

**Directory of Entomological Education in Canada /  
Répertoire des formations en Entomologie au Canada**

**Edition / Édition 5 \*  
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Edited by / éditée par Tonya Mousseau

This Directory lists post-secondary institutions in Canada that offer training in entomology, that includes course work, supervision of entomological research and internet entomology courses. For some schools, the information from more than one department is listed separately. The information about schools is sorted by, and within, geographical location (by province; see below), and is in their language of instruction.

Information contained in this Directory was compiled from responses received to questionnaires sent to post-secondary institutions in 2005. Schools that did not respond, or that do not have an entomology program, are not listed in the Directory.

The 2005 edition of the Directory was prepared by members of the Student Affairs Committee of the Entomological Society of Canada, and included Tonya Mousseau (Chair), Mireille Marcotte, Jeanne Robert, Ayman Mostafa, and Sarah Jandricic.

Le répertoire dresse une liste des institutions post-secondaires offrant une formation en entomologie (incluant les cours, la supervision dans le domaine de la recherche et les cours offerts sur internet). Pour certaines institutions, l'information est présentée séparément par faculté. L'information est rangée en ordre alphabétique par province, et dans la langue d'instruction.

Les informations compilées proviennent de questionnaires envoyés aux différentes institutions post-secondaires. Les institutions n'ayant pas répondu au questionnaire, ou n'offrant pas de formation en entomologie ne sont pas listées ici.

La 2005 édition du répertoire a été préparé par les membres du comité des affaires étudiantes de la société d'entomologie du Canada. Le comité comprenait Tonya Mousseau (président), Mireille Marcotte, Jeanne Robert, Ayman Mostafa, and Sarah Jandricic.

\* The first edition of the Directory was prepared by members the Student Affairs Committee of the Entomological Society of Canada in June 1997, and included Troy Danyk (Chair), Amanda Chau, Claude Godin, Laura Hooper, Paul Lomic, Lloyd Jeffs and Eric Lucas. Second edition, T. Danyk (ed.), October 1999. Third edition, T. Danyk (ed.), November 2001. Fourth edition. T. Danyk (ed.) October 2002.

\* La première édition du répertoire a été préparé par les membres du comité des affaires étudiantes de la société d'entomologie du Canada en juin 1997. Le comité comprenait Troy Danyk (président), Amanda Chau, Claude Godin, Laura Hooper, Paul Lomic, Lloyd Jeffs et Eric Lucas. La deuxième édition, T. Danyk (ed.), octobre 1999. La troisième édition, T. Danyk (ed.), novembre 2001. La quatrième édition. T. Danyk (ed.), octobre 2002.

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## **British Columbia**

### **University of Victoria**

The entomology program at the University of Victoria is currently under development. At present there is ongoing graduate work in entomology and there are plans for a more formal selection of courses in the future. For more information on entomology at the University of Victoria, please contact:

Dr. Neville Winchester  
Adjunct Assistant Professor,  
Research Entomologist, SLI  
Biology Department, University Victoria  
Board Member, International Canopy Network  
Telephone: (250) 721-7099  
Fax: (250) 721-7120

**Simon Fraser University  
Department of Biological Sciences**

Simon Fraser University  
8888 University Drive  
Burnaby, British Columbia  
V5A 1S6  
Canada

Telephone: 604-291-4475

FAX: 604-291-3496

Homepage: [www.sfu.ca/biology](http://www.sfu.ca/biology)

Research and academic facilities

The Department of Biological Sciences (through the former Centre for Pest Management) is recognized to be the first institution in North America to offer a comprehensive post-graduate degree program in pest management. The Department is presently comprised of 41 full time faculty members, 6 Lecturers and 5 Teaching Technicians. Faculty provide research training to students toward the MPM, MSc, and PhD degrees. The department currently has over 180 graduate students. Entomological related research areas include apiculture, behavioural ecology, biological control, biotechnology, chemical ecology, chemical toxicology, insect biochemistry, medical and veterinary entomology, plant and forest pathology, plant stress physiology and vertebrate pests.

Courses offered with an entomology component

Undergraduate

BISC 317. Insect Biology

BISC 417. Entomology

BISC 435. Introduction to Pest Management.

Graduate

BISC 601-5. Agriculture, Horticulture and Urban Pest Management. A broad range of agricultural pests and their management, with emphasis on insects, crop diseases, and weeds in greenhouses, orchards and field crops. Pest problems in urban environments, including stored products in and near buildings.

BISC 602-5 Forest Pest Management. Management of insect, microbial, vertebrate and plant pests of forests and forest products, including seed orchards, nurseries, dryland sorting areas. Emphasis is placed on diagnosis, decision making, interactions and techniques for forest pest management.

BISC 816-3 Biology and Management of Forest Insects. Bionomics, ecology, economic impact, and management of the major groups of forest insects, based on intensive reviews of information on representative species.

BISC 841-3 Plant Disease Development and Control. An examination of the major factors that lead to development of soil-associated and foliar plant diseases in cultivated crops, in relation to the nature, underlying principles, application and limitations of various types of control practices.

BISC 842-3 Molecular Physiology of Insects. An examination of hormonal and nutritional factors that

influence growth and development, as well as energy metabolism in insects, with emphasis on the molecular mechanisms involved in their regulation.

**BISC 843-3 Applied Behavioural Ecology.** Concepts and methods from behavioural ecology and population dynamics are used to solve problems of an applied nature (e.g. pest management, harvesting policies, management of human diseases). Model building and analysis feature prominently.

**BISC 844-3 Biological Controls.** Principles, theory, and practice of the use of living organisms in the natural regulation and the control of organisms. Emphasis will be on parasitic insects, and include host specificity, genetics, genetic controls, and the evolution of host-parasite associations.

**BISC 846-3 Insecticide Chemistry and Toxicology.** The chemistry of insecticides, with emphasis on their toxicology, metabolism and molecular mechanism of action.

**BISC 847-3 Pest Management in Practice.** Status and special problems of research development and implementation of pest management programs in different kinds of ecosystems; consideration of factors such as management systems, economics, communication, legal and social constraints and ethics in the practice of pest management.

#### Financial support

It is the policy of the Department of Biological Sciences that all graduate students should have financial support either from scholarships, teaching appointments, faculty research grants, or some combination thereof. Most students who are not scholarship holders can be supported by a combination of teaching assistantships and research grants. Current cost-of-living expenses can amount to over \$10,000 per year.

#### List of faculty involved in entomology based research

**Dr. Gerhard Gries.** Insect chemical ecology. Research investigates the role of semiochemicals in the communication between animals, or between animals and plants. Use techniques such as GC-EAD, HPLC, GC-MS, and wind tunnel bioassays to decipher the semiochemical-based communication system of a wide variety of insects, particularly moths and beetles. [gries@sfu.ca](mailto:gries@sfu.ca)

**Dr. Norbert H. Haunerland.** Insect biochemistry and physiology. Research on the biochemical mechanisms of lipid transport and metabolism in insects to identify insect specific metabolic events that may lead to novel targets for bio-rational insect control, using biochemical, physiological and molecular approaches. [haunerla@sfu.ca](mailto:haunerla@sfu.ca)

**Dr. Carl Lowenberger.** Parasitology and Vectors of Disease. Entomology, parasitology, insect parasite interactions, disease epidemiology. Research focuses on the transmission of disease-causing organisms by insect vectors, and more specifically at the insect immune response to these parasites. [clowenbe@sfu.ca](mailto:clowenbe@sfu.ca)

**Dr. Russell A. Nicholson.** Pesticide biochemistry and toxicology. Research into the cellular and molecular mechanisms of insecticide action in the central nervous system of invertebrates. [nicholso@sfu.ca](mailto:nicholso@sfu.ca)

**Dr. Bernie D. Roitberg.** Behavioural ecology and pest management. Projects include: studies on the importance of spatial structure of resources to population ecology of the Tephritidae; elucidating the importance of genetic structure of aphid populations to the evolution of aphid behaviour; development of dynamic models of malaria; and dynamic models for conservation biology. [roitberg@sfu.ca](mailto:roitberg@sfu.ca)

**Dr. Mark L. Winston.** Apiculture and social insects. Research on honey bees and their pheromones.  
[winston@sfu.ca](mailto:winston@sfu.ca)

#### Adjunct Professors

**Dr. Peter Belton.** Emeritus Associate Professor. Medical entomology.

**Dr. David Gillespie.** Research Scientist, Agriculture and Agri-Food Canada, Agassiz, British Columbia. Agricultural entomology and biological control of greenhouse pests.

**Dr. Mark Goettel.** Research Scientist, Agriculture and Agri-Food Canada, Lethbridge, Alberta. Insect pathology and biological control.

**Dr. Gary Judd.** Research Scientist, Agriculture and Agri-Food Canada, Summerland, British Columbia.

**Dr. Manfred Mackauer,** Professor Emeritus. Parasitoid ecology and biological control of insects.

**Dr. Bob S. Vernon.** Research Scientist, Agriculture and Agri-Food Canada, Agassiz, British Columbia. Agricultural entomology.

#### Admissions and enquires

Students wishing to enter the MSc or MPM program must have completed a Bachelor's degree at a recognized university with a graduation average of B or better (cumulative grade point average 3.0 on all post-secondary coursework), have a research supervisor prior to admission, and provide evidence of ability to carry out advanced studies. The Master's. program is expected to be completed in less than three years. It is an excellent choice for those seeking a thorough preparation prior to embarking on a PhD. degree at SFU or elsewhere.

Students wishing to enter the PhD program must either 1) have a 3.5 GPA in a bachelor's degree program and evidence of research ability, or 2) have completed a MSc. degree or its equivalent from a recognized university. All PhD. students must also have a research supervisor prior to admission. The PhD program is expected to be completed in less than five years and students will be directed by a supervisory committee of at least two faculty including the research supervisor. The PhD. thesis must contain original publishable work of significance and must be defended publicly.

#### **Simon Fraser University**

##### **School of Criminology**

Simon Fraser University  
8888 University Drive  
Burnaby, British Columbia  
V5A 1S6

Telephone: 604 291 3589

Fax: 604-291-4140

Homepage: [www.sfu.ca/criminology](http://www.sfu.ca/criminology)

**Dr. Gail Anderson.** Forensic Entomology. Dr. Anderson is an Associate Professor in the School of Criminology and Associate Director of the Undergraduate Program in Criminology. Major research area is forensic entomology (use of insects in death investigations).

**University of British Columbia  
Plant Science Graduate Program**

Faculty of Land and Food Systems  
248-2357 Main Mall  
Vancouver, British Columbia  
V6T 1Z4  
Canada

Telephone: 604-822-1219  
Fax: 604-822-6394  
Homepage: [www.agsci.ubc.ca/grad/plant\\_sc.htm](http://www.agsci.ubc.ca/grad/plant_sc.htm)

Research and Academic facilities

The Faculty offers MSc and PhD programs in Plant Science, with specialization in integrated pest management, insect physiology/toxicology, insect-plant interactions, insect pathology, insect ecology and biological control. The Faculty is located in the MacMillan Building on the main campus. Other facilities include state-of-the-art greenhouse complex, and the Totem Park Field Laboratory, also on campus. The Faculty has fifty full-time faculty, two of which are entomologists, as well as three adjunct Professors in Agriculture and Agri-Food Canada who are entomologists. The Faculty currently has ten graduate students in entomology and 3-4 undergraduates specializing in crop protection.

List of Faculty

**Dr. Murray B. Isman.** Discovery and development of botanical insecticides and antifeedants; insect-plant chemical interactions; insect toxicology.

**Dr. Judith H. Meyers.** Insect population biology; biological control of pests and weeds; insect viruses.

**Dr. Robert S. Vernon,** Adjunct Professor, Agriculture and Agri-Food Canada, Agassiz, British Columbia. Integrated pest management in vegetable crops; physical barriers for pests; geographical information systems; pest and disease monitoring.

**Dr. Sheila M. Fitzpatrick,** Adjunct Professor, Agriculture and Agri-Food Canada, Agassiz, British Columbia. Integrated pest management in berry crops; mating disruption with pheromones.

**Dr. David Theilmann,** Adjunct Professor, Agriculture and Agri-Food Canada, Summerland, British Columbia. Molecular biology of insect viruses; transgenic insect virus production; insect pathology.

Courses offered with an entomology component

*Undergraduate*

Agroecology 327. Introduction to Entomology. A survey of the structure, classification and biology of insects; ecology and insect life history; impacts of insects on humans. Same course as Biology 327.

Agroecology 427. Insect Ecology. Behavioral, population and community ecology of insects. Interaction between insects and plants and the application of the principles of insect ecology to biological control of insects and weeds. Same course as Biology 411.

Agroecology 428. Integrated Pest Management. Development and implementation of multi-disciplinary pest management programs in agricultural crops. Web-based course.

*Graduate*

Plant Science 531. Biological control. Theory of biological control. Case histories. Concepts of natural insect population regulation. Development of integrated control programs and environmental manipulations.

Plant Science 532. Advanced Insect Physiology. Recent advances in selected fields of insect physiology, emphasizing the neural and/or hormonal integration of metabolic activities and insect-plant chemical interactions.

Financial support

The University awards Graduate Fellowships of \$16,000 each on a competitive basis. The Faculty has a limited number of part-time teaching assistantships available annually.

Admissions and enquires

Applicants for the PhD degree must have completed: (1) a bachelor's degree with First Class Honours, or (2) a bachelor's degree with on year of study in a Master's program, with a first class average from at least 18 credits and clear evidence of research ability or potential, or (3) a master's degree with clear evidence of research ability or potential.

Applicants for the MSc degree must hold a bachelor's degree with: (1) honours in the field of the proposed Master's courses with first class standing in at least 12 credits of 3<sup>rd</sup> and 4<sup>th</sup>-year course work in that field, or (2) first class standing in at least 12 credits of the course work and at least upper second class standing in the remaining course work at the 3<sup>rd</sup>- and 4<sup>th</sup>-year level prescribed by the department concerned as prerequisite to the Master's program.

For more information, contact Dr. Murray B. Isman, Graduate Advisor, Plant Science, Faculty of Land and Food Systems, University of British Columbia, Vancouver, British Columbia, V6T 1Z4, Canada; telephone 604-822-2329; fax 604-822-6394; email [isman@interchange.ubc.ca](mailto:isman@interchange.ubc.ca).

**University of British Columbia**

**Department of Zoology**

University of British Columbia  
#2354 - 6270 University Boulevard  
Vancouver, British Columbia  
V6T 1Z4  
Canada  
Telephone: 604-822-2131  
Fax: 604-822-2416  
Homepages: [www.zoology.ubc.ca](http://www.zoology.ubc.ca)

## List of faculty

**Dr. Judith Myers** directs students in Insect Population Ecology and Biological Control. Dr. Myers has a joint appointment with Agroecology Program, Faculty of Agricultural Sciences, UBC. E-mail: [myers@zoology.ubc.ca](mailto:myers@zoology.ubc.ca).

**Dr. Wayne Maddison** is a Professor and CRC Research Chair in the Departments of Zoology and Botany at UBC. Mr. Maddison's laboratory focuses on the systematics and evolution of spiders. E-mail: [wmaddisn@interchange.ubc.ca](mailto:wmaddisn@interchange.ubc.ca)

## Courses offered with an entomology component

Biol 327. Introductory Entomology.  
Biol 411/ Agro 427: Insect Ecology  
Plnt 531. Graduate course in Biological Control.  
PLNT 532: Advanced Insect Physiology

Other relevant courses include ecology, conservation biology and applied ecology.

Current information regarding courses in Biology can be found on the Zoology homepage under Undergraduate Biology Program Guide. This lists all of the Biology courses offered at UBC. Other course offerings can be found in the on-line UBC Calendar, [www.student-services.ubc.ca/publicat/](http://www.student-services.ubc.ca/publicat/).

### **University of Northern British Columbia**

Ecosystem Science and Management Program  
College of Science and Management  
University of Northern British Columbia  
3333 University Way  
Prince George, British Columbia  
V2N 4Z9  
Canada  
Telephone: 250-960-6664  
Fax: 250-960-5539  
Homepage: <http://www.unbc.ca>

#### Research and academic facilities

UNBC, officially opened in August 1994. It is located near the geographical centre of British Columbia in Prince George, BC. The university currently has about 3500 undergraduate students and 350 graduate students.

The College of Science and Management currently offers a number of undergraduate and graduate degrees, many of which are interdisciplinary in nature. Of those, BSc degrees in Biology, Natural Resources Management (Forestry, Wildlife and Fisheries, and Resource Recreation majors), and Environmental Science; MSc degrees in Natural Resources Management, and a PhD in Natural Resources and Environmental Studies are most appropriate for students with an interest in entomology.

#### List of faculty with entomologically relevant expertise.

**Dr. Staffan Lindgren.** Dr. Lindgren is an entomologist whose interests centre on the ecology and management forest insects. E-mail: [lindgren@unbc.ca](mailto:lindgren@unbc.ca).

**Dr. Lisa Poirier.** Dr. Poirier is an entomologist with interests in tritrophic interactions in forest ecosystems. E-mail: [poirierl@unbc.ca](mailto:poirierl@unbc.ca)

**Dr. Russ Dawson.** Dr. Dawson is a bird ecologist with particular interests in the effects of ectoparasitic insects on reproductive fitness in birds. E-mail: [dawsonr@unbc.ca](mailto:dawsonr@unbc.ca).

**Dr. Kathy Lewis.** Dr. Lewis is a forest pathologist with interests in insect-fungus interactions. E-mail: [lewis@unbc.ca](mailto:lewis@unbc.ca).

**Dr. Chris Hawkins.** Dr. Hawkins is a plant physiologist/silviculturist with interests in insect impacts on forest regeneration. E-mail: [hawkinsc@unbc.ca](mailto:hawkinsc@unbc.ca).

#### Undergraduate courses offered with an entomology component

**BIOL 322-3 Entomology.** Introductory course in entomology taught every other year in the fall term.

**FSTY 307-4 Forest Health.** Integrated forest entomology and pathology course taught annually in the fall term.

**BIOL 202-3 Invertebrate Zoology.** Survey course in which entomology occupies three lectures and one lab. Taught annually in the winter term. This course (or equivalent) is a prerequisite for BIOL 322-3.

**BIOL 421-3 Insects, Fungi and Society.** An undergraduate/graduate course taught in the winter term every other year. The course covers the role of insects (and other arthropods and invertebrates) and fungi in human society, including ecological, historical, economic, health and socioeconomic impacts.

For additional undergraduate courses, see <http://www.unbc.ca/calendar/>

**NRES 798-3 Special Topics** or **NRES 799-3 Independent Study** may be offered as required for graduate students needing entomology at the graduate level. These courses are tailored to meet the needs

of individual (799) or groups of students (798). Other graduate courses with a significant entomology component are **NRES 730-3 Disturbance Ecology** and **NRES 733-3 Animal-Plant Interactions**. **BIOL 611-3 Insects, Fungi and Society** is taught concurrently with BIOL 421-3.

For additional graduate courses, see <http://www.unbc.ca/calendar/graduate/>

Students may also take courses at other western institutions under the Western Deans' Agreement (<http://www.unbc.ca/graduatestudies/>)

### Financial support

There are numerous scholarships and bursaries available to undergraduate students; see <http://www.unbc.ca/finaid/> for details. Graduate students can apply for teaching assistantships valued at \$8 000 per year. Additional scholarships and bursaries are also available both at UNBC (see:<http://www.unbc.ca/finaid/>) and nationally (<http://www.graduateaid.com>). NSERC graduate scholarship-eligible Master's students pay half tuition and are eligible for the UNBC Entrance scholarship, valued at \$10,000 per year. PhD students pay no tuition.

### Admissions and enquiries

Admissions information for prospective undergraduate students can be found at <http://www.unbc.ca/calendar/undergraduate/admissions/undergraduate.html> and enquiries should be directed to [registrar-info@unbc.ca](mailto:registrar-info@unbc.ca)

Admissions and contact information for prospective graduate students can be found at <http://www.unbc.ca/graduatestudies/>.

## Alberta

### University of Alberta

#### Department of Biological Sciences

Faculty of Science  
CW 405 Biological Sciences Centre  
University of Alberta  
Edmonton, Alberta  
T6G 2E9  
Canada

Telephone: 780-492-0672

Fax: 780-492-9234

Homepage: [www.biology.ualberta.ca](http://www.biology.ualberta.ca)

#### Research and academic facilities

The University of Alberta offers programs of research and study leading to the degrees (with thesis) of MSc and PhD. The disciplinary strengths of the Departments include botany, ecology, biotechnology, cell biology, conservation biology, endocrinology, entomology, environmental biology, evolution, genetics, microbiology, molecular biology, palaeontology, parasitology, physiology, systematics, and zoology.

#### List of faculty

**Dr. M.L. Evenden.** To date my work has focused on the chemical ecology of mate finding in the Lepidoptera and how sex pheromones can be used in IPM against moth pests. [mevenden@ualberta.ca](mailto:mevenden@ualberta.ca)

**Dr. B.S. Heming.** Development and functional morphology of insects and in systematic aspects of the Thysanoptera. Recent studies have focused on the origin and fate of germ cells in embryos of the bug, *Rhodnius prolixus*, germ line history in Thysanoptera, and the embryogenesis of sense organs in blister beetle embryos (Coleoptera: Meloidae). E-mail: [bruce.heming@ualberta.ca](mailto:bruce.heming@ualberta.ca).

**Dr. W.R. Kaufman.** Physiology, pharmacology and endocrinology of ixodid ticks. Projects include: endocrinology of salivary gland development and degeneration during the feeding cycle; control of vitellogenesis; actions of hormones on salivary glands and reproductive system; and pharmacology of fluid secretion in salivary glands. E-mail: [reuben.kaufman@ualberta.ca](mailto:reuben.kaufman@ualberta.ca).

**Dr. B.A. Keddie.** Pathogen-host interactions from the cellular to organism levels, primarily baculoviruses in lepidopteran hosts and cell lines. Application of pathogens for management of phytophagous insect pests; recent work on pests of canola. E-mail: [akeddie@gpu.srv.ualberta.ca](mailto:akeddie@gpu.srv.ualberta.ca).

**Dr. H.C. Proctor.** Ecology, evolution, systematics and behaviour of mites (Arachnida: Acari). Most research focuses on aquatic, soil, and feather mites. Theoretical research areas includes the community ecology of freshwater and soil invertebrates, determinants of biodiversity, co-evolution of hosts and symbionts, and both macro-and microevolutionary aspects of sexual selection. E-mail: [hproctor@ualberta.ca](mailto:hproctor@ualberta.ca).

**Dr. J. Roland.** Impact of habitat structure on population processes such as fecundity, mortality and insect movement, and is aimed at understanding dynamics at the landscape (regional) level. Current projects

include effect of forest fragmentation on forest tent caterpillar, spatial dynamics of butterfly populations, spatial dynamics of willow-gall insects and their parasitoids. E-mail: [jroland@gpu.srv.ualberta.ca](mailto:jroland@gpu.srv.ualberta.ca).

**Dr. F.A.H. Sperling.** Insect systematics, with interests in molecular evolution, population genetics, biodiversity and conservation. Emphasis on speciation in swallowtail butterflies and spruce budworm moths. Also insect pest complexes, phylogeny reconstruction, taxonomy, plant-insect interactions, forensic entomology, and internet-accessible faunal inventories. E-mail: [felix.sperling@ualberta.ca](mailto:felix.sperling@ualberta.ca).

*Emeritus and Adjunct Professors (may serve as co-supervisors)*

**Dr. G.E. Ball.** Professor Emeritus. Research interests are in systematics, morphology, evolution and zoogeography. Currently working with carabid beetles, particularly the Neotropical fauna and its extensions into North America, using the methods of phylogenetic systematics and historical biogeography. E-mail: [g.ball@ualberta.ca](mailto:g.ball@ualberta.ca).

**Dr. D.A. Craig.** Professor Emeritus. Current research has focused on the hydrodynamics of evolution of body form in aquatic insects. Hydrodynamics of aquatic insects in relation to: hydraulic regimes, microhabitat selection, evolution of body form, filter feeding, ingestion of DOM, locomotion, escape mechanisms. E-mail: [d.craig@ualberta.ca](mailto:d.craig@ualberta.ca).

**Dr. D.W. Langor.** Adjunct Professor, Northern Forestry Centre. Systematics, ecology and management of *Pissodes* (Coleoptera: Curculionidae); systematics, bionomics and population genetics of Scolytidae; and the effects of forestry practices on soil arthropods. E-mail: [dlangor@nrcan.gc.ca](mailto:dlangor@nrcan.gc.ca).

**Dr. W.J.A. Volney.** Adjunct Professor, Northern Forestry Centre. Impacts of forest insects on tree and stand growth, population biology of North American *Choristoneura* spp., and development of forest pest management systems. Also involved with the application of quantitative methods to biological systems. Email: [jvolney@nrcan.gc.ca](mailto:jvolney@nrcan.gc.ca).

#### Courses offered with an entomology component

For course offerings and descriptions in the Department of Biological Sciences, please consult [www.biology.ualberta.ca](http://www.biology.ualberta.ca).

#### Financial support

Graduate students at the University of Alberta are supported financially by a limited number of teaching assistantships. Funding is assured for a total of three (MSc) or five (PhD) years, subject to an annual review of academic and teaching performance. Additional summer support comes from research trust accounts of the student's supervisor. Also available: Bill Shostak Wildlife Award (\$5 000), D. Alan Birdsall Memorial Scholarship (\$4 000), Donald M. Ross Scholarship (\$1 500), FGSR Research Travel (\$500), Department of Biological Sciences Travel Subsidy (\$300), McAfee Estate Scholarships (\$1 300).

#### Admissions and enquires

It is recommended that entering students have strong backgrounds in the biological sciences. The minimum admission requirements are a four-year undergraduate degree, or its academic equivalent, from a recognized university, and a grade point average of at least 77% (= 3.2/4.0, 7.0/9.0, or B to B+ or better) in the last two years of undergraduate study. For graduate students applying for the PhD degree program, we usually consider all courses taken at the MSc level the equivalent of one academic year. Foreign students whose first language is not English must have a minimum score of 600 on the Test of English as

a Foreign Language.

*Department of Biological Sciences*

For further information about the graduate program in the Department of Biological Sciences, please contact: Associate Chair (Graduate Studies), Department of Biological Sciences, CW-405, Biological Sciences Centre, University of Alberta, Edmonton, AB, T6G 2E9, Canada; e-mail [bio.grad.coordinator@ualberta.ca](mailto:bio.grad.coordinator@ualberta.ca); telephone 780-492-1257; fax 780-492-9457. Or you may contact any faculty member directly.

**Department of Agriculture, Food and Nutritional Sciences**

Faculty of Agriculture, Forestry & Home Economics  
410 Agriculture/Forestry Centre  
University of Alberta  
Edmonton, Alberta  
T6G 2P5  
Canada

Telephone: 780-492-3239

Fax: 780-492-4265

Homepage: [www.afns.ualberta.ca](http://www.afns.ualberta.ca)

List of faculty

*Department of Agriculture, Food and Nutritional Sciences*

**Dr. Lloyd Dosdall.** Integrated management of insect pests of crops, especially root maggots, bertha armyworm, diamondback moth, and cabbage seedpod weevil in canola; taxonomy and biology of stoneflies (Plecoptera).

Email [Lloyd.Dosdall@ualberta.ca](mailto:Lloyd.Dosdall@ualberta.ca)

Entomology Courses Offered

1. **PL SC 487:** This course presents the principles and practice of integrated insect pest management with emphasis on insect control strategies in field crops in western Canada. Topics include methods for sampling and monitoring, estimating yield losses, developing economic thresholds, and reducing crop losses by integrated management strategies. The primary objective of the course is to train students in various approaches used in insect pest management. The course aims to provide students with the background knowledge required for making insect pest management decisions and conducting research in insect pest management.

2. **PL SC 495:** This course presents integrated cultural, biological, and chemical control of insects, disease organisms, and weeds that interfere with field crop production. The course aims to provide students with the knowledge required for understanding the mechanisms and practice of integrated crop protection.

**Department of Renewable Resources**

Faculty of Agriculture, Forestry and Home Economics  
General Services Building 7-51  
University of Alberta  
Edmonton, Alberta  
T6G 2H1  
Canada

Telephone: 780-492-2820 (Mrs. S. Nakashima, Graduate Program Secretary)

Fax: 780-492-4323

Homepage: [www.rr.ualberta.ca](http://www.rr.ualberta.ca)

List of faculty

**John Acorn** (Sessional). Undergraduate instruction in insect natural history and field trips for teaching collection methods. Current projects include guidebooks to Alberta insects, and ongoing studies of cicindelid and coccinellid ecology in Alberta, as well as studies of goliathine scarabs and their larvae from Africa. Email: [janature@compusmart.ab.ca](mailto:janature@compusmart.ab.ca)

**Barbara Beck** (Sessional). Instruction in field identification of the evident groups of Lepidoptera and Odonata. Email: [barb.beck@ualberta.ca](mailto:barb.beck@ualberta.ca)

**Lee Foote**. Functional roles of aquatic invertebrates with studies of trophic position and relationships to water quality, fish and waterfowl in boreal and prairie wetlands as indicated by stable isotope analysis (SIA). Email: [lee.foote@ualberta.ca](mailto:lee.foote@ualberta.ca)

**John Spence**. Arthropod biodiversity, especially in relation to effects of forest management and urbanization; forest pest management; population and community ecology of gerrids, carabids and spiders; spread and impact of introduced insects. Email: [john.spence@ualberta.ca](mailto:john.spence@ualberta.ca).

## **University of Calgary**

Department of Biological Sciences  
University of Calgary  
2500 University Drive NW  
Calgary, Alberta  
T2N 1N4  
Canada

Telephone: 403-220-3140

Fax: 403-289-9311

Homepage: [www.bio.ucalgary.ca](http://www.bio.ucalgary.ca)

### Research and academic facilities

The Department of Biological Sciences is comprised of five academic divisions with over 50 faculty members offering a Bachelor of Science in six major and honours programmes: Biological Sciences; Biochemistry; Plant Biology and Biotechnology; Cellular, Molecular, and Microbial Biology; Ecology; and Zoology. All graduate degrees are thesis- based. The Department is affiliated with the Kananaskis Field Stations in the mountains west of Calgary and the Bamfield Marine Biological Station on the west coast of Vancouver Island.

### List of faculty

**Dr. John Addicott** - Obligate pollination / seed predation mutualism between yuccas (*Yucca*, Agavaceae) and yucca moths (*Tegeticula*, Incurvariidae). Email: [jaddicot@ucalgary.ca](mailto:jaddicot@ucalgary.ca)

**Dr. Lawrence Harder** - Diversity of floral design and display that characterize angiosperms. Address the roles of design and display in particular pollination and mating environments. Email: [harder@ucalgary.ca](mailto:harder@ucalgary.ca)

**Dr. Rob Longair** - Behaviour of solitary vespid wasps; Insect biodiversity in managed and natural habitats. Email: [longair@ucalgary.ca](mailto:longair@ucalgary.ca)

**Dr. Mary Reid** - Relationships between habitat and the breeding biology of organisms using bark beetles (Coleoptera: Scolytidae), a group that exhibits a wide diversity of mating systems, parental care, and breeding distributions that have not been previously explained. Email: [mreid@ucalgary.ca](mailto:mreid@ucalgary.ca)

**Dr. Derek Sikes** - Systematics, ecology and conservation biology of Coleoptera. Insect inventory and monitoring. Email: [dsikes@ucalgary.ca](mailto:dsikes@ucalgary.ca)

**Dr. Steven M. Vamosi** - Ecological interactions in speciation and extinction. Evolution of hosts and prey in response to attack by parasitoids and predators. Ecological character displacement, phylogenetics, and sexual conflict. Email: [smvamosi@ucalgary.ca](mailto:smvamosi@ucalgary.ca)

Emeritus Associate Professor & Adjuncts

**Dr. M. M. Bentley** - Molecular and developmental genetics in *Drosophila melanogaster*. Email: [bentley@ucalgary.ca](mailto:bentley@ucalgary.ca)

**Dr. Gordon Pritchard** - 1) Functional morphology of insects; 2) Insect phylogeny and systematics; 3) Impact of highways on insects. Email: [gpritcha@ucalgary.ca](mailto:gpritcha@ucalgary.ca)

**Dr. Robin Owen** - Evolutionary genetics of the Hymenoptera and include: bumble bee genetics, ecology and taxonomy; theoretical population genetics of X-linked and haplodiploid systems; and insect mimicry. Email: rowen@mtroyal.ab.ca

### Courses offered with an entomology component

#### *Undergraduate*

Ecology 417. Aquatic Communities and Ecosystems. Community composition and dynamics at the various trophic levels of aquatic ecosystems. Temporal and spatial changes in community composition, physical and chemical conditions, and their effects on the ecosystem.

Ecology 491. Ecological Entomology. Insect diversity. Terrestrial and aquatic adaptations. Chemical ecology and insect relationships with plants. Behavioural ecology with emphasis on social insects. Insect populations and their natural and artificial control.

Ecology/Zoology 507.89. Insect Biodiversity. A 10-day intensive field course designed to provide a detailed introduction to the natural history and classification of insects. Material covered will include: techniques for collecting and identification of major groups of insects and related terrestrial arthropods (spiders, ticks, etc.); aspects of behaviour and ecology of local species; use of insects as indicators of environmental change; censusing/monitoring insect populations.

Zoology 375. An Introduction to Invertebrate Zoology. A survey of the invertebrate phyla with particular reference to those which exemplify the following grades of organization; protoplasmic, cellular, tissue, and organ-system and within the latter - acoelomate, pseudocoelomate, schizo-coelomate and enterocoelomate. Emphasis is placed on functional morphology of major phyla.

Zoology 475. The phylogeny of the invertebrates; the relationships and adaptive radiation of all animal phyla, with emphasis on those structural and functional characteristics that are of evolutionary significance.

### Financial support

The University of Calgary offers a number of undergraduate scholarships which are administered through the Office of Student Awards and Financial Assistance. It can also provide information regarding federal and provincial financial assistance. For graduate students, the Department has available a limited number of Teaching Assistantships. There are also a large number of scholarships and awards offered by government, industry, and other agencies which graduate students can apply for.

### Admissions and enquiries

Given the large number of undergraduate and graduate programs offered by the Department it is suggested that prospective students access information via the Web. The University of Calgary can be accessed at [www.ucalgary.ca](http://www.ucalgary.ca). They will be able to consult the current Calendar regarding admission requirements, programs, and courses as well as up-to-date information on services and activities. Prospective students may also access the web homepage for the Department of Biological Sciences at [www.bio.ucalgary.ca](http://www.bio.ucalgary.ca). Prospective students may also contact the General Office in the Department; telephone 403-220-3140; fax 403-289-9311.

## **Saskatchewan**

### **University of Saskatchewan**

#### **Department of Biology**

University of Saskatchewan  
112 Science Place  
Saskatoon, SK  
S7N 5E2

Telephone: 306-966-4399

Fax: 306-966-4461

Homepage: [www.usask.ca/biology](http://www.usask.ca/biology)

#### **Department of Applied Microbiology and Food Science**

University of Saskatchewan  
51 Campus Drive  
Saskatoon, SK  
S7N 5A8  
Homepage: [www.ag.usask.ca/departments/amfs/index.html](http://www.ag.usask.ca/departments/amfs/index.html)

#### **Department of Plant Sciences**

University of Saskatchewan  
51 Campus Drive  
Saskatoon, SK  
S7N 5A8  
Telephone: 306-966-5855  
Fax: 306-966-5015  
Homepage: <http://www.usask.ca/agriculture/plantsci/index.html>

### Research and academic facilities

The University of Saskatchewan has approximately 15 000 undergraduate students and over 1 700 graduate students in over 100 areas and disciplines. Located in the center of the Canadian prairies, the U of S maintains a strong agricultural component. The University is central to the development of Canada's most vibrant agricultural research and development community, which has become world famous for the application of biotechnology in the agriculture industry. In addition to the University farm on campus, the U of S owns three research farms located off-campus and has under lease Matador Research Station on the edge of Lake Diefenbaker and a scenic 52-hectare site at Emma Lake, both remarkable sites for biological research. The University is also home to Innovation Place, one of the most successful research parks in North America with over 100 organizations in industries such as agriculture, novel foods, computing and telecommunications, pharmaceuticals, and the environmental sciences. University researchers attract over \$55 million in research funding each year. The annual investment in the local R&D community, including Innovation Place, is approximately \$200 million. This includes the federally and provincially funded agriculture research installations. The Canadian Light Source synchrotron project (Canada's largest science and technology project in a generation) will be built at the U of S by late 2003. Research at the U of S has resulted in the first genetically engineered vaccine for animals, the first Canadian experiment undertaken aboard a space shuttle, and the introduction of over 100 new crop varieties.

A great deal of entomological research ranging from insect biochemistry and physiology, to field ecology and taxonomy, is conducted at the Saskatoon Research Centre, Agriculture & Agri-Food Canada's research station located on the U of S campus. Several of the AAFC researchers are affiliates of

the U of S, providing an excellent opportunity for interaction between the university community and the research facility. This association allows for graduate students and even undergraduates to conduct research projects at AAFC while completing their studies at the U of S.

#### List of faculty

**Dr. A. Davis**, Department of Biology. Plant Morphology: Nectaries and nectar secretion, including floral mutants; plant-insect relationships. E-mail: [davisa@duke.usask.ca](mailto:davisa@duke.usask.ca).

**Dr. M.A. Erlandson**, Adjunct professor, Agriculture and Agri-Food Canada, Saskatoon Research Centre, Ecological Pest Management Section. Insect Pathology: baculovirus (nuclear polyhedrosis virus) and *Bacillus thuringiensis* as Bertha Armyworm and Diamondback Moth biocontrol agents; *Beauveria bassiana* (a deuteromycete fungus) and an entomopoxvirus group of insect-specific viruses as grasshopper biocontrol agents. E-mail: [erlandsonm@em.agr.ca](mailto:erlandsonm@em.agr.ca).

**Dr. C. Gillott**, Professor Emeritus, Department of Biology. Insect physiology and control: Regulation of growth and reproduction; biological control. E-mail: [gillott@duke.usask.ca](mailto:gillott@duke.usask.ca).

Dr. J. Gray, Department of Biology. Insect Neurobiology: How the insect nervous systems makes use of multi-sensory cues to produce adaptive flight behaviours; utilizes a combination of behavioural and electrophysiological techniques to record from insects flying in a wind tunnel and virtual reality-based flight simulator. E-mail: [jrg138@duke.usask.ca](mailto:jrg138@duke.usask.ca).

**Dr. D.D. Hegedus**, Adjunct professor, Agriculture and Agrifood Canada, Saskatoon Research Centre, Molecular Genetics Section. Antibiosis: Generation of transgenic canola expressing genes for insecticidal or anti-feedant proteins. E-mail: [hegedusd@em.agr.ca](mailto:hegedusd@em.agr.ca).

**Dr. G.G. Khachatourians**, Department of Applied Microbiology and Food Science. Entomological Microbiology. E-mail: [khachatouria@sask.usask.ca](mailto:khachatouria@sask.usask.ca).

**Dr. D. Lehmkuhl**, Department of Biology. Ecosystems: Biology and taxonomy of aquatic insects; environmental impact studies. E-mail: [lehmkuhl@duke.usask.ca](mailto:lehmkuhl@duke.usask.ca).

**Dr. R.L. Randell**, Department of Biology. Systems ecology: Ecosystem organization; integrated pest management; digital computer simulation. E-mail: [randell@sask.usask.ca](mailto:randell@sask.usask.ca).

#### Courses offered with an entomology component

##### *Undergraduate courses*

BIOL 203.6 Animal Structure and Function. Surveys the structure, function, and evolution of the major groups of vertebrate and invertebrate animals.

BIOL 364.3 Economic Entomology. Emphasizes the ecological aspects of economic entomology. Includes a laboratory and lecture survey of economically important arthropods, a consideration of the principles of pest control and discussion of pesticides.

BIOL 365.3 Insect Diversity and Evolution. Surveys insects and their close relatives based on morphology and taxonomy. Focuses on insect natural history, comparative anatomy and classification. Representative types examined in the laboratory provide an understanding of current trends in insect taxonomy and phylogeny.

BIOL 366.3 Insect Structure and Function. Introduction to structure and function in insects. Topics are the

integument, sensory systems, nervous and chemical coordination, gaseous exchange, food intake and utilization, metabolism, haemolymph and circulation, excretion, osmoregulation, reproduction, growth, and development. Comparisons with vertebrate physiological systems are made as appropriate.

BIOL 368.3 Higher Invertebrate Structure and Function. A study of the functional morphology of higher invertebrate animals. Laboratories investigate the physiology of invertebrates.

BIOL 436.3 Animal Parasitology. Deals with helminths, arthropods and protozoa of people, domestic and wild animals, and birds. Examples from these parasite and host types will be used to illustrate important concepts, including basic structure and function, life cycles, ecology, biogeography, individual and population level host-parasite-environment relationships, epizootiology and parasite control strategies.

BIOL 466.3 Aquatic Insects. Identification of aquatic insects, discussions of current literature, field trips, collections, and laboratory work. Note: Students are advised to contact the instructor about making a collection of insects the summer before enrolling in the course.

AP MC 433.3 Microbial Insecticides. The use of microorganisms as biological insect pest control agents is a rapidly advancing area of biological, agricultural and environmental significance. Examines the microbiology and molecular biology of such pest control agents.

PL SC 311.3 General Apiculture. Introduction to the science and practice of beekeeping. Subjects include the morphology and physiology of the honey bee, beekeeping equipment, manipulation of bees, swarm control, increase, honey production, bee diseases and wintering.

PL SC 332.3 Horticulture Entomology. Introduction to insect problems of horticultural crops. A practical emphasis on problem diagnosis and some consideration of subsequent management in an ecological context. The diagnosis and management of insect problems are specifically oriented towards vegetable, fruit, and ornamental crops in commercial fields, protected environments, recreational areas and gardens.

#### *Graduate courses*

BIOL 871.3 Advanced Insect Physiology. A review of recent advances in certain fields of insect physiology.

AP MC 833.3 Microbial Insecticides. Microorganisms as biological insect pest control agents is a rapidly advancing area of applied microbiology and agriculture. Examines the microbiology and molecular biology of such pest control agents.

AP MC 838.3 Laboratory in Microbial Insecticides. Experimental methods in the production, molecular analysis and use of microbial insecticides. Commercially available and experimental microbial insecticides will be used to demonstrate principles of bioassay, culturing pathogens, characterization of insecticidal molecules, mycoinsecticide action, cuticle degrading enzyme production and commercial bacterial insecticide application technology.

## **Manitoba**

### **University of Manitoba**

Department of Entomology  
University of Manitoba  
Winnipeg, Manitoba  
R3T 2N2  
Canada

Telephone: 204-474-9257

Fax: 204-474-7628

Homepage: <http://www.umanitoba.ca/faculties/afs/entomology/>

### Research and academic facilities

Entomology became a separate Department within the Faculty of Agriculture in 1920. The first MSc student graduated in 1951, and the first PhD in 1962. The Department's main focus is now undergraduate and graduate teaching, and research. Undergraduate teaching is within the framework of degrees or diplomas of the Faculty of Agricultural and Food Sciences. The Faculty does not offer a bachelors degree in Entomology but, within the framework of a bachelor's degree program it is possible to take a sequence of up to nine courses given in the Department. About half of the graduate work and research activity in the Department is in applied areas. Additionally, all academic staff do active research, and supervise graduate work, on fundamental entomological topics. Departmental research facilities include the J.B. Wallis Museum of Entomology (<http://www.umanitoba.ca/faculties/afs/entomology/jbwallis.html>), controlled environment chambers and an area for apiculture. Other accessible facilities include a scanning electron microscope, pesticide analysis laboratories, livestock, field plots and commercial scale fields, and greenhouse space. The University of Manitoba is the oldest university in western Canada, and is a coeducational, non-denominational government-funded institution with about 24 000 students and 6 000 academic and support staff. The Department of Entomology is on the main campus, which is about 11 km south of the centre of Winnipeg. The Department offers MSc and PhD degrees. In either program, students must achieve a high standard in a research project and in a thesis reporting their results. Students must also take some course work, including a course intended to develop written and oral communications skills, to promote critical thinking and to provide exposure to diverse fields of entomology and related sciences. Current enrolment in the Department's graduate programs is 20 students

### LIST OF FACULTY

#### **Neil J. Holliday, Ph.D. (Bristol) - Department Head**

Ecology and management of crop pest insects, biological control, population biology and ecology of carabid beetles, feeding and evolutionary ecology of geometrid moths, biodiversity in managed forest ecosystems.

Email: [neil\\_holliday@umanitoba.ca](mailto:neil_holliday@umanitoba.ca)

<http://www.umanitoba.ca/faculties/afs/entomology/staff/faculty/hollidaypage.html>

#### **Rob Currie, Ph.D. (Manitoba)**

Pheromonal regulation of vitellogenesis in worker honey bees, management of varroa mites, the application of honey bee pheromones in crop pollination and physiological, ecological, and behavioural studies of insect pollinators.

Email: [rob\\_currie@umanitoba.ca](mailto:rob_currie@umanitoba.ca)

<http://www.umanitoba.ca/faculties/afs/entomology/staff/faculty/curriepage.html>

**Terry Galloway, Ph.D. (Manitoba)**

Biology and management of arthropod pests of wild and domestic animals, interactions of ectoparasites and their hosts, taxonomy of flea larvae, forensic entomology and life histories and production of aquatic insects.

Email: [terry\\_galloway@umanitoba.ca](mailto:terry_galloway@umanitoba.ca)

<http://www.umanitoba.ca/faculties/afs/entomology/staff/faculty/gallowaypage.html>

**Rob Roughley, Ph.D. (Alberta)**

Systematics, evolution and biogeography of water beetles and other taxa. Biodiversity of grassland ecosystems. Graduate students are encouraged to develop independent research projects on the taxon of their choice.

Email: [rob\\_roughley@umanitoba.ca](mailto:rob_roughley@umanitoba.ca)

<http://www.umanitoba.ca/faculties/afs/entomology/staff/faculty/roughleypage.html>

SENIOR SCHOLARS

**Pat MacKay, Ph.D. (British Columbia)**

Ecology, physiology and geographic variability of aphid polymorphism, dispersal, overwintering and density regulation. Economic aspects of aphid biology, including economic thresholds and sequential sampling schemes for aphid pests of field crops.

Tel: (204) 474-9204

Email: [pa\\_mackay@umanitoba.ca](mailto:pa_mackay@umanitoba.ca)

ADJUNCT PROFESSORS

Adjunct and Honourary Research Professors associated with the Department may supervise graduate students, but some are available only to be members of student's advisory committees. Current adjuncts, their affiliations and areas of expertise are given below. Enquiries about willingness to supervise graduate students should, in the first instance, be directed to the Department Head.

<b>Name</b>	<b>Affiliations</b>	<b>Area of interest</b>
Gail S. Anderson	Simon Fraser University	Forensic entomology
Rob Anderson	University of Winnipeg	Biting flies, arthropod vectors of disease
Paul G. Fields	Agriculture & Agri-Food Canada	Stored products entomology: alternatives to fumigants
Ulrich Kuhlmann	CABI Bioscience, Switzerland	Biological control of agricultural insect pests
Robert J. Lamb	Agriculture & Agri-Food Canada	Management of crop pests, host plant resistance, aphid biology
L. Robbin Lindsay	Health Canada	Arthropod-borne zoonotic diseases
Peter G. Mason	Agriculture & Agri-Food Canada	Biological and integrated control of agricultural insects pests
Michael J. Paterson	Fisheries & Oceans Canada	Freshwater ecology, roles of aquatic insects in pollutant dynamics
Cheryl Podemski	Fisheries & Oceans Canada	Freshwater ecology, effects of contaminants on aquatic

		invertebrates
David M. Rosenberg	Fisheries & Oceans Canada	Freshwater ecology, aquatic invertebrates as indicators of ecological impact
Marjorie Smith	Agriculture and Agri-Food Canada	Host plant resistance to insect pests
Juliana J. Soroka	Agriculture & Agri-Food Canada	Ecological crop protection, IPM in oilseeds, legumes and grasses
Désirée Vanderwel	University of Winnipeg	Biochemistry, biosynthesis of insect pheromones
A. Richard Westwood	University of Winnipeg	Forest entomology, biology of Lepidoptera
Noel D.G. White	Agriculture & Agri-Food Canada	Protection of stored grain and grain products

### COURSES OFFERED WITH AN ENTOMOLOGY COMPONENT

#### **Undergraduate Courses that require no prerequisite**

##### **038.205 Introductory Entomology**

An introductory survey of insect biology suitable for any student of biology, environment or agriculture.

##### **038.316 Veterinary and Wildlife Entomology**

An introduction to the interactions between vertebrates and insects suitable for those interested the ecology or parasitology of these relationships, in wildlife or livestock management , or in insects as vectors of disease.

##### **038.317 Crop protection entomology**

A course for students who want to learn about principles of controlling insects, the insects that attack crops, and the ecology of insect-crop interactions.

##### **038.432 Pollination Biology**

A course for students interested in insects as pollinators of plants and in the ecology and evolution of the pollination interaction and of social organisms.

#### **Courses requiring the prerequisite of 038.205 Introductory Entomology**

##### **038.428 Aquatic Entomology**

For those interested in the ecology of insects living in water, and their role in aquatic ecosystems

##### **038.450 Insect Taxonomy and Morphology**

For students of systematic biology, or those interested in advancing their knowledge of insect structure and classification

##### **038.452 Physiological Ecology of Insects**

A course for those interested in physiological ecology in general, and those interested in insect-specific aspects of physiology and ecology such as moulting and diapause regulation and parasitoid ecology.

#### **Insect collection course**

From time to time, the Department offers a course in which students make a supervised large collection of insects, and use it to learn about taxonomy and identification. Interested students should contact R.E. Roughley or T.D. Galloway.

## GRADUATE COURSES

### **038.712 Insect Population Management (0-0:3-0) 3 credit hours.**

Term papers, tutorials and workshops to study systems of managing populations of injurious and useful insects based upon models of the processes of insect population dynamics. Prerequisite: consent of instructor. Offered 2005-6 and alternate years thereafter.

**038.715 Advanced Entomology 1 (3) credit hours.** A required course for M.Sc. students in Entomology. Students must submit essays and seminars in areas chosen to fit the requirements of their program. They are required to prepare for and participate actively in discussion sessions and other class meetings. Not available for credit in a Ph.D. program.

**038.720 Advanced Insect Taxonomy (0-0:3-0) 3 credit hours.** Tutorials, laboratory periods and discussion of classification and evolution of insects. Offered 2005- 6 and alternate years thereafter.

**038.721 Special Topics in Entomology (3) credit hours.** The content of this course will deal with specific topics of entomology at the advanced level.

**038.722 Advanced Entomology (3) credit hours.** A required course for Ph.D. students in Entomology. Students must submit essays and present seminars in areas chosen to fit the requirements of their program. They are required to prepare for and participate actively in discussion sessions and other class meetings. Not available for credit in a M.Sc. program.

### **038.723 Advanced Pollination Biology (0-0:3-0) 3 credit hours.**

Tutorials, assignments and discussion periods of current topics relating to the physiology and life history of insect pollinators and their ecological interactions with entomophilous plants. Subjects studied may be selected to fit the interests of individual students. Prerequisite: Consent of instructor.

### **038.724 Advances in Physiological Ecology of Insects (0-0:3-L) 3 credit hours.**

The effect of environmental factors such as temperature, moisture, light and other organisms on the physiology and ecology of insects. Prerequisite: 038.205 or consent of instructor. Not to be held for credit with 038.452. Offered in 2005-6.

## GRADUATE PROGRAMS

The Department of Entomology is the only such in Canada. The department has strong links with agricultural and environmental research organizations in Winnipeg and across Canada, and is uniquely positioned to provide comprehensive graduate training in entomological research. The department offers both M.Sc. and Ph.D. degrees. In both M.Sc. and Ph.D. programs, students must achieve a high standard in a research project and in a thesis reporting their results. Students must also take some course work, including a course intended to develop written and oral communications skills, to promote critical thinking and to provide exposure to diverse fields of entomology and related sciences.

Graduates of the Ph.D. from the Department of Entomology occupy academic positions in a number of universities in Canada and elsewhere, others occupy senior scientist positions with Agriculture Canada, Environment Canada, or other government research and regulatory agencies. Graduates of the M.Sc. program have proceeded to Ph.D. programs elsewhere, while others have entered the workforce following their M.Sc. degree. A high proportion of insect extension specialists in provincial governments in western Canada are graduates of the department's M.Sc. program. Other recent graduates have positions as forest and prairie management ecologists, careers in agribusiness, producer organizations or pesticide companies, or technical positions in research organizations.

## Fields of Research

The research of the department is about equally divided between basic studies and applied studies. The department has faculty in the areas of apiculture and pollination biology; physiological, population and community ecology of insects; insect systematics; insect-vertebrate interactions and aquatic entomology. Particular areas of focus include honey bee parasite management, insects as agents of biological control, crop and livestock entomology, arthropod ectoparasites of mammals and birds, and the study of insect bio-diversity in response to forest and prairie management. Adjunct professors associated with the department provide additional depth and breadth in the areas of forest entomology, pheromone chemistry, crop protection entomology, stored product entomology, forensic entomology, and the role of insects in aquatic ecosystems.

## General Requirements:

### **Admission**

The minimum admission requirement to the M.Sc. programme is a Grade Point Average of 3.00 over the final two years of the undergraduate programme. Admission to the Ph.D. programme requires a Grade Point Average during the Master's programme of at least 3.00. Students with equivalent qualifications will be considered. Students entering either programme are expected to have taken some previous courses in insect biology. Academically strong students without this preparation may be admitted to the M.Sc. degree but will be expected to take additional courses to ensure that they have a strong foundation of entomological knowledge. International students who have not taken a previous degree in English will be required to submit evidence that they meet the University of Manitoba's English language competence requirements before their applications will be considered.

## Financial support

N.S.E.R.C. and other agencies award scholarships tenable in the Department of Entomology. The University of Manitoba offers Graduate Fellowships of \$16,000 p.a. for Ph.D. students and \$12,000 p.a. for M.Sc. students (2004 rates). There are also limited number of Province of Manitoba Graduate Scholarships. Student stipends from a supervisor's research funds are available for some research topics. Teaching assistantships are also available, but should be regarded as supplementary income only; they are insufficient in amount to support students during their programme. The Department does not accept graduate students unless there is assurance of adequate financial support for the normal duration of the graduate program (2 years for M.Sc., 3 or more years for Ph.D.).

## Application Deadlines

The Department of Entomology allows students to begin their program on either 1 September, 1 January or 1 May. For admission for each of these start dates, Canadian and U.S. students should send their applications with complete supporting documentation to arrive in the Department of Entomology at least three (3) months before the intended start date. International students should send their applications with complete supporting documentation to arrive in the Department of Entomology at least seven months (7) before the intended start date.

## M.Sc. in Entomology

### **Admissions**

Admission requirements are those of the Faculty of Graduate Studies found in the [Graduate Studies Regulations](#) section of the Calendar.

[http://webapps.cc.umanitoba.ca/calendar03/faculties/graduate\\_studies/regulations/masters/](http://webapps.cc.umanitoba.ca/calendar03/faculties/graduate_studies/regulations/masters/)

### Program Requirements

In addition to the minimum course requirements of the Faculty of Graduate Studies, students are required to take [038.715 Advanced Entomology 1](#)

<http://webapps.cc.umanitoba.ca/calendar03/search.asp?cou=1&act=search&key=038.715>

Second language reading requirement: none

Expected time to graduation: 2 - 2.5 years

### Ph.D. in Entomology

#### **Admission**

Admission requirements are those of the Faculty of Graduate Studies found in the [Graduate Studies Regulations](#) section of the Calendar

[http://webapps.cc.umanitoba.ca/calendar03/faculties/graduate\\_studies/regulations/phd/](http://webapps.cc.umanitoba.ca/calendar03/faculties/graduate_studies/regulations/phd/)

#### **Program Requirements**

In addition to the minimum course requirements of the Faculty of Graduate Studies, students are required to take [038.722 Advanced Entomology](#)

<http://webapps.cc.umanitoba.ca/calendar03/search.asp?cou=1&act=search&key=038.722>

Second language reading requirement: yes

Expected time to graduation: approximately 3 - 3.5 years

For Graduate Studies admission information,

[http://www.umanitoba.ca/graduate\\_studies/prospective/admissions/](http://www.umanitoba.ca/graduate_studies/prospective/admissions/)

To download the University of Manitoba Graduate Fellowship Application Form, please click

[http://www.umanitoba.ca/faculties/graduate\\_studies/awards\\_scholarships/forms/UMGF05.pdf](http://www.umanitoba.ca/faculties/graduate_studies/awards_scholarships/forms/UMGF05.pdf)

## Ontario

### **Brock University**

Department of Biological Sciences  
Brock University  
St. Catharines, Ontario  
L2S 3A1  
Canada

Telephone: 905-688-5550, extension 3388

Fax: 905-688-1855

Homepage: [www.brocku.ca](http://www.brocku.ca)

### Research and academic facilities

The Department of Biological Sciences, Brock University, offers a program leading to the MSc degree. We have very good ties to the Agriculture Research Station in Vineland, Ontario. In addition, Brock has just opened an Oenology and Viticulture Institute. The Niagara Parks Commission in Niagara Falls, Ontario opened its Butterfly Conservatory in 1997. Most years there will be one graduate student internship available at the Conservatory. The student is expected to teach at the Niagara Horticulture School, conduct research on butterflies at the Conservatory and complete course work leading to the MSc at Brock University. Currently we have two graduate student interns in the program. We have 15 full-time faculty and one sessional lecturer.

### List of faculty

**Dr. Fiona F. Hunter.** She works primarily on systematics and behavioural ecology of biting flies, and is currently involved in West Nile Virus mosquito surveillance in conjunction with the Ontario Ministry of Health and Long Term care. She also has graduate students working at the Niagara Parks Butterfly Conservatory on *Heliconius* butterflies.

**Dr. Miriam Richards** works mostly on the evolutionary biology and ecology of social sweat bees, especially those from Mediterranean regions. She also has interests in insect molecular evolution of bees and human behaviour, focusing on mate choice. Current research projects include field studies of sweat bee sociality and social diversity of bees. She is always on the look-out for new grad students.

### Courses offered with an entomology component

#### *Undergraduate*

BIOL 3P64. Introductory Insect Biology. Familiarity with insects will be gained through field and laboratory exercises and lectures covering morphology, physiology, evolution, ecology, social behavior and harmful and beneficial aspects of the insects.

BIOL 4P64. Insect Behavior. Selected topics in the field of insect behavior including: programming and integration of behavior orientation and dispersal, feeding and plant-herbivore co-evolution, chemical, visual and acoustical communication, defensive behavior, reproductive behavior and the eusocial insects.

#### *Graduate*

Graduate students can take BIOL 4P64 for credit. Usually this means they present an additional seminar and write a longer essay for the course.

### Financial support

Please contact the Department of Biological Sciences for current levels of financial support.

### Admission and enquiries

Admission requires an Honours BSc (at least B+ standing) in some area of the life sciences. Further information can be obtained from Dr Doug Bruce, Graduate Coordinator, Department of Biological Sciences, or consult our home page. The Graduate Studies section has the information regarding admission requirements etc.

**Carleton University / University of Ottawa**

Biology Department  
College of Natural Sciences  
Carleton University  
Ottawa, Ontario  
K1S 5B6  
Canada

Telephone: 613-520-3515  
Fax: 613-520-5613  
Homepages: [www.carleton.ca](http://www.carleton.ca)

University of Ottawa  
Institute of Biology  
Biology Department  
University of Ottawa  
Ottawa, Ontario  
K1N 6N5  
Canada

Telephone: 613-562-5800 or 613-562-6335  
Fax: 613-562-5486  
Homepage: [www.bio.uottawa.ca](http://www.bio.uottawa.ca)

Research and academic facilities

The Ottawa-Carleton Institute of Biology is one of the largest centers in Canada for graduate studies and research in Biology. The Institute was formed in 1982 by the amalgamation of the graduate programs of Carleton University and the University of Ottawa. More than 45 full time faculty and 15 adjunct professors supervise the research of approximately 140 graduate students at the Institute. The Institute has three major fields of research: cell and molecular biology; physiology and biochemistry; and ecology, systematics and behaviour. The Institute also contributes to interdisciplinary specializations including biotechnology, environmental and chemical toxicology, neurosciences, and environment and economic interactions. Because of its location in Canada's capital, Institute scientists have the opportunity to collaborate with the many federal government research scientists in institutions including the National Research Council, Agriculture Canada, Health Canada, National Museums, Environment Canada, Atomic Energy of Canada and Canadian Wildlife Service. It is from these institutions that our adjunct professors are drawn.

Important facilities available to graduate students in Ottawa are the National Science Library (CISTI) and the biological collections and libraries located at the National Museums and Agriculture and Agri-Food Canada. Each graduate student has an advisory committee composed of his/her supervisor and professors from both campuses to provide guidance on the research project. Joint campus committees are also organized for the PhD oral comprehensive exam and the thesis defence. Most graduate courses are team taught by faculty from both campuses and adjuncts from other institutions.

List of faculty

**Dr. J.T. Arnason**; University of Ottawa. Our research group has studied in detail several types of phytochemical defenses in plant families including light activated phytochemicals of the sunflower family, insect antifeedant defenses of the mahogany family, neurotoxins and synergists of the pepper

family, and dehydrodiferulate dimers in cereals. The adaptive response of insects and other pests to these defenses and their applications have been another focus of this research. Currently, our discovery program is studying rare plant families of the neotropics in collaboration with Costa Rican researchers in order to discover new and potentially useful natural plant products. Telephone: (613) 562-5262; e-mail: [jarnason@science.uottawa.ca](mailto:jarnason@science.uottawa.ca).

**Dr. Paul Catling;** University of Ottawa. Research is being directed to the prediction and causes of changing distribution patterns. Subjects include rare native species of agricultural importance with shrinking distributions, as well as invasive aliens with expanding distributions. Systematics and ecology of vascular epiphytes, northeastern North American flora, and the insect groups Lepidoptera and Odonata. Telephone: (613) 759-1373 e-mail: [catlingp@em.agr.ca](mailto:catlingp@em.agr.ca).

**Dr. Naomi Cappuccino;** Carleton University. Population dynamics of alien invasive plants; biocontrol of weeds; population dynamics of insect herbivores; plant-insect interactions. Telephone: 613-520-2600 Ext.7549; e-mail: [ncappucc@ccs.carleton.ca](mailto:ncappucc@ccs.carleton.ca)

**Dr. D. Currie;** University of Ottawa. Macroecology: studies of regional to global scale patterns of species richness, population density, community organization and the natural and anthropogenic factors that influence them. Limnology: studies of the factors that control the abundance and activity of aquatic organisms, as well as the trophic structure of aquatic communities. Telephone 613-562-5800, extension 6355; e-mail [dcurrie@oreo.uottawa.ca](mailto:dcurrie@oreo.uottawa.ca).

**Dr. L. Fahrig;** Carleton University. Population dynamics. Influence of spatial and temporal patterns of habitat on population abundance and survival; effects of landscape structure on dispersal; population response to habitat loss, fragmentation and disturbance. Telephone 613-520-2600, extension 3856; e-mail [lenore\\_fahrig@carleton.ca](mailto:lenore_fahrig@carleton.ca).

**Dr. M.R.L. Forbes;** Carleton University. Putative measures of environmental stress; the evolution of disease virulence; the combined effects of stress and parasitism on animal populations; the evolution of phenotypic plasticity; community ecology of parasites; and the population ecology of the key species in the Bay of Fundy. Telephone 613-520-2600, extension 3873; e-mail [mforbes@ccs.carleton.ca](mailto:mforbes@ccs.carleton.ca).

**Dr. J.G. Houseman;** University of Ottawa. Interests are in the development and evaluation of teaching and learning tools that support the teaching of biology, and sciences, in Higher Education. Previous research focused on the processes, mechanism and regulation of the alimentary tract in insects, including both digestive and detoxification processes. Telephone 613-562-5800, extension 4552; e-mail [houseman@aixl.uottawa.ca](mailto:houseman@aixl.uottawa.ca).

**Dr. L.P. Lefkovitch;** Carleton University, Adjunct professor. Applications of mathematics and statistics in biology; in particular, pattern recognition and clustering in taxonomy and ecology. Telephone 613-224-7963; e-mail [llefkovi@ccs.carleton.ca](mailto:llefkovi@ccs.carleton.ca).

**Dr. Pierre Mineau;** Carleton University. Impact of pest control and pesticide use on terrestrial vertebrates; avian toxicology and exposure characteristics of cholinesterase-inhibiting insecticides; regulatory pesticide risk-assessment methodology; assessing the reproductive, behavioural, and endocrine toxicity of pesticides; farming and biodiversity; the value of birds for insect control; migratory bird conservation and pesticide use in the Americas.

**Dr. A. Morin;** University of Ottawa. Ecology and control of black flies; size spectra of stream assemblages; impacts of human activities on running water ecosystems; primary and secondary productivity of running waters; heavy metal contamination of invertebrate communities of the St Lawrence River; empirical and predictive models in running water ecology; role of meiofauna in the

nitrogen cycle in marine mesocosms; design and optimization of sampling programs. Telephone 613-562-5800, extension 4549; email [amorin@uottawa.ca](mailto:amorin@uottawa.ca).

**Dr. S.B. Peck;** Carleton University. My students design their own research topics or focus, in consultation with a supervisory committee. MSc topics are usually centered in eastern Canada, and PhD topics may have a wider geographic scope. Interested students should contact me with their research plans and interests. The Ottawa area offers my students superb strengths for their research, using the biosystematic collections, government library resources, and professional contact with the arthropod scientists at Agriculture Canada and the Canadian Museum of Nature. Past students have written theses or dissertations on a diverse set of topics in the taxonomy, evolution, ecology or biogeography of various arthropods including the following. 1. The biosystematics and higher phylogenetic classification of Pyralid moths. 2. The biosystematics and higher phylogenetic classification of Empidid flies. 3. Life cycle and ecological impact of the introduced *Polistes versicolor* wasps in the Galapagos Islands. 4. Island biogeography determinants of species diversity in the insect species in the Hawaiian and Galapagos archipelagos. 5. Dead-wood feeding beetles: species diversity and forest structure in managed and naturally disturbed spruce forests in Nova Scotia. 6. The overwintering biology of the European introduced earwig *Forficula auricularia* Linnaeus (Insecta: Dermaptera). 7. The ecology and reproductive biology of the carrion beetle assemblage in the Mer Bleue Bog area of Ontario. 8. The biology and distribution of the Silphidae and Agyrtidae of Canada and Alaska (Insecta: Coleoptera). 9. A taxonomic revision of the Nearctic species of *Himerta* Foerster (Hymenoptera: Ichneumonidae). Telephone 613-520-2600, extension 3860; e-mail [sbpeck@ccs.carleton.ca](mailto:sbpeck@ccs.carleton.ca).

**Dr. B.J.R. Philogène;** University of Ottawa. The development of efficient, environmentally acceptable methods for insect control requires an understanding of the insect's strategies for survival and the host's ability to survive. The search for plant characteristics that render crops more resistant to the attacks of phytophagous insects has resulted in the identification of allelochemicals such as the phototoxic @-terthienyl or berberine, as well as alkaloids and phenolics. Such compounds are either toxic or function as synergists. Moreover they affect the insect's ability to sustain attack by their natural parasites and/or predators. Dr. Philogène is not accepting graduate students for the year 2004. Telephone: (613) 562-5800 Office: ext. 4166, Lab: ext. 4166; e-mail: [bphilog@science.uottawa.ca](mailto:bphilog@science.uottawa.ca)

**Dr. C. Plowright;** University of Ottawa. Current research interests include function and mechanisms of choice behaviour; animal cognition and behavioural ecology; evolutionary approach to animal cognition: how considerations of the adaptive significance of behaviour can shed light onto the mechanisms of learning and choice; food collection behaviour in pigeons and bumblebees. Telephone: (613) 562-5800, Office: ext. 4849, Lab: ext. e-mail: [cplowrit@uottawa.ca](mailto:cplowrit@uottawa.ca)

**K.B. Storey;** Carleton University. Metabolic regulation and the adaptations of cellular biochemistry that allow animals to undertake unique lifestyles or endure extreme environmental stresses. We analyze the molecular mechanisms of natural freeze tolerance in frogs, turtles and insects, and study the regulation of metabolic rate depression in animals that hibernate, estivate or endure prolonged oxygen deprivation. Telephone 613-520-3678; e-mail [kenneth\\_storey@carleton.ca](mailto:kenneth_storey@carleton.ca).

**Dr. Tom N. Sherratt;** Carleton University. I am interested in two main research areas: a) the evolution of behaviour and b) the spatio-temporal dynamics of populations. Work on the evolution of behaviour has asked how cooperation can be maintained among non-relatives, how warning signals evolve and how and why sex-limited polymorphisms are maintained in damselflies. Work on population dynamics has explored new mechanisms for generating travelling waves in natural populations, tested whether seabird populations exhibit density-dependent growth, and examined how invertebrate populations recover from the application of pesticides.

### Financial support

The Biology Department will endeavor to provide a minimum level of personal funding (MLPF) to all students accepted into its programs. This funding will normally be provided for the first two years of the M.Sc. program, the first three years of the Ph.D. program, or for the first four years of study for students who are first admitted to M.Sc. and who subsequently transfer to the Ph.D. Funding will \$16,000 per annum. Most students who do not hold a major external scholarship (ex. NSERC, FCAR, OGS or other government programs) are expected to earn part of the MLPF through teaching assistantships (TA) or research assistantships (RA). The balance of the MLPF is provided as a bursary from the student's supervisor(s). Some additional scholarship support from the University and/or the Department may also be available.

### Admissions and enquiries

Details of the program requirements and regulations are published in the graduate calendars of the University of Ottawa and Carleton University. Students are admitted for graduate work in Biology under the general regulations of the Institute of Biology. Criteria for admission include academic performance (average of at least B+ in the last 2 years of a 4 year undergraduate program), research experience and referees' appraisals. The student must also be accepted by a faculty member who will supervise the student's research project, and funding must be arranged, before admission can be completed. The choice of supervisor will determine the primary campus location of the student. It will also determine which university will award the degree. Additional information is available on our homepage, and from addresses given above.

**McMaster University**  
Department of Biology  
McMaster University  
1280 Main Street West  
Hamilton, Ontario  
L8S 4K1  
Canada

Telephone: 905-525-9140, extension 24400  
Fax: 905-522-6066  
Homepage: [www.science.mcmaster.ca/Biology/Dept.html](http://www.science.mcmaster.ca/Biology/Dept.html)

### Research and academic facilities

McMaster University is located in the west end of Hamilton. The campus includes the Biology Department which is housed in the Life Sciences Building. Collaboration between departments is a vital feature of the scientific research programmes at McMaster. In the Biology Department, research may be undertaken entirely within the department or in conjunction with departments such as Anatomy, Biochemistry, Geology, Pathology, Physics and Psychology.

Biology offers MSc and PhD degrees, and post-doctoral research opportunities. Undergraduate programmes include: philosophy/biology; arts and science/biology; molecular biology/ biotechnology; biology (two options); biology/mathematics; biology/pharmacology and biology/psychology.

In addition to general laboratories, we have animal quarters, a greenhouse and growth chambers, an insectary and a teaching collection, facilities for fish holding and recombinant DNA research and an electron microscope facility which contains transmission, scanning and ESEM microscopes, energy dispersive X-ray analysis and a cryogenic specimen preparation system for SEM. We are well equipped with research equipment such as fluorescence microscopes, ultracentrifuges, radioactivity counters, oligonucleotide synthesizer, HPLC, spectrophotometers and other analytical instruments.

Our department has 33 faculty, 11 associate members, and 9 adjunct faculty members. We have affiliations with three main agencies: the Institute for Molecular Biology and Biotechnology, the Royal Botanical Gardens and the Canada Centre for Inland Waters.

### List of faculty

**Dr. Ana R. Campos.** Genetic and molecular analysis of visual system development in *Drosophila melanogaster*. email: [camposa@mcmaster.ca](mailto:camposa@mcmaster.ca)

**Dr. Patricia Chow-Fraser.** Assessment of anthropogenic impacts on the functional ecology of freshwater ecosystems, in particular, lakes and wetlands of the Great Lakes basin. email: [chowfras@mcmaster.ca](mailto:chowfras@mcmaster.ca)

**Dr. J. Roger Jacobs.** Role of glia in establishment of nervous system morphology and neuronal growth cone guidance in *Drosophila*, using genetic, morphological and molecular tools. email: [jacobsr@mcmaster.ca](mailto:jacobsr@mcmaster.ca)

**Dr. Jurek Kolasa.** Our work concentrates on structure and variability of complex, multi-species assemblages. We are interested to find out how complexity and community interactions affect species extinctions and levels of biodiversity at various scales of time and space. The communities we investigate are invertebrates inhabiting natural rock pools. email: [kolasa@mcmaster.ca](mailto:kolasa@mcmaster.ca)

**Dr. Michael J. O'Donnell.** The cellular mechanisms of ion-transport in insects (*Rhodnius prolixus*), crustaceans and larval fish. email: [odonnell@mcmaster.ca](mailto:odonnell@mcmaster.ca)

**Dr. C. David Rollo.** The integration and functions of behaviour, morphology and physiology relevant to the ecological design of organisms. email: [rollocd@mcmaster.ca](mailto:rollocd@mcmaster.ca)

**Dr. Rama S. Singh.** Evolutionary genetics: molecular genetics of speciation in *Drosophila*; evolution of sex- and reproduction-related genes. email: [singh@mcmaster.ca](mailto:singh@mcmaster.ca)

### Courses offered with an entomology component

#### *Undergraduate*

Biology 2F03. Fundamentals of Ecology. A broad overview of ecology at the level of organisms, populations and communities.

Biology 3MM3. Invertebrate form and function. Analysis of sensory reception, nervous control systems, feeding, skeletal support, locomotion, excretion, respiration and reproduction in selected invertebrates.

Biology 3R03. Field Biology I: Insect Taxonomy/Ecology Module. An introduction to entomology by collecting insects (in order to make a synoptic collection), giving a seminar and writing a research paper.

#### *Graduate*

Biology 709. Special Topics in Biology. Studies requiring selection from specialized areas of research as approved by the Biology Department.

### Financial support

There are many awards and scholarships available to undergraduate students. Contact: Kathy McIntosh, Undergraduate Assistant at 23049. Stipends are available for MSc and PhD candidates, and are paid by the Department, partly from research grants and partly in the form of Teaching Assistantships. Minimum levels of support in the Department of Biology for 2000/2001 are \$15,601 for an M.Sc. and \$16,65 for a PhD. These levels of support depend on funding from government so these stipends may vary year to year. Scholarships from outside agencies are available to qualified students as are University scholarships for outstanding graduate students. Contact Pat Hayward, telephone extension 23546, for more information regarding graduate stipends in Biology.

### Admissions and enquiries

To enter the Arts and Science or Natural Sciences Programme at McMaster you must have certain Ontario Academic Credits (OACs). For the details, please contact the Associate Registrar in Gilmour Hall Room 108, L8S 4L8; telephone extension 24796.

For admission into the MSc programme in Biology, the candidate must have a B+ standing in the final year of a Honours BSc (4 year degree) programme. To enter the PhD programme, the candidate must have first class standing in an Honours BSc programme or a MSc with a B+ standing. For more information, please contact Pat Hayward, telephone extension 23546.

**Queen's University**  
Department of Biology  
Queen's University  
Kingston, Ontario  
K7L 3N6  
Canada

Telephone: 613-533-6160  
Fax: 613-533-6617  
Homepage: [biology.queensu.ca/](http://biology.queensu.ca/)

The Department offers general biology courses which include material on insect physiology, molecular biology, biotechnology and ecology. Graduate courses are offered on insect physiology, genetics and molecular biology. Active research at the undergraduate, MSc, PhD and postdoctoral levels is on aspects of insect neurobiology, behaviour, development, cell biology and molecular biology. Visit our web site for a brief description of courses and research programs.

### Faculty

**Dr. William G. Bendena.** Insect molecular biology and biochemistry: Our research is focused on the molecular description of neuropeptides, their biosynthesis, interaction with receptors and final mechanism of action. In particular, we have focused on neuropeptide families and their receptors that appear insect-specific and whose lack of expression and/or inappropriate expression may have catastrophic effects on the physiology and/or behaviour of insects. email: [bendenaw@biology.queensu.ca](mailto:bendenaw@biology.queensu.ca)

**Dr. R. Meldrum Robertson.** Neural circuits and motor patterning: Some specific projects interesting me at present are: 1. the effect of temperature on the operation of interneuronal circuitry; 2. the protective effect of heat shock on the operation of neural circuits. 3. plasticity at the insect neuromuscular junction. email: [robertrm@biology.queensu.ca](mailto:robertrm@biology.queensu.ca)

**Dr. Virginia K. Walker.** Genetics and molecular biology of insect development: Our research interests concern the regulation of gene expression during development and in response to environmental and chemical stress. We address this problem in insects in two related, and overlapping, efforts. In the area of resistance to chemical stresses, we study the molecular genetic basis of resistance to an anti-cancer drug in the fly, *Drosophila*, (with Dr. S. Cole) and the moth, *Heliothis*, as well as examine the possible chemical control of locusts using growth regulators (with Dr. E. Ball, Australia and Dr. G. Wyatt). Investigations on resistance to environmental stress of cold and desiccation use *Drosophila* (with Dr. A. Chippindale), the *Tenebrio* beetle and the spruce budworm, *Choristoneura*. Thermotolerance experiments have been done in locusts (with Dr. M. Robertson). The work on cold tolerance led to the isolation and cloning of the first insect antifreeze protein genes (with Dr. P. Davies), and modeling of their action (with Z. Jia). email: [walkervk@biology.queensu.ca](mailto:walkervk@biology.queensu.ca)

### Courses offered with an entomology component

#### *Undergraduate*

BIOL-307 Field Biology I : Two weeks of field work plus written assignments in one or two areas of study to be done when specialized modules are available in May, July, August or February. Studies may include ecology of birds, fish, insects, small mammals, plants, tundra and taiga, lakes and caves. The schedule of offerings for each year is available in January.

BIOL-423 Modern Insect Science: An exploration into the world of insects, one of the most abundantly successful group of organisms on the earth.

BIOL-507\* Insect Biotechnology.

Financial support

All students accepted for admission into a graduate program are considered for limited departmental funding. In addition to departmental funding, there are some internal fellowships and scholarships available annually. See website for further details.

**Sir Sanford Fleming College**

School of Natural Resources  
Sir Sanford Fleming College  
PO Box 8000  
Lindsay, Ontario  
K9V 5E6  
Canada

Telephone: 705-324-9144

Homepage: [www.flemingc.on.ca](http://www.flemingc.on.ca)

On-line courses include Forest Entomology & Pathology, and Bio-Art: The Art of Nature. All of these courses are "fully accredited courses", and come complete with illustrated lecture notes, all assignments and evaluations. Every project can be completed via e-mail, in a totally paperless manner. You can even register on-line.

## **University of Guelph**

Ontario Agricultural College  
Department of Environmental Biology  
University of Guelph  
Guelph, Ontario  
N1G 2W1  
Canada

Telephone: 519-824-4120  
Fax: 519-837-0442  
Homepage: [www.uoguelph.ca](http://www.uoguelph.ca)

### Research and academic facilities

The Department of Environmental Biology, one of several academic units in the Ontario Agricultural College, offers degrees in BSc (in Environmental Biology, Plant Biology, and Toxicology and Environmental Protection), MSc and PhD (both in Plant Protection or Environmental Management). The two major areas of specialization in the Department are plant protection and environmental management, and include studies in entomology (pest management, systematics, ecology, physiology, and toxicology), plant pathology, weed science, apiculture, pollination biology, agroforestry, pesticide chemistry and toxicology, biological control, environmental microbiology, and aquatic biology. The Department has a wide variety of well-equipped laboratories, field research stations, greenhouses and other facilities at several locations. There are 22 full-time and nine emeritus and adjunct faculty, 17 fulltime

technical and administrative staff and more than 40 full-time contract staff. The Department also has close working arrangements with several government laboratories, and cooperates with several agencies on international programs concerning plant protection and environmental management. The Department has about 90 graduate students (40% in the PhD program). MSc students complete their programs in about 7 semesters; PhD students in about 11 semesters.

### List of faculty

**Dr. Ernesto Guzman.** Honey bee genetics and behavior. Honey bee pathology. email: [eguzman@uoguelph.ca](mailto:eguzman@uoguelph.ca)

**Dr. J. Christopher Hall.** Immunochemical techniques for pesticide detection, mode of action of herbicides. email: [jchall@uoguelph.ca](mailto:jchall@uoguelph.ca)

**Dr. Rebecca Hallett.** Vegetable pest management, chemical ecology of insects, insect-plant interactions, host plant resistance. email: [rhallett@uoguelph.ca](mailto:rhallett@uoguelph.ca)

**Dr. Peter G. Kevan.** Pollination biology, plant breeding systems, crop and native vegetation and insect fauna, apiculture, applied and conservation ecology, foraging behaviour. email: [pkevan@uoguelph.ca](mailto:pkevan@uoguelph.ca)

**Dr. Stephen A. Marshall.** Phylogeny and zoogeography of parasitic & saprophagous flies; distribution & identification of Ontario insects. email: [samarsha@uoguelph.ca](mailto:samarsha@uoguelph.ca)

**Dr. Gard W. Otis.** Honey bee behaviour, ecology, and evolution; Asian honey bees; parasitic mites of bees; tropical biology; forest entomology. email: [gotis@uoguelph.ca](mailto:gotis@uoguelph.ca).

**Dr. Jonathan M. Schmidt.** Insect physiology, sensory and nutritional aspects of insect parasitism and predation. email: [jonschm@uoguelph.ca](mailto:jonschm@uoguelph.ca)

**Dr. Cynthia D. Scott-Dupree.** Integrated management of insect pests of crops; insect resistance to insecticides; impact of agroecosystems on non-target insects in field and greenhouse environments. email: [cscottdu@uoguelph.ca](mailto:cscottdu@uoguelph.ca)

**Dr. Mark K. Sears.** Biology and control of insect pests of field crops; management of resistance to insecticides; non-target effects of transgenic crops. email: [msears@uoguelph.ca](mailto:msears@uoguelph.ca)

**Dr. Paul Sibley.** Water and sediment quality; invertebrate toxicology; environmental impact assessment using benthic communities. email: [psibley@uoguelph.ca](mailto:psibley@uoguelph.ca)

**Dr. Keith R. Solomon.** Fates, effects & toxicology of pesticides; insect resistance to pesticides. email: [ksolomon@uoguelph.ca](mailto:ksolomon@uoguelph.ca)

### Courses offered with an entomology component

#### *Undergraduate*

ENVB-204. Biology of Plant Pests. An interdisciplinary course on the nature and importance of diseases, weeds, Insects and abiotic stresses on plant productivity and quality. A case history approach will be used to illustrate the biology of plant pests, the principles of pest population management, and related topics.

ENVB-221. Introductory Apiculture. Designed to acquaint the student with the broad field of beekeeping. Will include honey bee biology and behaviour, management for honey production, products of the hive, pests and enemies and the value of bees as pollinators of agricultural crops. Frequent audio visual presentations.

ENVB-303. Pesticides and the Environment. The role and use of pesticides by various facets of society and the effect of these pesticides on biological activities in the environment. A research proposal is required.

ENVB-304. Natural Chemicals in the Environment. The role of naturally occurring chemical substances in the interrelationships of organisms, population dynamics and the structure of ecosystems, and the role of such chemicals in the biological regulation and control of pests.

ENVB-309. Insects in Relation to Wildlife. A survey of the more common insects of importance to wildlife and outdoor recreation.

ENVB-311. Natural History of Insects. An introduction to the natural history and field identifications of the more common families of insects occurring in Ontario.

ENVB-404. Behaviour of Insects. Investigation of the behaviour of insects within an ecological and evolutionary framework. Topics range from basic behavioral principles to the complex behaviour exhibited by the social insects.

ENVB-409. Biological Control: Insects. Studies of natural controls that are used to regulate populations of insects and weeds. The course will examine the role of parasitoids, predators and pathogens in managing pest populations.

ENVB-410. Applied Entomology. A study of the life histories and pest management practices employed against insect pests of various plant and animal hosts. Principles of economic entomology are illustrated using specific insect pests as examples.

ENVB-422. Biology of Aquatic Insects. A study of the adult and immature forms of aquatic insects.

ENVB-424. Biological Activity of Pesticides. A study of the fate and mode of action of pesticides, e.g., insecticides herbicides and fungicides.

ENVB-426. Field Entomology. An introduction to insect sampling, observation, and experimentation in field situations. Lectures and discussions on the biology of the insect fauna of the field site. Students conduct two projects (individual or small group): (1) a diversity study involving the observation, collection and identification of selected groups of insects and (2) a behaviour/ecology study utilizing experimental techniques to test hypotheses.

ENVB-427. Insect Biosystematics. A study of the lesser known groups of native insects and an introduction to taxonomic procedure and the principles of insect systematics. A collection of at least 500 insects is required.

ENVB-442. Problems in Environmental Biology. Students will select a research problem in an area of special interest. Direction will be given by a faculty member concerned with entomology-apiculture, applied microbiology, weed science and environmental physiology, plant pathology, etc., as represented within the department.

ENVB-455. Ecotoxicological Risk Characterization. A biologically based, advanced course that will give students working knowledge of current processes and techniques for ecotoxicological risk characterization. Course material covers, dose response characterization, exposure characterization, risk assessment, and risk management decision making.

ENVB-478. Forest Ecology. Principles of forest ecology with emphasis on the ecological principles needed for sound forest management. Biotic and abiotic components of forest ecosystems will be discussed in the context of energy flow, nutrient cycling, forest succession and appropriate silvicultural systems.

ENVB-480. Topics in Applied Biology. An integrated overview of those areas of applied biology that are of special interest to environmentalists. Lectures and discussions will be presented by faculty and other professionals from research, business, education and technical fields. Students will conduct seminars on selected topics.

#### *Graduate*

ENVB-6340. Colloquium in Insect Systematics. Weekly discussions and seminars dealing with current topics in systematic entomology.

ENVB-6370. Physiology of Insects. Students will be assigned a library exercise and will select a laboratory project in their own area of interest. Emphasis will be placed on techniques and familiarity with current literature.

ENVB-6400. Biological Control. A study of the practical and theoretical methods of using biological agents to reduce or modify invertebrate populations.

ENVB-6540. Insect Pest Management. The course will examine the various methods of controlling insects and the development of pest management programs.

ENVB-6520. Pollenation Biology. Pollination biology is discussed from both entomological and botanical viewpoints, stressing fundamental and applied aspects.

ENVB-6620. Management and Biology of the Honey Bee. An in-depth treatment of advanced topics related to honey bees, including management techniques such as wintering bees, queen rearing and instrumental insemination, comb-honey production, genetics and breeding of honey bees, caste determination, and social behaviour of honey bees. Discussion sections will focus on recent research.

ENVB-6450. Topics in Environmental Biology. This course provides graduate students, either individually or in groups, with the opportunity to pursue topics in the major areas of departmental specialization: plant protection and environmental management. This course may be offered in any of lecture, reading/seminar, or individual project formats.

ENVB-6530. Ecotoxicological-Risk Characterization. A biologically based, advanced course that will give students working knowledge of current procedures and techniques for ecotoxicological-risk characterization. Course material covers: dose-response characterization, exposure characterization, and risk assessment and risk-management decision making.

3406550. Bioactivity and Metabolism of Pesticides. The basis of pesticide bioactivity will be examined, with emphasis on mode of action, structure-activity relationships and analytical methods. Students will participate in seminars and prepare a research paper and/or conduct a laboratory research project upon consultation with the instructor(s).

ENVB-6570. Pesticide Toxicology Colloquium. A literature review and open discussion course designed to critically analyze issues of pesticide toxicology and their relevance to human health and the environment.

#### Financial support

The number of graduate students which the Department will accept is limited and the Department has a policy that guarantees each student a minimum level of support, currently \$16 500 a year. Additional sources of income include graduate teaching assistantships and scholarships.

#### Admissions and enquiries

For information about the graduate program, contact the Graduate Coordinator, Department of Environmental Biology, University of Guelph, Guelph, Ontario, N1G 2W1, Canada.

**University of Toronto**

Department of Zoology  
St. George Campus  
University of Toronto  
Ramsay Wright Zoological Laboratories  
25 Harbord Street  
Toronto, Ontario  
M5S 1A1  
Canada

Telephone: 416-978-2084

Fax: 416-978-8532

Homepage: [www.zoo.utoronto.ca/](http://www.zoo.utoronto.ca/)

Research and academic facilities

The Department of Zoology at the University of Toronto is the largest and most diversified institution of its kind in Canada. Staffed by more than 70 professors, the Department supervises a population of approximately 150 graduate students. Over thirty graduate courses are offered by members of the Department. The collective research interests of the staff cover almost every area of the discipline and, thanks to a system of cross-appointments with other cognate departments, many of our faculty members are engaged in substantial interdisciplinary research.

Although there are no specific undergraduate or graduate programs in entomology, research dealing with insects occurs in each of the Department's main research programs: Genetics, Cell, Molecular, and Developmental Biology; Physiology; Ecology and Ethology; and Evolutionary Biology. The department, through its close association with the Royal Ontario Museum, is one of the few training centres for Systematic Entomology in Canada and both MSc and PhD students have access to the collections and work under supervision of cross-appointed ROM curators. Other areas of strength are insect neurobiology and endocrinology, and physiology, molecular and development biology.

List of faculty

**T.M. Alloway.** Research on social biology of ants. [antguy@abspruce.org](mailto:antguy@abspruce.org)

**Harold Atwood.** Research encompasses the structure, function, and development of the nervous system and muscles. Specific areas of study are (1) long-term physiological and morphological alterations of synapses induced by changes of activity and by neurohormones, (2) synaptic transmission, (3) effects of inhibitory nerve fibres, (4) genetic effects on synaptic transmission in the fruit fly, *Drosophila*. Email: [h.atwood@utoronto.ca](mailto:h.atwood@utoronto.ca)

**Michael Barrett.** Michael studies the physiology and biochemistry of insect growth and metamorphosis, with emphasis on the mechanisms of sclerotization in insect cuticle and the role of biogenic amines and peptides in the control of feeding behaviour in bloodsucking insects. E-mail: [barrett@zoo.utoronto.ca](mailto:barrett@zoo.utoronto.ca).

**Doug Currie.** Doug is curator of entomology at the Royal Ontario Museum, and is interested in the systematics and comparative biology of aquatic insects, especially blackflies and caddisflies. E-mail: [dcurrie@zoo.utoronto.ca](mailto:dcurrie@zoo.utoronto.ca)

**Chris Darling.** Chris is curator of entomology at the Royal Ontario Museum, and is interested in the systematics and biology of parasitic Hymenoptera. E-mail: [chrisd@rom.on.ca](mailto:chrisd@rom.on.ca).

**Sherwin Desser.** Sherwin is a parasitologist who studies mosquitoes and ceratopogonids as vectors of protozoan parasites. E-mail: [wired@zoo.utoronto.ca](mailto:wired@zoo.utoronto.ca).

**D.L. Gibo.** Biology of social insects. Email: [dgibo@utm.utoronto.ca](mailto:dgibo@utm.utoronto.ca)

**Dorothea Godt.** To find and analyze the factors that are involved in morphogenesis of cells my laboratory uses a genetic approach. We study the development of the ovary of *Drosophila melanogaster*. Email: [dgodt@zoo.utoronto.ca](mailto:dgodt@zoo.utoronto.ca)

**James Fullard.** Research involves the senses (mostly hearing) and behaviours of insects (mostly moths) and bats in temperate and tropical environments. Email: [jfullard@utm.utoronto.ca](mailto:jfullard@utm.utoronto.ca).

**D.T. Gwynne.** Sexual selection and arthropod mating systems. [dgwynne@utm.utoronto.ca](mailto:dgwynne@utm.utoronto.ca)

**Ellen W. Larsen.** Ellen is interested in how genes affect the shape of adult organs in fruit flies. E-mail: [ellenw@zoo.utoronto.ca](mailto:ellenw@zoo.utoronto.ca).

**Angela Lange.** My research interests lie within the field of insect reproductive physiology. In particular, I am interested in the means by which cells and tissues communicate with one another in order to produce integrated and coordinated output. To this end, I have developed a model system in which I have identified motor and modulatory input onto the oviducts of the locust, *Locusta migratoria*. These inputs must be coordinated in order to produce the correct response at the appropriate time (e.g. egg-laying). This work entails neurophysiology, neurochemistry, receptor physiology and signal transduction. Work of this nature can furnish the means of controlling insect pests by development of new insecticides. Email: [alange@credit.erin.utoronto.ca](mailto:alange@credit.erin.utoronto.ca)

**A.C. Mason.** Focuses on sensory processes underlying communication and decision-making, concentrating on insect systems, since insects offer attractive and simple systems for study. Email: [amason@utsc.utoronto.ca](mailto:amason@utsc.utoronto.ca)

**Ian Orchard.** Ian investigates the neurobiology of peptidergic and aminergic neurons in insects, especially the way these neurons control target tissues. E-mail: [ian.orchard@utoronto.ca](mailto:ian.orchard@utoronto.ca)

**Patricia Romans.** Patricia studies molecular biology and genetics of the malaria vector mosquito *Anopheles gambiae*, especially germ line transformation technology and genes involved in melanotic encapsulation. E-mail: [victorie@zoo.utoronto.ca](mailto:victorie@zoo.utoronto.ca).

**Locke Rowe.** Locke is an evolutionary ecologist interested in mating systems, sexual selection, and life histories. His work includes developing theory and experimental tests with water striders and other aquatic insects. E-mail: [lrowe@zoo.utoronto.ca](mailto:lrowe@zoo.utoronto.ca).

**J.J.B. Smith.** Smith is interested in sensory physiology, in particular, taste systems, how they code for different stimuli and how this relates to feeding behaviour. E-mail: [berry.smith@utoronto.ca](mailto:berry.smith@utoronto.ca).

**Sandy M. Smith.** Conducts research in forest entomology, insect ecology, biological control, and invasive species. Her primary focus is on the ecological basis of augmenting natural enemies for biocontrol (both invertebrates and vertebrates), and includes parasitoid fitness, aspects of natural morality in pest population dynamics, native parasitoid releases and non-target risk assessment. Email: [s.smith.a@utoronto.ca](mailto:s.smith.a@utoronto.ca)

**Marla Sokolowski.** Genetic, molecular, neurobiological and environmental underpinnings of behaviour in the fruit fly. Email: [msokolow@utm.utoronto.ca](mailto:msokolow@utm.utoronto.ca)

**Brian Stewart.** Research is directed at understanding the molecular mechanisms that regulate the development and function of neurons. We use a multidisciplinary approach in the fruit fly, *Drosophila melanogaster*, to create genetic mutants and transgenic flies that perturb genes involved in neural function and development and then assay the effects of the mutations using electrophysiology, biochemistry, electron microscopy and imaging. Email: [stewart@utsc.utoronto.ca](mailto:stewart@utsc.utoronto.ca)

**Ulrich Tepass.** Ulrich works on epithelial development in *Drosophila*. E-mail: [utepass@zoo.utoronto.ca](mailto:utepass@zoo.utoronto.ca).

**James Thomson.** Thompson works on the evolutionary ecology of plant-animal interactions, with particular emphasis on plants and pollinators. E-mail: [jthomson@zoo.utoronto.ca](mailto:jthomson@zoo.utoronto.ca).

**Stephen Tobe.** Stephen works with juvenile hormones and neuropeptides, in particular on the allatostatins, a family of neuropeptides which inhibit juvenile hormone production in cockroaches, flies and Lepidoptera. E-mail: [stephen.tobe@utoronto.ca](mailto:stephen.tobe@utoronto.ca).

#### List of courses with an entomology component

##### *Undergraduate*

ZOO252Y1Y. Introductory Animal Physiology. The main ideas of physiology and the contribution of experimentation to our understanding of life processes. Uses examples from throughout the animal kingdom, and includes the physiology of nervous, muscular, sensory and endocrine systems, control mechanisms, salt and water balance, respiration, thermoregulation, reproduction and metabolic processes.

ZOO344H1S. Comparative Endocrinology of Invertebrates. The importance of neurohormones and hormones in the regulation of reproduction, growth, metamorphosis and metabolism in arthropods, especially insects and crustaceans, molluscs, and other invertebrates.

JZM357H1S. Parasitic Helminths and Arthropods. Morphology, life cycles, evolutionary history and adaptations to a parasitic mode of life. Host- parasite relationships are explored through the study of various helminths and arthropod parasites, the diseases they cause, and our attempts to control them.

ZOO360H1S. Insect Biology. Introduction to the morphology, physiology, development, behaviour, ecology, evolutionary history, and biological significance of insects.

ZOO361H1F. Field Entomology. A field and laboratory course to provide practical experience in techniques for collecting and studying insects. Students will each prepare an insect collection and conduct a smallscale research project. Includes intensive field work in Florida during Reading Week.

BIO303H1S. Tropical Ecology and Evolution. A field course to introduce students to the diversity of biological communities in the tropics focussing on ecological and evolutionary interactions. Plant and animal communities of tropical sites in the New World tropics are compared and contrasted with temperate communities. Students undertake small-scale research projects in the field. Many students choose projects on insects.

BIO308H1F. Biodiversity and Ecology in Indochina. Offered in May in Vietnam for approximately two weeks. Emphasis on arthropods, amphibians and reptiles with the possibility of other groups of animals and plants being studied. Comparisons of biodiversity of microhabitats in terrestrial and aquatic ecosystems at a single site.

ZOO485Y1Y. Research in Physiology. This is a laboratory course designed to teach the experimental basis of modern animal physiology, and which uses insects as model preparations in anywhere from 25-50% of the laboratories.

*Graduate*

ZOO1502 Y. Molecular Entomology. Reading and discussion of recent literature on molecular biological study of important topics in insect science, including work on *Drosophila*.

ZOO1511. Systematic Entomology. Directed study into any of a number of areas for graduate students. Offered when there is sufficient interest.

Financial support

The Department of Zoology offers a Guaranteed Minimum Income (GMI) to all students in the “funded cohort”. The funded cohort, as defined by the University of Toronto, is considered to be students in the following program stages:

Students in year 1 of their MSc (in the Department of Zoology students are funded in the second year of their MSc), students in years 1-4 of their PhD (where the student has completed an MSc or equivalent program), students in years 1-5 of their PhD (assuming direct entry into a PhD from a bachelor’s degree or a transfer from an uncompleted MSc into a PhD, where time is considered from their initial registration as a graduate student).

For the current academic year 2004-05, the Department provides support for the funded cohort of students at or above current minimum levels set by the University. These minima are: \$21,176 for Canadian students or permanent residents, \$25,971 for international students.

Major scholarship holders receive a minimum of \$2,000 in fellowship support, in addition to other guaranteed support provided by supervisors, TAing or additional fellowship and awards. Students without major scholarships are supported through a combination of supervisor’s grant support (expected minimum \$8,000), teaching assistantships, and University fellowships. In addition to the University of Toronto fellowship programs, support is available to Canadian citizens and permanent residents from federal and provincial government programs. Further information: Fellowships Office, SGS. University of Toronto, 65 St. George Street, Toronto, Ontario, M5S 2Z9, Canada.

Admissions and enquiries

The Department of Zoology offers graduate training leading to an MSc or a PhD degree. An elementary but competent knowledge of physics and chemistry will be required, and knowledge of the general field of biology, must be demonstrated. Minimum requirements are a mid - B average (73 - 76%; GPA approximately 3.0) in each of the last two completed years (or approximately last 10 full course equivalents if a degree was completed on a part-time basis). Address inquiries to: Room 426, Ramsay Wright Building, University of Toronto, 25 Harbord Street, Toronto, Ontario, Canada, M5S 3G5; telephone 416-978-3477; e-mail grad@zoo.utoronto.ca.

## Québec

### **Université Bishop's University**

<http://www.ubishops.ca/>

Department of Biological Sciences

Lennoxville, Quebec

Canada J1M 1Z7

Tel: 819-822-9600

Fax: 819-822-9661

<http://www.ubishops.ca/ccc/div/sci/bio/index.html>

#### Research and academic facilities

The biology programmes at Bishop's University provide a broad foundation in the field of biology, preparing its students for numerous options. These include graduate studies in the biological or life sciences fields, and professional studies in medicine, dentistry, veterinary medicine, the allied health sciences, forestry, wildlife biology, microbiology, and many other applied areas. A degree in biology also prepares the student for direct employment in the biotechnology sector, environmental biology, or the allied health fields. The Department of Biological Sciences is well equipped for study and student research in general biology, physiology, molecular biology and ecology. In house facilities include aquatic and terrestrial animal rooms, a greenhouse, walk-in-growth chambers, laminar flow hoods, incubators, centrifuges, research microscopes, autoclaves, and computers for data analysis, graphing and simulation studies. Students are given first-hand experience in the use of these facilities and are encouraged in every way possible to develop their capacities for independent work in biology.

#### List of faculty

Bishop's University offers only undergraduate programs but Dr Jade Savage can supervise graduate students enrolled in a graduate program of another university.

Dr Jade Savage. Systematics and biodiversity of Muscidae (Diptera), especially in arctic and alpine environments. E-mail: [jsavage@ubishops.ca](mailto:jsavage@ubishops.ca) Phone: (819) 822-9600, ext. 2362

#### Courses offered with an entomology component

- Entomology
- Invertebrate Zoology
- Honours project in systematics and biodiversity of insects
- Conservation
- Biogeography
- Possibility of a spring field course in entomology

#### Admissions and enquiries

<http://www.ubishops.ca/ccc/div/sci/bio/programs.htm>

## **Concordia University**

Department of biology  
1455, boul. de Maisonneuve O.  
Montréal (Québec) H3G 1M8  
Canada

Telephone:(514) 848-2424

Homepage: <http://artsandscience.concordia.ca/biology/>

### Research and academic facilities

Concordia University's Faculty of Arts and Science, is the home to some of the most innovative classroom teaching and cutting-edge research in Canada. There has never been a more exciting time to choose Concordia's Faculty of Arts and Science as your home for post-secondary education. We are in the midst of hiring some of the world's best and brightest professors at a level that appears to be unprecedented among Canadian universities. We have now hired 100 tenure-track professors and are expecting to hire another 100 over the next four years, marking the largest faculty rejuvenation at Concordia in more than a generation.

When you choose to study at Concordia's Faculty of Arts and Science, you benefit from being a part of one of the largest and fastest-growing Faculties in Canada. Our 14,000 undergraduate and graduate students can choose from among more than 1,800 courses, spread out over 27 departments and colleges. Our graduates are not only well-versed in their core area of study, but they also possess a broad knowledge base, which is a highly-prized asset whether they continue on to graduate school or decide to launch a career in the workforce. No matter what your academic goals may be, we are confident that you will find a home here.

### List of faculty

**Dr. Paul Albert.** Insect sense organs, structure and function; electrophysiological studies of taste sensilla in caterpillars. Email: [albert@alcor.concordia.ca](mailto:albert@alcor.concordia.ca)

**Dr Emma Despland.** Self-organization of social behaviour in forest tent caterpillars; individual-based modeling of the effects of insect behaviour on group dynamics; influence of conspecifics on the behaviour (particularly feeding behaviour) and performance of gregarious insects. Email: [despland@alcor.concordia.ca](mailto:despland@alcor.concordia.ca)

### Courses offered with an entomology component

BIOL 385 Entomology (3 crs). Introduction to insect taxonomy, morphology and anatomy.

BIOL 386 Insect Behaviour and Physiology (3 crs). Structure and function of sensilla and their roles in insect behaviour.

### Financial Assistance

Assistance is available for qualified candidates, on a competitive basis, in the form of teaching assistantships, university Scholarships, Fellowships, research grant stipends or bursaries, that provide a minimum of \$12,000 CDN. For scholarships and Fellowships, candidates should write to the School of Graduate Studies for application forms and Information. The deadline for submissions is **December 1**.

Qualified students are also encouraged to apply for Natural Science and Engineering Research council fellowships and Quebec residents for FCAR by deadlines in mid-October.

### Admission and inquiries

**Undergraduate.** Quebec applicants should have successfully completed the two-year pre-university CEGEP program. Other applicants should have completed high school with equivalent course preparation in science. **You can apply on-line!** <http://registrar.concordia.ca/c2c/websis/> or contact:

Undergraduate Admissions  
Concordia University  
Admission Application Centre  
P.O. Box 2900  
Montreal, Quebec H3G 2S2 Tel: (514) 848-2668 Fax: (514) 848-8631

**M.Sc.** The normal admission requirement is an honours B.Sc. in Biology (minimum B average) or equivalent. Applicants are encouraged to visit or correspond with faculty members in their area of interest.

**Ph.D.** Applicants should have an M.Sc. degree in life sciences, a strong research and academic background (minimum B average). Applications for full-time study are considered for September and January admission.

**Application deadlines:** January 15 for Fall Semester (September entry) August 31 for Winter Semester (January entry)

For further information or inquiries, please contact: [artsnsci@vax2.concordia.ca](mailto:artsnsci@vax2.concordia.ca)

## **Université Laval**

Département d'Aménagement  
Département de Biologie  
Département de Foresterie  
Département de Géographie  
Département de Phytologie

Université Laval  
Cité Universitaire  
Québec, Québec  
G1K 7P4  
Canada

[www.ulaval.ca](http://www.ulaval.ca)

### Recherches et enseignement

L'Université Laval ([www.ulaval.ca](http://www.ulaval.ca)) est la plus importante université francophone offrant des programmes de formation et de recherche en entomologie au Canada. Des cours traitant en totalité ou en partie des insectes sont offerts aux niveaux du baccalauréat, de la maîtrise et du doctorat dans les programmes de trois départements ayant des programmes de formation spécialisée en sciences, soit à la Faculté des Sciences et de Génie (FSG), la Faculté des Sciences de l'Agriculture et de l'Alimentation (FSAA) et la Faculté de Foresterie et de Géomatique (FFG).

Le programme de formation aux 3 niveaux universitaires du département de biologie (FSG) recouvre une variété de sous- disciplines allant de la biologie moléculaire à l'écologie végétale et animale en passant par la physiologie. Le professeur Conrad Cloutier et ses collaborateurs dirigent des étudiants chercheurs en entomologie aux niveaux de la maîtrise et du doctorat.

Au département de Biologie végétale de la FSAA, les volets entomologie, malherbologie et phytopathologie sont d'intérêt particulier pour les étudiants voulant acquérir une base scientifique cohérente en phytoprotection. Le professeur Jacques Brodeur dirige des étudiants chercheurs en entomologie avec l'aide de collaborateurs.

Au département des Sciences du bois et de la forêt de la FGG, le professeur Eric Bauce dirige des étudiants chercheurs en entomologie avec l'aide de collaborateurs.

Les professeurs et leurs étudiants chercheurs inscrits à ces programmes peuvent faire partie de centres de recherche majeurs basés à l'Université Laval. Le Centre de Recherche en Horticulture (CRH) ([www.crh.ulaval.ca](http://www.crh.ulaval.ca)) regroupe plusieurs chercheurs affiliés à la FSAA et la FSG. Le Centre de Recherche en Biologie Forestière (CRBF) ([crbf.rsvs.ulaval.ca](http://crbf.rsvs.ulaval.ca)) regroupe environ de nombreux chercheurs provenant de la FFG et de la FSG. Ces centres rassemblent des laboratoires et facilités de recherche modernes réservés aux professeurs et étudiants chercheurs, et aux chercheurs postdoctoraux qui collaborent avec eux. Le Centre d'Etudes Nordiques (CEN) regroupe des professeurs et étudiants chercheurs provenant de plusieurs Facultés de l'Université Laval et d'autres universités, dans un contexte multidisciplinaire.

L'Université Laval possède parmi ses infrastructures de recherche majeures accessibles aux professeurs et étudiants chercheurs en entomologie trois fermes expérimentales dont la plus importante (125 ha) est la Ferme J. Rhéaume vouée à la recherche en horticulture; un parc de 25 serres expérimentales totalisant une surface de 4 000 m<sup>2</sup> et une forêt expérimentale d'environ 200 km<sup>2</sup> située en milieu boréal dans la Réserve

Faunique des Laurentides (Forêt Montmorency). Les infrastructures majeures du CEN comprennent des laboratoires de recherche en milieu subarctique situés près de la côte de la Baie d'Hudson.

#### Chercheurs et enseignants en entomologie

Trois professeurs réguliers de l'Université Laval dont un membre du département de Biologie (FSG), un membre du département de Phytologie (FSAA) et un membre du département des Sciences du bois et de la forêt (FFG) dirigent des étudiants chercheurs en entomologie. De plus, un professeur dans chacun des départements de Géographie et d'Aménagement dirigent aussi des étudiants chercheurs ayant un intérêt pour les insectes, bien que l'entomologie ne soit pas identifiée spécifiquement dans leurs programmes de formation.

#### *Département d'Aménagement*

Claude Lavoie. Enseignement en aménagement. Paléo-entomologie. Reconstitution de paléoenvironnements à partir d'insectes fossiles, notamment les coléoptères et fourmis. Communautés d'insectes des tourbières. Paléo-climat. Interactions climat, insectes, feu. Poste électronique: [claudio.lavoie@ame.ulaval.ca](mailto:claudio.lavoie@ame.ulaval.ca)

#### *Département de Biologie (FSG)*

Conrad Cloutier. Enseignement de l'entomologie générale et des principes de la lutte biologique. Recherche sur la biologie et l'écologie des insectes entomophages. Comportement des parasitoïdes et des prédateurs généralistes. Lutte intégrée et lutte biologique. Interactions des ennemis naturels avec les plantes transgéniques et les biopesticides. Poste électronique: [conrad.cloutier@bio.ulaval.ca](mailto:conrad.cloutier@bio.ulaval.ca).

#### *Département de Foresterie (FFG)*

Eric Bauce. Enseignement en entomologie forestière. Recherche en écolophysiologie de l'alimentation et de la nutrition des insectes défoliateurs forestiers. Relations plantes-insectes. Epidémiologie et écologie des ravageurs forestiers. Poste électronique: [eric.bauce@sbf.ulaval.ca](mailto:eric.bauce@sbf.ulaval.ca).

La Direction de la recherche forestière du Gouvernement du Québec contribue également à la formation d'étudiants chercheurs de la FFG.

#### *Département de Géographie*

Louise Filion. Enseignement en dendrochronologie. Recherche en paléo-écologie et en dendro-écologie. Mise en évidence des épidémies d'insectes ravageurs comme facteurs d'évolution à long terme de la végétation forestière. Poste électronique: [louise.filion@cen.ulaval.ca](mailto:louise.filion@cen.ulaval.ca).

#### *Département de Phytologie (FSAA)*

Jacques Brodeur. Enseignement en lutte intégrée. Recherche en écologie comportementale des parasitoïdes et prédateurs aphidiphages. Prédation intraguilde et interactions des pathogènes avec les insectes entomophages. Lutte intégrée aux ravageurs des cultures de serre et gazonnières. Poste électronique: [jacques.brodeur@plg.ulaval.ca](mailto:jacques.brodeur@plg.ulaval.ca).

#### Cours offerts en entomologie

Bio-10051. Introduction à l'entomologie. Cours de 2 crédits offert au baccalauréat. Importance des insectes et de leur étude scientifique. Systématique et évolution des insectes. Caractéristiques générales et classification des insectes. Biologie et importance des principaux taxons d'insectes et d'arthropodes apparentés.

Bio-21422. Entomologie. Cours de 3 crédits. Bases scientifiques de l'étude des insectes. Structure et fonction. Développement et reproduction. Adaptations comportementales et vie sociale. Cycles de vie et saisonnalité. Réponses à la température et aux autres facteurs abiotiques. Herbivorie et autres relations trophiques des insectes. Relations avec les humains. Alternatives de contrôles chimiques et non chimiques des insectes nuisibles. Le laboratoire portera sur la systématique, l'identification et la collecte des insectes à des fins scientifiques.

Bio-17250. Laboratoire d'entomologie forestière. Cours de 2 crédits offert au niveau du baccalauréat. Biologie et morphologie des insectes. Taxinomie et identification des insectes ravageurs forestiers.

Bio-64063. Contrôle naturel des populations d'insectes. Cours de 2 crédits. Cours et discussions précédées de lectures dirigées sur les principes des interactions multitrophiques au sein des populations d'insectes. Stratégie de survie et de reproduction des prédateurs et des parasitoïdes. Pathologie des insectes. Impact des ennemis naturels et des épidémies sur les populations de leurs victimes. Théorie de la lutte biologique par l'exploitation des ennemis naturels et des pathogènes d'insectes.

Bio-19820. Ecologie chimique. Cours de 2 crédits. Introduction à la communication chimique chez les animaux et entre les animaux et les plantes. Fonctions des médiateurs chimiques dans les systèmes naturels et aménagés. Le cours est offert aux trois niveaux, les exigences étant plus élevées pour les étudiants des niveaux supérieurs.

For-16649. Entomologie forestière. Cours de 2 crédits destiné aux étudiants du baccalauréat. Ecologie et principes de contrôle des insectes forestiers. Biologie et épidémiologie des insectes ravageurs forestiers.

For-17212. Protection des forêts. Cours de 4 crédits destiné aux étudiants du baccalauréat. Impact écologique des insectes ravageurs, dynamique des populations, détection et intervention. Phytopathologie, feux de forêt.

### Aide financière

Les étudiants ont accès aux concours des programmes de bourses du Conseil de Recherche en Science Naturelles et Génie du Canada (CRSNG) et du Fond pour la formation des Chercheurs et l'Aide à la Recherche (FCAR) ainsi qu'à divers autres programmes de bourses dans certains domaines précis de recherche. Les professeurs offrent des postes d'étudiants chercheurs rémunérés pour certains projets de recherche subventionnée. Les étudiants au doctorat bénéficient du Fond de Soutien au doctorat de l'Université Laval pouvant permettre de subvenir partiellement à leurs besoins. Les étudiants à la maîtrise peuvent obtenir des postes d'assistance aux laboratoires d'enseignement aux trimestres d'automne et d'hiver. Les étudiants étrangers Français bénéficient de frais de scolarité égaux à ceux des étudiants canadiens.

### Critères d'admission et informations

Les étudiants sont admissibles au baccalauréat sur la foi de l'obtention du diplôme d'études collégiales décerné par le Ministère de l'Éducation du Québec (DEC) ou de son équivalent dans les programmes canadiens d'éducation. L'admission à la maîtrise est conditionnelle à l'obtention d'un baccalauréat en sciences biologiques ou de l'équivalent. Et au doctorat sur la foi de l'obtention d'une maîtrise en Sciences

ou de son équivalent. Toute demande d'admission à la maîtrise et au doctorat est évaluée et sujette à l'approbation par la direction des programmes particuliers. Toute demande d'information ou de formulaires de demande d'admission doit être adressée au: Bureau du registraire, Pavillon Jean-Charles Bonenfant, Université Laval, Cité Universitaire, Québec, Québec, G1K 7P4, Canada; téléphone 418-656-3080; télécopieur 418-656-5216.

## **Université de Montréal**

Département des sciences biologiques  
Université de Montréal  
C.P. 6128, succursale Centre-ville  
Montréal QC H3C 3J7  
Canada

Téléphone : (514) 343-6875  
Télécopieur : (514) 343-2293  
Courrier électronique : [biologie@umontreal.ca](mailto:biologie@umontreal.ca)

### Recherches et enseignement

La Faculté des sciences de l'Université de Montréal est née en 1920. L'enseignement de la biologie y a débuté la même année. La création du Département, ou plutôt de l'Institut de biologie, remonte cependant à 1921. Depuis sa création, le Département est en évolution constante. Au cours des années, et à travers de nombreuses réformes, ses programmes du premier cycle se sont adaptés pour offrir une formation de biologiste capable d'œuvrer sur un marché du travail très diversifié pour permettre la poursuite avec succès d'études supérieures et d'une carrière en recherche. De plus, le Département s'est doté, depuis la fin des années quatre-vingt d'axes prioritaires de recherche et de formation aux cycles supérieurs. Ainsi fut créé l'Institut de recherche en biologie végétale ([IRBV](#)). Les champs de la taxonomie, de la systématique, de l'évolution et de la phylogénie, puis de la biodiversité, se sont développés et constituent désormais des forces du Département. Le Département de sciences biologiques compte plus d'une quarantaine de professeurs-chercheurs, de professeurs associés et de chercheurs invités dont les champs d'activité couvrent plusieurs domaines de la biologie moderne.

### Chercheur et enseignant en entomologie

Dr Pierre-Paul Harper professeur titulaire Tél. (514) 343-6790 Fax : (514) 343-2293 Courriel: [pierre-paul.harper@umontreal.ca](mailto:pierre-paul.harper@umontreal.ca)

Systématique et taxonomie des insectes aquatiques: Plécoptères, Éphéméroptères, Trichoptères, Diptères (Tipulidae, Empididae, Chironomidae). Écologie d'insectes d'eau douce: dynamique de populations, cycles biologiques, structures temporelle et spatiale des communautés. Biogéographie et faunistique.  
Systematics and taxonomy of aquatic insects: Plecoptera, Ephemeroptera, Trichoptera, Diptera (Tipulidae, Empididae, Chironomidae). Ecology of freshwater insects: population dynamics, life cycles, temporal and spatial structures of communities. Biogeography and faunistics.

### Critères d'admission et informations

<http://www.bio.umontreal.ca/Acad/admission.html>  
<http://www.bio.umontreal.ca/Acad/admission.html#English>

## **McGill University**

Department of Natural Resource Sciences  
Macdonald Campus of McGill University  
21 111 Lakeshore Road  
Ste. Anne de Bellevue, Québec  
H9X 3V9  
Canada

Telephone: 514-398-7890  
Fax: 514-398-7990  
E-mail: [info@nrs.mcgill.ca](mailto:info@nrs.mcgill.ca)  
Homepage: [www.mcgill.ca/nrs/](http://www.mcgill.ca/nrs/)

### Research and academic facilities

McGill University's entomology programs are at the Macdonald Campus, on the shore of Lac St. Louis on the west end of the Island of Montréal, 30 km from the Downtown McGill Campus. The Department of Natural Resource Sciences is an interdisciplinary group that is concerned with natural and managed ecosystems, at both the macro and micro levels, with the aim of conservation and optimal resource management. This includes promoting sustainability, biodiversity and new economic opportunities.

The courses and academic programs offered by the Department of Natural Resource Sciences allow students to explore interactions among the components of terrestrial and aquatic ecosystems through the development of a strong, interdisciplinary background in basic and applied science. The Department offers BSc (Agr.Env.), MSc and PhD degrees, as well as joint MSc and PhD degrees in Neotropical Environment (Entomology) with the McGill School of Environment and the Smithsonian Tropical Research Institute in Panama.

Facilities and resources are available at the Macdonald Campus for terrestrial, aquatic and laboratory studies in such areas as ecology, systematics, population dynamics, pest management, physiology and pathology. Affiliated with the Department is the Lyman Entomological Museum which houses nearly three million specimens. McGill University also has an extensive network of field stations including the Morgan Arboretum, Stoneycroft Wildlife Area and Molson Reserve adjoining Macdonald Campus, as well as the Mont St Hilaire Biosphere Reserve, Subarctic Research Station (Schefferville, QC), Arctic Research Station (Axel Heiberg Island) and the Bellairs Research Institute (Barbados).

### Academic Staff

**Ms. S. Boucher** (Curator, Lyman Entomological Museum). Systematics and ecology of the leaf-miner flies (Agromyzidae) and biodiversity of Diptera in Beringia.

**Dr. C.M. Buddle** (Assistant Professor). Terrestrial arthropod biodiversity, in particular spider and insect diversity in managed and unmanaged forests; the effects of downed woody material on arthropod communities; the role of generalist predators in detritus-based food webs; spider ecology, life-history, and taxonomy.

**Dr. G.B. Dunphy** (Associate Professor). Virulence mechanisms of the bacterium *Xenorhabdus* in insects; insect immunity.

**Dr. D.J. Lewis** (Associate Professor). Ecology and distribution of aquatic invertebrates, especially insects; ecology and control of biting flies.

**Dr. M.E. Rau** (Associate Professor). The use of plagiourchiid digenean parasites as agents in the biological control of insect- and snail-borne diseases of medical and veterinary importance.

**Dr. T.A. Wheeler** (Associate Professor). Insect systematics, biodiversity and zoogeography; with a focus on phytophagous and saprophagous flies, especially Chloropidae. Ongoing studies include the systematics and ecology of Diptera in grasslands, the diversity and zoogeography of Holarctic flies and the use of insects in biodiversity studies.

#### Adjunct Professors

**Dr. R.S. Anderson** (Canadian Museum of Nature, Ottawa). Systematics, evolution and bio-diversity of weevils (Coleoptera: Curculionidae) and the application of results from systematics research to issues of bio-diversity conservation and management. Works primarily in Central and South America with some regional work in Canada.

**Dr. G. Boivin** (Agriculture and Agri-Food Canada, St-Jean-sur-Richelieu). Behavioral ecology of insect parasitoids: host selection, host discrimination, learning. Selection of natural enemies for biological control programs against insect pests of vegetable crops.

**Dr. J.M. Cumming** (Agriculture and Agri-Food Canada, Ottawa). Systematics, biodiversity and ecology of predaceous Diptera, especially Empidoidea. Phylogeny and higher classification of brachyceran Diptera. Systematics of fossil Diptera and their role in higher classification.

**Dr. C. Vincent** (Agriculture and Agri-Food Canada, St-Jean-sur-Richelieu). Research and development of Insect Management programs for agricultural insects, with particular focus on physical control methods, bio-insecticides, and study of insect behaviour of insects in the field and in the laboratory.

#### Entomology courses offered

##### *Undergraduate courses*

ENTO 330 Insect Biology - Insect structure and function, development and specialization, ecology, behaviour, diversity, evolution, classification and management.

ENTO 336 Economic Entomology - Comparison of the economic impact of insect pests in agricultural crops and forests with the social and economic value of insects. Principles of pest management theory, emphasizing insect monitoring, sampling, and economic decision levels.

ENTO 352 Control of Insect Pests - Modern concepts of integrated control techniques and principles of insect pest management, with emphasis on biological control (use of predators, parasites and pathogens against pest insects), population monitoring, and manipulation of environmental, behavioral and physiological factors in the pest's way of life. Physical, cultural, and genetic controls and an introduction to the use of non-toxic biochemical controls (attractants, repellents, pheromones, antimetabolites).

ENTO 425 Insect Ecology - Study of how insects and their relatives interact with their environment, each other, and other plants and animals. Emphasis on population and community ecology, biodiversity and conservation, plant-insect interactions, and applied insect ecology. Relationships between insects and ecosystem function.

ENTO 440 Systematic Entomology - Classification of principal orders, suborders and superfamilies of insects; use of keys; collecting methods.

ENTO 446 Apiculture

*Graduate courses open to senior undergraduates*

ENTO 515 Parasitoid Behavioral Ecology - The origin and diversity of parasitoid species will be presented. Aspects of behavioural ecology that pertain to host selection, optimal allocation of progeny and sex and host-parasitoid interactions are examined. The importance of these processes is discussed in a biological control perspective.

ENTO 520 Insect Physiology - Organismal approach to insects, emphasizing the physiology and development, and the physiological relations of insects to their environment.

ENTO 535 Aquatic Entomology

ENTO 550 Veterinary and Medical Entomology - Environmental aspects of veterinary and medical entomology. An advanced course dealing with the biology and ecology of insects and acarines as aetiological agents and vectors of disease, and their control. Integrated approaches to problem solving.

*Graduate courses*

ENTO 600 Insect Pathology

ENTO 610 Insect Phylogeny and Diversity - Discussion of current topics in phylogenetic systematics, evolution, and biodiversity, with special reference to insects and related arthropods.

ENTO 615 Forest Entomology - Current topics in forest entomology.

ENTO 726 Insect Population Dynamics

### Financial support

Information on scholarships, awards and financial aid for undergraduate students is available through [www.mcgill.ca/courses/](http://www.mcgill.ca/courses/) (access the on-line Undergraduate Scholarships and Awards Calendar).

Information on financial support for graduate students is at [www.mcgill.ca/gps/fellowships](http://www.mcgill.ca/gps/fellowships). The document *Making Ends Meet: a Guide to Graduate Funding at McGill*, available in PDF format at the above URL, is a comprehensive guide to funding for grad students.

### Admissions and enquiries

Admission requirements and on-line application forms for the BSc (Agr.Env.) degree are at [www.mcgill.ca/applying](http://www.mcgill.ca/applying). Information on undergraduate programs in the Department of Natural Resource Sciences is at [www.mcgill.ca/nrs/undergrad](http://www.mcgill.ca/nrs/undergrad).

Information on admission requirements and application procedures for graduate programs is at [www.mcgill.ca/applying/graduate](http://www.mcgill.ca/applying/graduate). General information on postgraduate studies at McGill is at [www.mcgill.ca/gps](http://www.mcgill.ca/gps) and information on graduate programs in the Department of Natural Resource

Sciences is at [www.mcgill.ca/nrs/graduate](http://www.mcgill.ca/nrs/graduate). Information on the joint Neotropical Environments program is at [www.mcgill.ca/neo](http://www.mcgill.ca/neo)

## **Université du Québec à Montréal (UQAM)**

Département des sciences biologiques  
Université du Québec à Montréal  
C.P. 8888, Succursale "Centre-Ville"  
Montréal, Québec  
H3C 3P8  
Canada

Téléphone: 514-987-4118  
Télécopieur: 514-987-4647  
Site internet: [www.unites.uqam.ca/dsbio](http://www.unites.uqam.ca/dsbio)

### Recherches et enseignement

Au Département des sciences biologiques, les activités de formation et recherche sont regroupées selon trois grands axes: Écologie, Toxicologie et environnement santé et Biologie moléculaire/biotechnologie qui comportent d'emblée une dimension environnementale. Actuellement, notre corps professoral regroupe 50 membres incluant un professeur sous octroi. Une quinzaine de chercheurs post-doctoraux oeuvrent aussi au sein de notre département ainsi que 105 étudiants inscrits à la maîtrise et 50 au doctorat en biologie.

De plus, une vingtaine de chercheurs d'autres institutions ayant d'étroites associations de recherche avec nos professeurs détiennent un statut de professeurs associés au Département des sciences biologiques. À ce titre, ils participent à la formation de nos étudiants par le biais de l'enseignement, de l'encadrement d'étudiants aux études avancées et présentent des demandes de subventions en collaboration avec nos professeurs. Il y a 15 étudiants gradués dont les recherches touchent l'entomologie.

### Chercheurs et enseignants en entomologie

**Dr. Daniel Coderre.** Utilisation d'insectes bénéfiques en lutte biologique. ([coderre.d@uqam.ca](mailto:coderre.d@uqam.ca))

**Dr. Éric Lucas.** Écologie des entomophages, interactions entre ennemis naturels et lutte biologique. ([lucas.eric@uqam.ca](mailto:lucas.eric@uqam.ca))

**Dr. Yves Mauffette.** Effets du stress sur les plantes hôtes et sur les insectes défoliateurs, écophysiologie et la germination d'essence feuillue. ([mauffette.yves@uqam.ca](mailto:mauffette.yves@uqam.ca))

**Dr. Charles Vincent.** Agriculture et agroalimentaire Canada. Lutte intégrée. ([vincentch@em.agr.ca](mailto:vincentch@em.agr.ca))

**Dr. Tim Work.** L'utilisation des insectes comme indicateurs de la biodiversité.

### Cours offerts en entomologie

BI08360. Lutte biologique. Historique et bases écologiques de la lutte biologique. Biologie des organismes prédateurs, parasites et pathogènes. Conservation, augmentation et évaluation de l'efficacité des ennemis naturels. Lutte biologique contre les ravageurs des forêts, les mauvaises herbes, et les vecteurs d'importance médicale et vétérinaire et contre les mammifères.

BI08901. Biotechnologies appliquées à l'amélioration des végétaux. Étude des différentes méthodes utilisées en biotechnologie végétale pour l'amélioration des plantes. Exemples d'applications: fixation de l'azote moléculaire, résistance aux virus, insectes et champignons.

### Aide financière

Les étudiants bénéficient d'une bourse de recherche ou d'un salaire provenant d'assistantat de recherche ou d'enseignement. Un revenu minimum annuel de \$8,500 est garanti à tous les étudiants inscrits. Les étudiants peuvent appliquer aux programmes de bourses d'excellence du CRSNG et FQRNT ainsi qu'aux divers programmes de l'UQAM incluant ceux de la Fondation. Les professeurs mettent un effort à intégrer dès le premier cycle les étudiants dans leurs projets de recherche qui se traduit par un soutien financier dès le premier cycle. À part les salaires et bourses qui leur sont directement versés, les étudiants bénéficient de l'équipement et du matériel coûteux nécessaires à leur formation dans des domaines de pointe ainsi que de la présence de personnel qualifié (techniciens ou agents de recherche), le tout payé principalement à même les subventions des professeurs

### Critères d'admission et informations

Maîtrise en biologie. Le candidat doit être titulaire d'un baccalauréat ou l'équivalent en biologie, obtenu avec une moyenne cumulative d'au moins 3,2 sur 4,3 ou l'équivalent; ou posséder les connaissances requises, une formation appropriée et une expérience jugée pertinente. Tout candidat doit avoir établi une entente de principe avec un professeur habilité à diriger un mémoire.

[www.websysinfo.uqam.ca/regis/pkg\\_wpub.affiche\\_prog\\_desc?P\\_prog=3440](http://www.websysinfo.uqam.ca/regis/pkg_wpub.affiche_prog_desc?P_prog=3440)

Doctorat en biologie. Le candidat doit être titulaire d'une maîtrise de recherche ou l'équivalent en biologie ou dans une discipline connexe, obtenue avec une moyenne cumulative d'au moins 3,2 sur 4,3 ou l'équivalent. Tout dossier de candidature faisant état d'une moyenne cumulative inférieure à 3,2 mais supérieure à 2,8 sur 4,3 sera étudié par le sous-comité d'admission et d'évaluation du programme et pourrait, dans certains cas, faire l'objet d'une recommandation d'admission. Les étudiants inscrits au programme de maîtrise en biologie, microbiologie appliquée ou dans une discipline connexe ayant complété leur scolarité et ayant maintenu une moyenne cumulative supérieure à 3,5 sur 4,3 pourront déposer une demande écrite auprès de la direction du programme pour une admission au doctorat sans compléter leur mémoire. Exceptionnellement, un candidat possédant un grade de bachelier ou l'équivalent en biologie ou dans une discipline connexe, obtenu avec une moyenne cumulative égale ou supérieure à 3,7 sur 4,3 ou l'équivalent et possédant une formation appropriée ainsi qu'une expérience en recherche reconnue, pourrait déposer une demande d'admission au programme.

[www.websysinfo.uqam.ca/regis/pkg\\_wpub.affiche\\_prog\\_desc?P\\_prog=3805](http://www.websysinfo.uqam.ca/regis/pkg_wpub.affiche_prog_desc?P_prog=3805)

## **Université du Québec à Trois-Rivières (UQTR)**

Département de chimie-biologie  
Université du Québec à Trois-Rivières  
3351 boul. des Forges  
Trois-Rivières, Québec  
Canada, G9A-5H7

### Recherches et enseignement

Le Département de chimie-biologie comprend 36 professeurs regroupés en trois sections: biologie écologique (10 professeurs), biologie médicale (11 professeurs), et chimie-biochimie (15 professeurs). Le corps professoral de chaque section est secondé par une équipe de techniciens et de techniciennes offrant un support dans les activités d'enseignement de laboratoire.

Notre Département assure l'enseignement et fournit les ressources matérielles et humaines nécessaires pour dispenser divers programmes, tant au niveau du certificat, qu'aux niveaux baccalauréat, maîtrise et doctorat. Ainsi, nous intervenons dans le cadre de trois programmes de certificat (biologie médicale, sciences de l'environnement et biologie moléculaire), de cinq baccalauréats (biologie, biologie médicale, biochimie, biophysique et chimie), de quatre maîtrises (biophysique et biologie cellulaires, chimie (entente d'extension avec l'Université du Québec à Montréal), pâtes et papiers (programme multidépartemental), et sciences de l'environnement) et de trois doctorats: biophysique et biologie cellulaires, pâtes et papiers (programme multidépartemental) et sciences de l'environnement (programme réseau de l'Université du Québec).

### Chercheurs et enseignants en entomologie

**Dr Jacques Boisvert.** Contrôle biologique des insectes piqueurs. téléphone: (819) 376 5053 poste 3372/  
Fax: (819) 376 5084/ courriel: Jacques\_Boisvert@UQTR.CA

**Dr Guy Charpentier.** Microbiologie, entomologie, insecticides microbiologiques, entomopathogènes, impacts environnementaux des insecticides, détection des entomopathogènes. Lutte biologique contre les insectes piqueurs. téléphone: (819) 376 5053 poste 3370 Fax: (819) 376 5084 Courriel: Guy\_Charpentier@uqtr.ca

### Cours offerts en entomologie

#### **ECL1002 Ecologie des insectes et problèmes de contrôle**

Confronter l'étudiant avec les grands principes écologiques appliqués aux insectes et lui apporter les connaissances sur les étapes d'étude et les méthodes de contrôle des insectes considérés comme pestes. Grands principes écologiques appliqués aux insectes. Principaux insectes considérés comme pestes et problèmes de nuisance. Implications médicales et vétérinaires des insectes. Etapes d'étude écologique des insectes en vue de saisir les problèmes de nuisance (cycles vitaux et cycle trophogoniques). Méthodes de contrôle de populations d'insectes considérés comme pestes.

#### **ENT1001 Entomologie**

Initier l'étudiant à la biologie, la morphologie et le développement des insectes. Apparition, caractéristiques et place des insectes dans les arthropodes; principes de classification des arthropodes et des insectes; morphologie externe et morphologie interne des insectes. Physiologie des grands systèmes; cycles et développement des insectes terrestres et aquatiques; critères d'identification des grandes familles d'insectes.

Critères d'admission et information

[www.uqtr.ca/chimiebio](http://www.uqtr.ca/chimiebio)

## **Université du Québec à Rimouski (UQAR)**

Département de biologie  
300, allée des Ursulines  
Rimouski, Québec, Canada  
G5L 3A1

Téléphone: 418-723-1986  
Télécopieur: 418-724-1525  
Ligne info-programme: 1-800-511-3382  
<http://www.uqar.qc.ca/bcss/>

### Recherches et enseignement

Nos recherches ont pour axes privilégiés: 1) la faune terrestre et aquatique, 2) l'écologie forestière et 3) l'écophysologie et la biologie évolutive. Ces priorités ont été confirmées par l'octroi récent de chaires de recherche pour chacun de ces axes

### Chercheurs et enseignants ayant des thèmes de recherches qui touchent à l'entomologie

Dr Luc Sirois, chercheur en Écologie forestière. Recherche fondamentale sur l'écologie des perturbations et la régénération forestière. Recherche appliquée à l'aménagement forestier durable Écologie des feux en forêt boréale: cyclage du carbone après feu (débris ligneux grossiers) en relation avec la colonisation entomologique. Étude de la décomposition des débris ligneux grossiers d'épinettes noires en relation avec les coléoptères saproxyliques. Colonisation des débris ligneux grossiers par les Formicidae. Tél.: 418-723-1986, poste 1592 Courriel: [Luc\\_Sirois@uqar.qc.ca](mailto:Luc_Sirois@uqar.qc.ca)

### Cours offerts ayant un lien avec l'entomologie

BIO13099 Invertébrés  
BIO27299 Arthropodes

### Critères d'admission et informations

[http://wer.uqar.qc.ca/bcss/bio/Enseignement/Menu\\_Enseignement.htm](http://wer.uqar.qc.ca/bcss/bio/Enseignement/Menu_Enseignement.htm)

**Université du Québec à Chicoutimi (UQAC)**

Département des sciences fondamentales

555, boulevard de l'Université

Chicoutimi (Québec)

G7H 2B1

Téléphone : (418) 545 5011

Télécopieur : (418) 545 5012

<http://dsf.uqac.ca/dept/index.htm>

Recherches et enseignement

Le **département des sciences fondamentales (DSF)** regroupe trois secteurs disciplinaires: la biologie, la chimie et la physique. Ses responsabilités concernent la gestion des ressources humaines et matérielles, ainsi que l'administration, la recherche, les études supérieures (maîtrise en ressources renouvelables et doctorat en sciences de l'environnement).

Chercheurs et enseignants ayant des thèmes de recherches qui touchent à l'entomologie

**Dr Hubert Morin.** Dynamique spatio-temporelle des épidémies de la tordeuse des bourgeons de l'épinette (tbe) dans l'est de l'Amérique du Nord à l'aide de la dendroécologie et des analyses macroreste et pollinique. Impact de la tordeuse des bourgeons de l'épinette sur la dynamique et la croissance des pessières noires. Courriel: [Hubert\\_Morin@uqac.ca](mailto:Hubert_Morin@uqac.ca) Tél: (418) 545-5011 poste 5062

**Dr. André Francoeur.** Professeur émérite. Identification, écologie et répartition des fourmis du Québec. Révision des genres *Myrmica* et *Leptothorax* pour la région néartique. Courriel: [andre\\_francoeur@uqac.ca](mailto:andre_francoeur@uqac.ca) Tél: (418) 545-5011 poste 5076.

Critères d'admission et informations

<http://www.uqac.ca>

**Université du Québec  
Institut national de recherche scientifique- Institut Armand-Frappier (INRS-IAF)**

531, boulevard des Prairies  
Laval (Québec)  
H7V 1B7  
[Etudier@inrs.quebec.ca](mailto:Etudier@inrs.quebec.ca)  
[www.inrs.quebec.ca](http://www.inrs.quebec.ca)

Recherches et enseignement / Research and academic facilities

L'INRS-Institut Armand-Frappier, une composante de l'Institut national de la recherche scientifique (INRS), contribue aux efforts québécois de recherche, de formation et de transfert technologique dans le domaine de la santé humaine, animale et environnementale. Regroupant une cinquantaine de professeurs-chercheurs, le Centre met à profit son importante expertise en immunologie et en microbiologie pour comprendre comment les microbes, les cellules cancéreuses ou les greffes influent sur le système immunitaire.

The INRS-Institut Armand-Frappier research centre, a component of the Institut national de la recherche scientifique (INRS), plays a vital role in research, training and technology transfers conducted in Quebec in the areas of human, animal and environmental health. INRS-Institut Armand-Frappier, which has approximately fifty faculty members, uses its extensive expertise in immunology and microbiology to determine the impact of infectious pathogens, cancer cells or organ transplants on the immune system, as well as to characterize various immune effector cells.

Chercheurs et enseignants en entomologie / List of faculty

**Dr. Serge Belloncik.** Virus et pathogènes d'insectes : écologie, caractérisation et contrôle biologique. Maladies virales transmises par les insectes piqueurs. Interactions virus-cellules, virus-virus. Biotechnologie cellulaire. / Researches on insect pathogens and viruses: Ecology, characterizations and biological control applications. Replication of an insect virus in vivo and *in vitro*: Interaction with insect cells and with other viruses and pathogens. Insect cellular biotechnology. Tél. (450) 687-5010 Fax (450) 686-5626 Courriel [serge.belloncik@inrs-iaf.quebec.ca](mailto:serge.belloncik@inrs-iaf.quebec.ca)

**Dr Claude Guertin.** Développement d'insecticides biologiques à base d'agents entomopathogènes pour le contrôle des populations d'insectes ravageurs. Tél. (450) 687-5010 poste 4234 Fax (450) 686-5526. Courriel [Claude.Guertin@inrs-iaf.quebec.ca](mailto:Claude.Guertin@inrs-iaf.quebec.ca)

Soutien financier / Financial Support

L'INRS encourage vivement les étudiants à se prévaloir des programmes de bourses d'études des organismes de subventions privés ou publics. Par ailleurs, l'INRS a, depuis plusieurs années, une politique de soutien financier dont l'objectif principal est de permettre aux étudiants de se consacrer à plein temps à leur programme d'études et à la recherche qu'il comporte.

Le programme de soutien financier est destiné :

- aux étudiants réguliers. Il s'agit d'étudiants admis et inscrits à un programme d'études dont l'INRS assume seul la responsabilité administrative et pédagogique et

- aux étudiants en situation d'accueil inscrits dans un des centres de l'INRS en dehors des programmes de maîtrise et de doctorat. Il s'agit d'étudiants inscrits à la maîtrise ou au doctorat dans une autre université et qui, sous la responsabilité d'un professeur de l'INRS, viennent effectuer dans un de ses centres un stage qui contribue à la réalisation de leur mémoire ou de leur thèse.

INRS actively encourages students to avail themselves of the scholarship programs offered by private and public sponsoring organizations. In addition, INRS has for several years adopted a financial support policy to enable students to pursue full-time study and research programs.

Financial support programs are directed at :

- full-time students, i.e., students admitted to and registered in a study program entirely administered and taught at INRS;
- visiting students registered at an INRS Centre but not under a graduate or doctoral program, i.e., students registered for graduate or doctoral studies at other universities who, under the supervision of an INRS professor, are pursuing a fellowship at an INRS Centre in order to complete a dissertation or thesis.

Critères d'admission et informations / Admissions and enquiries

Variable selon le programme d'étude. Informations disponibles sur le site internet. / Variable depending on study program. Information available on web site.

La direction des étudiants chercheurs en entomologie par les professeurs réguliers implique des collaborations multiples avec d'autres chercheurs établis dans d'autres institutions vouées à la recherche. Les chercheurs de ces institutions ont la possibilité de diriger des étudiants chercheurs inscrits dans des universités québécoises comme professeurs associés ou de les co-diriger en tant que collaborateurs.

The supervision of graduate students by regular professors involves multiple collaborations with researchers working at other research institutions. These researchers have the possibility to supervise graduate students registered in Quebec universities as associate professors or to co-supervise them as collaborators.

**Service canadien des forêts – Centre de foresterie des Laurentides /  
Canadian Forest Service – Laurentian Forestry Centre**

1055, rue du P.E.P.S  
C.P. 3800  
Sainte-Foy, Québec  
G1V 4C7

Renseignements généraux / General information

Téléphone/Telephone: (418) 648-3335

Télécopieur/Fax: (418) 648-5849

[www.cfl.scf.rncan.gc.ca](http://www.cfl.scf.rncan.gc.ca)

**Dr Johanne Delisle** ([jdelsisle@rncan.gc.ca](mailto:jdelsisle@rncan.gc.ca)). Stratégies reproductives des tortricidés/ Reproductive strategies of tortricids. Professeure associée au département de biologie de l'Université Laval/ Associate professor at the Department of Biology of Université Laval.

**Dr Michel Cusson** ([mcusson@rncan.gc.ca](mailto:mcusson@rncan.gc.ca)). Endocrinologie des lépidoptères, polydnavirologie et biotechnologies/Lepidopteran endocrinology, polydnavirology and biotechnologies. Il dirige des étudiants chercheurs et stagiaires postdoctoraux à titre de professeur associé au Département de biochimie de l'Université Laval/ He supervises graduate students and postdoctoral fellows in his capacity as adjunct professor in the Department of Biochemistry at Université Laval.

**Dr Jacques Régnière** ([jregniere@rncan.gc.ca](mailto:jregniere@rncan.gc.ca)). Dynamique des populations, modélisation, impact des changements climatiques/ Population dynamics, modelling, impact of climate change. Professeur associé à la faculté de foresterie et géomatique de l'Université Laval et à la faculté de foresterie de l'Université de Toronto/ Associate professor at the Faculty of Forestry and Geomatics of Université Laval and at the Faculty of Forestry of the University of Toronto.

**Dr Christian Hébert** ([chebert@rncan.gc.ca](mailto:chebert@rncan.gc.ca)). Biodiversité, écologie et contrôle naturel des insectes ravageurs/ Biodiversity, ecology and natural control of insect pests. Professeur associé à la faculté de foresterie et géomatique de l'Université Laval. Il dirige aussi des étudiants inscrits au département de biologie de la même université/ Associate professor at the Faculty of Forestry and Geomatics of Université Laval. He also supervises students in the Department of Biology of Université Laval.

**Dr Barry Cooke** ([bcooke@rncan.gc.ca](mailto:bcooke@rncan.gc.ca)). Dynamique des populations d'insectes forestiers/ Population dynamics of forest insects. Professeur associé à l'Université du Québec à Montréal/ Associate professor at the Université du Québec à Montréal.

**Dr Robert Lavallée** ([rlavallee@rncan.gc.ca](mailto:rlavallee@rncan.gc.ca)). Lutte biologique avec des champignons entomopathogènes, relations plantes – insectes, résistance de l'épinette de Norvège au charançon du pin blanc, *Pissodes strobi*, ECOBIOM/ Biological control with entomopathogen fungi, insect – plant interactions, resistance of Norway spruce to the white pine weevil, *Pissodes strobi*, ECOBIOM. Professeur associé à la faculté de foresterie de l'Université Laval et à l'Université du Québec à Montréal/ Associate professor at the Faculty of Forestry of Université Laval and at the Université du Québec à Montréal.

**Centre de Recherche et de Développement en Horticulture  
Agriculture et Agroalimentaire Canada / Horticulture Research & Development Centre  
Agriculture and Agro-Food Canada**

430, boulevard Gouin  
Saint-Jean-sur-Richelieu  
Québec, Canada J3B 3E6  
<http://res2.agr.ca/stjean/index.htm>

**Dr. Guy Boivin**, Ph.D. Écologie comportementale des parasitoïdes: Allocation optimale de la progéniture et du sexe chez les parasitoïdes des oeufs; Sélection et recherche de l'hôte chez les trichogrammes; Dynamique des populations et écologie des parasitoïdes des oeufs des charançons; Effet des basses températures chez les parasitoïdes; Utilisation des sémiochimiques dans la localisation de l'hôte chez les parasitoïdes. / Behavioral ecology of parasitoids. Optimal progeny and sex allocation in egg parasitoids. Host detection and selection in *Trichogramma* species. Population dynamics and ecology of egg parasitoids of weevils. Effect of low temperatures on parasitoids. Use of semiochemicals by parasitoids in locating their hosts.

Professeur associé, [Sciences et ressources naturelles](#), Campus Macdonald (Université McGill). / Adjunct Professor, [Natural Resource Sciences](#), Macdonald Campus of McGill University.  
Tél: (450) 346-4494 poste 210 / Télécopie: (450) 346-7740 Courriel: [boiving@agr.gc.ca](mailto:boiving@agr.gc.ca)

**Dr. Charles Vincent**, agr., Ph.D. Bio-insecticides, bio-essais. Lutte intégrée des insectes d'importance horticole. Comportement des insectes en laboratoire et en champ. Méthodes de lutte physique contre les insectes. / Integrated management of horticultural insects. Behaviour of insects in the laboratory and in the field. Insect management with physical control methods. Bio-insecticides, bio-assays.

Professeur associé, [Sciences biologiques](#), UQAM. Professeur associé, [Sciences des ressources naturelles](#), Campus Macdonald (Université McGill). / Adjunct Professor, [Biological Sciences](#), UQAM. Adjunct Professor, [Natural Resources Sciences](#), Macdonald Campus of McGill University. Tél.: (450) 346-4494 poste 202/ Fax: (450) 346-7740 Courriel: [vincentch@agr.gc.ca](mailto:vincentch@agr.gc.ca)

**Dr Noubar J. Bostanian**, Ph.D. Biologie, dynamique et développement de seuils de ravageurs des petits fruits. Lutte biologique de certains ravageurs de fruits et petits fruits. Effets subtils des produits antiparasitaires sur les arthropodes auxiliaires. Développement des produits insecticides et acaricides naturels ou synthétiques contre les ravageurs des fruits et petits fruits. / Biology, dynamics and study of small fruit pests and development of thresholds. Biological control of certain fruit and small fruit pests. Subtle effects of pesticides on beneficial arthropods. Development of natural or synthetic insecticides and acaricides for fruit and small fruit pests.  
Tél: (450) 346-4494 poste 204 /Fax: (450) 346-7740 Courriel: [bostianiannj@agr.gc.ca](mailto:bostianiannj@agr.gc.ca)

**Ministère de l'Agriculture, des Pêcheries et de l'Alimentation du Québec (MAPAQ)**

Direction de l'innovation scientifique et technologique  
Complexe scientifique  
2700, rue Einstein  
Sainte-Foy (Québec)  
G1P 3W8

**Dr Michèle Roy**, agronome-entomologiste. Lutte intégrée dans les grandes cultures et en horticulture.  
Professeure associée au département de phytologie à l'Université Laval. téléphone: (418) 643-9729/  
télécopieur: (418) 646-6806 / [michele.roy@agr.gouv.qc.ca](mailto:michele.roy@agr.gouv.qc.ca)

## **Institut québécois d'aménagement de la forêt feuillue**

58, rue principale  
Ripon, Québec  
J0V 1V0  
<http://www.iqaff.qc.ca>

**Dr. François Lorenzetti.** Régimes de perturbations naturelles causés par les insectes forestiers, relations plantes-insectes, interactions à trois niveaux trophiques en général. Professeur associé au Département d'informatique et d'ingénierie, Université du Québec en Outaouais (<http://www.uqo.ca>). Courriel: [florenzetti@iqaff.qc.ca](mailto:florenzetti@iqaff.qc.ca); Téléphone: (819) 983-6589; Télécopieur: (819) 983-6588

**Codena Inc.**

426, Chemin des Patriotes  
Saint-Charles-sur-Richelieu  
(Québec) Canada J0H 2G0  
Téléphone: 450-584-2207  
Télécopieur: 450-584-2523  
[www.codena.ca](http://www.codena.ca)

**Dr. Hélène Chiasson**, Vice-présidente Codéna / Vice-President of Codena

Entomologiste, spécialisée en protection intégrée des cultures. Elle a obtenu une bourse post-doctorale du CRSNG pour travailler chez UDA en 1993 sur l'identification, la sélection et le développement de biopesticides à base d'extrait de plantes. Elle est à l'origine du projet sur le développement de biopesticides chez UDA. / Entomologist specializing in integrated crop protection. In 1993, she won a post-graduate fellowship from NSERC to work at UDA on the identification, selection, and development of biopesticides based on plant extracts. She is one of the founders of the biopesticide development project at UDA.

**Institut de recherche et de développement en agroenvironnement inc. (IRDA)/ Research and Development Institute for the Agri-Environment**

3300, rue Sicotte, C. P. 480  
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Télec. : (450) 778-6539  
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[www.irda.qc.ca](http://www.irda.qc.ca)

Chercheurs en entomologie

**Josée Boisclair.** Agronome et entomologiste, M.P.M. Entomologie, horticulture maraîchère. Domaines d'expertise: dépistage et lutte intégrée contre les ravageurs des cultures maraîchères, Réseau d'avertissements phytosanitaires - maïs sucré. Tél. : (450) 778-6522, poste 227 Courriel : [josee.boisclair@irda.qc.ca](mailto:josee.boisclair@irda.qc.ca). Professionnelle associée au Département de phytologie de l'Université McGill.

**Dr Gérald Chouinard.** Agronome et entomologiste, Ph.D. Entomologie, pomiculture Domaines d'expertise : production fruitière intégrée, lutte biologique et lutte intégrée dans les vergers, dépistage et prévision des insectes du pommier, Réseau d'avertissements phytosanitaires - pommier, comportement des insectes. Tél. : (450) 778-6522, poste 249 Courriel : [gerald.chouinard@irda.qc.ca](mailto:gerald.chouinard@irda.qc.ca). Professeur associé au Département des sciences biologiques de l'Université du Québec à Montréal et à la Faculté des études supérieures de l'Université Laval.

**Dr Daniel Cormier.** Entomologiste, Ph.D. Entomologie, pomiculture. Domaines d'expertise : dépistage du charançon de la prune, Réseau d'avertissements phytosanitaires - pommier, utilisation des ennemis naturels indigènes en protection du pommier, écologie chimique des insectes. Tél.: (450) 778-6522, poste 239. Courriel : [daniel.cormier@irda.qc.ca](mailto:daniel.cormier@irda.qc.ca)

**Dr. Gérard Mailloux.** Biologiste, Ph.D. Entomologie agricole. Domaines d'expertise: écologie et lutte intégrée aux populations d'insectes inféodés aux plantes horticoles. Tél.: (450) 653-4413, poste 247. Courriel: [gerard.mailloux@irda.qc.ca](mailto:gerard.mailloux@irda.qc.ca)

## **New Brunswick**

### **University of New Brunswick**

#### **Department of Biology**

Fredericton, New Brunswick

P.O. Bag Service 45111

E3B 6E1

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Homepage: <http://www.unb.ca/fredericton/science/biology/>

### **Faculty of Forest and Environmental Management**

Fredericton, New Brunswick

P.O. Box 44555

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E3B 6C2

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### Research and academic facilities

The University of New Brunswick enrolls over 7 100 students full-time and 1 200 part-time in undergraduate programs on its Fredericton campus and about 2 000 full-time and 1 000 part-time on its Saint John campus. More than 1 200 full- and part-time students on both campuses are enrolled in the School of Graduate Studies. The department of Biology offers the degrees of MSc and PhD.

The Department is well equipped with equipment for laboratory and field studies. There is a close cooperation with scientists at nearby research centres of Agriculture and Agri-Food Canada and the Canadian Forest Service, which provides students access to additional equipment and facilities.

### List of faculty

**Dr. Gilles Boiteau.** Honorary Research Associate, Agriculture and Agri-Food Canada - Potato Research Centre. Population ecology and management of agricultural insects. E-mail: [boiteaug@agr.gc.ca](mailto:boiteaug@agr.gc.ca)

**Dr. Allen Curry.** Ecology and management of freshwater fish and invertebrates, Including biotic indicators of stream ecosystem health. E-mail: [racurry@unb.ca](mailto:racurry@unb.ca).

**Dr. Eldon Eveleigh.** Adjunct Professor, Atlantic Forestry Centre. Population ecology of forest insects, especially spruce budworm, balsam fir sawfly and parasitoid-host interactions. E-mail: [eeveleigh@nrcan.gc.ca](mailto:eeveleigh@nrcan.gc.ca).

**Dr David Gray.** Honourary Research Associate, Atlantic Forestry Centre. Disturbance and landscape ecology, spatial dynamics of forest insects, insect phenology. Email: [dgray@nrcan.gc.ca](mailto:dgray@nrcan.gc.ca)

**Dr Steve Heard.** Associate Professor. Evolution of insect-plant associations. Email: [sheard@unb.ca](mailto:sheard@unb.ca)

**Dr. Yvan Pelletier.** Honourary Research Associate, Agriculture and Agri-Food Canada - Potato Research

Centre. Insect physiology and behaviour, management of potato pests. E-mail: [pelletier@agr.gc.ca](mailto:pelletier@agr.gc.ca)

**Dr. Christopher Lucarotti.** Honorary Research Associate, Atlantic Forestry Centre. Insect pathology. E-mail: [clucarot@nrcan.gc.ca](mailto:clucarot@nrcan.gc.ca).

**Dr. Dave MacLean.** Management of insects at the forest level, decision support systems for insect management. Climate change effects on insect outbreaks. E-mail: [macleand@unb.ca](mailto:macleand@unb.ca).

**Dr. Don Ostaff.** Honorary Research Associate, Atlantic Forestry Centre. Biological control of forest insects, insect population dynamics. E-mail: [dostaff@nrcan.gc.ca](mailto:dostaff@nrcan.gc.ca).

**Dr. Harald Piene.** Honorary Research Associate, Atlantic Forestry Centre. Plant ecology, impact of insects on tree growth. E-mail: [hpiene@nrcan.gc.ca](mailto:hpiene@nrcan.gc.ca).

**Dr. Dan Quiring.** Behavioural and ecology of insects, especially host plant - insect interactions, and the management of insect pests. Population ecology and dynamics of insects. E-mail: [quiring@unb.ca](mailto:quiring@unb.ca).

**Dr Lucie Royer.** Honorary Research Associate, Atlantic Forestry Centre. Distribution, population dynamics, behaviour, chemical ecology of forest insects. Email: [lroyer@nrcan.gc.ca](mailto:lroyer@nrcan.gc.ca)

**Dr. William Seabrook.** Insect neurophysiology and behaviour, pheromone biology and insect pest management. E-mail: [seabrook@unb.ca](mailto:seabrook@unb.ca).

**Dr. Pakkirisamy Sivasubramanian.** Endocrinology and developmental neurobiology of insects. E-mail: [psivasub@unb.ca](mailto:psivasub@unb.ca).

**Dr. Jon Sweeney.** Honorary Research Associate, Atlantic Forestry Centre. Ecology, behaviour and management of cone and seed insects. E-mail: [jsweeney@nrcan.gc.ca](mailto:jsweeney@nrcan.gc.ca).

**Dr. Graham Thurston.** Honorary Research Associate, Atlantic Forestry Centre. Biology of nematodes and forest insect pest management. E-mail: [gthurston@nrcan.gc.ca](mailto:gthurston@nrcan.gc.ca).

**Dr. Jean Turgeon.** Adjunct Professor, Ontario Forest Centre. Ecology, behaviour and management of cone and seed insects. E-mail: [jturgeon@nrcan.gc.ca](mailto:jturgeon@nrcan.gc.ca).

**Dr. Reginald Webster.** Honorary Research Associate. Insect reproductive biology, taxonomy and diversity. E-mail: [rwebster@nb.sympatico.ca](mailto:rwebster@nb.sympatico.ca).

**Dr Rick West.** Honorary Research Associate. Forest insect pest management, especially biological control. Email: [reely.west@roadrunner.nf.net](mailto:reely.west@roadrunner.nf.net)

#### Courses offered with an entomology component

BIOL 3601. Invertebrate Zoology. In-depth study of invertebrate structure, development and phylogeny.

BIOL 4119. Insect Physiology. A review of the principal functions in insects.

BIOL 4819. Insect Behavior. Studies intra- and interspecific interactions and the application of behaviour to insect control.

FOR 4625. Integrated Management of Fire, Insects and Fungi. A common approach to management at the stand/population and landscape levels. Taxonomy of major families insects and diseases, and fire simulations will covered in laboratory sessions.

FOR 4602. Ecology of Forest Insects. Evaluates factors influencing insects in forest communities emphasis on predator-prey, parasitoid-host and insect-plant interactions as well as natural selection, physiological constraints, behaviour and population dynamics.

FOR 4973. Forestry Field Camp II. An intensive 5-9 day series of field exercises, starting before the fall term, involving low student/faculty ratios, and designed to improve integrative and quantitative forecasting skills.

FOR 6623. Insect Behavioural Ecology.

FOR 6633. Insect Population Dynamics.

FOR 6653. Forest Insect Pest Management.

### Financial support

#### *Department of biology*

Graduate Research Assistantship (GRA) and Graduate Teaching Assistantship (GTA) funds are available to support a number of graduate students every year. For further information on obtaining GRA or GTA support, interested students should contact the Director of Graduate Studies (Fredericton campus) at [www.unb.ca/biology/Faculty/Benfey.html](http://www.unb.ca/biology/Faculty/Benfey.html). Research Assistantships (RAs) are available through funds awarded to individual faculty members by external agencies, such as the Natural Sciences and Engineering Research Council of Canada, or from research contracts. The RA is the principal means of support for graduate students. Thus, the supervisor plays a major role in funding.

#### *Faculty of Forest and Environmental Management*

The value of assistantships depends upon the qualifications of the student and the availability of funds. Exceptional students may have their assistantships supplemented by a Magee Postgraduate Merit Award or a Fraser Inc. Scholarship in Forestry. Research Assistantships (RAs) are available through funds awarded to individual faculty members by external agencies, such as the Natural Sciences and Engineering Research Council of Canada, or from research contracts. The RA is the principal means of support for graduate students. Thus, the supervisor plays a major role in funding.

### Admissions and enquiries

Go to [http://www.unb.ca/web/biology/Degree\\_Info/Graduate.html](http://www.unb.ca/web/biology/Degree_Info/Graduate.html) or [www.unb.ca/forestry/graduate.htm](http://www.unb.ca/forestry/graduate.htm) for details on admissions and enquiries.

**Mount Allison University**

Biology Department  
Flemington Room 105  
63B York Street  
Sackville, New Brunswick  
E4L 1G7

Phone: 364-2500  
Fax: 364-2505  
Email: [cwaterlot@mta.ca](mailto:cwaterlot@mta.ca)

Research and academic facilities

The Biology Department has ten faculty members, the equivalent of three full time support staff associated with the teaching program, a further ten support staff dedicated to research activities, and one full time secretary.

The Biology Department is housed in the Flemington Building which was opened in 1931 and remodelled in 1967, and again in 1996. The building is named in honour of the university's sixth president. The department is particularly well equipped for research activities.

List of faculty

**Dr. Ron Aiken.** Reproductive biology and sex allocation of hermaphroditic molluscs. Mating strategies of aquatic invertebrates. Ecology and life history strategies of aquatic insects. Email: [raiken@mta.ca](mailto:raiken@mta.ca)

**Dr Donna Giberson.** Adjunct Professor. University of PEI, Charlottetown, PEI. Freshwater ecology, with a primary focus in life histories and environmental impact studies on aquatic insects in streams. Email: [giberson@upei.ca](mailto:giberson@upei.ca)

Financial support, admissions and enquiries

<http://www.mta.ca/admin.html>

## **Prince Edward Island**

### **University of Prince Edward Island**

Department of Biology  
550 University Avenue  
Charlottetown, PEI  
C1A 4P3  
Canada  
Telephone: 902-566-0301  
Fax: 902-566-0740  
Homepage: [www.upei.ca/~biology/](http://www.upei.ca/~biology/)

### Research and academic facilities

UPEI is a primarily undergraduate institution which offers a BSc in Biology through the main campus. A new graduate programme was instituted in January 2000, allowing us to offer MSc. programmes in various fields of Biology. In addition, several faculty in the Department hold adjunct appointments with the Atlantic Veterinary College or other nearby institutions, so there is opportunity for graduate studies in most fields covered by our faculty.

We have a particularly strong field component to our courses, and are well known in the region for the quality and range of our field courses. Consequently, we have a good supply of field sampling equipment for entomology, botany, ornithology and mammalogy as well as freshwater and marine studies.

The Department also has two scanning electron microscopes and an automated DNA sequencer available for student use or advanced study.

The Department has a strong undergraduate research component which is reflected in Honours and Special Studies projects. On average, two to four such projects concentrate on entomological study each year, with particular emphasis on aquatic insects. We also have links with the Agriculture and Agrifood Canada Station in Charlottetown, so there is potential to work on projects relating to Biological Control and Integrated pest management, mostly relating to potato production. A new entomological initiative that could provide some interesting projects in the years to come is an inventory and exploration of the insects of the Islands of the Gulf of St. Lawrence. This project will focus on PEI, Cape Breton Island, and the Magdalene Islands, and could include study of aquatic insects, beetles, or certain species of fly.

### List of faculty

**Dr Donna J. Giberson.** Freshwater ecology, with a primary focus in life histories and environmental impact studies on aquatic insects in streams. Email: [giberson@upei.ca](mailto:giberson@upei.ca)

**Dr Lawrence Hale.** Molecular biology, with a primary focus on *Drosophila*, but with ongoing projects with Colorado potato beetle and dragonflies. Email: [lhale@upei.ca](mailto:lhale@upei.ca)

**Dr James Kemp.** Pollination biology, with a primary focus on floral morphology, but expanding interest in identification and biology of native pollinators on PEI. Email: [jkemp@upei.ca](mailto:jkemp@upei.ca)

**Dr. Christine Noronha,** Agriculture Canada, Charlottetown (Adjunct): Biological Control of agricultural pests, Integrated Pest Management. Email: [noronhac@agr.gc.ca](mailto:noronhac@agr.gc.ca)

**Dr. David McCorquodale**, Dept. of Biology, University College of Cape Breton (Adjunct): Taxonomy and biodiversity of insects, particularly the beetle groups Cerambycidae, Carabidae, Coccinellidae, and Curculionidae. Email: [david\\_mccorquodale@uccb.ca](mailto:david_mccorquodale@uccb.ca)

### Courses offered with an entomology component

#### *Undergraduate*

Biology 341. Biology of Insects. Also offered as a partial requirement for a graduate level seminar course. This course is an introduction to entomology, including insect classification, anatomy, development, ecology, and behaviour. Labs focus on morphology and identification.

Biology 462. Limnology.

This course focuses on the physics, chemistry and biology of inland fresh waters, but includes a significant component on aquatic insects.

Biology 441. Special Studies.

This is an independent studies course that offers the opportunity to do a small research project. Three or four small projects are carried out annually on topics relating to entomology.

#### *Graduate*

Biology 881 - DIRECTED STUDIES IN BIOLOGY

Under the supervision of a faculty member, a graduate student independently pursues an area of interest in depth. The course includes an extensive literature review of the specific discipline, directed research on the topic, or collection and analysis of data. Topics must not be a part of the student's thesis research although they may be in a complementary area.

Biology 812 - ADVANCED TOPICS IN ECOLOGY AND ENVIRONMENTAL SCIENCES

This course covers advances in practical and theoretical aspects of aquatic and terrestrial ecology, and represents one of the three general axes of research expertise within the Department. A combination of formal lectures, directed readings, and group discussion of journal articles is used. Students are expected to prepare written reports or present seminars.

### Financial support

No local scholarships are available for graduate study, so graduate students are generally funded from research grants from supervising faculty. Several undergraduate scholarships are available, including one-year and four-year full tuition scholarships. Teaching assistantships are available, but are not lucrative enough to offset graduate costs.

### Admissions and enquiries

Contact potential supervisors directly at the above address for information regarding graduate studies.

## **Nova Scotia**

### **Dalhousie University**

#### **Department of Biology**

Life Sciences Centre

Dalhousie University

Halifax, Nova Scotia

B3H 4J1

Canada

Telephone: 902-494-3515

Fax: 902-494-3736

Homepage: [is.dal.ca/~biology2](http://is.dal.ca/~biology2)

Email: [Biology@Dal.ca](mailto:Biology@Dal.ca) If you want to contact a Professor or Staff member, please put "Attention: Persons's Name" in the Subject Line.

#### **Department of Microbiology and Immunology**

Dalhousie University

Sir Charles Tupper Medical Building

Halifax, Nova Scotia

B3H 4H7

Canada

Telephone: 902-494-3587

Fax: 902-494-5125

Homepage: <http://microbiology.medicine.dal.ca/>

#### **Department of Psychology**

Dalhousie University

Life Sciences Center

1355 Oxford Street

Halifax, Nova Scotia

B3H 4J1

Canada

Homepage: [acsweb.ucis.dal.ca/psych/default.html](http://acsweb.ucis.dal.ca/psych/default.html)

### Academic and research facilities

Dalhousie is the smallest of the comprehensive universities in Canada, which are those offering a full range of professional programmes such as law, medicine, engineering, in addition to core undergraduate programmes and graduate research. As such, it allows many of the advantages of smaller universities and the scope and opportunities of large universities.

MSc and PhD degrees can be obtained in all three Departments.

### List of faculty

#### *Department of Biology*

**Dr Vett Lloyd.** Assistant Professor. Genetics, Genomic imprinting, *Drosophila* models of human diseases, Cloning Behaviour, Cell Biology, Developmental Biology, *Drosophila melanogaster*.

**Dr. Sandra .J. Walde.** Population dynamics, arthropods, dispersal, species interactions

*Department of Microbiology and Immunology*

**Dr. Don B. Stolz.** Polydnviruses, reoviruses and the biology of insect parasites. Picornaviruses affecting the honeybee. Email: [dstoltz@dal.ca](mailto:dstoltz@dal.ca)

*Department of Psychology*

**Dr. Shelley A. Adamo.** Behaviour, hormonal basis of behaviour. Interactions between immune systems, nervous systems and behaviour in invertebrates (crickets, parasitic wasps). Email: [shelley.adamo@dal.ca](mailto:shelley.adamo@dal.ca)

**Dr. Ian A. Meinertzhagen.** Insect neurobiology: The synaptic organisation of the fly's lamina. The function of synaptic genes in fly photoreceptor terminals. The larval brain of *Drosophila*. The brain of the ascidian larva *Ciona*. Email: [Ian.Meinertzhagen@dal.ca](mailto:Ian.Meinertzhagen@dal.ca)

**Dr. Stephen R. Shaw.** Insect neurobiology: A primary goal is to uncover the cellular mechanisms that have accounted for long-term neural plasticity during evolutionary change. Insects are among the model systems of choice because of their uniquely identifiable neuronal sets, and as well offer a wider range of adaptations available locally through small-game field expeditions, one of the last remaining frontiers in the east.. Email: [stephen.shaw@dal.ca](mailto:stephen.shaw@dal.ca)

Research Associates

**Dr. Michael Hardman.** Entomologist. Population ecology, acarology, integrated pest management, biological control, simulation modelling and orchard pest management. Email: [hardmanm@agr.gc.ca](mailto:hardmanm@agr.gc.ca)

**Dr. Kenna MacKenzie.** Berry Crop Entomologist. Studies on the blueberry Stem gall and on pollination biology. Email: [mackenzi@agr.gc.ca](mailto:mackenzi@agr.gc.ca)

**Dr. Rob Smith.** Entomology, insect pheromones and biocontrol. Horticulture and pest management. Email: [smithr@agr.gc.ca](mailto:smithr@agr.gc.ca)

Admissions and financial support

Contact the Department for information on admission requirements and financial support.

## **Acadia University**

Department of Biology  
Acadia University  
24 University Avenue  
Wolfville, Nova Scotia  
B4P 2R6  
Canada  
Telephone: 902-585-1334  
Fax: 902-585-1059  
Homepage: [www.acadiau.ca/science/biol/home.htm](http://www.acadiau.ca/science/biol/home.htm)

### Academic and research facilities

Acadia University is located in Wolfville, Nova Scotia, a town of approximately 3 500 people, about 100 km northwest of Halifax. The university maintains an annual enrollment of 4 000 students. Situated on one hundred hectares, the university faces the diked meadows of the historic Evangeline country and the tidal flats of the Bay of Fundy.

The department of biology at Acadia University offers undergraduate and MSc degrees in biological sciences with certain specializations including entomology. The Acadia Centre for Wildlife and Conservation Biology located within the department is the hub of numerous entomological research projects. The Acadia Centre for Estuarine Research is particularly involved in studies of freshwater invertebrates. The Atlantic Cooperative Wildlife Ecology Research Network usually conducts several insect-related research projects.

There is also an affiliation with several entomologists working at the nearby Agriculture Canada Kentville Research Centre. Several field research stations belong to the department and are ideal for conducting studies in conduction with the Acadia Centre for Wildlife and Conservation Biology. Basic equipment necessary for entomological research is available within the department in addition to some more specialized instrumentation pertaining to physiological research.

### List of faculty

**Dr. Tom Herman** (Head of Biology Department). Population ecology, conservation biology, and biology of Odonata (e.g. effect of resource distribution on mating and spacing systems in temperate and tropical dragonflies). Email: [tom.herman@acadiau.ca](mailto:tom.herman@acadiau.ca)

**Dr. Glenys Gibson**. Invertebrate development and life-history evolution (mostly marine). Email: [glenys.Gibson@acadiau.ca](mailto:glenys.Gibson@acadiau.ca)

**Dr. Phil Taylor**. Conservation biology, landscape ecology, and biology of Diptera. natural history and evolution of mating behaviours in the family Tabanidae (Horse and deer flies). Email: [phyl.taylor@acadiau.ca](mailto:phyl.taylor@acadiau.ca)

**Dr. Soren Bondrup-Nielsen**. Population biology and Coleoptera. Reproduction, social organization and movement, especially dispersal of the forked fungus beetles. These topics, within a habitat mosaic at the level of the landscape are central to understanding population structure. Dispersal is of special concern as it affects both the dynamics of population density as well as population genetics. Email: [soren.bondrup-nielsen@acadiau.ca](mailto:soren.bondrup-nielsen@acadiau.ca)

**Dr. Graham Daborn**. Animal-sediment relationships; the dynamics of saltmarshes in macro- and mesotidal systems; the interactions between pelagic and benthic organisms, and the biology of some

dominant species of fish and invertebrates. Emphasis is placed upon holistic, multidisciplinary studies of estuaries. Research projects relate to the impacts of tidal power development, and the role of local communities in resource conservation and environmental management of coastal ecosystems. Email: [graham.daborn@acadiau.ca](mailto:graham.daborn@acadiau.ca)

#### Research Associates

**Dr. Michael Hardman.** Entomologist. Population ecology, acarology, integrated pest management, biological control, simulation modelling and orchard pest management. Email: [hardmanm@agr.gc.ca](mailto:hardmanm@agr.gc.ca)

**Dr. Kenna MacKenzie.** Berry Crop Entomologist. Studies on the blueberry Stem gall and on pollination biology. Email: [mackenziek@agr.gc.ca](mailto:mackenziek@agr.gc.ca)

**Dr. Rob Smith.** Entomology, insect pheromones and biocontrol. Horticulture and pest management. Email: [smithr@agr.gc.ca](mailto:smithr@agr.gc.ca)

**Dick Rogers.** Apiculturist/Entomologist. Wildwood Labs Inc. Integrated Pest Management (IPM) of field, berry and orchard pests, honey bee pest management and systemic insecticide toxicity to honey bees. Email: [info@wildwoodlabs.com](mailto:info@wildwoodlabs.com)

#### Courses offered with an entomology component

Currently, a single course in entomology (Biol 4153) is taught at the undergraduate level and a graduate level tutorial in entomology (Biol 5503/5513) is also available. Entomology is also taught as a component of the field course (Biol 2406) at Bon Portage Island. Other courses that have a significant entomology component include: Parasitology (Biol 3123), Animal Behaviour (Biol 3143), Population Ecology (Biol 3323), Biodiversity (Biol 3363), Special Problems in Biology (Biol 3413), Arthropod Biology (Biol 3833), Comparative Animal Physiology (Biol 4443), Evolution (Biol 4463), and Biogeography (Biol 4493).

The graduate course with entomological content are: Advanced Seminar in Ecology (Biol 5113/5123), Tutorial in Genetics (Biol 5183), Tutorial in Entomology (Biol 5503/5513), Tutorial in Histology and Morphogenesis (Biol 5603/5613), Advanced Project in Conservation Ecology (Biol 5813/5823), and an Advanced Seminar in Behavior (Biol 5913/5923).

#### Financial support

Various graduate and undergraduate fellowships and teaching assistantships are available for undergraduate and graduate students. The amount of support varies depending on type of fellowship / assistantship and also differs from year to year.

#### Admissions and inquiries

Admission to both undergraduate and graduate programs requires at least 70% (B-) average. Candidates for graduate admission must have 70% average in all the biology courses taken in their last two years of undergraduate program. Applicants are advised to contact their prospective supervisor directly at the time of application (deadline February 1). Acceptance of a qualified candidate is based primarily on the recommendation of the prospective supervisor. Inquiries should be addressed to the Department of Biology, Acadia University, Wolfville, Nova Scotia, Canada, B4P 2R6.

## **Mount Saint Vincent University**

166 Bedford Highway  
Halifax, Nova Scotia  
B3M 2J6  
Canada

Website <http://www.msvu.ca>

### Research and academic facilities

From the smallest microorganism to the largest living mammal, the examination of living things will astound you. As a student of Biology you'll investigate everything from cell growth to microbial genes. You'll have the opportunity to work one-on-one with professors and get plenty of individual attention. MSVU's small classes offer a world of research possibilities for all science students.

### List of faculty

**Dr. Amalie Fröhlich.** Developmental neuroanatomy of the insect visual system (*Drosophila*, *Musca*, *Petrobius*) and of the insect olfactory system (*Apis*). Determination of neuronal cell fate and regulation of connectivity. Email: [amalie.frohlich@msvu.ca](mailto:amalie.frohlich@msvu.ca)

### Financial support

<http://www.msvu.ca/Financial-Information/index.asp>

### Admissions and enquiries

<http://www.msvu.ca/Admissions/index.asp>

## **Saint-Mary's University**

923 Robie St  
Halifax, Nova Scotia  
B3H-3C3

Website: [www.smu.ca](http://www.smu.ca)

### Research and academic facilities

In national surveys of universities in Canada, Maclean's Magazine and Canadian Business Magazine give Saint Mary's top marks for its high calibre programs. Saint Mary's offers a full range of unique graduate and undergraduate programs, including forensic science, applied science, applied psychology, astronomy, environmental studies, Irish studies, Atlantic Canada studies, business administration, criminology, history, international development studies, philosophy and women's studies. A wide selection of programs provides a co-op education option, allowing students to mix academics with practical skills.

Saint Mary's is home to a Science Faculty widely known for its cutting-edge research and commitment to students both in the classroom and research activity. The university has topnotch research equipment to conduct leading research, which includes a computerized chemistry laboratory, the only observatory in the region, and the region's only Environmental Science and Ecosystem Remediation Centre.

### List of faculty

**Dr Doug Strongman.** Taxonomy of Trichomycetes. Pathogenesis of some fungal pathogens to the tarnished plant bug, *Lygus lineolaris*. Reduced risk pest management for root weevils in berry crops. Determining insect colonization rates and patterns on carcasses over time in the Maritimes region. Population dynamics of insects on lowbush blueberry and the role of disease. Email: [doug.strongman@smu.ca](mailto:doug.strongman@smu.ca)

**Dr Susan Bjornson.** Biological Control of Insect Pests. Pathogens of Beneficial Arthropods. Email: [susan.bjornson@smu.ca](mailto:susan.bjornson@smu.ca)

**Dr Matthias Foellmer.** Spider mating behaviour. Email: [Matthias.foellmer@smu.ca](mailto:Matthias.foellmer@smu.ca)

### Research Associates

**Dr. Michael Hardman.** Entomologist. Population ecology, acarology, integrated pest management, biological control, simulation modelling and orchard pest management. Email: [hardmanm@agr.gc.ca](mailto:hardmanm@agr.gc.ca)

**Dr. Kenna MacKenzie.** Berry Crop Entomologist. Studies on the blueberry Stem gall and on pollination biology. Email: [mackenziek@agr.gc.ca](mailto:mackenziek@agr.gc.ca)

**Dr. Rob Smith.** Entomology, insect pheromones and biocontrol. Horticulture and pest management. Email: [smithr@agr.gc.ca](mailto:smithr@agr.gc.ca)

### Courses offered with an entomology component

427.1(2) Introductory Entomology. An introduction to the fascinating world of insects. The anatomy, physiology and taxonomy of this group will be examined. Lab work will include field trips for collection of insects and exposure to methods for preservation and presentation of insect collections.

428.1(.2) Applied Entomology. Insect ecology and the relationship of insects to humans. Topics covered will include: insect biodiversity, morphological and behavioral modifications for specific ecological roles and the impact of insects on human activities.

432.1(.2) Medical and Veterinary Entomology. This course presents an introduction to the biology of insects and other arthropods that cause disease in humans and domestic animals. Topics include the biology and behavior of disease vectors and external parasites, the role of vectors in the transmission of disease organisms, life cycles of vector-borne pathogens, and the mechanisms of vector and disease control.

### Financial support

Contact Student Services at 902-420-5615; fax 902-420-5125.

### Admissions and enquiries

Admissions Office, Phone 902-420-5415; fax 902-496-8100; e-mail: [admissions@smu.ca](mailto:admissions@smu.ca)

## **Nova Scotia Agricultural College**

P.O. Box 550  
Truro, Nova Scotia  
B2N 5E3

Tel: 902-893-6722  
Fax: 902-895-5529  
Email: [regsac.ns.ca](mailto:regsac.ns.ca)

### Research and academic facilities

Traditionally, students have chosen NSAC for sound technical and academic training in agricultural science and technology. Increasingly, students understand that agriculture is the science of life – and that an NSAC education provides a solid foundation for endless higher education and career options. NSAC maintains a welcoming, small-school atmosphere on one of the most modern, best-equipped campuses in the Atlantic region. Moderate class sizes, excellent facilities, and dedicated professors foster a learning environment that is both challenging and supportive.

### List of Faculty

**Dr Jean-Pierre Le Blanc.** Professor, Department of Environmental Sciences. Integrated pest management, insect ecology and taxonomy. Email: [jleblanc@nsac.ns.ca](mailto:jleblanc@nsac.ns.ca)

**Professor Glen Sampson.** Associate Professor, Department of Environmental Sciences. Weed Science. Ecologically based weed management in the context of integrated pest management, biological weed control utilizing fungi and insects. Dr Sampson is part of the Grad Faculty at Dalhousie University. Email: [gsampson@nsac.ns.ca](mailto:gsampson@nsac.ns.ca)

**Dr. Gilles Boiteau,** Adjunct Professor, Department of Environmental Sciences. Research Scientist (Agriculture Canada, Fredericton). Biological and chemical control of insect pests on potatoes, insect transmission of plant pathogens, and insect dispersal. Email: [boiteaug@agr.gc.ca](mailto:boiteaug@agr.gc.ca)

### Financial Support

A good education is an important investment in your future. We can help you find ways to finance that investment through student loans, scholarships, bursaries, and on-campus employment opportunities.

Visit the Registry for information about the student loan process, check out the Awards Office to find out how NSAC rewards excellence, or link to Career Services for on-campus job listings.

[http://www.nsac.ns.ca/choosingnsac/money\\_matters.htm](http://www.nsac.ns.ca/choosingnsac/money_matters.htm)

### Admissions and Requirements

Admission Requirements vary depending on the program you're applying for, where you're applying from, and whether you are applying as a mature student. The Registry can give you information on requirements for: Atlantic Canadian applicants, Canadian applicants outside Atlantic Canada, International Student applicants and Mature Student applicants

[http://www.nsac.ns.ca/choosingnsac/admission\\_requirements.htm](http://www.nsac.ns.ca/choosingnsac/admission_requirements.htm)

## **Newfoundland**

### **Memorial University of Newfoundland**

Department of Biology  
Memorial University  
St. John's, Newfoundland  
A1B 3X9  
Canada  
Telephone: 709-737-7698  
Fax: 709-737-3018  
Homepage: [www.mun.ca/biology](http://www.mun.ca/biology)

#### Research and academic facilities

The Department has 27 faculty and offers graduate programs at the MSc and PhD level with 90 graduate students enrolled. These are supervised by Biology and Ocean Sciences Centre faculty as well as co-supervised by adjunct professors outside Memorial. The University is situated in St. John's, a small coastal city surrounded by low hills. This is a cold maritime coastal environment in the boreal forest, thus well suited to research in freshwater, wetlands and boreal forest habitats, all existing within minutes of the Department. On the western side of the Island are low mountains with a similar habitat but on a wider range of rock types and with a more continental climate. In Labrador, the conditions vary from boreal forest to low arctic tundra. The Department also interacts with Agriculture and Agri-Food Canada Department of Fisheries and Oceans, and provincial government agencies all of which have supported research in entomology in this Department.

#### List of faculty

**Dr. Murray H. Colbo.** Freshwater Biology with particular interest in freshwater insects and environmental quality. Email: [mcolbo@mun.ca](mailto:mcolbo@mun.ca)

**Dr. Peggy Dixon,** Adjunct Professor, Agriculture and Agri-Food Canada. Development and implementation of IPM programs for vegetables and small fruits. Use of forecasting, monitoring, biological controls and biorational products (eg. pheromones) in IPM. [dixonpl@agr.gc.ca](mailto:dixonpl@agr.gc.ca)

**Dr. Roger Pickavance.** Biology of ground spiders. Email: [rpickava@mun.ca](mailto:rpickava@mun.ca)

**Dr. Jean Finney-Crawley.** Biology of nematode parasites of insects. Email: [jfinneyc@mun.ca](mailto:jfinneyc@mun.ca)

**Dr. Hugh Whitney,** Adjunct professor, Director of Animal Health, Newfoundland and Labrador Department of Natural Resources, animal disease vectors and parasites. Email: [hughwhitney@gov.nf.ca](mailto:hughwhitney@gov.nf.ca)

#### Courses offered with an entomology component

##### *Undergraduate*

- 3160. Insect Morphology and Physiology.
- 3401. Comparative Animal Physiology.
- 4150. Insect Systematics and Ecology.
- 4180. General Parasitology.
- 4181. Experimental Parasitology.
- 4820. Field Course in Terrestrial Biology.

*Graduate*

6900. Entomology.

6910. Applied Entomology.

7900. Special Topics are also given as required.

Admissions and enquiries

Contact the Department at the above address for information.