

# NEWSLETTER OF THE BIOLOGICAL SURVEY OF CANADA (TERRESTRIAL ARTHROPODS)

## Table of Contents

<b>General Information and Editorial Notes</b> .....	(inside front cover)
<b>News and Notes</b>	
Forest arthropods project news .....	51
Black flies of North America published.....	51
Agriculture and Agri-Food Canada entomology web products.....	51
Arctic symposium at ESC meeting.....	51
Summary of the meeting of the Scientific Committee, April 2004 .....	52
New postgraduate scholarship.....	59
Key to parasitoids and predators of <i>Pissodes</i> .....	59
Members of the Scientific Committee 2004 .....	59
<b>Project Update: Other Scientific Priorities</b> .....	60
<b>Opinion Page</b> .....	61
<b>The Quiz Page</b> .....	62
<b>Bird-Associated Mites in Canada: How Many Are There?</b> .....	63
<b>Web Site Notes</b> .....	71
<b>Arctic Corner</b>	
Update on the Insects of the Arctic project .....	72
<b>Selected Publications associated with the Biological Survey</b> .....	80
<b>Selected Future Conferences</b> .....	85
<b>Answers to Faunal Quiz</b> .....	86
<b>Quips and Quotes</b> .....	87
<b>Requests for Material or Information Invited</b> .....	88
<b>Request for Cooperation (form)</b> .....	89

## **General Information**

The Newsletter of the Biological Survey of Canada (Terrestrial Arthropods) appears twice yearly. All material without other accreditation is prepared by the Secretariat for the Biological Survey.

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**Queries, comments, and contributions to the Newsletter are welcomed by the editor. Deadline for material for the Spring 2005 issue is January 28, 2005.**

## **Editorial Notes**

The Biological Survey of Canada (Terrestrial Arthropods) develops and coordinates national initiatives in taxonomic and ecological entomology on behalf of the Canadian Museum of Nature and the Entomological Society of Canada. The Newsletter communicates information about systematic and faunistic entomology that may be of interest in Canada, and reports especially on activities relevant to the Biological Survey.

### **Alternative formats**

Instead of receiving this paper copy two other options are available on request to [bsc@mus-nature.ca](mailto:bsc@mus-nature.ca):

- An email alert will be sent when each issue is available on the Survey's web site at: [www.biology.ualberta.ca/bsc/bschome.htm](http://www.biology.ualberta.ca/bsc/bschome.htm).

or

- Each issue can be delivered in pdf format directly to your email box

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## News and Notes

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### Forest arthropods project news

The results of the survey of forest arthropod biodiversity projects in Canada (see Forest Arthropod Project Inventory in Canada. Newsletter of the Biological Survey of Canada (Terrestrial Arthropods) 23(1): 17-18) are now available on the Biological Survey web site.

This database will be actively maintained so should there be changes or additions, please forward information to David Langor (dlangor@nrca.gc.ca). Thanks to all who responded to the survey.

The first issue of the Forest Arthropods Newsletter is in preparation and will be distributed in early December 2004. If you have news items about forest arthropod biodiversity issues, including faunistics, systematics, conservation, disturbance ecology and adaptive forest management, that you would like to contribute to the Newsletter (in English or French), please forward by October 31, 2004 to Dave Langor (dlangor@nrca.gc.ca).

### The Black Flies of North America published

The Black Flies (Simuliidae) of North America by P.H. Adler, D.C. Currie and D.M. Wood was published this year. This book compiles nearly all the published information on North American black flies. All aspects of black flies are treated within the context of a worldwide perspective, including natural history and ecology, cytology and morphology, phylogeny and classification, economic impact, pest management, natural enemies, history of research, study methods, and identification. Information on ordering can be found at [www.cornellpress.cornell.edu](http://www.cornellpress.cornell.edu).

### Agriculture and Agri-Food Canada Entomology Web Products

Many of the entomology web products that were removed from the Agriculture and Agri-food Canada website in 2002 have been relocated to two websites established by the CanaColl Foundation and the North American Dipterists Society. Most of the original Canadian National Collection of Insects, Arachnids and Nematodes website is now located at <http://www.canacoll.org/>. The site has been updated and is still being developed. Important documents such as a Checklist to the Beetles of Canada and Alaska, and an Illustrated Glossary of Positional and Morphological Terms for Chalcid Wasps, as well as several new documents, can be found on the CanaColl website. Most of AAFC's Diptera web documents are now located at <http://www.nadsdiptera.org/>. These include the newsletters Fly Times and Tachinid Times, a Directory of North American Dipterists, the CNC Diptera type catalogues, and a series of web pages on Tachinidae.

### Arctic Symposium at the ESC meeting

There will be a symposium at the upcoming meeting of the Entomological Society of Canada and Acadian Entomological Society (Charlottetown, 15-18 October 2004), focusing on the insects of the Central Barrens region of arctic Canada. The goal of the symposium is to highlight what has been learned in the four years of the Survey's project on Insects of the Arctic, and note the work that still needs to be done.

See p. 72 for an update on the 2003 and 2004 arctic field collecting.

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## Summary of the meeting of the Scientific Committee of the Biological Survey of Canada (Terrestrial Arthropods), April 2004

The Scientific Committee met in Ottawa on April 22-23, 2004, including new members Dr. Owen Olfert and Dr. Jon Sweeney.

### Scientific projects

#### 1. Grasslands

The first grasslands volume – Ecology and interactions – has had one chapter submitted, one is undergoing internal review, and one has complete text but figures are in progress. A number of other authors have agreed to submit chapters by the end of May. A list of potential authors for the second volume – Arthropods in altered grasslands – is being assembled. Moreover, a preliminary list of authors for the third faunistic / systematic volume is being compiled. Evidently, such a volume will have little potential overlap with the EMAN assessment of species diversity in the prairie ecozone, which is in progress.

The 2004 grasslands focus trip is at Aweme, MB June 4–6. The event is a “bioblitz”, including scientists from various disciplines.

#### 2. Terrestrial Arthropods of Newfoundland and Labrador

The project continues to be active mainly due to the efforts of Dr. David Larson. Work on keys continues mainly for the Coleoptera although other orders have been done. Work is in process to make colour photographs of all taxa. A database of entomological literature dealing with NF/LB is being built. There is a Biota database of NF/LB taxa and general collection localities. Dr. Larson is retiring from Memorial University and there are no plans to replace him with another entomologist. There is great concern about the future of the insect collection there and after some discussion with others in Newfoundland it was determined that for the time being the entire MUN collection should be relocated to the Northern Forestry Centre, CFS, Edmonton on a long-term loan, although it is imperative that the collection move back

to Newfoundland in the future. There has been little progress with plans for publications, but this issue will be pursued because the first fascicle will establish the format for the series.

An article was published in the BSC Newsletter to describe the project and encourage participation. The BSC website was also updated with a separate page describing the project and including a list of families of NF/LB insects, number of taxa per family and availability of keys. Other terrestrial arthropod groups will be added to this list soon. The involvement of others is required for building, testing and refining keys.

#### 3. Forest arthropods

A forest arthropod project inventory done in the 1990's and published in the BSC newsletter to help facilitate communication had been updated recently and is accessible on the BSC website (see p. 51). The list shows 65 projects to date. One objective of the Forest Arthropod Project will be to update this database regularly.

The content of the BSC website has been enlarged to provide a better description of the project. Publication of a Forest Arthropods Newsletter through the Canadian Forest Service, Northern Forestry Centre is planned, and after discussion the Committee agreed that a bilingual electronic version would be the preferred format, given the funds available.

Dr. Langor reminded the Committee that at the last meeting there was discussion about organizing a symposium for the 2005 Joint Annual Meeting of the Entomological Society, which could focus either on a taxon approach with a synthetic paper on each of several groups, or on procedures, interpretation, and prognosis. These ideas will be developed further.

Work continues on the sucking insects of jack pine and lodgepole pine. A new project

to prepare a handbook on the Cerambycidae of Canada and Alaska has been started. It was also suggested that the forest arthropods project explore the possibility of inventory work in National Parks, for example Waterton Lakes National Park, even including a field trip. These ideas will be followed up.

#### *4. Insects of the arctic*

All of the black fly records from the 2003 expedition to Rankin Inlet, Arviat and Baker Lake had been incorporated into the new black fly book, which has set the stage for a major paper synthesizing the biogeography and composition of the black flies of the Northwest Territories and mainland Nunavut. In 2004 the last remaining area will be explored, the Seward Peninsula of Alaska, setting the stage for an expedition in 2005 to Anadyr and environs.

Other 2004 arctic work will be carried out near Rankin Inlet. An arctic symposium at the 2004 ESC annual meeting, a Biological Survey of Canada symposium, will focus on results from the arctic project. The Arctic and Boreal Entomology course will be taught at Churchill again from July 31 to August 14, 2004. About 15 people are registered so far.

#### *5. Seasonal adaptations*

Papers on "Seasonal adaptations of arctic insects" and "The roles of insect cocoons in cold conditions" are in press. A paper on "Insect adaptations to cold and changing environments" was submitted to the symposium editor. A symposium paper on "How similar are daily and seasonal biological clocks?" will be presented at the International Congress of Entomology. Some other papers on insect life cycles are in progress. Research is envisaged in Japan in 2004-2005. The Encyclopedia of the Arctic, including short entries on Insects, Insect larvae, and Mosquitoes is also in press for October 2004.

### **Other scientific priorities**

#### *1. Invasions and reductions*

Consultations continue about the possibility of holding a workshop about invasive alien

species, which would consider science issues rather than policy. Such a symposium would deal with arthropod issues that cut across agriculture and forestry. The content and participation in such a symposium, with a focus on scientific synthesis, as well as potential funding, will be explored further. It would likely take at least two years to organize a symposium or workshop with broad engagement from across the country.

A subproject on coccinellid beetles continues to focus on the introduced species of coccinellids and the potential effect on native species, looking at historical changes and developing a baseline for future comparisons. Coverage for most provinces is in place. Discussions continue on what the final products will be. Discussions have also begun about a possible more public component with the CMN.

#### *2. Endangered species*

Issues related to endangered species were discussed, including the possibility of writing a status report for a whole group rather than a species. A list of potentially rare or endangered insects, as for British Columbia, is useful to leverage money for other inventories, but there may be danger in the potential use of the information to initiate COSEWIC status reports which might unnecessarily restrict or stop collecting in those areas. Wider arthropod data are necessary, but not in species-by-species status reports. The Committee also discussed criteria used to determine what is listed, because some attempts to list have been based on very limited information or very small numbers of collected specimens. COSEWIC has approval to appoint two arthropod co-chairs in 2004, and a decision will be made soon. Some smaller initiatives would be undertaken by the BSC before any decision is made about a national project on endangered species.

#### *3. Arthropods of the Gulf of St. Lawrence Islands*

A document introducing a BSC project for these unique and interesting habitats was

circulated. Area and distance from source lead to some interesting questions. Several co-operators will each conduct their own sampling but others will be engaged for help with identifications and sampling techniques. One or more synthetic publications will be produced considering elements such as biogeography, glacial history, size, and distance from potential sources of colonists, as well as graduate theses and undergraduate projects as part of the ongoing program.

#### *4. Survey website*

The BSC website has about 20,000 visits per year, and is well received. In addition to ongoing updates, a number of particular updates were made recently including revised Committee details, announcements about the Grasslands project and new sections for the Forest arthropod project, the Terrestrial arthropods of Newfoundland and Labrador project, and results of the Survey review. New publications posted include recent newsletters as well as the French translation of the voucher brief. Minor corrections for French web pages were received and will soon be made. New sections and therefore more menu items continue to be added to the home page, so that the look and content will be reviewed in case changes are necessary. The possibility of links from societies and other institutions to the Survey website is being followed up, in order to make the BSC resource more widely accessible.

#### *5. Survey poster*

A poster outlining the work of the Survey has been completed and is available to Committee members for download, for use at conferences or in departments.

#### *6. Databasing*

A proposal to GBIF to digitize odonate collections was turned down. Two other major proposals for Canada Foundation for Innovation grants for collaborative information facilities were also turned down. Some members emphasized the fact that proper maintenance and handling of specimens, especially identification, is far more important than what most

people perceive as the task of databasing a collection.

Noting that one of the problems with databasing is that each researcher seems to be independently georeferencing individual sites, resulting in a duplication of effort, the Committee agreed to explore the development of a database of the most common collecting locations, especially cryptic localities with little known or historical names.

#### *7. Monitoring of continuing priorities*

Some other Survey interests were reviewed, including arthropods of aquatic habitats, arthropods of the Queen Charlotte Islands (Haida Gwaii), arthropod ectoparasites of vertebrates (including extensive collections of ectoparasites of birds and mammals in Manitoba by Dr. Galloway, largely in cooperation with the Manitoba Wildlife Rehabilitation Organization and Manitoba Conservation, and a paper from Sweden describing the sequencing of black fly blood meals to provide data on parasite-host associations), arthropods of special habitats, and agroecosystems (including a review of long-term interdisciplinary cropping system studies on the Prairies, with some arthropod components).

#### *8. Other priorities*

The Committee also considered actions and information about the project on keys to the families of terrestrial arthropods in Canada, wider distribution of French translations of the briefs on voucher specimens and on label data, arthropods and fire, naturalists publications, the faunal analysis project, the idea of a Canadian Encyclopaedia of Life, liaison with other organizations, advice for a list of insect common names, and other topics.

### **Liaison and exchange of information**

#### *1. Canadian Museum of Nature*

Mr. Roger Baird, Director, Collection Services, reported new developments. Renovations of the Victoria Memorial Museum Building are advancing. Full-scale work will begin in May. Construction will be done in phases between

now and 2008-2009. The first major phase will be complete in May 2006 with the opening of a renovated fossil gallery, and relocation of the birds and mammals hall. The Museum will continue to be open during construction with about half of the facility available to the public at any one time, but the Museum is confident in its ability to manage the risks and challenges of running a construction site and a public facility at the same time.

The Federal Biodiversity Information Partnership (FBIP) is continuing with its collaborative work with the various federal science departments, working on proofs of concept on how to share and exchange data or provide interoperability of data from the different departments. Some conversions of existing information and gathering of new information have been completed. Ownership of the data will continue to reside with each institution.

Significant developments in the U.S. include funding for the Barcode of Life project, and FBIP will monitor these developments.

The CMN received the succession plan report for the Head of the Secretariat and continues to look at options. The work of the BSC, the way information is shared and exchanged and the Museum's role in facilitating that work is an important part of the Museum's strategic direction. The Museum believes that it gains high value in its relationship with the scientific community through the BSC model, and wants to continue to build on that model with the broader scientific community. Further steps in that direction will be taken, including discussions with the Canadian Society of Zoologists and the Canadian Botanical Association and with other government departments. A general forum for a broad range of external stakeholders is anticipated later in the year.

## *2. Agriculture and Agri-Food Canada*

Dr. Jean-François Landry reported on developments from Agriculture and Agri-Food Canada. The reorganization that has been occurring over the last two years continues. One good thing for taxonomy and the CNC stem-

ming from the reorganization is re-emphasis on biodiversity in research. The Agriculture Policy Framework now guides all research. Research groups are aligned across the country rather than locally, and the Biodiversity Theme leader is now Dr. Lianne Dwyer, the current Director of ECORC. All the insect taxonomists fall under the arthropod biodiversity group. Budget uncertainties have made long-term planning difficult. However, research has continued with sufficient resources. The Biodiversity Theme scientists and managers recently met. The biological collections and their importance were emphasized in a significant way at this meeting.

Two committees are especially active within the taxonomist group at ECORC. The curatorial committee has been revitalized and new members appointed. The committee is hoping to promote the establishment of a collection manager position for the CNC to oversee the day to day operations of the collections. Talks about renovations and/or building new facilities are ongoing, although no firm details have been announced.

A handbook committee has been reborn to deal with the Insects and Arachnids of Canada Handbook series, now revived by NRC Press and with the complete agreement and collaboration of the Press. The short-term goals of the committee are to establish new guidelines as well as to discuss priorities for continuing and updating the series. Its long-term goal is to serve as scientific advisor for the handbook series, discuss and recommend new proposals, and select qualified revisers, while NRC Press retains its full role as publisher. A number of handbooks are in progress. Members of the Committee commented that the handbook series has had a tremendous impact on entomology in Canada, as the first source of information for many groups. The handbooks are very significant products. Other members emphasized that the handbooks package taxonomic expertise in a usable manner, allowing people to identify the organisms, and contrasted barcoding prod-

ucts (the subject of recent attention) in asking "have they facilitated identifications?"

### *3. Entomological Society of Canada*

Dr. Charles Vincent, President, Entomological Society of Canada remarked that the Past-president, Dr. Sandy Smith, had spoken highly of the Biological Survey and he was pleased to be able to attend this meeting. He announced that the new BSC scholarship will be in place by the time of the annual meeting in Charlottetown. Two other new ESC scholarships are also being implemented. The Society's strategy is to try to increase membership by attracting more young people. Overall membership numbers are more-or-less stable. The new editor of *The Canadian Entomologist*, Dr. Richard Ring, is becoming familiar with production of the journal. The Publications Committee and Dr. Ring are developing a proposal for various changes to the journal, though there are economic, image and technical considerations. Dr. Giberson noted that planning for the joint ESC/AES meeting is progressing well. The meeting will be held October 15-18 and will run over a weekend as an experiment to draw in more university personnel. No formal collecting sessions for the meeting have yet been arranged but collecting without permits is allowed in most areas.

### *4. Canadian Forest Service*

Dr. Brenda McAfee introduced herself as the CFS Science Advisor for Biodiversity. The Canadian Forest Service is also undergoing a reorganization and changes in senior personnel. A new national forest strategy is being implemented. Actions and priorities are still being determined and therefore the department is currently in a transition year. Dr. McAfee is confident that biodiversity will be one of the science priorities. Some of the issues under consideration include growing links between environment and trade, management and sustainability of the diversity of the forest landscape, increasing frequency and impact of forest disturbance (fires and insects), the growing threat from non-native invasive pests, and a

better need for understanding the role of forests in global cycles.

There is some opportunity for focus on work relevant to the Biological Survey. There will be a marriage between forest science and policy, a coordinated approach to invasive pests and a new approach to natural disasters, liability and risk management. Beyond the issues and opportunities is the need for increased federal engagement. Innovative solutions are required to address increasing threats to public forests, such as invasive pests, which seem likely to be a priority. Indeed, a biodiversity working group of several departments has put forward a draft national strategy for addressing the threat of alien invasive species. In addition, a Memorandum to Cabinet is being drafted to address forest pests. The focus will be on protection, prediction, detection, mitigation and control. Taxonomy is essential for detection. Regional consultations are currently being held for the Invasive Alien Species strategy and Dr. McAfee suggested that members of the Survey attempt to comment on the strategy. Another activity within the CFS and with the Canadian Council of Forest Ministers is reporting on criteria and indicators. A report will be tabled in 2005.

It was noted that CFS is a science-based policy organization, not a science organization. In other words science has to be done that can be translated into policy. This will include biodiversity work. Examining the Aquatic invasives network as a possible model for terrestrial invasive species, including a possible submission of a proposal for a full NSERC Networks of Excellence for invasive species, was mentioned as the sort of suggestion that might be brought forward at the regional consultations.

### *5. Biodiversity Convention Office*

Dr. Ole Hendrickson noted that the BCO is the focal point for the Convention on Biological Diversity. The Parties to the Convention meet every two years and at the last meeting in February 2004 a major issue was a new work

program on protected areas. More significantly, at the meeting next year of the Conference of the Parties and the 2 science bodies, the Global Taxonomy Initiative will undergo a major review. There has been little progress with the GTI although there have been some informal discussions about funding stand-alone taxonomic capacity-building in developing countries. There is a realization that taxonomy can not be viewed just as an add-on to a forestry or fisheries program. The process of reviewing the global taxonomy initiative will bring more attention to taxonomy at the international level in the coming 2 years. Dr. Mark Graham, Canadian Museum of Nature will be coordinating Canada's participation in the upcoming international meetings.

At the national level the BCO tries to help stimulate the implementation of work done under the Convention on Biological Diversity. A federal-provincial-territorial process identified priorities including invasive species. Other initiatives involve stewardship, science and information, and monitoring of status and trends. A meeting was held with the provinces last month. The ESC and others had pointed out the need for a science advisory body for biodiversity but support has not been forthcoming for such an initiative within Environment Canada. It is difficult to push the biodiversity science agenda because of various interests of the provinces, which manage crown lands and forests. It will also be a challenge to get this agenda elevated to a status that will attract new funding. Dr. John Herity, the former Director of BCO, has left the department. Mr. David Brackett is currently Acting Director.

At the federal-provincial meeting in April the province of Alberta tabled a proposal for an Alberta biodiversity monitoring program. There is interest in determining whether this could be adopted nationally. Dr. Hendrickson distributed a concept paper to the Committee and welcomed comments on whether the federal government should try to promote this sort of program nationally. After prolonged discussion by the Committee about the history of the

program and potential weaknesses or alternatives the Committee agreed to prepare a brief point-of-view about the Canadian Biodiversity Monitoring Program concept paper, and transmit it to Dr. Hendrickson.

#### *6. Parasitology module, Canadian Society of Zoologists*

Dr. David Marcogliese reminded the Committee that the parasitology module is based on the concept of the terrestrial arthropod module but operates without any official recognition or support. The parasitologists have produced such products as a directory, a list of systematic expertise, EMAN protocols for monitoring biodiversity, a national perch project and a national stickleback project. He added that there have been some recent hirings in the parasitology field – Dr. Carl Lowenberger at Simon Fraser University and Dr. Todd Smith at Acadia University. Dr. Marcogliese noted that the Canadian Society of Zoologists passed a resolution at its annual meeting last year that stated: “The Canadian Society of Zoologists urges the government of Canada to establish a national science council on biodiversity, a “think tank” of our best scientists in evolution, ecology and systematics, that would help set the research agenda for biodiversity science and advise on its application to policy”. Dr. Marcogliese observed that there seems to be a partitioning of issues in the realm of the national biodiversity agenda. Economic or political issues such as alien species are being dealt with individually in various departments without support for a cohesive package. He provided information about some other networks and projects, and circulated a number of articles pertaining to biodiversity initiatives.

#### **Other items**

##### *1. BSC award*

Arrangements to establish the BSC award – for faunal studies in Canada – have been completed with the Entomological Society of Canada and the information was published in the ESC Bulletin and on the ESC website. Capital funds have been secured to assure the

future of the award, and smaller donations are being sought to fund the first year's award. For example, donations will be solicited from present and past members of the Scientific Committee.

### *2. Regional developments*

Information of potential interest from different parts of the country was reported. In British Columbia, initiatives to undertake a biodiversity strategy include an examination of richness and rarity areas and threats such as roads, alien species, pollution, disruption of habitat, and logging. Protected areas in B.C. do not coincide with the richness/rarity hotspots. Funding for several other projects has been turned down by various agencies. A wide range of other projects in B.C. was reviewed. At the University of Victoria Dr. Richard Ring retires on June 30, 2004 and will not be replaced by an entomologist. Papers from the Richard Ring symposium in Kelowna last November are in process for *The Canadian Entomologist*. A new entomology collections manager has been hired at the Royal BC Museum. At that museum there was a display on giant robotic insects as well as a display highlighting entomological work in B.C., and the entomological work received much more positive public appreciation than the robotic display.

In the Prairies, a national project is looking at the interface between agriculture and forestry. Other projects were noted, including a list of the spiders of Manitoba and many projects on Lepidoptera and on forest insects in Alberta. Efforts are underway to restore the Criddle laboratory in Aweme, and a historical record database on the insects of Aweme is being built. EMEND (Ecological Management Emulating Natural Disturbance) sites in northwestern Alberta recently received funds to establish permanent facilities.

In Ontario, the Royal Ontario Museum is approaching its fundraising goal for the renovation of the museum and new galleries, and work is proceeding on the new addition. Projects especially in southern Ontario and

other developments were reviewed including publication of *The Black Flies (Simuliidae)* of North America, and new insect records from several parks and protected areas. The CNC website has been updated and moved to the CanaColl Foundation's site. The annual meeting of the Entomological Society of Ontario will be in St. Catharines in the fall.

In Quebec, entomological projects were reviewed, including a study of the Swede Midge supported by the provincial government, and taxonomic and faunistic studies especially at McGill University. The Association des entomologistes amateurs du Québec is involved with producing an updated checklist of the beetles of Quebec, including extensive new surveying and collecting in southern Quebec.

In Newfoundland and the Maritimes the 2004 ESC annual meeting will be held in Charlottetown. The University of Prince Edward Island is undergoing extensive renovations, and the biology building is being gutted and rebuilt although personnel are not being relocated in the interim. Various projects and publications from across the Maritimes were reviewed. The Acadian Entomological Society is starting an online regional peer-reviewed journal.

For the arctic, the only entomological work taking place in 2004 likely will be work at Rankin Inlet and the Arctic and Boreal Entomology course at Churchill. However, NSERC has re-implemented its northern supplement.

### *3. Other matters*

The Survey also considered the draft Annual Report to the CMN, further use of Survey review documents, and recent Survey publications. The Annual General Meeting of the Biological Survey Foundation was held.

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## New Postgraduate Scholarship

The Biological Survey has initiated a post-graduate award to encourage interest in the study of faunistics in Canadian habitats by providing further support to students working on the biodiversity of insects or other terrestrial arthropods in Canada.

The \$1000 award will be administered by the Entomological Society of Canada (ESC), and will be awarded every second year, alternating with the Keith Kevan award, and therefore given in 2004, 2006, etc.

The Survey has arranged for start-up funding for the award but more donations will help ensure the long-term stability and growth of the fund. To make a donation please send a cheque to: The Entomologi-

cal Society of Canada, 393 Winston Avenue Ottawa, ON K2A 1Y8. Indicate in a covering letter that the funds are for the Biological Survey of Canada Scholarship fund. Tax receipts will be issued. For further information email [entsoc.can@bellnet.ca](mailto:entsoc.can@bellnet.ca)

Applicants must be post-graduate students at the time of application, be studying at a Canadian university, and be carrying out a project on insect (or terrestrial arthropod) faunistics in a Canadian habitat. Application forms and further details at [http://esc-sec.org/BSC\\_Scholarship\\_2004.pdf](http://esc-sec.org/BSC_Scholarship_2004.pdf) or from the Chair of the ESC Student Awards Committee, Rosemarie De Clerck-Floate ([floate@agr.gc.ca](mailto:floate@agr.gc.ca)).

## Key to parasitoids and predators of *Pissodes*

An illustrated key for the identification of 31 species of Diptera and Hymenoptera was developed for the publication Rearing, identification, and biology of parasitoids and predators associated with *Pissodes* weevils in Canada, by D.J.M. Williams and D.W. Langor.

The publication is now available online at [http://nofc.cfs.nrcan.gc.ca/biodiversity/en/keys/index\\_e.php](http://nofc.cfs.nrcan.gc.ca/biodiversity/en/keys/index_e.php), and the key to adult Hymenoptera and Diptera associated with *Pissodes* species in Canada has been transformed into an interactive key.

### Members of the Scientific Committee 2004

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Ms. Joanne DiCosimo  
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# Project Update: Other Scientific Priorities

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Hugh V. Danks

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In addition to its major current scientific projects — highlighted in earlier newsletters — including arthropods of grasslands, of Newfoundland and Labrador, of forests and of the arctic, keys to families, and seasonal adaptations, the Biological Survey of Canada (BSC) promotes a number of other scientific interests of different scale or orientation.

## Developing scientific projects

Two projects involving active scientific research are in the relatively early stages of development. A project on Invasions and reductions in the Canadian insect fauna recognizes the long-standing impact and current interest of introduced species and consists of both general themes and specific research elements. The general synthesis of relevant information is being addressed primarily by planning for a symposium or workshop within a couple of years. Unlike many other current discussions, this would have a focus on a credible scientific synthesis about invasive species, rather than on the feasibility or political implications of particular policies [contact: David Langor].

An active specific component on invasions and reductions has begun with the verification of coccinellid distributions as shown by specimens in collections across the country. This work serves not only to establish a baseline of information for the future, but also supports the analysis of ongoing changes in the coccinellid fauna that might be attributable to the impact of introduced species. A more public component in this project is also being considered [contact: David McCorquodale].



*Harmonia axyridis*, an introduced lady beetle.  
(photo by S.A. Marshall)

A second developing project of active research deals with the Arthropods of the Gulf of St Lawrence. Study of the faunas of these offshore habitats will allow many interesting biogeographical questions to be addressed [contact: Donna Giberson].

## Ongoing projects

The BSC continues to organize several projects that currently have no active field component. A long-standing project on faunal analysis aims to document the state of knowledge and the availability of expertise for the various taxa of arthropods in Canada, thus supporting attempts to strengthen resources in several areas. Extensive information is already available on the BSC website at <http://www.biology.ualberta.ca/bsc/english/faunalanalysis.htm>. [contact: Rob Roughley]

A project on Arthropods and fire has engendered planning for a symposium on the subject to be held at the joint entomological societies meeting in 2006. [contact: Rob Roughley]

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The BSC also keeps aware of developments pertaining to endangered species and of the possibility of publications of particular interest to naturalists, and expects to launch more specific projects in these areas within a few years.

### General interests

The BSC has long been interested in the topics of systematics, collections, faunal information and so on. For example, it has published briefs about the importance of research collections, data labels, and voucher specimens. Many copies of the recent briefs about label data and about voucher specimens have been disseminated in recent months, including wide distribution of the French-language versions of these briefs (see also <http://www.biology.ualberta.ca/bsc/english/briefs.htm>).

The BSC now actively monitors developments with respect to databasing, given the recent proliferation of organizations offering web-based dissemination of taxonomic data. The BSC has pointed out that support is needed for the core work of systematics to provide the verified information on which these web

products depend, and not just for the web interfaces which have attracted so much interest and funding.

### Outreach and information

The BSC makes information widely available through this newsletter, on its web site, and in other ways. The web site is deliberately extensive, providing access to electronic publications and other resources. It receives many visits and is widely appreciated. [<http://www.biology.ualberta.ca/bsc/bschome.htm>]

A poster documenting the BSC's work is available in electronic form, primarily to permit members of the advisory committee to promote the BSC regionally or at scientific meetings. Photographs of entomologists have also been assembled.

Recently, a BSC student award was established through the Entomological Society of Canada (and funded as a result of BSC efforts) in order to promote faunistic studies on Canadian arthropods. [<http://www.biology.ualberta.ca/bsc/english/scholarship.htm>]

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## Opinion Page

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*—The Opinion Page is a forum for views and ideas of potential interest to readers—  
Contributions should be sent to the editor.*

Since the inception of the Opinion Page feature in the Spring 2003 issue of this newsletter we have received discussion-provoking articles on diverse topics of current interest: The real costs of insect identifications; DNA barcoding; and Bioinformatics and misinformatics.

We do not have an essay for this issue but no doubt many readers have opinions worth sharing. Why not develop a commentary for a future newsletter?

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## The Quiz Page

*—test your knowledge of Canada and its fauna—*

1. Name 3 habitats derived by the action of wind, and explain the usual origin of these kinds of habitats (each of which has a characteristic insect fauna).
2. In some taxa parthenogenetic species are more prevalent in the arctic than elsewhere. Name five major taxa (orders or families) with parthenogenetic arctic representatives.
3. Name five insect orders that occur commonly on birds or in their nests.
4. What kinds of adult insects would a collector be likely to find under bark during the winter in eastern Canada?
5. What feature is shared by flies of the families Acroceridae, Diopsidae, Nycteribiidae and Pipunculidae.

[Answers on p. 86]

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# Bird-Associated Mites in Canada: How Many Are There?

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My husband, Dave Walter, and I are avid acarologists who have worked on the ecology and systematics of mites from soil, water, plants, invertebrates, reptiles, mammals and birds. After spending several years in subtropical and tropical Australia, where almost every mite we came across represented a new species (or genus, or family), we were looking forward to returning to the boreal zone. “We will be able to get back to ecological research”, said Dave blithely, “because surely most species in Canada have been described.” Hah. Had we read Val Behan-Pelletier’s article in the 2001 Biological Survey newsletter, we would have been better prepared for the taxonomic mysteries presented by terrestrial microarthropods in this country ([http://www.biology.ualberta.ca/bsc/news\\_20\\_2/soilfauna.htm](http://www.biology.ualberta.ca/bsc/news_20_2/soilfauna.htm)). The Faunal Analysis Report on mites paints a similar picture, with an estimated 80% of mites in Canada yet to be discovered ([http://www.biology.ualberta.ca/bsc/english/acari\\_old.htm](http://www.biology.ualberta.ca/bsc/english/acari_old.htm)). The hypothetical 7927 unrecorded species are not evenly distributed among mite taxa. Some groups are well known, for example the ticks, Ixodida, with 33 of an estimated 38 species in Canada already recorded. Others have scarcely had their taxonomic surfaces scratched, such as the gall mites (Eriophyoidea), with only 100 of potentially 1000 species known.

Among the lesser known taxa, one ecological group stands out as particularly mysterious: bird mites. This is surprising given the charismatic nature of their habitat. Nevertheless, when one compiles the Faunal Analysis Report’s list of bird-specific taxa

(Rhinonyssidae, Syringophilidae, Harpirhynchidae, Turbinoptidae, Freyanoidea, Pterolichoidea, Analgoidea), only 21 of an estimated 3275 species are noted as having been reported from birds in Canada. These mites dwell in the respiratory passages, skin, and plumage of their hosts, with the last three superfamilies representing “feather mites” in the strict sense (Gaud and Atyeo 1996) (Fig. 1). When one considers that the above list does not include families that have some but not all members associated with birds (e.g. Macronyssidae, Dermanyssidae, Ereyenetidae), there is clearly a huge amount remaining to be discovered about acarine ornithophiles in Canada.

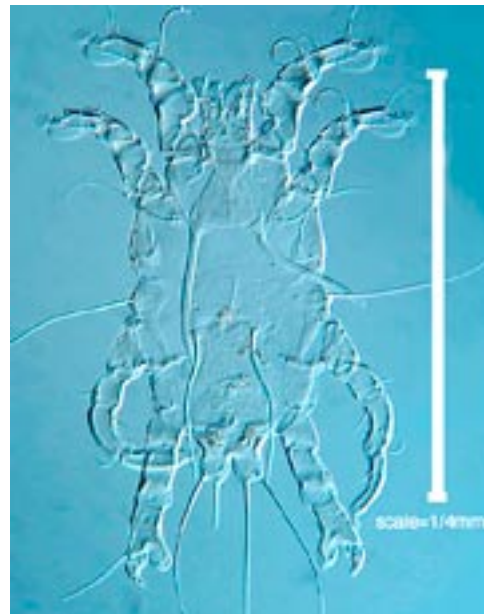


Fig. 1. Male feather mite (Analgoidea: Xolalgidae, *Ingrassiella* sp.) from the gray catbird, *Dumetella carolinensis*. Image by Heather Proctor.

As part of an NSERC Discovery project, I am compiling a list of all reported host-feather mite relationships in published literature. Unlike most of my research, this study actually has some applied value: bird mites can cause serious diseases like scaly-leg in wild birds (Fig. 2) and blood-feeding nest mites are potential agents of West Nile transmission (Fig. 3). Most feather mites, however, appear to be relatively harmless (Proctor 2003). Wheeler and Threlfall (1989) compiled a very useful list of ectoparasites of birds that included most literature records of feather mites in Canada up to the time of publication. Since then, several new records have been published. Based on my literature review there are at least 48 species and 35 genera of feather mites reported from birds in Canada (see Tables 1 and 2). Although this is more than the Faunal Analysis Report's count of 15 species, it is still a far cry from the 2000 species of feather mites that are expected to occur in this country.

How realistic is this predicted number? Another part of my NSERC project, a survey of bird-associated mites from Alberta, may help provide some clues. Compared to other provinces, especially Newfoundland and Manitoba, Alberta has been essentially unexplored with regard to feather mites. Indeed, up to now, only two species of feather mites have been recorded from birds in Alberta (Table 2). Most host specimens for my study have come



Fig. 2. Grotesquely deformed foot of an evening grosbeak (*Coccothraustes vespertinus*), and the causal agent, *Knemidocoptes* sp. cf. *intermedius* Fain and MacFarlane (Analloidea: Knemidocoptidae). Image by Wayne Knee and Heather Proctor.



Fig. 3. The blood-feeding *Dermanyssus quintus* Vitzthum (Mesostigmata: Dermanyssidae), from a hairy woodpecker (*Picoides villosus*). Image by Wayne Knee and Heather Proctor.

from the Fish and Wildlife Forensic Lab, with others loaned by the Provincial Museum of Alberta or donated by colleagues who have found window-kills. Each bird's body is thawed, shaken in a mixture of ethanol, water and dish soap (the 'martini method'), and the washings poured through a 53  $\mu\text{m}$  sieve. With the help of summer students I have so far extracted mites (and lice) from 112 of the 394 bird species known from Alberta, ranging in size from tiny kinglets and ruby-throated hummingbirds to sandhill cranes and white pelicans (Fig. 4). Although only a small number of these samples have been processed so far, we have recorded representatives of 13 families and 23 genera of feather mites plus Turbinoptidae (considered a 'feather mite' by some experts), Epidermoptidae, Knemidocoptidae, Erythetidae, Harpirhynchidae, Syringophilidae, Trombiculidae, Rhinonyssidae, Dermanyssidae, Laelapidae and Macronyssidae.

Our study parallels research underway at the University of Manitoba by Terry Galloway, who has washed an impressive 213 species of birds with a focus

on feather lice. Terry pointed out the scanty knowledge of parasites of birds of Canada several years ago (Galloway and Danks 1990) and is working hard to rectify this. Together, we are collaborating with Sergei Mironov from Zoological Institute of Russia, a renowned feather mite systematist, to identify the Freyanoidea, Pterolichoidea and Analgoidea from Canadian birds. As of June 2004, feather mites from 125 spp. of birds have been identified. They represent 80 genera and 203 species. According to Sergei, 76 of these are species new to science. Extrapolation to the 470 bird species known from Canada (*see footnote*) implies that a total of 763 feather mite species should inhabit Canadian birds, of which 286 are likely to be new. This does not approach the expected number of 2000 species of feather mites hypothesized in the Faunal Analysis Report; however, one shouldn't dismiss the higher value as hyperbole. For most bird species we have washed only a few individuals (the modal value is 1). Because it is unusual for an individual bird to carry all mites associated with its species, increasing the number of host specimens washed will likely also increase the number of mite species recorded. Also, there may be geographic differences in feather mite assemblages on the same host such that a cross-country survey of one bird species will result in more mites than concentration on the host species at a single site. Mironov (pers. comm., June 2004) notes that the house martin in the Old World has different mite species at the eastern and western edges of its range, and that the barn swallow in Canada bears a species of *Trouessartia* that is not represented on this host species in Europe. Likewise,

Proctor and Jones (2004) found that different populations of Australian brush turkey hosted different assemblages of mites in northern, central and southern Queensland.

Ultimately, I am interested in what factors determine the diversity of feather mites on different species of birds. Some hosts have no species of feather mites known from them (e.g. penguins), or only one, whereas others have more than 20 species (Proctor 2003). Understanding determinants of diversity is a very long-term goal, in part because the avifauna of several important geographic areas has not been explored, including much of South America and China. I am currently working with Dr. Mauricio Barreto from the University of Valle (Fig. 4) on his huge collection of mites from Colombian birds, and am also involved in an NSF-funded survey of southern Chinese vertebrates and their parasites. These efforts will go some way to filling the gaps in knowledge of global feather mite diversity and host-specificity; however, given the surprisingly large number of new species found



Fig. 4. From left, Mauricio Barreto (visiting scientist from Colombia) Heather Proctor, and Wayne Knee (NSERC summer student) with an American white pelican (*Pelecanus erythrorhynchos*). Image by Michael Pedruski.

*Footnote:* Avibase ( <http://www.bsc-eoc.org/avibase/avibase.jsp?region=ca&pg=checklist&list=clements> ) lists 671 as the number of bird species in Canada. However, once extinctions, extirpations, rarities and accidentals are removed, the count is 470 'truly' Canadian birds.

from birds sampled from just two provinces in Canada, new material from these tropical areas will likely be overwhelming and require years of dedicated effort from more mite-loving systematists than currently exist. That won't stop us from trying, though!

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Table 1. List of families and genera of feather mites from birds in Canada based on published literature.

Superfamily	Mite family	Mite genus
Analgoidea	Alloptidae	<i>Brephosceles</i>
		<i>Microspalax</i>
	Analgidae	<i>Analges</i>
		<i>Ancyralges</i>
		<i>Diplaegidia</i>
		<i>Megninia</i>
		<i>Megniniella</i>
		<i>Metanalges</i>
		<i>Bonnetella</i>
		<i>Scutomegninia</i>
		<i>Zachvatkinia</i>
		<i>Passeroptes</i>
	Dermationidae	<i>Promyialges</i>
		<i>Montesauria</i>
Epidermoptidae	<i>Nycteridocaulus</i>	
	<i>Proctophyllodes</i>	
Proctophyllodidae	<i>Pterodectes</i>	
	<i>Mesalgoides</i>	
Psoroptoididae	<i>Pteronyssoides</i>	
	<i>Trouessartia</i>	
Pteronyssidae	<i>Analloptes</i>	
	<i>Ingrassia</i>	
Trouessartiidae	<i>Metingrassia</i>	
	<i>Vingrassia</i>	
Xolalgidae	<i>Freyana</i>	
	<i>Rhynchocaulus</i>	
Freyanoidea	Freyanidae	<i>Falculifer</i>
		<i>Cathartacarus</i>
	Eustathiidae	<i>Gabucinia</i>
		<i>Neopetitota</i>
	Falculiferidae	<i>Montchadskiana</i>
		<i>Limosilichus</i>
	Gabuciniidae	<i>Phyllochaeta</i>
		<i>Sikyonemus</i>
	Kramerellidae	<i>Thecarthra</i>
		<i>Montchadskiana</i>
Pterolichidae	<i>Limosilichus</i>	
	<i>Phyllochaeta</i>	
Syringobiidae	<i>Sikyonemus</i>	
	<i>Thecarthra</i>	

Table 2. Species of feather mites known from birds in Canada (sorted by host), from published records. See Table 1 for placement of mite genera in families.

Host family	Host genus	Host species	Host authority	Mite genus	Mite species	Mite authority	Province	Ref
Accipitridae	<i>Pandion</i>	<i>haliaetus</i>	Linnaeus	<i>Bonnetella</i>	<i>fusca</i>	(Nitzsch)	ON	15
Alaudidae	<i>Eremophila</i>	<i>alpestris</i>	(Linnaeus)	<i>Analges</i>	<i>tridentulatus</i>	Haller	Canada	26, 28
Alcedinidae	<i>Ceryle</i>	<i>alcyon</i>	Linnaeus	<i>Gabucinia</i>	<i>alcyon</i>	Boyd	ON	8, 28
Anatidae	<i>Anas</i>	<i>acuta</i>	Linnaeus	<i>Freyana</i>	<i>anatina</i>	(Koch)	MB	9, 28
Anatidae	<i>Anas</i>	<i>americana</i>	Gmelin	<i>Freyana</i>	<i>anatina</i>	(Koch)	MB	9, 28
Anatidae	<i>Anas</i>	<i>americana</i>	Gmelin	<i>Freyana</i>	<i>largifolia</i>	(Dubinin)	MB	9, 28
Anatidae	<i>Anas</i>	<i>clypeata</i>	Linnaeus	<i>Freyana</i>	<i>anatina</i>	(Koch)	MB	9, 28
Anatidae	<i>Anas</i>	<i>clypeata</i>	Linnaeus	<i>Freyana</i>	<i>largifolia</i>	(Dubinin)	MB	9, 28
Anatidae	<i>Anas</i>	<i>crecca</i>	Linnaeus	<i>Freyana</i>	<i>largifolia</i>	(Dubinin)	MB	9, 28
Anatidae	<i>Anas</i>	<i>discors</i>	Linnaeus	<i>Freyana</i>	<i>largifolia</i>	(Dubinin)	MB	9, 28
Anatidae	<i>Anas</i>	<i>platyrhynchos</i>	Linnaeus	<i>Freyana</i>	<i>anatina</i>	(Koch)	MB	9, 28
Anatidae	<i>Anas</i>	<i>strepera</i>	Linnaeus	<i>Freyana</i>	<i>anatina</i>	(Koch)	MB	9, 28
Anatidae	<i>Anas</i>	<i>strepera</i>	Linnaeus	<i>Freyana</i>	<i>largifolia</i>	(Dubinin)	MB	9, 28
Anatidae	<i>Aythya</i>	<i>americana</i>	Eyton	<i>Freyana</i>	<i>anatina</i>	(Koch)	MB	9, 28
Anatidae	<i>Cygnus</i>	<i>columbianus</i>	(Ord)	<i>Vingrassia</i>	<i>cygni</i>	Mironov and Galloway	MB	18
Anatidae	<i>Melanitta</i>	<i>nigra</i>	Linnaeus	<i>Freyana</i>	<i>anatina</i>	(Koch)	BC, NL	7, 28
Anatidae	<i>Melanitta</i>	<i>perspicillata</i>	Linnaeus	<i>Freyana</i>	<i>anatina</i>	(Koch)	BC, NL	7, 28
Apodidae	<i>Cypseloides</i>	<i>niger</i>	(Gmelin)	<i>Rhynchocaulus</i>	<i>nephoecetou</i>	Peterson, Atyeo and Moss	Canada	22, 28
Bombycillidae	<i>Bombycilla</i>	<i>cedrorum</i>	Vieillot	<i>Proctophylodes</i>	<i>armatus</i>	(Banks)	ON	4, 28
Cathartidae	<i>Cathartes</i>	<i>aura</i>	(Linnaeus)	<i>Ancyralgus</i>	<i>cathartinus</i>	Mironov and Galloway	MB	19
Cathartidae	<i>Cathartes</i>	<i>aura</i>	(Linnaeus)	<i>Cathartacarus</i>	<i>aurae</i>	Mironov and Galloway	MB	19
Columbidae	<i>Columba</i>	<i>livia</i>	Gmelin	<i>Passeroptes</i>	<i>bispinosus</i>	(Banks)	ON	4, 28
Columbidae	<i>Columba</i>	<i>livia</i>	Gmelin	<i>Falculifer</i>	<i>rostratus</i>	(Buchholz)	ON	20, 28
Columbidae	<i>Ectopistes</i>	<i>migratorius</i>	(Linnaeus)	<i>Diplaegidia</i>	<i>gladiator</i>	(Haller)	ON	26, 28
Corvidae	<i>Cyanocitta</i>	<i>crystata</i>	(Linnaeus)	<i>Megnina</i>	<i>aculeatus</i>	(Haller)	Canada	26, 28
Emberizidae	<i>Pheucticus</i>	<i>ludovicianus</i>	(Linnaeus)	<i>Analges</i>	<i>fringillarum</i>	Haller	Canada	26, 28
Emberizidae	<i>Junco</i>	<i>hyemalis</i>	(Linnaeus)	<i>Analges</i>	<i>passerinus</i>	(Linnaeus)	Canada	26, 28
Emberizidae	<i>Junco</i>	<i>hyemalis</i>	(Linnaeus)	<i>Proctophylodes</i>	<i>armatus</i>	(Banks)	ON	4, 28

Host family	Host genus	Host species	Host authority	Mite genus	Mite species	Mite authority	Province	Ref
Emberizidae	<i>Melospiza</i>	<i>georgiana</i>	(Latham)	<i>Proctophylloides</i>	<i>polyxenus</i>	Atyeo and Braasch	NL	1, 28
Emberizidae	<i>Melospiza</i>	<i>melodia</i>	(Wilson)	<i>Proctophylloides</i>	<i>armatus</i>	(Banks)	ON	4, 28
Emberizidae	<i>Plectrophenax</i>	<i>nivalis</i>	(Linnaeus)	<i>Analges</i>	<i>longispinosus</i>	Tyrrell	MB	26
Emberizidae	<i>Plectrophenax</i>	<i>nivalis</i>	(Linnaeus)	<i>Analges</i>	<i>longispinosus</i>	Tyrrell	MB	25
Emberizidae	<i>Poocetes</i>	<i>gramineus</i>	(Gmelin)	<i>Pterodectes</i>	<i>muticus</i>	Banks	ON	4, 28
Emberizidae	<i>Spizella</i>	<i>passerina</i>	(Bechstein)	<i>Analges</i>	<i>passerinus</i>	(Linnaeus)	Canada	26, 28
Emberizidae	<i>Zonotrichia</i>	<i>albicollis</i>	(Gmelin)	<i>Proctophylloides</i>	<i>armatus</i>	(Banks)	ON	4, 28
Fringillidae	<i>Carduelis</i>	<i>pinus</i>	(Wilson)	<i>Proctophylloides</i>	<i>pinnatus</i>	(Nitzsch)	NL	27, 28
Fringillidae	<i>Pinicola</i>	<i>enucleator</i>	(Linnaeus)	<i>Proctophylloides</i>	<i>glandarinus</i>	(Koch)	NL	1, 28
Hirundinidae	<i>Tachycineta</i>	<i>bicolor</i>	(Vieillot)	<i>Megninia</i>	<i>albidus</i>	(Tyrrell)	Canada	5, 26, 28
Hirundinidae	<i>Tachycineta</i>	<i>bicolor</i>	(Vieillot)	<i>Pteronyssoides</i>	<i>tyrrelli</i>	(Canestrini)	Canada	26, 28
Hydrobatidae	<i>Oceanodroma</i>	<i>castro</i>	(Vieillot)	<i>Brephosceles</i>	<i>decapus</i>	(Gaud)	NL	21
Icteridae	<i>Agelaius</i>	<i>phoeniceus</i>	(Linnaeus)	<i>Proctophylloides</i>	<i>egglestoni</i>	Spory	MB	13
Icteridae	<i>Agelaius</i>	<i>phoeniceus</i>	(Linnaeus)	<i>Mesalgoides</i>	<i>johnstoni</i>	Spory	MB	13
Icteridae	<i>Dolichonyx</i>	<i>oryzivorus</i>	(Linnaeus)	<i>Analges</i>	<i>passerinus</i>	(Linnaeus)	Canada	26, 28
Mimidae	<i>Dumetella</i>	<i>carolinensis</i>	(Linnaeus)	<i>Megninia</i>	<i>tyrrelli</i>	(Haller)	Canada	26, 28
Muscicapidae	<i>Catharus</i>	<i>guttatus</i>	(Pallas)	<i>Proctophylloides</i>	<i>armatus</i>	(Banks)	ON	4, 28
Muscicapidae	<i>Ixoreus</i>	<i>naevius</i>	(Gmelin)	<i>Promyialges</i>	<i>uncus</i>	(Vitzthum)	BC	23
Muscicapidae	<i>Turdus</i>	<i>migratorius</i>	Linnaeus	<i>Proctophylloides</i>	<i>armatus</i>	(Banks)	ON	4, 28
Muscicapidae	<i>Turdus</i>	<i>migratorius</i>	Linnaeus	<i>Proctophylloides</i>	<i>musicus</i>	Vitzthum	NL	24, 27, 28
Parulidae	<i>Dendroica</i>	<i>coronata</i>	(Linnaeus)	<i>Proctophylloides</i>	<i>quadrisetosus</i>	Atyeo and Braasch	NL	27, 28
Parulidae	<i>Dendroica</i>	<i>palmarum</i>	(Gmelin)	<i>Proctophylloides</i>	<i>armatus</i>	(Banks)	ON	4, 28
Parulidae	<i>Dendroica</i>	<i>striata</i>	(Forster)	<i>Analges</i>	<i>digitatus</i>	Haller	Canada	26, 28
Parulidae	<i>Dendroica</i>	<i>striata</i>	(Forster)	<i>Proctophylloides</i>	<i>dendroicae</i>	Atyeo and Braasch	NL	24, 27, 28
Parulidae	<i>Dendroica</i>	<i>striata</i>	(Forster)	<i>Proctophylloides</i>	<i>longiquadratus</i>	Atyeo and Braasch	NL	1, 28
Parulidae	<i>Mniotilta</i>	<i>varia</i>	(Linnaeus)	<i>Proctophylloides</i>	<i>armatus</i>	(Banks)	ON	4, 28
Parulidae	<i>Parus</i>	<i>hudsonicus</i>	Forster	<i>Proctophylloides</i>	<i>ateri</i>	Fritsch	NL	27, 28
Pelecanidae	<i>Pelecanus</i>	<i>erythrorhynchus</i>	Gmelin	<i>Metingrassia</i>	<i>pelecani</i>	Mironov and Galloway	MB	18
Phalacrocoracidae	<i>Phalacrocorax</i>	<i>auritus</i>	(Lesson)	<i>Scutomegninia</i>	<i>microfal-cifera</i>	Mironov	Canada	16
Picidae	<i>Melanerpes</i>	<i>erythrocephalus</i>	(Linnaeus)	<i>Pteronyssoides</i>	<i>simplex</i>	(Haller)	Canada	26, 28

Host family	Host genus	Host species	Host authority	Mite genus	Mite species	Mite authority	Province	Ref
Picidae	<i>Picoides</i>	<i>villosus</i>	(Linnaeus)	<i>Megninia</i>	<i>pici</i>	(Buchholz)	Canada	26, 28
Picidae	<i>Picoides</i>	<i>villosus</i>	(Linnaeus)	<i>Pteronyssoides</i>	<i>speciosus</i>	(Tyrrell)	Canada	26, 28
Picidae	<i>Sphyrapi-cus</i>	<i>ruber</i>	(Gmelin)	<i>Pteronyssoides</i>	<i>simplex</i>	(Haller)	Canada	3, 28
Picidae	<i>Sphyrapi-cus</i>	<i>varius</i>	(Linnaeus)	<i>Pteronyssoides</i>	<i>speciosus</i>	(Tyrrell)	Canada	3, 28
Procellariidae	<i>Puffinus</i>	<i>gravis</i>	(O'Reilly)	<i>Brephosceles</i>	<i>parvatus</i>	Peterson	Canada	21
Procellariidae	<i>Puffinus</i>	<i>gravis</i>	(O'Reilly)	<i>Brephosceles</i>	<i>puffini</i>	Peterson	NB, NL, NS	6, 21
Procellariidae	<i>Puffinus</i>	<i>gravis</i>	(O'Reilly)	<i>Microspalax</i>	<i>manicata</i>	Megnin and Trouessart	NL	6
Procellariidae	<i>Puffinus</i>	<i>griseus</i>	(Gmelin)	<i>Brephosceles</i>	<i>puffini</i>	Peterson	NB, NL, NS	21
Rallidae	<i>Porzana</i>	<i>carolina</i>	(Linnaeus)	<i>Megniniella</i>	<i>ratcliffi</i>	Mironov and Galloway	MB	18
Rallidae	<i>Porzana</i>	<i>carolina</i>	(Linnaeus)	<i>Metanalges</i>	<i>holderi</i>	Mironov and Galloway	MB	18
Recurvirostridae	<i>Recurvirostra</i>	<i>americana</i>	Gmelin	<i>Bychovskiata</i>	<i>subcharadrii</i>	Dubinin	AB	17
Regulidae	<i>Regulus</i>	<i>calendula</i>	(Linnaeus)	<i>Proctophyl-lodes</i>	<i>glandarinus</i>	(Koch)	NL	27, 28
Scolopacidae	<i>Actitis</i>	<i>macularia</i>	(Linnaeus)	<i>Megninia</i>	<i>forcipatus</i>	(Haller)	Canada	26, 28
Scolopacidae	<i>Calidris</i>	<i>fuscicollis</i>	(Vieillot)	<i>Megninia</i>	<i>forcipatus</i>	(Haller)	Canada	26, 28
Scolopacidae	<i>Calidris</i>	<i>fuscicollis</i>	(Vieillot)	<i>Sikyonemus</i>	<i>pusticulatus</i>	Dabert	MB	10
Scolopacidae	<i>Calidris</i>	<i>himantopus</i>	(Bonaparte)	<i>Montchadski-ana</i>	<i>dubinini</i>	Dabert and Ehrnsberger	MB	12
Scolopacidae	<i>Calidris</i>	<i>himantopus</i>	(Bonaparte)	<i>Sikyonemus</i>	<i>micropal-amae</i>	Dabert	MB	10
Scolopacidae	<i>Limosa</i>	<i>haemastica</i>	(Linnaeus)	<i>Limosilichus</i>	<i>haemastictae</i>	Dabert	MB	10
Stercorariidae	<i>Stercorarius</i>	<i>parasiticus</i>	(Linnaeus)	<i>Thecarthra</i>	<i>stercorarii</i>	Dubinin	MB	11, 10
Strigidae	<i>Bubo</i>	<i>virginianus</i>	(Gmelin)	<i>Neopetitota</i>	<i>bubonis</i>	Atyeo and Philips	AB	2
Tyrannidae	<i>Empidonax</i>	<i>flaviventris</i>	(Baird and Baird)	<i>Analges</i>	<i>fringillarum</i>	Haller	Canada	26, 28
Tyrannidae	<i>Sayornis</i>	<i>phoebe</i>	(Latham)	<i>Analges</i>	<i>passerinus</i>	(Linnaeus)	Canada	26, 28
Tyrannidae	<i>Sayornis</i>	<i>phoebe</i>	(Latham)	<i>Pterodectes</i>	<i>muticus</i>	Banks	ON	4, 28
Tyrannidae	<i>Tyrannus</i>	sp.		<i>Analges</i>	<i>tyranni</i>	Tyrrell	Canada	26, 28
Tyrannidae	<i>Tyrannus</i>	<i>tyrannus</i>	(Linnaeus)	<i>Nycteridocau-lus</i>	<i>lamellus</i>	Atyeo	MB	14

1: Atyeo and Braasch (1966); 2: Atyeo and Philips (1984); 3: Banks (1905); 4: Banks (1909); 5: Bonnet (1924); 6: Bourgeois and Threlfall (1979); 7: Bourgeois and Threlfall (1981); 8: Boyd (1967); 9: Buscher (1965); 10: Dabert (2003); 11: Dabert and Ehrnsberger (1995); 12: Dabert and Ehrnsberger (1999); 13: Hood and Welch (1980); 14: McKenzie and MacKenzie (1981); 15: Miller *et al.* (1997); 16: Mironov (2000); 17: Mironov and Dabert (1997); 18: Mironov and Galloway (2002); 19: Mironov and Galloway (2003); 20: Mitchell (1953); 22: Peterson (1971); 22: Peterson *et al.* (1980); 23: Philips and Fain (1991); 24: Threlfall and Wheeler (1986); 25: Twinn (1935); 26: Tyrrell (1882); 27: Wheeler and Threlfall (1986); 28: Wheeler and Threlfall (1989).

Biological Survey of Canada  
Terrestrial Arthropods français

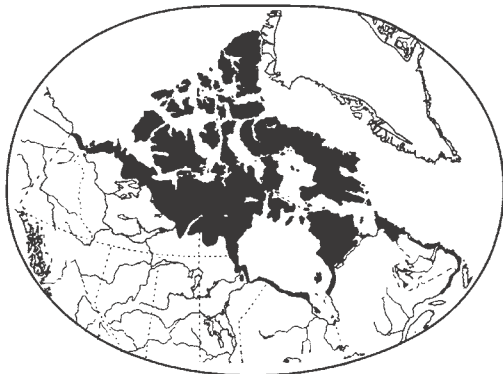
## Web Site Notes

### The first 25 years

This somewhat cryptic menu item appeared on our website in April. *The Biological Survey of Canada (Terrestrial Arthropods): The first 25 years* is based on a document prepared in 2003 following a full review of BSC activities. After the 2003 review members of the Scientific Committee recognized that this summary could be useful for a wider audience, especially those who are not familiar with the BSC. This page provides background information about the Survey and its work from 1981 to present. It briefly addresses:

- Organization of the Survey
- History of the Survey
- Scientific Committee membership
- Scientific Committee meetings
- Secretariat
- Relationship with the Entomological Society of Canada
- Biological Survey Foundation
- Survey projects and priorities
- Funding
- General strengths of the Survey
- Productivity
- Impact
- Broader context
- Appendix: Publications and other products

We hope that you will take the time to refresh your memory about the overall work of the BSC and draw it to the attention of students and other people who may be unfamiliar with the Biological Survey of Canada (Terrestrial Arthropods).



## ARCTIC CORNER

*News about studies of arctic insects*

### Introduction

*Arctic Corner* provides a forum for news of particular arctic interest, replacing the Biological Survey's newsletter *Arctic Insect News* (1990–2000). Contributions to *Arctic Corner* are welcomed by the Editor (see inside front cover).

### Update on the "Insects of the Arctic" project: field collecting in 2003 and 2004

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Douglas C. Currie

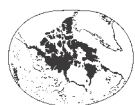
Department of Natural History, Royal Ontario Museum, 100 Queens Park, Toronto, ON M5S 2C6 dcurrie@zoo.utoronto.ca

### Introduction

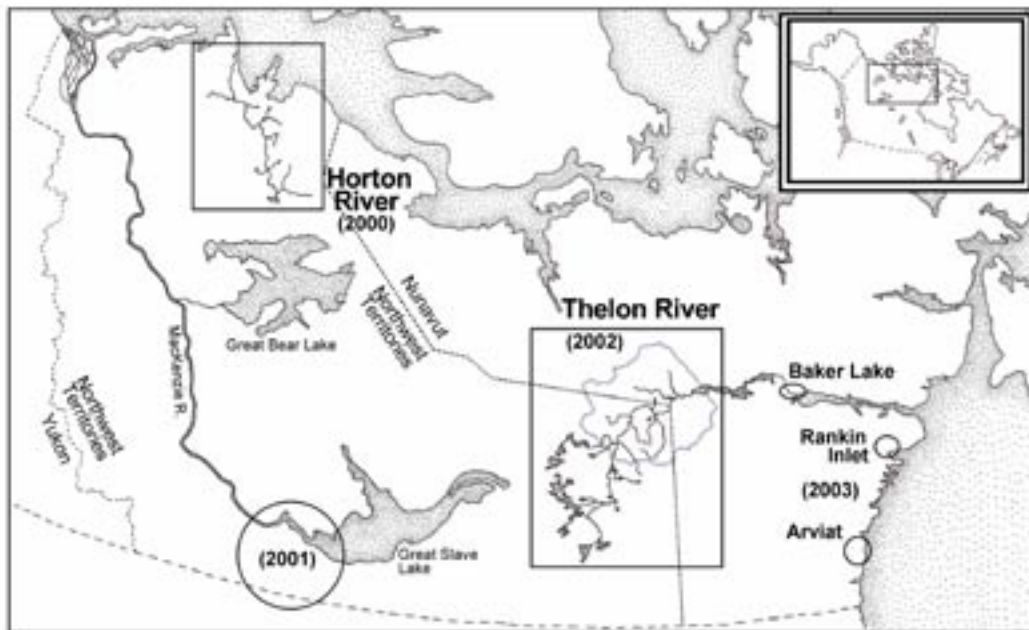
The "Insects of Keewatin and Mackenzie Project" began in 2000 to focus attention on the poorly surveyed arctic zone located on the northern Canadian mainland. The goal of the project was to document insect diversity in and near major rivers in the barrenlands region between the Mackenzie River and Hudson Bay. The project was considered to be a natural extension of the Survey's Insects of the Yukon initiative (see Danks and Downes 1997), and is now being continued under the more inclusive title, "Insects of the Arctic".

The project has consisted of four successive collecting expeditions, starting in 2000 in the northwest Barrens, and extending, in 2003, to northwestern Hudson Bay (see map for sampling locations). Two of the expeditions were

far from any habitation, and involved flying in to a headwater lake or river confluence, then travelling downstream to collect along the river corridor. The other two trips were conducted around existing communities, and so collections were made near roads and trails near the communities. Because of the short collecting periods for each trip, the focus of each survey reflected the interests of the individual participants, so black flies and the aquatic orders, Ephemeroptera, Plecoptera, and Trichoptera, were collected for all trips, and certain Diptera (i.e. Chironomidae, Phoridae) or Lepidoptera were collected on trips where specialists in those groups were included. However, specimens captured from mass collecting methods (e.g. aquatic kick and dip sampling, malaise trapping, sweep netting, beating) have been



*Arctic Corner*



Central barrens 2000 to 2003 sampling areas.

shared with the general entomological community.

The first expedition (July/August 2000) was a river trip along the Horton River (east of the Mackenzie River, and almost due north of Great Bear Lake, see map). Team members (Doug Currie, Donna Giberson, Peter Adler, Brian Brown, and Malcolm Butler) flew into Horton Lake, and paddled 30 to 40 km each day, setting up in a new location nearly every night. This allowed us to collect aquatic and terrestrial insects along approximately 700 km of the river corridor (reports in Currie et al. 2000; Currie and Adler 2000). In the summer of 2001, Doug Currie and Peter Adler traveled north from Edmonton to Yellowknife and collected black flies from streams along roads in southern NWT. For the next expedition (July 2002), another river trip was organized, this time along approximately 325 km of the Thelon River, which straddles the border between NWT and NU. Donna Giberson, Doug Currie, and Peter Adler were joined for this trip by MSc students Lisa Purcell (University of Prince Edward Island) and Amanda Roe (University of Alberta) to collect black flies, general aquatic

insects, and Lepidoptera (reports in Currie et al. 2002; Giberson and Shaverdo 2003; Shaverdo and Giberson in press). The fourth trip in the series, and the main focus of this report, occurred in the region around northwestern Hudson Bay. Doug Currie, Donna Giberson, and Peter Adler flew to Arviat, Baker Lake, and Rankin Inlet during July 2003 and sampled streams and rivers in the vicinity of those three communities.

### Summary of results from previous trips

**Black flies:** Doug Currie and Peter Adler collected black flies during each of the four trips to the arctic for this project. Black flies were collected over nearly 4 weeks from 52 sites along the Horton River in 2000, resulting in 30 species in 4 genera (Currie et al. 2002; Currie and Adler 2000). Two years later, they collected 29 species in 8 genera over a 3-wk sampling period along the Thelon River. Only 17 species were shared between the two drainages, yielding a total of 42 species in the two river systems (Currie et al. 2002). These expeditions resulted in a total of 42 species from the mainland barrenlands zone of Canada

(compared to only 22 species that had been previously reported).

**Mayflies:** Mayflies were collected from 26 of the 38 main river sites, tributaries, and nearby ponds along the Horton and 31 of the 34 sites along the Thelon River by Donna Giberson and Lisa Purcell. Donna has been working with Steve Burian of Southern Connecticut State University (New Haven) to identify and verify the material from these collections, which have resulted in 22 species in 12 genera and 7 families. The Horton River had higher species diversity than the Thelon, despite a much more northerly location than the Thelon River. Fifteen species were recorded from the Horton River, but a Rarefaction Analysis suggested that the river was under-sampled and more species may be present in that area. Twelve species were recorded from the Thelon corridor, and probably represent the total number available. Only five species were found in both river corridors. Few species had previously been reported in the area now known as Nunavut, although the current Northwest Territories has been relatively well collected. Four of the species found in the Horton and Thelon rivers were new to NWT (compared to 52 previously reported there) and five were new to NU (added to the nine species previously reported there). The mayflies that were found are generally northern or mountain species, and represent a classic "above treeline" fauna. Four species were holarctic in distribution, and only one species found (along the Thelon) is considered to be an eastern species; the remainder appear to have Beringian roots and are also found west of the Mackenzie River.

**Stoneflies:** Donna Giberson and Lisa Purcell also collected stoneflies from the main river sites, tributaries and associated ponds along the two large river corridors, and Donna has been working with Ken Stewart of the University of North Texas to identify the collections. Stoneflies were found in 17 of the 38 Horton sites and 28 of the 34 Thelon River sites.

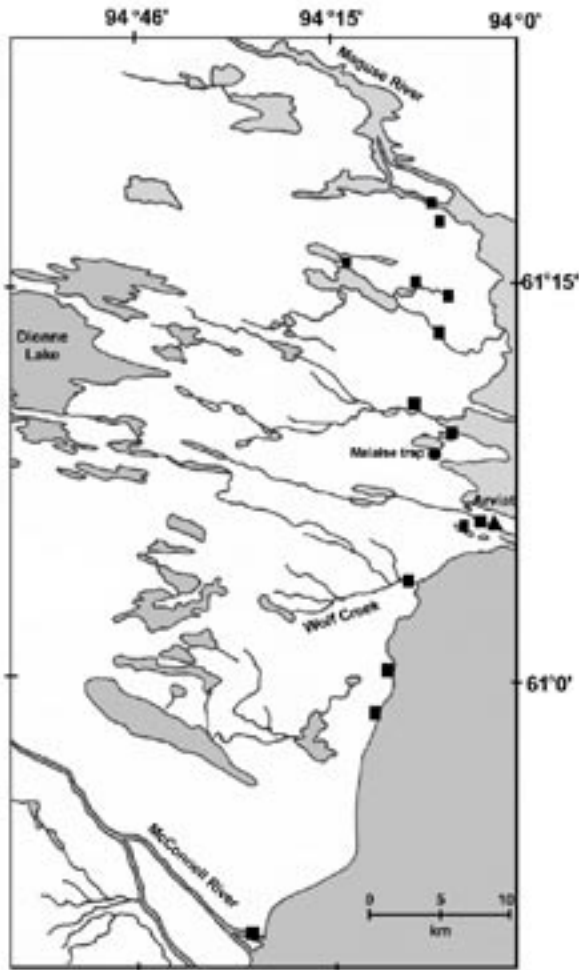
Species diversity was similar in the two rivers, with 9 species in the Horton and 7 in the Thelon. Overall, 13 species were collected, in 11 genera and 4 families, and only three were common to both drainages. Nineteen species had previously been reported in NWT and at least 5 in NU, and these collections have added 5 species to NWT and 3 to NU. Three of the species are Holarctic in distribution, and all have also been collected west of the Mackenzie River.

**Water beetles:** Water beetles were collected by Donna Giberson, and identified by Helena Shaverdo, a Post-doctoral researcher in Rob Roughley's lab at the University of Manitoba (currently at the Naturhistorisches Museum Wien in Vienna), who expressed interest in collaborating on the water beetles. Five of the 37 sites along the Horton River had water beetles, compared to 15 of the 34 sites along the Thelon. Sixty-one specimens were collected in total, yielding 13 species (in 7 genera) of Dytiscidae and 1 species of Gyrinidae. Only two species were found in the Horton corridor, compared to 13 along the Thelon, but the difference in species diversity may be at least partly due to differences in sampling effort. Most of the collections represented range extensions for the water beetle species, and there was one new record for NWT and one for NU (Giberson and Shaverdo 2003; Shaverdo and Giberson in press). Seven of the species have holarctic distributions, and all have also been collected west of the Mackenzie River.

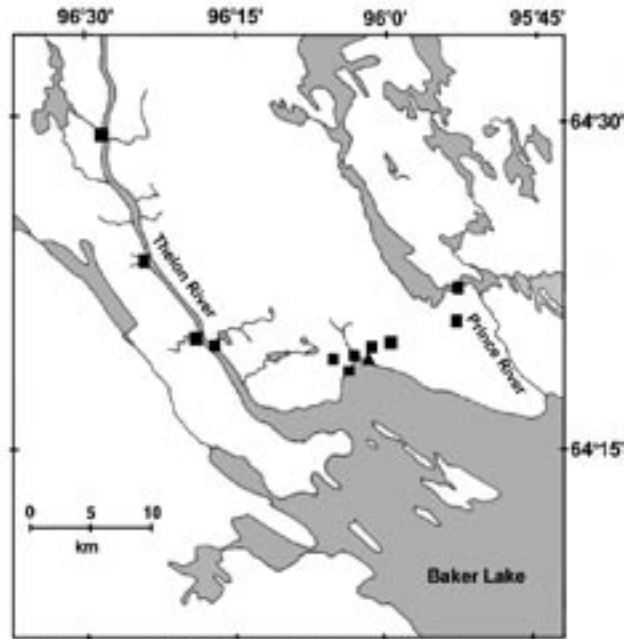
### **Field Collecting in 2003: Arviat, Baker Lake, and Rankin Inlet**

Donna Giberson, Doug Currie, and Peter Adler travelled to the region around northwest Hudson Bay during the summer of 2003, with the objective of sampling as many aquatic habitats near the three communities as possible. Unlike previous trips, where we flew in to headwater sections of isolated rivers, the sampling plan consisted of using the communities as a base, then travelling out each day to

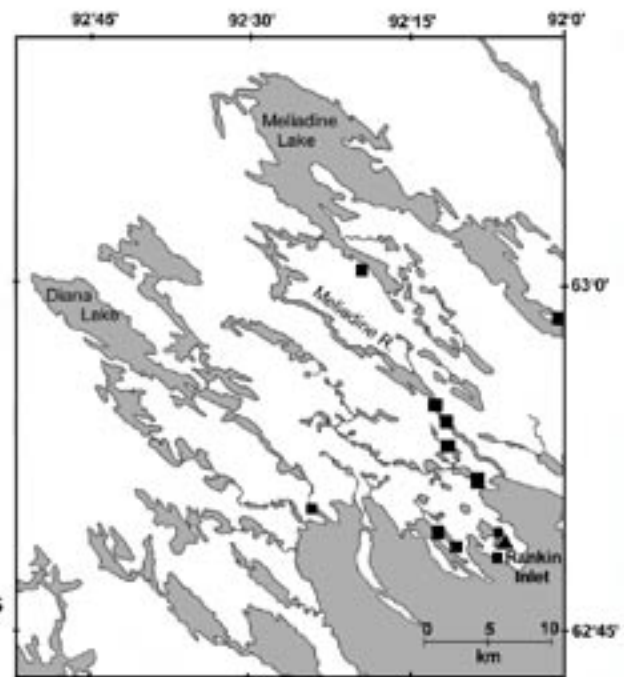




A. Arviat sampling areas



B. Baker Lake sampling areas



C. Rankin Inlet sampling areas

2003 sampling areas.

sample nearby rivers and ponds. Various modes of transport were used to access sampling sites, including truck, All-Terrain vehicle, motorboat, and foot.

### Sampling sites:

The area around northwestern Hudson Bay is dominated by low relief granitic outcrops (Canadian Shield), so is generally rocky with depressions that fill with water and vegetation. Lowland areas are marshy and underlain by permafrost. When flying over the region in summer, the first impression is that of nearly unlimited water: large tundra ponds that drain into each other, and ultimately into large rivers that flow into Hudson Bay; small ponds that perch in rocky outcrops and which may be isolated from each other; and marshy areas and small seeps that characterize much of the remaining land mass. Our sampling consisted of rock-searches, kick-netting, and sweep netting in the tundra near the sampling sites, and monitoring of a Malaise trap near Arviat. Sampling was conducted around Arviat from July 9–13 (with Malaise sampling extending to mid-September at this location), Baker Lake from July 14–17, and Rankin Inlet from July 18 - 21, 2003.



Malaise trap set up near tundra pond north of Arviat.

**Arviat (formerly Eskimo Point):** Arviat is located on Hudson Bay, in the southernmost part of Nunavut. It is marshy, with very low relief, and the main flowing water is from tundra pond to tundra pond, although there are

two large river systems just north (the Maguse River) and south (the McConnell River) of the community. Road access was limited to a few km in either direction of town, but a large esker system near town provided ATV access to a wide variety of sampling areas, so most sampling was done with the aid of Inuit guides, who were familiar with the area. We would like to acknowledge the help of Guy Alikut, our host at Jeannie's B&B, and Ludovic Onert, our Inuit guide, for their invaluable help in getting us out to suitable sampling habitats in the few days we were in town. Guy provided transport to sample sites that were accessible by truck, and Ludovic guided our intrepid crew out onto the tundra (and back!) on ATVs. Mike Settingerton from the Nunavut Wildlife dept. also helped with sampling, and volunteered to maintain a malaise trap for the remainder of the summer at a site about 6 km north of town.

**Baker Lake:** The community of Baker Lake is near the geographical centre of Canada, and is located inland from Arviat and Rankin Inlet. The town is on the shores of Baker Lake, near the mouth of the Thelon River. The area is better supplied with roads than Arviat, partly because of its importance as a centre of mineral exploration. Relief is greater than found in Arviat, with low rocky hills rising up from the lake to the north of town. Many small streams drain the permafrost-covered hills around town and flow to Baker lake, providing considerable sampling habitat near town. In addition, tundra ponds (large and small) abound in the hollows in the hills, and streams can be found draining these ponds as well. Two large river systems were also accessible for sampling; a rough road extends to Prince River to the east, and the Thelon River is accessible to the west via motorboat. Our hosts at the Baker Lake Lodge drove us out to Prince River (approximately 10 km from town) and we walked back to town, sampling streams and ponds on the way. We were also able to sample aquatic habitats near town by





Doug and Peter sampling small tundra pond outflow on Prince River Road, near Baker Lake.

walking along a myriad of roads that extend outward from Baker Lake. Joan Scotti also took us up the Thelon River by motor boat, to a point about half-way to Aberdeen Lake; this allowed us to acquire samples from the lower Thelon River, to compare to our samples from the middle part of the river the year before.

**Rankin Inlet:** Rankin Inlet is another coastal community, located north of Arviat and east of Baker Lake. As with Baker Lake, the area is well supplied by roads and trails, and many sites could be accessed easily by truck or by foot. The staff at Nunavut Arctic College in Rankin were extremely helpful, pointing us to suitable sampling habitat (and providing transport) and providing comfortable accommodation while we were in Rankin. We would like to acknowledge Mike Setterington again for organizing the accommodation, and Mike Shouldice (the

Campus director) for all his help. Our main sampling locations around Rankin Inlet were along the road to Meliadine River to the north, and on the Tudlik Peninsula west of town. Mike Shouldice continued to collect aquatic insect larvae at a site on the Meliadine River for the rest of the summer in 2003, as well as a site on the Diana River (NW of Rankin Inlet).

As in previous trips, Peter Adler and Doug Currie focussed on the black flies, and were particularly interested in the many small streams that connected tundra pools. A major goal of the survey was to look for two enigmatic species of black fly that had so far eluded capture during this project, but which had been collected previously in the Canadian Arctic. The two species were *Simulium giganteum*, known in the Nearctic from a single specimen collected near Baker Lake, and an undescribed species of *Hellichiella* which has been collected from the James Bay region of Quebec, but is currently known only from a description of its chromosomes. Unfortunately, neither species was found during this survey, suggesting that knowledge of simuliid diversity in Arctic Canada may still be incomplete. Twenty-five species of black fly, in five genera, were recorded from 48 collecting sites in this survey, but only a single new record was added, with the capture



Doug and Peter sampling the Meliadine River, north of Rankin Inlet.

of *Simulium annulitarse*; all other species had been collected in the previous surveys. Most of the species collected (19 of 25) were in the genus *Simulium*, with the remainder in *Metacnephia* (3 species), *Helodon*, *Stegopterna*, and *Cnephia* (one species each). Fifteen species were collected around Arviat, 20 around Baker Lake, and 13 around Rankin Inlet. These species records, and others collected during the arctic insects project, have been incorporated into a newly published book on the black flies of North America (Adler et al. 2004).



Near Arviat; Doug Currie showing vial of black flies to Frank, a local resident who came by while we were sampling.

Donna Giberson collected general aquatic invertebrates from both the running water and standing water sites encountered around the three communities, with a total of 45 collections. Diversity of both the Mayflies and Stoneflies was lower than found along either the Horton or Thelon river corridors, despite a much broader range of habitats sampled; only 4 species of mayfly and 5 species of stonefly were encountered in the 2003 survey. All were species that had also been collected along the Thelon River. The Trichoptera, Coleoptera, and other invertebrates that were collected are still being studied, but preliminary work suggests that the fauna is similar to that collected along the Thelon in 2002. Malaise trap residues have been sent to interested specialists who are currently developing the data.

One of the highlights of the 2003 sampling was working closely with local people in each of the three communities. Word quickly spread around each community when we were there, and we were often stopped on the streets and in shops and asked “bug questions”. Also, we met up with several locals as we were sampling, and generated a lot of interest; many people were not aware that the larval stages of the black flies (locally called “milugiaq”) and mosquitoes (“kikturiaq”) were aquatic, and many more were surprised at the number of insects

found in the streams they take drinking water from.

### Field Collecting in 2004: Rankin Inlet, and western Alaska

Although Donna Giberson was not able to travel to the arctic during the summer of 2004, a collaboration with Mike Shouldice of Nunavut Arctic College has meant that collections will continue in 2004 along the Meliadine and Diana Rivers. Mike will sample these rivers every couple of weeks during the summer, and is also maintaining a Malaise Trap near the river to provide seasonal data on the emergence of many of the aquatic species.

Doug Currie and Peter Adler visited westernmost Alaska during the summer of 2004 in order to gain biogeographic context for the Canadian arctic black fly fauna. The areas sampled (Nome, Bethel and environs) – which once formed part of the Bering Land Bridge – are situated approximately 1000 km west of the major road networks in Alaska. Only 7 species of black flies were previously recorded from this vast and sparsely surveyed territory. Although the 2004 collections have yet to be scrutinized in the laboratory, at least 30 morphologically recognized species have thus far been identified, more than quadrupling the



number of species previously recorded from western Alaska. The number of species will unquestionably increase once the polytene chromosomes of larvae have been screened for sibling species. Twenty-two western Alaskan species (73%) exhibit a Holarctic distribution, underscoring the close association between the Nearctic and Palearctic faunas at high latitudes. Yet given the close proximity between westernmost Alaska and the Russian Far East (Chukotka), it is perhaps surprising that no new records were established for species currently known only from the Palearctic Region. On the other hand, the distributions of 8 Nearctic species are extended westward to within a hundred or so kilometers of Chukotka, suggesting the possibility that some of these species may eventually be found on the other side of the Bering Sea.

### Future work

In 2005, Doug Currie and Peter Adler will further their studies of faunal affinities between East and West Beringia by undertaking a collecting expedition to Chukotka in the Russian Far East. Anadyr and Provideniya, which are both accessible by air from Nome, Alaska, have been identified as likely bases of operation. Donna Giberson is hoping to head back to Rankin Inlet with Steve Burian (mayflies) and Jade Savage (muscid flies), to sample for species that have so far been missed in the earlier surveys.



Donna Giberson on road between Baker Lake and the Prince River Bridge, complete with sampling gear.

Photo by D.C. Currie.

### Symposium at the Entomological Society of Canada meeting

There will be a symposium at the upcoming meeting of the Entomological Society of Canada and Acadian Entomological Society (Charlottetown, 15–18 October 2004), focusing on the insects of the Central Barrens region of arctic Canada. The goal of the symposium is to highlight what has been learned in the four years of the project, and note the work that still needs to be done.

### Literature Cited

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- Currie, D.C. and P.H. Adler. 2000. Update on a survey of the black flies (Diptera: Simuliidae) from the Northwest Territories and Nunavut Project. *Arctic Insect News* 11: 6–9.
- Currie, D.C., D. Giberson, and P.H. Adler. 2002. Insect biodiversity in the Thelon Wildlife Sanctuary. *Newsletter of the Biological Survey of Canada (Terrestrial Arthropods)* 21(2): 59-64.
- Danks, H.V. and J.A. Downes (Eds.). 1997. Insects of the Yukon. Biological Survey of Canada (Terrestrial Arthropods), Ottawa. 1034 pp.
- Giberson, D.J. and H.V. Shaverdo. 2003. Update on the survey of aquatic insects from Keewatin and Mackenzie project: The predaceous water beetles (Coleoptera: Adephaga: Dytiscidae and Gyrinidae). *Newsletter of the Biological Survey of Canada (Terrestrial Arthropods)* 22 (2): 61-65.
- Shaverdo, H.V. and D.J. Giberson. in press. Predaceous water beetles (Coleoptera: Adephaga: Dytiscidae, Gyrinidae) collected along the Horton and Thelon Rivers in the Arctic Central Barrens of Canada. *Canadian Field-Naturalist*.

All photos and maps by D.J. Giberson except where otherwise noted.

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## Selected publications associated with the Biological Survey

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|---|---|--|
| Arthropods of Canadian Grasslands (Newsletter)  | 2004. H.V. Danks (Ed.). No. 10. 33 pp.  | See <a href="http://www.biology.ualberta.ca/bsc/english/newsletters.htm#grasslands">www.biology.ualberta.ca/bsc/english/newsletters.htm#grasslands</a>   |
| Le rôle des spécimens de référence pour valider les recherches faunistiques et écologiques. Mémoire préparé par la Commission biologique du Canada (arthropodes terrestres) | 2003. T.A. Wheeler. Commission biologique du Canada (arthropodes terrestres) Document no 9f. 21 pp. | Disponible sur demande de la Commission biologique du Canada. Texte disponible à <a href="http://www.biology.ualberta.ca/bsc/briefs/brfvouchers.htm">http://www.biology.ualberta.ca/bsc/briefs/brfvouchers.htm</a> |
| The role of voucher specimens in validating faunistic and ecological research. A brief prepared by the Biological Survey of Canada (Terrestrial Arthropods)                 | 2003. T.A. Wheeler. Biological Survey of Canada Document Series No. 9. 21 pp.                       | Copies available on request from the Survey; full text at <a href="http://www.biology.ualberta.ca/bsc/briefs/brvouchers.htm">http://www.biology.ualberta.ca/bsc/briefs/brvouchers.htm</a>                          |
| Studying insect photoperiodism and rhythmicity: Components, approaches and lessons  | 2003. H.V. Danks. European Journal of Entomology 100(2): 209–221.                                   | Reprints available on request from author  |
| Arthropods of Canadian Grasslands (Newsletter)  | 2003. H.V. Danks (Ed.). No. 9. 35 pp.   | Free of charge on request or see <a href="http://www.biology.ualberta.ca/bsc/english/newsletters.htm#grasslands">http://www.biology.ualberta.ca/bsc/english/newsletters.htm#grasslands</a>                         |
| Modification of adverse conditions by insects   | 2002. H.V. Danks. Oikos 99(1): 10–24.   | Reprints available on request from author  |
| The range of insect dormancy responses  | 2002. H.V. Danks. European Journal of Entomology 99(2): 127–142.                                    | Reprints available on request from author  |
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| Arthropods of Canadian Grasslands. An Initiative of the Biological Survey of Canada (Terrestrial Arthropods). Prospectus             | 2002. J.D. Shorthouse and T.A. Wheeler. Biological Survey of Canada (Terrestrial Arthropods). 31 pp.                                 | See <a href="http://www.biology.ualberta.ca/bsc/english/propsectus.htm">http://www.biology.ualberta.ca/bsc/english/propsectus.htm</a>  |
| Arthropods of Canadian Grasslands (Newsletter)   | 2002. H.V. Danks (Ed.). No. 8. 41 pp.  | Free of charge on request or see <a href="http://www.biology.ualberta.ca/bsc/english/newsletters.htm#grasslands">http://www.biology.ualberta.ca/bsc/english/newsletters.htm#grasslands</a>                                       |
| Financement de la recherche en biodiversité : Sources de fonds disponibles pour les diplômés en biodiversité des arthropodes         | 2001. T.A. Wheeler.  | Disponible à <a href="http://www.biology.ualberta.ca/bsc/french/frfunding.htm">http://www.biology.ualberta.ca/bsc/french/frfunding.htm</a>   |
| Information on Biodiversity Funding: Funding Sources for Graduate Students in Arthropod Biodiversity                                 | 2001. T.A. Wheeler.  | Available at <a href="http://www.biology.ualberta.ca/bsc/english/funding.htm">http://www.biology.ualberta.ca/bsc/english/funding.htm</a>   |
| The nature of dormancy responses in insects  | 2001. H.V. Danks. Acta Societatis Zoologicae Bohemicae 65(3): 169–179.   | Reprints available on request from author  |
| Normes d'étiquetage pour les arthropodes terrestres. Mémoire préparé par la Commission biologique du Canada (arthropodes terrestres) | 2001. T.A. Wheeler, J.T. Huber et D.C. Currie. Commission biologique du Canada (arthropodes terrestres) Série Documents no 8. 21 pp. | Disponible sur demande de la Commission biologique du Canada. Texte disponible à <a href="http://www.biology.ualberta.ca/bsc/briefs/brnormesetiquetage.htm">http://www.biology.ualberta.ca/bsc/briefs/brnormesetiquetage.htm</a> |
| Label data standards for terrestrial arthropods. A brief prepared by the Biological Survey of Canada (Terrestrial Arthropods)        | 2001. T.A. Wheeler, J.T. Huber and D.C. Currie. Biological Survey of Canada Document Series No. 8. 20 pp.                            | Copies available on request from the Survey. Full text at: <a href="http://www.biology.ualberta.ca/bsc/briefs/brlabelstandards.htm">http://www.biology.ualberta.ca/bsc/briefs/brlabelstandards.htm</a>                           |
| Arthropods of Canadian Grasslands (Newsletter)   | 2001. H.V. Danks (Ed.). No. 7. 31 pp.  | Free of charge on request or see <a href="http://www.biology.ualberta.ca/bsc/english/newsletters.htm#grasslands">http://www.biology.ualberta.ca/bsc/english/newsletters.htm#grasslands</a>                                       |
| Dehydration in dormant insects   | 2000. H.V. Danks. Journal of Insect Physiology 46(6): 837–852.   | Reprints available on request from author  |
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Arctic Insect News	2000. H.V. Danks (Ed.). No. 11. 31 pp.	Free of charge on request (Annual issues 1–10 also available). Volumes 9–11 available at <a href="http://www.biology.ualberta.ca/bsc/english/newsletters.htm#arctic">http://www.biology.ualberta.ca/bsc/english/newsletters.htm#arctic</a>
Measuring and reporting life-cycle duration in insects and arachnids	2000. H.V. Danks. <i>European Journal of Entomology</i> 97(3): 285–303.	Reprints available on request from author
Insect cold hardiness: A Canadian perspective	2000. H.V. Danks. <i>CryoLetters</i> 21(5): 297–308.	Reprints available on request from author
Terrestrial arthropod biodiversity projects – building a factual foundation. A brief from the Biological Survey of Canada (Terrestrial Arthropods).	2000. H.V. Danks and N.N. Winchester. <i>Biological Survey of Canada Document Series</i> No. 7. 38 pp.	Copies available on request from the Survey; full text at <a href="http://www.biology.ualberta.ca/bsc/briefs/brbioprojects.htm">http://www.biology.ualberta.ca/bsc/briefs/brbioprojects.htm</a>
The diversity and evolution of insect life cycles	1999. H.V. Danks. <i>Entomological Science</i> 2(4): 651–660.	Reprints available on request from author
Life cycles in polar arthropods – flexible or programmed?	1999. H.V. Danks. <i>European Journal of Entomology</i> 96(2): 83–102.	Reprints available on request
La dormance et les cycles biologiques	1999. H.V. Danks. <i>Antennae</i> 6(2): 5–8.	See: <a href="http://www.seq.qc.ca">http://www.seq.qc.ca</a>
Insects of the Yukon	1997. H.V. Danks and J.A. Downes (Eds.). <i>Biological Survey of Canada (Terrestrial Arthropods)</i> , Ottawa. 1034 pp	\$95 (includes shipping) from Entomological Society of Canada*
Annotated List of Workers on Systematics and Faunistics of Canadian Insects and Certain Related Groups	1997. H.V. Danks and S. Goods. Third edition, 1996. <i>Biological Survey of Canada Document series</i> No. 6. 119 pp.	Free of charge on request from the Survey

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| The SAGE Project. A workshop report on terrestrial arthropod sampling protocols for graminoid ecosystem                           | 1996. A.T. Finnamore (Ed.).   | Available on the Internet at <a href="http://www.eman-rese.ca/eman/reports/publications/sage/intro.html">http://www.eman-rese.ca/eman/reports/publications/sage/intro.html</a>  |
| The advantages of using arthropods in ecosystem management. A brief from the Biological Survey of Canada (Terrestrial Arthropods) | 1996. A.T. Finnamore. 11 pp.  | Limited number of copies available upon request from the Survey; full text at: <a href="http://www.biology.ualberta.ca/bsc/briefs/bradvantages.htm">http://www.biology.ualberta.ca/bsc/briefs/bradvantages.htm</a>  |
| How to assess insect biodiversity without wasting your time. A brief  | 1996. H.V. Danks. Biological Survey of Canada Document Series No. 5. 20 pp.                                 | Copies available on request; full text at: <a href="http://www.biology.ualberta.ca/bsc/briefs/brassess.htm">http://www.biology.ualberta.ca/bsc/briefs/brassess.htm</a> (Abridged version in Global Biodiversity (1997) (version française dans La biodiversité mondiale (1997)) |
| Comment évaluer la biodiversité des insectes sans perdre de temps   | 1996. H.V. Danks. Commission biologique du Canada (Arthropodes terrestres) Série Documents No. 5.           | Texte disponible à <a href="http://www.biology.ualberta.ca/bsc/briefs/brcommentevaluer.htm">http://www.biology.ualberta.ca/bsc/briefs/brcommentevaluer.htm</a>  |
| The wider integration of studies on insect cold-hardiness   | 1996. H.V. Danks. European Journal of Entomology 93(3): 383–403.  | Reprints available on request from author   |
| Regional diversity of insects in the Pacific Northwest  | 1995. H.V. Danks. J. ent. Soc. Br. Columb. 92: 57–71.   | Reprints available on request from author   |
| Insect cold-hardiness: insights from the Arctic.  | 1994. H.V. Danks, O. Kukal and R.A. Ring. Arctic 47(4): 391–404.  | Reprints available on request from author   |
| Insect Life-cycle Polymorphism: Theory, Evolution and Ecological Consequences for Seasonality and Diapause Control                | 1994. H.V. Danks (Ed.). Series Entomologica 52. Kluwer Academic Publishers, Dordrecht, Netherlands. 376 pp. | \$195 U.S. Available from Kluwer Academic Publ. Group, P.O. Box 358, Accord Station, Hingham, MS 02018-0358   |
| Terrestrial arthropods of peatlands, with particular reference to Canada  | 1994. A.T. Finnamore and S.A. Marshall (Eds.). Mem. ent. Soc. Can. 169. 289 pp.                             | \$32 (includes shipping) from Entomological Society of Canada*  |
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Terrestrial arthropod biodiversity: planning a study and recommended sampling techniques. A brief	1994. S.A. Marshall, R.S. Anderson, R.E. Roughley, V. Behan-Pelletier and H.V. Danks. Bull. ent. Soc. Can. 26(1), Suppl. 33 pp.	Copies available on request from the Survey; full text at <a href="http://www.biology.ualberta.ca/bsc/briefs/brterrestrial.htm">http://www.biology.ualberta.ca/bsc/briefs/brterrestrial.htm</a>
Regional diversity of insects in North America	1994. H.V. Danks. American Entomologist 40(1): 50–55.	Reprints available on request from author
La diversité des espèces d'insectes du Québec, vues dans une perspective nord-américaine	1994. H.V. Danks. Revue d'entomologie du Québec 37 [1992]: 46–51.	Tirés-à-part disponibles sur demande.
Seasonal adaptations in insects from the high arctic	1993. H.V. Danks. pp. 54–66 in M. Takeda and S. Tanaka (Eds.), [Seasonal adaptation and diapause in insects]. Bun-ichi-Sogo Publ., Ltd., Tokyo. (In Japanese).	Copies of English version available on request from author
Environmental lip-synching in Canada	1993. G.E. Ball. Alternatives 20(1): 21.	
The biodiversity crisis, a national initiative: the Biological Survey of Canada (Terrestrial Arthropods)	1993. H.V. Danks. Association of Systematics Collections Newsletter 21(2): 17–23.	
Systematics and entomology: diversity, distribution, adaptation and application	1993. G.E. Ball and H.V. Danks (Eds.). Mem. ent. Soc. Can. 165. 272 pp.	\$25 (includes shipping) from Entomological Society of Canada*

\*To order publications from the Entomological Society of Canada contact the Society at 393 Winston Ave. Ottawa, Ontario K2A 1Y8; tel.: 613-725-2619, fax: 613-725-9349; email: [entsoc.can@bellnet.ca](mailto:entsoc.can@bellnet.ca) [Orders from Canada pay the above-noted price in Canadian dollars; orders from other countries pay the above-noted price in U.S. dollars. Add 7% GST on all orders for Canada.]

## Selected Future Conferences

Organization	Date	Place	Contact
<b>ENTOMOLOGICAL CONFERENCES</b>			
<b>Entomological Society of Canada</b>	2004, 15–18 Oct.	Charlottetown, PE	with the Acadian Entomological Society <a href="http://www.acadianes.org/aesesc04.html">http://www.acadianes.org/aesesc04.html</a>
	2005	Alberta	with the Entomological Society of Alberta
	2006	Québec	with la Société d'entomologie du Québec
<b>Entomological Society of America</b>	2004, 14–18 Nov.	Salt Lake City, UT	ESA, 9301 Annapolis Rd., Lanham, MD 20706-3115; <a href="mailto:meet@entsoc.org">meet@entsoc.org</a>
	2005, 6–10 Nov.	Fort Lauderdale, FL	ESA, see above
	2006, 10–14 Dec.	San Diego, CA	ESA, see above
<b>Third International Congress of Palaeoentomology</b>	2005, 7–11 Feb.	South Africa	<a href="http://www.palaeoentomolog.ru/events.html">http://www.palaeoentomolog.ru/events.html</a>
<b>3rd Annual Meeting of the North American Black Fly Association</b>	2005, 5–7 Feb.	Lake Placid, FL	Elmer Gray, <a href="mailto:ewgray@uga.edu">ewgray@uga.edu</a>
<b>OTHER SUBJECTS (especially those relevant to Survey projects)</b>			
<b>North American Benthological Society</b>	2005, 23–27 May	New Orleans, LA	<a href="http://www.benthos.org/Meeting/index.htm">http://www.benthos.org/Meeting/index.htm</a>
<b>PROVINCIAL SOCIETIES</b>			
<b>Entomological Society of British Columbia</b>	2004, 29 Oct.	Burnaby, BC	<a href="http://esbc.harbour.com/">http://esbc.harbour.com/</a>
<b>Entomological Societies of Alberta and Saskatchewan (joint meeting)</b>	2004, 28 Oct.	Lloydminster, AB	<a href="http://www.biology.ualberta.ca/courses.hp/esa/esa.htm">http://www.biology.ualberta.ca/courses.hp/esa/esa.htm</a>
<b>Entomological Society of Manitoba</b>	2004, 5–6 Nov.	Winnipeg, MB	<a href="http://home.cc.umanitoba.ca/~fieldspg/">http://home.cc.umanitoba.ca/~fieldspg/</a>
<b>Entomological Society of Ontario</b>	2004, 5–7 Nov.	St. Catharines, ON	<a href="http://www.entsocont.com/">http://www.entsocont.com/</a>
<b>Société d'entomologie du Québec</b>	2004, 4–5 Nov.	Montreal, QC	<a href="http://www.seq.qc.ca/">http://www.seq.qc.ca/</a>

## Answers to Faunal Quiz

[see page 62]

1. Habitats derived by the action of wind include dunes, loess deposits and badlands.

*Dunes* are created when wind moves sand grains - chiefly by bouncing, but also by rolling and aerial suspension; sand is blown from the windward face, building the dune, and accumulates on the steep leeward side, which intermittently avalanches as the sand reaches its maximum angle of repose of 34 degrees.

*Loess* is a deposit of silt that was laid down by wind action (comprising relatively fine particles 2-64 microns in diameter, a substrate that supports particular vegetation types); thick deposits were formed especially from rock flour outwashed from large, continental glaciers.

*Badlands* are sculptured land typically caused in dry areas by wind erosion (as well as run-off from rainfall) which removes relatively soft or unconsolidated rocks, such as sandstone, resulting in unevenly etched structures especially when the softer deposits are locally capped by harder protective layers.

2. Taxa with arctic parthenogenetic representatives are Trichoptera, Ephemeroptera, Chironomidae, Simuliidae (Diptera), Psyllidae, Coccidae (Homoptera), and Miridae (Heteroptera) (cf. Danks 1981 Arctic Arthropods).
3. Bird parasites and associates found on birds or in their nests include Siphonaptera, Phthiraptera (Mallophaga), and several parasitic families of Diptera and Hemiptera, as well as primarily scavenging Diptera, Coleoptera and Lepidoptera, which in turn have parasitic and predaceous associates including Hymenoptera. (Also, many groups of mites are known from these habitats including parasites, scavengers and other species.)
4. Under bark during the winter in eastern Canada, a collector would be likely to find oecophorid moths, various beetles, ichneumonids, and other adult insects, and in more sheltered places more of these kinds as well as crickets, ants, flies, and others.
5. These families all have unusual heads: in size for Acroceridae and Pipunculidae (small-headed flies and big-headed flies); in head shape for Diopsidae (stalk-eyed flies); and folding back on to the thorax in Nycteribiidae (bat flies).

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## Quips and Quotes

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Those who talk to themselves are seldom interrupted (Anon)

He that knows little often repeats it (Thomas Fuller)

His only fault is that he has none (Pliny the younger)

A shut mouth catches no flies (Anon.)

### **Bosses and mentors**

“It was absolutely marvellous working for Pauli. You could ask him anything. There was no worry that he would think a particular question was stupid, since he thought all questions were stupid.”

(Victor Weisskopf, in Am. J. Physics 1977)

“I can tolerate one or two mistakes, then I’ll cut their hearts out with a spoon.”

(Katherine Harmer, CEO of Evolutionary Technologies International, on dealings with her research scientists, in the late 1990s)

Strategies are okayed in boardrooms that even a child would say are bound to fail. The problem is there is never a child in the boardroom.

(Victor H. Palmieri)

Failing organizations are usually overmanaged and under-led.

(Warren Bennis)

Ninety percent of politicians give the other ten percent a bad reputation.

(Henry Kissinger)

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## Requests for Material or Information Invited

Would you like assistance in studying the fauna?

The Biological Survey of Canada encourages cooperation in taxonomic and ecological studies of the arthropod fauna. Please complete and return the form on the next page if you have a request for material or information that might be obtained elsewhere in Canada (compare the sample entries from a previous list of requests that are shown below). See also the Survey's website (<http://www.biology.ualberta.ca/bsc/english/listofrequests.htm>) for the full list or an electronic version of the Request for Cooperation form.

Requests may be submitted anytime and will be posted on the web periodically. To have your entry included in the Spring 2005 newsletter please submit it by the middle of January.

	<b>Material Requested</b>	<b>Areas of Interest</b>	<b>Collecting Methods, Notes</b>	<b>Name of Requester</b>
1	Acari (free living and parasitic terrestrial and aquatic mites)	Anywhere, but especially sub-arctic and arctic Canada, Canadian grasslands	Berlese-Tullgren funnel extraction from subaquatic substrates, from grasses and sedges, and from bird and mammal nests, would be especially fruitful (preserve in 75% ethanol +5% glycerine).	V.M. Behan-Pelletier; E.E. Lindquist; I.M. Smith
2	Adelgidae (conifer woolly aphids)	Anywhere	Preserve insects and bark, needles or galls in 70% ethanol. Specimen records and host plant records	R. Footitt
3	Aleyrodidae (white-flies)		Preserve insects and host plant material in 70% ethanol. Adults may be dried. Specimen records and host plant records. (Canadian National Collection deficient in all species, including pest species)	R. Footitt
4	Anthomyzidae	New World	Adults from any habitat, but often associated with graminoids. Preservation in 70% ethanol preferred. Malaise and especially pan trap residues are acceptable and valuable. General description of herbaceous cover and soil moisture advantageous.	K.N. Barber
5	Aphididae (aphids)	Anywhere	Preserve in 70% ethanol. Specimen records and host plant records.	R. Footitt
6	Asilidae (robber flies)	North America	Pinned adults	R.A. Cannings

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# Request for Cooperation

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Please complete and return to:

Biological Survey of Canada  
(Terrestrial Arthropods)  
Canadian Museum of Nature  
P.O. Box 3443, Station "D"  
Ottawa, ON K1P 6P4  
email: [hdanks@mus-nature.ca](mailto:hdanks@mus-nature.ca)

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Name: \_\_\_\_\_ Tel. : \_\_\_\_\_

Email: \_\_\_\_\_ Fax: \_\_\_\_\_

Address: \_\_\_\_\_

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**Material required** (specify taxon, region, habitat, or other details, as appropriate):

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**Information required** (describe in reasonable detail):

\_\_\_\_\_

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**Cooperation offered** – if there is anything specific you might be able to supply in return (e.g. identifications, material) please indicate it here:

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\_\_\_\_\_

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