrot weevil, larvae were inoculated with conidio-spores, and haemolymph subsequently extracted. Haemocyte counts were made and types identified, and by 48 hours post-infection numbers were found to be significantly lower in treated versus control insects.

Searle, T. & W.N. Yule. Entomology Dept., Macdonald College, 21 111 Lakeshore Road, Ste-Anne-de-Bellevue, Qué. H9X 1C0

Effects of *Beauveria bassiana* on parasitoid emergence from Colorado potato beetles, (*Lepinotarsa decemlineata*).

Beauveria bassiana isolates were assayed for virulence, and for their effect on a parasitoid, (*Myiophorus doryphorae*), using field collected larvae. Mortality was high, but none of the *Beauveria* isolates reduced parasitoid fly emergence. Thus *Beauveria* should not be deleterious to this naturally occurring control agent when used in the field.

Sinclair, B. Department of Biology, Carleton University, Ottawa, Ont. K1S 5B6

Advances in the systematics of *Trichoclinocera* (Diptera: Empididae).

Specimens of *Trichoclinocera* (Clinocerinae) are commonly collected on large, bare, emergent rocks of streams and creeks, however identification has been difficult. The genus is redescribed and found to comprise 13 Nearctic species, including 6 new species. The life history and feeding behaviour of *Trichoclinocera* are also discussed.

Smith, J.J.B. Department of Zoology, University of Toronto, Toronto, Ont.
M5S 1A1

The cellular basis of learning.

Learning is generally thought to involve changes in synaptic connectivity between neurons, i.e. in the effectiveness whereby a neuron causes a response in others with which it synapses. Though present models for the mechanisms underlying these changes are based on non-insect preparations, research on insects may yet yield important insights.

Smith, S. & Z. Wang. Faculty of Forestry, University of Toronto, 33
Willcocks St., Toronto, Ont. M5S 3B3

Collection criteria for initiating mass-reared populations of *Trichogramma*

Populations of *Trichogramma* collected from different geographical areas and derived from varying numbers of founding individuals were compared biologically, biochemically (isozymes) and behaviourally (flight). The results suggest that collections from a single site with few founders produce populations for inundative release with as wide a genetic/phenotypic base as populations from varied sites and multiple individuals.

Spence, J.¹, N. Møller Andersen² & M.V.H. Wilson³.

¹ Department of Entomology, University of Alberta, Edmonton, AB T6G 2E6

² Zoological Museum, University of Copenhagen, Universitetsparken 15, DK-2100 Copenhagen, Denmark

³ Department of Zoology, University of Alberta, Edmonton, AB T6G 2E9

Reset your watches gentlemen: fossil water striders (Hemiptera: Gerridae) show the clock is slow.

Two fossil gerrids from the Middle Eocene of British Columbia are referred to a modern species group. We infer that two monophyletic groups of *Limnoperus* Stål diverged more than 50 MYA, in contrast to divergence dates of 11.7-15.6 MYA inferred on the basis of electrophoretic results and a standard molecular clock.

Sperling, F. University of Ottawa, Dept. Biology, 30 George Glinski St.,
Ottawa, Ont. K1N 6N5

Mitochondrial DNA and species phylogenies in the *Papilio glaucus* and *P. troilus* species groups (Lepidoptera: Papilionidae).

The mtDNA phylogeny of the *Papilio glaucus* and *P. troilus* species groups compared favorably with a phylogeny based on allozymes. However, *P. rutulus* and *P. eurymedon* appeared to share their mtDNA in spite of being distinct species. I suggest that mtDNA may be a useful indicator of sex-linked species differences.

Stewart, J. Agriculture Canada, Research Station, P.O. Box 1210, Charlottetown, P.E.I. C1A 7M8

The European corn borer: A potential pest of potatoes grown on Prince Edward Island.

The impact of *Ostrinia nubilalis* (Hübner) on yield of potatoes was investigated at two sites in 1989 and 1990. At Tryon in 1989, a seasonal average of 1.16 larvae/stalk/week reduced the total and marketable yield by 7.5% and 8.8%, respectively, compared to plants protected with a bacterial insecticide.

Storey, K.B. Institute of Biochemistry, Department of Biology and Chemistry, Carleton University, Ottawa, Ont. K1S 5B6

To freeze or not to freeze: biochemical aspects of insect cold-hardiness.

Winter cold hardiness among insects takes one of two forms - freeze tolerance or freeze avoidance - each supported by specific biochemical adaptations. Our studies of goldenrod gall-formers, the freeze tolerant *Eurosta solidaginis* and the freeze avoiding *Epiblema scudderiana* have shown the controls of cryoprotectant polyol production including regulation of the enzymes involved, individual controls for the production of dual polyols and the role of the hexose monophosphate shunt. Polyol metabolism is also regulated by seasonal cycles including changes in enzyme activities, in the response of metabolism to temperature triggers, and in the ability to catabolize polyols. New studies have analyzed the relative effectiveness of various sugars and polyols in protecting the activities of polymeric enzymes (G6PDH, LDH, PFK) from freeze tolerant vs intolerant animals during freezing *in vitro*, and analyzed the regulation of enzymes (glucose-6-P and 6-P-gluconate dehydrogenases) that gate the hexose monophosphate shunt as well as the role of fructose-1,6-bisphosphatase in controlling the gluconeogenic conversion of glycerol to glycogen. Studies have also assessed cellular energetics and the involvement of anaerobic pathways of ATP production in subzero survival of frozen vs supercooled insects to determine if there are energetic advantages or limitations to freeze tolerance vs freeze resistance.

Stubbs, C., T. Goodman, E. Osgood & F. Drummond. Department of Entomology, University of Maine, Orono, Maine, 04469

Biology of *Osmia ribifloris*, an exotic leafcutter bee, in Maine blueberry fields.

A leaf cutter bee introduced from California was studied in a blueberry field in Winterport, Me. Tripping rates, pollen utilization, numerical increase, and parasitism were recorded. The potential use of this bee as a pollinator for blueberry are discussed in light of the results.

Sutcliffe, J.F.¹ & J.A. Shemanchuk².

¹ Dept. Biology, Trent University, Peterborough, Ont. K9J 7B8

² Agriculture Canada Research Station, Lethbridge, Alberta

Assessment of response of the black fly, *Simulium arcticum* (IIS-10.11) to host related odours.

Field research in central Alberta into the olfactory host-responses of the cattle-biting black fly *Simulium arcticum* has been underway for the past three years. In this paper, some of the methods developed for field assessment of the attractiveness of odours derived from host emanations and from "off-the-shelf" chemicals are described and their effectivenesses discussed.

Svärd, L. Département de Biologie, Université Laval, Ste-Foy, Qué. G1K 7P4

Sperm use pattern in *Pseudaleitia unipuncta*.

In species where females mate repeatedly sperm from different males may be in competition. Lepidoptera are considered to have almost complete sperm precedence. The results obtained on the polyandrous species *Pseudaleitia unipuncta*, using a red-eyed mutant marked, indicate that the use of the last male's sperm may vary.

Sweeney, J., Y.A. El-Kassaby, D.W. Taylor, D.G.W. Edwards & G.E. Miller. Forestry Canada, Maritimes Region, P.O.Box 4000, Fredericton, N.B. E3B 5P7

Applying the IDS method to remove seeds infested with the Douglas-fir seed chalcid, *Megastigmus spermotrophus* Wachtl.

The Incubation - Drying - Separation (IDS) method removed an average of 97% of the seed chalcid, *Megastigmus spermotrophus* Wachtl, from Douglas-fir seedlots without adverse effects on germination parameters. The IDS method should be useful for treating Douglas-fir seedlots that would otherwise require multiple sowing due to chalcid infestation.

Tailleux, I. & C. Cloutier. Département de Biologie, Université Laval, Cité universitaire, Ste-Foy, Qué. G1K 7P4

Impact de la tenthredine du mélèze sur les populations de mélèze larinin au Nouveau-Québec.

La tenthredine du mélèze (*Pristiphora erichsonii*) est aujourd'hui connue au Québec bien au-delà du 52° parallèle. Cependant, ce milieu beaucoup plus rigoureux permet-il à la tenthredine d'engendrer des effets mesurables sur la croissance du mélèze (*Larix laricina*). Une courte épidémie survenue au cours de la dernière décennie nous a permis en effet de constater que la défoliation a été suffisamment importante pour affecter la croissance radiale et morphologique des mélèzes de ces régions marginales.

Thistlewood, H.M.A., D.J. Pree & L.A. Crawford. Agriculture Canada, Research Station, Box 6000, Vineland Station, Ont. L0R 2E0

Genetic improvement of the phytoseiid mite *Amblyseius fallacis* for pyrethroid resistance.

Using 2 bioassay methods, we compared the toxicity of permethrin to 8 populations of *Amblyseius fallacis* from apple orchards. Laboratory selection resulted in a highly resistant R strain; partway through, survey, selection, and post-overwintering evaluation are described.

Tourneur, J.C.¹, J. Gingras¹ & M. Vancassel².

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² Laboratoire d'Ethologie, Université de Rennes, France.

Le fonctionnement ovarien de la population de Montréal de *Forficula auricularia* L. (Dermatata: Forficulidae).

Le fonctionnement ovarien de la population de Montréal de *Forficula auricularia* est affecté par des phénomènes de dégénérescence ovocytaire. Cela débute avant la fin de la vitellogénèse et se poursuit pendant la ponte et durant toute la période de soins aux œufs. En raison des basses températures prévalant durant la période d'incubation, les femelles n'ont plus aucun ovocyte sain plusieurs mois avant l'éclosion de leurs larves. La seule ponte produite ne représente que 15,4% du potentiel reproducteur théorique de la population.

Turnock, W.J. Agriculture Canada, Research Station, 195 Dafoe Road, Winnipeg, Man. R3T 2M9

The role of cold injury in winter survival.

Overwintering survival may be a major factor in determinating the distribution and abundance of native and introduced insect species, including pest and exotic biocontrol agents. Among freezing-intolerant species, exposure to low temperarures may cause death by freezing or non-freezing disruption of metabolic systems. Freezing has been deemed the major cause of major cause of overwintering mortality and physiological and biochemical aspects of this process have been extensively studied. However, critical experiments to determine if freezing was the cause of death have been done for only a few species. The type of model used to describe the relationship between survival, temperature and duration of exposure is determined by the cause of death. Models based on cold injury describe survival as a cumulative function of temperature and duration of exposure: $\text{Survival (logit P)} = a - bT_1 - cT_2 \dots zT_n$, where p = the proportion surviving, and T = the number of days of exposure to the temperature given by the subscript. Cold injury may also be latent, with its expression controlled by the temperature regime following exposure to the injurious temperature, and is reversible/repairable at developmental temperatures. Future research needs to document the cause of death of insects exposed to low temperatures, the mechanism of cold injury, and to describe the adaptations that enable some species to survive more extreme cold stress.

Vernon, R. & J.R. Mackenzie. Agriculture Canada, Vancouver Research Station, 6660 N.W. Marine Dr., Vancouver, B.C. V6T 1X2

Exclusion fences: A new technique for managing cabbage flies and other low flying crop pests.

Fences of black fibreglass window screen mesh were erected at heights of 0 (control), 0.3, 0.6 and 0.9m around 5x5m plantings of rutabagas. Female cabbage flies entering the enclosures, and subsequent crop damage declined linearly with fence height. Cabbage flies and damage were reduced by 80% within the 0.9m enclosures.

Vescio, S.A. Lakehead University, 2-351 Dufferin St., Thunder Bay, Ont. P7B 1N4

Is food quality a concern for eastern spruce budworm?

The dietary relationship between eastern spruce budworm and its host trees is unclear. Budworms feed from mid-May to the end of June, even though the preferred 1-year-old foliage is available past this time. Why do they not take advantage of the entire growing season? It may be that needles change physiologically through the season. Moisture content, nitrogen, indigestible fibre (cellulose, hemicellulose and lignin) and leaf toughness levels were measured from 1-year-old shoots of balsam fir, white spruce and black spruce. Nitrogen and moisture content were high in the spring and declined through the summer. Changes in foliage may render the needles unfavorable for budworm consumption resulting in a cessation of feeding.

Vet, L. Department of Entomology, Wageningen Agricultural University, P. O. Box 8031, 6700 EH, Wageningen, Netherlands

Learning in parasitoids in a tritrophic context

To locate hosts for oviposition, parasitoids may use stimuli that are derived from their host or from the food of their host, often plants. It is argued that foraging parasitoids are facing a reliability-detectability problem. Host-derived stimuli are the most reliable in indicating host presence and suitability but they are generally hard to detect. Plant stimuli, on the other hand, are easier to detect but are generally less reliable indicators. Learning is a powerful tool for parasitoids to solve this problem. Through associative learning, for example, parasitoids can link easy-to-detect stimuli to reliable but hard-to-detect stimuli. Specific mechanisms by which learning can improve foraging efficiency will be discussed.

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Toxicité de cristaux purifiés de *Bacillus thuringiensis* var *kurstaki* HD-1 chez les larves de tordeuse à bandes obliques, *Choristoneura rosaceana* (Lepidoptera: Tortricidae).

Au cours de bioessais à l'aide de disques de nitrate de cellulose, la toxicité de cristaux purifiés de deux souches de *Bacillus thuringiensis* var. *kurstaki* HD-1 a été comparée à celle de l'azinphosméthyle. Après 144h, la mortalité des larves de 3^e et 4^e stade était observée. On a évalué le pourcentage de défoliation des disques à l'aide d'un système d'analyse numérique d'images.

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The chemistry, hydrology, and vegetation of Canadian peatlands.

Peatlands are characterized by wet, organic soils formed when decomposition is much less than plant production. Under these conditions, the partially decomposed plant material accumulates and gradually raises the peatland surface above the surrounding mineral soils. Fens are minerotrophic peatlands while bogs are ombrotrophic. Rich fens have a ground layer dominated by 'brown mosses' and chemically are alkaline, whereas poor fens are *Sphagnum* dominated and acidic. Bogs are oligotrophic as compared to fens, which may be either oligotrophic or mesotrophic. These peat forming systems differ in

their nutrient status from wetland ecosystems such as swamps and marshes that are mesotrophic or eutrophic. Bogs in continental Canada are nearly always treed ecosystems, while in more oceanic areas they are mostly open (non-treed). Canadian peatlands have largely developed over paludified landscapes, and were initiated in the Mid-holocene in response to regional (allogenic) changes in climate can have marked influences on peatland development, local developmental (autogenic) changes created by the peatland itself can also influence the development of peatlands.

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Notes on the biology and control of the black army cutworm in Newfoundland.

The flight period of black army cutworm (BAC) moths in Newfoundland lasts from July to October and peaks in August. Black spruce seedlings planted in burned areas may be severely defoliated but non-coniferous weeds are preferred and eaten first. Several species parasitizing BAC larvae were identified. Chemical control and biological control using entomogenous nematodes are discussed.

**Wheeler,T.A. Department of Environmental Biology, University of Guelph,
Guelph, Ont. N1G 2W1**

Neartic - Neotropical connections in the genus *Rachispoda* (Diptera:
Spaeroceridae).

Phylogenetic relationships within the New World *Rachispoda* fauna indicate that faunal interchange between the Neartic and Neotropical regions has occurred at least three times since the early Tertiary. Inferred patterns of relationship are used to construct a scenario for the history of the New World *Rachispoda*.

**Williams, K.D. & M.B. Sokolowski. Department of Biology, York
University, 4700 Keele Street, North York,Ont. M3J 3L3**

Ovarian diapause in *Drosophila melanogaster*.

In *Drosophila melanogaster* ovarian diapause is achieved by the maintenance of post-eclosion immaturity in the ovaries. I examined the diapause response of *D. melanogaster* from various latitudes and performed a crossing analysis to assess the genetic basis of ovarian diapause in this genetically well characterized species.

Wolff, J.L., M.M.C. Yu & D.B. Levin. Dept. of Biology, York University, 4700 Keele St., North York, Ont. M3J 1P3

Baculovirus host-specificity is not determined at the level of entry into the host cell.

One of the characteristics that makes baculovirus attractive as potential biological insecticides is that, generally, they are remarkably specific. We have begun to examine the molecular mechanisms of host-specificity of three baculovirus and present evidence that host-specificity is determined by events after entry of these viruses into non-target cells.

Yu, M.M.C. & D.B. Levin. Dept. of Biology, York University, 4700 Keele St., North York, Ont. M3J 1P3

Characterization of a baculovirus that infects grasshoppers, locusts, and termites.

S/NPV, the nuclear polyhedrosis virus of the Egyptian Cotton Leafworm, *Spodoptera littoralis* (Lepidoptera: Noctuidae) is an unusual baculovirus because it crosses insect orders and infects at least three species of Orthoptera and one species of Isoptera. We have begun to characterize this virus at the biological and molecular genetic levels.

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Biology of *Harpalus rufipes* in Maine

The introduced carabid species, *Harpalus rufipes*, is the dominant carabid in Maine potato fields. It is both a weed seed predator and Colorado potato beetle predator. Dietary preference, dispersal, habitat preference, and flight behaviour was investigated.

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