Spring 2001 Vol. 20, No. 1

NEWSLETTER OF THE BIOLOGICAL SURVEY OF CANADA (TERRESTRIAL ARTHROPODS)

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Canadian Museum of Nature / Musée canadien de la NATURE

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 Fall 2001 issue is July 16, 2001.

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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 (formerly the National Museum of Natural Sciences) and the Entomological Society of Canada. This 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.

This newsletter will also be available soon on the Survey's website at:
http://www.biology.ualberta.ca/esc.hp/bschome.htm

News and Notes

Activities at the Entomological Societies' Meeting

The 2000 Joint Annual Meeting of the Entomological Society, Société d'entomologie du Québec and Entomological Society of America took place in Montreal 2-6 December 2000. The meeting was attended by nearly 3000 people, and this large meeting, which included the Entomological Society of America for the first time since 1982, comprised about 15 simultaneous sessions, with a full range of symposia, contributed papers, posters and other events. In all the meeting had more than 1000 papers and more than 800 posters.

Items in the program (emphasizing those of particular interest to the Biological Survey) included:

An opening plenary session

Symposia or conferences on: Acarology; Soil mites: systematics, biodiversity and ecology in four dimensions; Coleoptera systematics: perspectives and philosophical approaches; Water relations and winter survival of insects; Modelling insect seasonality; Insects in art and illustration: will we always need scientific illustrators; Arthropod diversity and management in dryland cropping systems; Mining the Coleopteran holomorph; North American Dipterists Society; Coleoptera Society: The systematics of Coleoptera: a millennium view; Heteroptera Society: Contributions of Thomas R. Yonke to Hemipterology in collaboration with his students and colleagues; Why is the Insecta so diverse and species rich: a phylogenetic perspective; Aquatic insect studies: old questions, new tools; Arthropods of grasslands: current status and future directions; International Society of Hymenopterists; The science of entomology: a view of the past and lessons for the future; Protecting and promoting our pollinators.

Many other symposia, formal and informal conferences, typically convened (like those above) by American and Canadian coorganizers.

Submitted papers, grouped by the ESA sections: Systematics, morphology and evolution; Physiology, biochemistry, toxicology, and molecular biology; Biology, ecology and behaviour; Medical and veterinary entomology; Regulatory and extension entomology; and Crop protection entomology.

Poster sessions, grouped in the same way.

A student paper competition, in many subsections, for both talks and posters.

The Linnaean games

The ESC Gold Medal Address.

Governing Board and Annual General Meetings also took place, and various honours were awarded by the Societies. Because the meeting was so large, and its core structure organized by the ESA, there was no banquet, and no complimentary coffee during the sessions, and some other events normal at the ESC meeting were abbreviated or took a different form. However, the SEQ and ESC organized a very well attended evening President's reception at the Château Ramezay Museum for members of those societies.

The meeting also featured an extensive display area, with numerous booths showing scientific books, equipment, and other items. A Canadian pavilion included displays from organizations such as the Entomological Society of Canada, including the Biological Survey, the Société d'entomologie du Québec, the Association des entomologistes amateurs du Québec, the Insectarium de Montréal, the Biodome de Montréal, and the Cooperation Entomofaune du Québec.

The Biological Survey showed a general poster at the ESC booth, displayed selected publications, and made available leaflets about the Survey, as well as its for-sale and free-of-charge publications.

The program was so diverse that a summary of individual titles of interest would be extremely long. However, presentations by Canadian entomologists on systematics and related themes included the following titles:

Ascid mites (Acari: Mesostigmata) of soil and adjacent habitats in lowland tropical rainforest of La Selva, Costa Rica: An example of underestimated acarine biodiversity. **E. Lindquist**

Patterns of diversity in the Ceratozetoidea (Acari: Oribatida): A global assessment. **V. Behan-Pelletier**

Mites on a rampage: Exploration of arboreal suspended soils in ancient rainforests. **N. Winchester**

What's on the Horizon?: Coleopteran systematics in the 21st Century. **R. Anderson**

Water balance in insects dormant for the winter. **H. Danks**

Modeling gypsy moth diapause: The key to a geographically robust phenology? **D. Gray**

Grasshopper seasonality in the Northern Great Plains. **D. Johnson**

The stability of gypsy moth seasonality in coastal British Columbia: A study of persistence. **J. Régnière**

Phylogeny of the *Papilio machaon* species group: Are *P. joanae* and *P. brevicauda* hybrid species? **A. Mitchell** and **F. Sperling**

Biological assessment of the link between mitochondrial DNA sequences, *Dioryctria* morphology and larval host. **F. Sperling, G. Roux, N. Rappaport, J. Stein** and **G. Grant**

Phylogenetic relationships of the genus *Thricops* Rondani and the status of *Alloeostylus* Schnabl (Diptera: Muscidae). **J. Savage**

A taxonomic revision of North American members of *Gyretes* Brullé (Coleoptera: Gyrinidae), North of Mexico. **J. Babin** and **Y. Alarie**

Cladistics of the Tryphoninae (Hymenoptera: Ichneumonidae) with comments on tribal relationships, classification and adaptive radiation. **A. Bennett**

The higher Diptera community of sedge meadows (Carex: Cyperaceae) in southern Quebec. **F. Beaulieu**

The use of molecules and morphology in delineating bumble bee species. **T. Whidden**

Diversity of Agromyzidae (Diptera) in Canadian tallgrass prairies. **V. Crecco**

Generic relationships of the subfamily Dolichopodinae (Diptera: Dolichopodidae). **S. Brooks**

Supercooling capacity and survival of low temperatures by a pyrethroid-resistant strain of *Typhlodromus pyri* Scheuten (Acari: Phytoseiidae). **D. Moreau** and **J. Hardman**

Realized host range assessment of European *Peristenus* species. **H. White** and **U. Kuhlmann**

Psithyrus invasions of bumblebee field colonies. **L. Pelletier** and **J. McNeil**

Differential dispersal and resource partitioning explain the coexistence of competing parasitoid species. **B. Van Hezewijk** and **J. Roland.**

Insect succession on pig carrion in Manitoba. **G. Gill**, **T. Galloway** and **G. Anderson**

The pollination ecology of cloudberry (*Rubus chamaemorus*). **A. Brown** and **J. McNeil**

After the 1998 ice storm: Temporal and spatial responses by a scolytid and its associated predators. **K. Ryall** and **S. Smith**

Does forest fragmentation affect the lepidopteran host assemblages of forest tent caterpillar parasitoids? **C. Schmidt** and **J. Roland**

Biodiversity of *Torymus* (Hymenoptera: Torymidae) associated with galls of *Diplolepis* (Hymenoptera: Cynipidae) in western vs. eastern Canada. **S. Rempel** and **J. Shorthouse**

Implications of spruce budworm management for the ecological diversity of moths and carabid beetles in the boreal forest. **C. Wytrykush** and **N. Holliday**

Large-scale population genetic structure of an alpine butterfly: Effects of landscape, dispersal, and population history. **N. Keyghobadi**, **J. Roland** and **C. Strobeck**

Flying beetle biodiversity and the effect of integrated pest management in mature northern Interior Douglas-fir, *Dendroctonus pseudotsugae*. **S. Carson**

Comparison of arthropod abundance, diversity and trophic richness within intercropped agroforesty and monoculture agroecosystems. **H. Middleton** and **S. Smith**

Diversity and forest maturation: Proposition of a new model. **P. Paquin**, **N. Dupérré** and **P.-P. Harper**

Parasitic wasps (Scelionidae, Trichogrammatidae) attacking tabanid eggs in Manitoba, Canada. **M. Iranpour**, **T. Galloway** and **L. Masner**.

Biogeography of *Cardiophorus* Eschscholtz (Coleoptera: Elateridae) of eastern North America with two new species and a new synonymy. **H. Douglas**

Intraguild predation among spider mite predators present in apple orchards. **C. Provost** and **D. Coderre**

The natural enemy response to high- and low-density infestations of *Tomicus piniperda* (L.) (Coleoptera: Scolytidae). **N. Rudzik, K. Ryall** and **S. Smith**

Soil formation and mite colonization on vegetated mine tailings near Sudbury, Ontario, Canada. **M. St. John, G. Bagatto**, **V. Behan-Pelletier, E. Lindquist, J. Shorthouse** and **I. Smith**

The effect of grazing on ant (Hymenoptera: Formicidae) biodiversity in the south Okanagan grasslands of British Columbia, Canada. **J. Heron** and **G. Scudder**

The effect of grazing on Orthopteran and Gryllopteran biodiversity in the Southern Okanagan Valley of British Columbia. **P. Liu Griesdale** and **G. Scudder**

Comparison of insect diversity on post-fire harvested and non-harvested forested landscapes in the Waterton Lakes area of southwestern Alberta. **E. Kinsella**

Spiders of Alberta and Saskatchewan. **D. Buckle** and **R. Holmberg**

Insects of the Galapagos Islands, Ecuador. **S. Peck**

The comparative morphology of the sting apparatus of bees. **L. Packer**

Combining digital images in a computer layering technique for viable 3-D images: Manually. **H. Goulet**

Assessment of arthropod biodiversity and pest dynamics in various production input levels and cropping system strategies. **O. Olfert**, **M. Braun** and **R. Weiss**

Intercropping and its impact on beneficial and pest insects on the Great Plains. **R. Butts, H. Carcámo, K. Floate** and **M. Weiss**

Why Strepsiptera cannot possibly be close relatives of Diptera. **J. Kukalova-Peck**

Phylogenetic resolution in Adephaga using larval chaetotaxy: Two examples from Dytiscidae. **Y. Alarie**

A cladistic classification of the Empidoidea (Diptera: Eremoneura). **J. Cumming** and **B. Sinclair**

Selected inventories and selected flies: Sphaerocerids and micropezids in temperate and tropical surveys. **S. Marshall**

Molecular systematics of *Simulium* s. str. (Diptera: Simuliidae). **M. Smith**

Examination of the peninsula effect upon insect species richness of the Bruce Peninsula (Ontario, Canada). **C. Onodera**

Carabidae abundance and diversity in Annapolis Valley, Nova Scotia apple orchards. **C. O'Flaherty, R. Smith, S. Rigby** and **C. Sheffield**

Insect diversity following stand conversion: A comparison among restoration techniques. **R. Morgan**, **S. Smith** and **M. Bellocq**

Comparative pollination effectiveness among Apoidean visitors of wild blueberry (*Vaccinium angustifolium* Ait.). **S. Javorek**, **K. MacKenzie** and **S. Vander Kloet**

Arctic insects, global warming and the ITEX program. **R. Ring**

Impacts of differing harvest intensities on carabid beetle diversity in the boreal forest. **T. Work**, **J. Spence, J. Volney, K. Cryer** and **D. Shorthouse**

Dynamique des communautés de collemboles dans des coupes sylvicoles, en forêt boréale. **M. Chagnon** and **S. Brais**

Staphylinid beetles as indicators of disturbance in northern forests. **G. Pohl**

Boreal spiders as indicators of multi-scale forest structure, disturbance, and biodiversity. **D. Shorthouse**

Patterns in mayfly emergence in Lake Erie. **L. Corkum**

Food web patterns along a stream continuum: Insights from stable isotope analysis. **R. Doucett**

Midgehikers on stoneflies: Using stable isotopes to sort out a parasitic relationship. **D. Giberson**

What parasites can contribute to the study of food webs. **D. Marcogliese**

Classification of aquatic Adephaga (Coleoptera): Old tools used in new ways lead to new answers. **R. Roughley**

Mentum deformities and community composition of chironomid larvae (Diptera: Chironomidae) downstream of a New Brunswick metal mine. **E. Swansburg**

Overview of Canadian grasslands. **K. Floate**

The use of fire as a biodiversity and conservation management tool in tallgrass prairies. **R. Roughley** and **D. Pollock**

Diversity of *Meromyza* (Diptera: Chloropidae) in Canadian native grasslands. **T. Wheeler**

Endemism and dispersal of short-horned bugs (Homoptera: Auchenorrhyncha) in Pacific Northwest intermontane grasslands. **A. Hamilton**

Parasitoids of bark beetles in eastern Canada: Recent insights. **K. Ryall** and **S. Smith**

Diversity of *Diplolepis* (Cynipidae) and their galls on the wild roses of Canada. **J. Shorthouse**

The influence of crown closure on defoliators of young trees. **D. Quiring** and **D. Ostaff**

Multiple-scale linkages of boreal forest spiders and carabids to habitat structure modifications. **D. Shorthouse**, **J. Spence** and **W. Volney**

Lepidoptera odysseys: How do 'Leps' deal with forest habitat structure? **L. Morneau**, **W. Volney** and **J. Spence**

Population genetic aspects of pollinator decline. **R. Owen** and **L. Packer**

Using communities of pollinators to assess environmental stress: Departures from log normality in diversity and abundance. **P. Kevan**

Systematics of the *strobi*-complex of the weevil genus *Pissodes*: The larval perspective. **D. Williams** and **D. Langor**

Morphometric modifications from free to parastic lifestyle in *Aleochara bilineata* (Gyll.) (Coleoptera: Staphylinidae) larvae. **L. Royer**, **J. LeLannic, J.-P. Nenon** and **G. Boivin**

The systematics of *Lasiopogon* Loew (Diptera: Asilidae). **R. Cannings**

Diversity of Agromyzidae (Diptera) in southern Yukon grasslands. **S. Boucher**

Mining collections: Cerambycidae (Coleoptera) and the importance of regional insect collections. **D. McCorquodale**

Preliminary surveys of terrestrial arthropods in mountain national parks in western Canada. **R. Longair**, **W. Fitch** and **A. Duguay**

The joint annual meeting was preceded by the meeting of the **Entomological Collections Network**, held at McGill University and attended by about 90 people. This all-day session included papers on:

Ephemeroptera, Plecoptera, and Trichoptera at the INHS, a database and summary of collections. **E. DeWalt** and **C. Favret**

Re-curating, databasing and mapping the odonate collection at the University of Nebraska State Museum. **M. Jameson**

Labels and unique identifiers. **J. Pickering**

Biota of Canada Information Network (BCIN). **I. Smith** and **L. Speers**

Retrospective data capture and documentation. **L. Speers**

Virtual insect collections: Dipterists lead the way. **C. Thompson**

Why curators must preserve everything for DNA - and how. **D. Quicke**

An entomological survey of Navassa Island, with notes on species richness and endemism. **W. Steiner** and **J. Swearingen**

The Biological Survey of Canada (Terrestrial Arthropods). **H. Danks**

Arthropods of Canadian grasslands: a Biological Survey of Canada megaproject. **T. Wheeler**

A taxonomist's vision: knowing all earth's species. **T. Erwin**

Great Smokies ATBI and <www.discoverlife.org> update. **J. Pickering**

At this meeting too, information about the Biological Survey of Canada (Terrestrial Arthropods) was made available.

Summary of the meeting of the Scientific Committee of the Biological Survey of Canada (Terrestrial Arthropods), October 2000.

The Scientific Committee met in Ottawa on 12-13 October 2000.

Scientific projects

The various scientific projects of the Survey were discussed, including the following progress.

1. Grasslands

Dr. Terry Wheeler had reported that the Survey's Informal Conference on Arthropods of Grasslands would be held as anticipated at the joint ESA/ESC/SEQ meeting on Wednesday 6 December. The list of speakers and titles is available on the BSC grasslands web page and in the fall BSC newsletter. A formal symposium on the grasslands project is planned, possibly at next year's ESC meeting in Niagara Falls. Habitat-based ecological projects will be the focus of this symposium and the symposium proceedings, along with additional ecological chapters, would constitute the first major volume in the Grasslands project.

Dr. Wheeler also reported on summer fieldwork in Manitoba, Saskatchewan and Alberta, continuing activities in the southern Yukon grasslands, and the processing and sorting of Diptera from grassland collections.

Dr. Floate reported on a preserved area of foothills grasslands in Alberta called the Ross grasslands. He commented on this and other unique habitats with a good potential for research. He added that frequent and widespread grass fires continue throughout Alberta. The year 2000 was another drought year in Alberta and the situation is critical, so that grassland ecology is in the public eye. He outlined some ongoing research on grasslands in Alberta.

The Committee reviewed research from elsewhere as well as ideas for seeking funding from foundations, upcoming conferences (see http://iisd.ca/wetlands/pcesc/default.htm) and additional grasslands conservation initiatives. To move forward the Grasslands project further the subcommittee will develop plans for joint collecting efforts in key grassland habitats over the next two or three years.

2. Arctic invertebrate biology

Dr. Ring reported on the symposium on cold hardiness held at the University of Victoria last spring. About 40 participants represented 8 different countries, and topics ranged from soil ecology to molecular genetics. Some of the papers will be published. The next meeting of this triennial event will take place in 2003 in the Czech Republic.

Dr. Danks reminded the Committee that the purpose of the project was to try and push forward work on arctic insects in Canada. Within that framework the *Arctic Insect News* newsletter was initiated. However, developments in this area have been lacking and Canadian content for the newsletter is rather limited. Many of the submissions are from or deal with work in other countries and more than half of the recipients of *Arctic Insect News* are from outside Canada. The newsletter, like the project itself, has not visibly increased work in Canadian arctic entomology, due to lack of funding, lack of personnel and difficulty in permit procedures for example. Although it is well received overseas, *Arctic Insect News* is not really serving the objectives of the Biological Survey. The Committee considered whether Arctic Insect News should be discontinued, allowing further efforts to be placed on the Grasslands Newsletter, for example. It was agreed to discontinue the newsletter, but to include a section in the Survey's regular newsletter devoted to arctic research. The Committee also thought that someone in the international community might want to start something similar to *Arctic Insect News*, but without the Canadian arctic emphasis of the Survey's newsletter.

3. Seasonal adaptations

Dr. Danks reported that the project on seasonal adaptations is progressing, with papers on dehydration in dormant insects, measuring and reporting life-cycle duration in insects and

mites, and insect cold hardiness: a Canadian perspective now published or in press. Dr. Danks had also recently submitted a paper on dormancy responses to a special issue of *Acta Societatis Zoologicae Bohemicae* planned to commemorate the 70th birthday of Prof. Ivo Hodek, the well-known Czech student of diapause and related phenomena. A symposium for the joint ESC/SEQ/ESA meeting entitled "Water relations and winter survival in insects" includes a presentation on "Water balance in insects dormant for the winter".

Dr. Danks reported that specific cooperative work at the University of Victoria is proceeding well. Dr. Danks added that he had recently been invited to give lectures on seasonal adaptations themes at the 4th European Workshop of Invertebrate Ecophysiology (in St. Petersburg in September 2001, the place where Prof. Danilevsky, the famous Russian scientist who worked on insect photoperiodism and diapause, did his work) and at the International Czech-Japanese Seminar of Entomology (Czech Republic in summer 2002).

4. Insects of Keewatin and Mackenzie

Drs. Currie and Giberson reported on the Horton River (see Newsletter of the Biological Survey of Canada (Terrestrial Arthropods) 19(2): 48-51). The permit process was extremely cumbersome, and they did not receive their final Inuvialuit land use permit until less than a week before they departed. Five entomologists had participated; engaging a professional outfitter proved to be a very wise investment. The expedition was very expensive and cost much more than field work done in foreign countries such as Vietnam. Dr. Currie concluded that although some of the processes of doing work in the north are discouraging, overall the trip was well worth the effort. Some of the preliminary scientific findings were outlined. Plans for 2001 are still under consideration, to the Kazan River, the Seal River or the Thelon River.

Other scientific priorities

1. Old growth forests

Dr. Scudder reminded the Committee that the aim of this item had been to work towards some sort of synthesis once various projects are complete. A symposium (perhaps in 2002) and also a publication are planned, with a specific focus rather than a more general biodiversity theme.

Dr. Ring outlined some continuing work on old growth forest arthropods from British Columbia. Dr. Currie reminded the Committee about a tract of old-growth forest near Cornwall, Ontario, as a potentially interesting area to study.

2. Invasions and reductions

Dr. Foottit and Dr. Scudder have just finished a chapter on pathways of introduction in Canada (based on selected distributional data) for a book that resulted from the session on invasions at the 1999 national EMAN meeting. Dr. Foottit and Dr. Scudder are considering a book about alien insects, which might soon be confirmed by the potential publisher. The government is currently greatly concerned about quarantine issues and risk assessment.

3. Survey web site

Dr. Danks reported that there had been delays in contract work on the website and in getting content for some sections. Then there proved to be technical difficulties especially with the online database of workers as well as such initial difficulties as incomplete uploads, wrong subdirectories and a user access problem for most of the files. Therefore, the BSC site was disabled for some time. As a result, the BSC newsletter and promotion of the biodiversity brief had to be delayed because they contained references to the site.

However, most of the content of the website is now available with a few areas still under construction. Much more information is now on the site, including the full text of Survey briefs and chapters from the *Insects of the Yukon* book. The Committee agreed that the site is now much enhanced.

4. Faunal analysis

Dr. Anderson reported that the initial faunal analysis information was prepared and posted on the Survey website including updated information on some orders. The site also has an introduction to the project and the protocols. Ways to allow updates on other orders were discussed and updates for Coleoptera and Diptera will be pursued as well as posting less current data for other groups to help stimulate further work.

5. Funding for biodiversity studies

Dr. Wheeler has continued to expand the database of funding sources, and the continued growth of the database will depend on further suggestions. Several copies of the list of sources were sent out to students in response to email requests. The introduction to the database, with general advice on grant applications, has now been posted on the BSC website. A modified copy of the introductory section will be submitted to the ESC Bulletin.

Difficulties with the Lyman Museum's web site mean that it has proved difficult to post the list of funding sources there and link it to the Survey site. Members of the Committee noted the Nature Discovery Fund of the Canadian Museum of Nature, reallocated NSERC funds, and a call for submissions for national centres of excellence, which had elicited applications linked to biodiversity.

6. Brief on biodiversity studies

Dr. Danks reported that the brief had been completed and published [Danks, H.V. and Winchester, N.N. 2000. Terrestrial Arthropod Biodiversity Projects — Building A Factual Foundation. Biological Survey of Canada (Terrestrial Arthropods) Document Series No. 7. Ottawa. 38 pp.] aimed at both general and more specific scientific audiences. Members of the Committee asserted that the brief is proving to be widely useful, and that such briefs are having an impact on what people are doing in biodiversity studies.

7. Arthropods and fire

Several investigations are under way on the relationships between arthropods and fire, especially in grasslands. Dr. Scudder will prepare an article on arthropods and fire in dry B.C. grassland for the next issue of the Grasslands Newsletter.

Dr. Roughley spoke about his fire-related work on tall-grass prairie, which had begun in response to inquiries on when is the best time to burn from a conservation point of view. Some results will be presented at the joint meeting in Montreal.

Others will be approached for potential reports or notes for the Grasslands Newsletter. Eventually, a symposium on this subject might be organized. If enough interest is generated too in fires in the boreal zone as well as in grasslands, a broader symposium might eventually be feasible.

8. Monitoring of continuing priorities

Updated information on earlier or currently less active Survey projects was reviewed, including arthropod fauna of springs, insects of Newfoundland, arthropod fauna of large rivers, arthropod ectoparasites of vertebrates, arthropods of the Queen Charlotte Islands (Haida Gwaii), and arthropods of special habitats.

With respect to arthropods of peatlands and freshwater wetlands, work with pitcher plants was reported by Dr. Giberson, revealing interesting findings about the pH of these habitats. Mount Allison University recently received a Canada Foundation for Innovation grant to develop a wetlands centre. If another grant application to fund qualified personnel is successful an influx of graduate students working on wetlands in the Maritimes would be expected. Dr. Currie reminded the Committee about the Australian winery, Banrock Station Winery, that established a wetland conservation initiative in Australia and is starting the same kind of program in Canada. The Royal Ontario Museum has been the benefactor of this program and recently received funds for wetlands research, beginning on Walpole Island in southwestern Ontario.

With respect to climatic change, Dr. Floate commented that a group of climatologists at the Lethbridge research centre have a number of models of climate change but are looking for collaborators on how insects respond to climate changes. Dr. Foottit described work in progress using climate-matching programs such as Bioclim - an algorithm that uses climate surfaces, initially with data on prairie insects. Dr. Ring noted that recent climate projections concerning changes in annual temperature and other factors are summarized in a recent publication from the Climate Change Project [Hengeveld, H.G. 2000. see http://www.msc-smc.ec.gc.ca/saib/climate/ccd_00-01.pdf]. Dr. Shorthouse noted that the symposium theme of annual meeting of the Entomological Society of Ontario (Great Lakes Forestry Centre, Sault Ste. Marie, Ontario, 27-28 October 2000) is Climate Change and Insect Populations.

Concerning agroecosystems, Dr. Floate announced that the expansion of the Lethbridge Research Centre has now begun, including an insect quarantine laboratory / rearing complex with an attached greenhouse as well as additional insect laboratories and offices. Several new pest problems are occurring in Alberta, for example, the sweet clover weevil, the pea leaf weevil, the wheat head armyworm and the cabbage seed pod weevil (abundant in 2000). There has also been a resurgence of the wheat stem sawfly, causing significant damage. Some other research and potential publications were summarized. Dr. Chiasson noted that the demand for organic agriculture is very high, but lack of promotion of alternatives to pesticides, such as biocontrol, is currently an impediment. Moreover, organic systems tend to contain alien insects, brought in on nursery stock, etc.

9. Publication of systematic and faunistic papers

Dr. Wheeler had pointed out continued concern over the dwindling avenues for publication of systematic and faunistic papers on Canadian arthropods because of an unwillingness by some outlets to accept certain categories of manuscripts documenting the Canadian fauna, and changes in editorial policy on format, for example. Dr. Wheeler noted that Lyman Museum Memoirs and Notes series still exist; such series could be strongly upgraded to provide a fully reviewed series of occasional publications on the systematics, faunistics (including surveys) and ecology of arthropods. The Committee discussed these issues at length and concluded that such an idea and related possibilities are worth pursuing through discussions including the CMN, the ESC, and others.

10. Other priorities

The Committee also discussed priorities such as damaged ecosystems and Survey publicity.

Liaison and exchange of information

1. Canadian Museum of Nature

Dr. Mark Graham, Director, Research Services, Canadian Museum of Nature reported that the Museum is beginning a new strategic 5-year plan, which will replace the previous 5-year plan. The process will include broad consultations. The Museum will soon be advertising 2 visiting fellowships to the Aylmer research facility.

A special meeting of Natural Sciences and Engineering Research Council, Social Sciences and Humanities Research Council, Canadian Institute for Health Research representatives and museum and university workers was held to discuss best practices for care of research collections. The CMN has also been part of preliminary consultations with the Biosphere, a large Montreal-based public organization of Environment Canada devoted to increasing knowledge of the environment, water and ecosystems, in particular those of the St. Lawrence River and the Great Lakes. Dr. Graham mentioned that he attended a briefing by Parks Canada on their plans to present a memorandum to cabinet.

Finally, Dr. Graham reminded the Committee that the Federal Biosystematics Partnership continues to represent the Canadian position on the Global Biodiversity Information Facility. A final agreement will be decided upon

in early December. A letter of invitation will be sent to all countries and if by March 1, 2001 there are 10 signatories (and substantial membership fees) the GBIF will be launched (see http://www.gbif.org).

2. Eastern Cereal and Oilseed Research Centre, Agriculture and Agri-Food Canada

Dr. Robert Foottit reported on the Canadian Biodiversity Network Conference, March 1-4, 2001 in Ottawa, which is being organized by Dr. Peter Hall. Dr. Scudder circulated a brochure [see: http://www.nrc.ca/confserv/biodiversity/] The aim of the conference is to develop a position to alert the federal government that there is a biodiversity crisis in Canada. A position paper (drafted by Drs. Scudder and Smith) will be presented at the conference outlining the state of biosystematics in Canada.

Dr. Floate described the North Star Initiative, whereby Agriculture Canada would aim at research that encompasses bio-fibre, alternative fuels, pharmaceuticals, environmental sustainability and so on as well as the process of growing food. Public-good research is also part of this concept. Dr. Foottit explained that ECORC's advisory committee will be meeting soon and one of the issues will be staffing in systematics, given continued attrition.

3. Entomological Society of Canada

Dr. Robert Foottit, Society Vice-President, reported that much activity is currently being focussed on the joint ESC/ESA/SEQ meeting in December in Montreal. The program includes symposia on soil mites, aquatic insects, arthropods of grasslands, a meeting of the Coleopterists' Society, and a number of other topics related to systematics and faunistics. He reported that the organization is progressing well. There will be a talk at the joint meeting on the falling off of taxonomic support on a world scale. Dr. Hélène Chiasson noted that there will be 70 symposia plus at least 1000 posters and almost as many 10-minute papers. There are at least 15 concurrent sessions. The program starts Sunday morning and there are also meetings and presentations in the evenings. The plenary session is on Sunday night followed by a social event. There will also be a town hall meeting, mainly for the ESA but relevant to all, to discuss how to change the ways entomological societies are run in order to encourage more participation, to take advantage of the electronic age, to prevent fee increases, etc.

Dr. Foottit mentioned a letter from the AEAQ and the SEQ sent to Minister Anderson in the context of the Species at Risk legislation, concerning the importance of studies in biodiversity and the need to support work in these areas. These ideas are supported by the ESC.

4. Parks Canada

Mr. Stéphane Greffard, Ecological Assessment Officer, explained that the focus at Parks Canada has been the implementation of the Report of The Panel on The Ecological Integrity of Canada's National Parks. Some of the key recommendations include making ecological integrity central in legislation and policy. The State of Parks report will soon be published giving an overview of ecological integrity and biodiversity in the Parks. Another focus is in building partnerships with regional land managers (provincial, territorial, aboriginal, etc.). For example, new national Parks were established in Nunavut. A position of Executive Director, Ecological Integrity has been established and Mr. Nik Lopoukhine has been appointed to this position. There are also plans to develop a national training and orientation program in ecological integrity for Parks Canada staff and managers. A memorandum to cabinet to develop national science strategy for Parks focuses on an improved science capacity within Parks and creating formal connections with universities and other science-based agencies for research in Parks.

Mr. Greffard had forwarded the documents sent by the Survey (about research in Parks and permits for insect collections) after the last Scientific Committee meeting to the relevant personnel at Parks. With respect to research, he said that it might be possible to orga-

nize a meeting to coordinate projects but no funds now are available for research. With respect to the permit process, Mr. Greffard explained that ultimately each park establishes its own policy.

Dr. Scudder pointed out that in B.C. the Conservation Data Centre has just finished mapping the occurrence of all the species at risk in B.C. and comparing areas that have been put aside for wildlife preservation. National (and provincial) parks do not appear to show records of any of the species at risk – few studies have been done in Parks due to the difficulty in the permit process. Therefore, on paper it appears that national parks are not serving their mandated purpose of maintaining biodiversity and ecological integrity.

5. Parasitology module, Canadian Society of Zoologists

Dr. David Marcogliese reported that the Parasitology module's main activities have been to produce EMAN protocols for the identification of parasites of vertebrates. Additional fascicles are in process. The national stickleback parasite survey is now an international IBOY project and funding is being sought to support the project. Dr. David Cone hopes to write up his work on the perch project this year while he is on sabbatical. Dr. Marcogliese circulated a number of publications of interest to the committee.

Dr. Marcogliese noted that the Canadian Society of Zoologists will meet next May in Sudbury. In 2002 the Parasitology section will host the International Congress of Parasitology in Vancouver. The 2002 meeting of the Canadian Society of Zoologists will be in Lethbridge. Dr. Marcogliese noted that in a recent visit to the U.K. he saw a lot of new building associated with natural history museums, largely as a result of the national policy of donating proceeds from lotteries to cultural organizations including museums.

Other items

1. Reports on regional developments of potential interest

Information of interest to the Survey from different regions of the country was provided, including the following topics. In British Columbia, Dr. Scudder indicated that he is in the last year of work on databasing and documenting sensitive species. A submission on priority setting for biodiversity conservation in B.C. is being prepared, using georeferenced data on some insects as well as other organisms to recommend how to set up an ideal conservation system to handle both rarity and richness as well as biogeoclimatic representation, and with a focus on land planning options. The South Okanagan - Similkameen Conservation Program (a coalition of 19 groups working together) has received $1 million from the federal government to help develop a land and resource management plan for the area [see http://www.bc.natureconservancy.ca/soscp/soscp/soscp.pdf]. Dr. Scudder reported that a Checklist of the Hemiptera of Canada and Alaska has been published. Other work on aphids and on mirids is in progress. Dr. Scudder also circulated the first newsletter from a BC Grasslands coalition, with a view to integrating cattle grazing and conservation in a new way ("biodiversity ranching"). Dr. Ring reported that the annual meeting of the Entomological Society of British Columbia will be held October 20 in Victoria. Dr. Robb Bennett is compiling a new checklist of the spiders of British Columbia and has started a new website for seed and cone insects through the BC Ministry of Forests (http://www.for.gov.bc.ca/TIP/IIG/).

In the prairies, Dr. Floate announced that Dr. Owen Olfert of the Agriculture and Agri-Food Canada Research Branch in Saskatoon won a federal government award for developing pest distribution maps for the prairies and a collaborative GIS monitoring system. Dr. Roughley reported that the annual meeting of the Entomological Society of Manitoba will take place the week of October 16. At the University of Manitoba database work continues. The entomology faculty and 20 graduate stu-

dents in the department have a diversity of projects. Dr. John Conroy, University of Winnipeg, died recently and much of the entomological work has fallen on Dr. Richard Westwood who is developing a large, well-supported forestry project. The Conservation Data Centre in Winnipeg is cataloguing considerable insect data by group.

In Ontario, Dr. Currie reported that the Royal Ontario Museum has a new CEO - Mr. William Thorsell, former editor-in-chief of the Globe and Mail, who seems to be steering the museum back to more traditional museum values. Master planning continues at the Museum. The work of databasing the collection continues: the butterflies are nearing completion and will be included in the Biota of Canada. The Blackflies of North America book is now in the cost production phase. Dr. Chris Darling and Dr. Sandy Smith have received a grant to work on the old growth white pine Haliburton forest, which has one of the longest canopy walkways in the world. Mr. John Swann has resigned from the ROM to complete his PhD thesis. Dr. Shorthouse reported that he has two graduate students in his laboratory at Laurentian University including one studying parasitoids associated with galls.

In Quebec, Dr. Wheeler reported that much current activity is directed toward the joint ESC/SEQ/ESA meeting. The Entomological Collections Network meeting, traditionally held in conjunction with the ESA meeting, will be hosted by McGill University. Dr. Wheeler hopes that there will be a final hiring decision on the Lyman Entomological Museum's Curator in the next two weeks. The Lyman Entomological Museum and McGill Herbarium shared a grant from a private foundation to provide infrastructure and personnel for databasing the collections of the two museums. Continued annual funding is possible from the same foundation and good progress was made on this year's installment. Dr. Chiasson reported that Dr. Noubar Bostanian, Agriculture et Agroalimentaire Canada, has long done research on insects in apple orchards. He will present this research for the first time at the joint meeting in December.

In Newfoundland and the Maritimes, Dr. Giberson reported that the annual meeting of the Acadian Entomological Society was held recently in Charlottetown. The meeting was very poorly attended. An emergency meeting was held to discuss the reasons for such low attendance and ways to improve the organization of the Society. Dr. Jeff Stewart, formerly a research scientist at Agriculture and Agri-Food Canada in Charlottetown, has moved to Lethbridge to take up a management position. Dr. Giberson reported that the fish kills that resulted from pesticide runoff into streams had led to buffer-strip legislation. However, buffer strips take time to grow, and fish kills continued last summer and remain a serious and controversial issue in PEI. The dragonflies of PEI project continues and Dr. Giberson is working with the Atlantic Dragonfly Inventory Project, which meets on November 11 in New Brunswick. In the Maritimes an action committee for pesticides is organizing a system that can quickly be mobilized if West Nile virus is positively identified. For the Arctic, Dr. Ring reported that he did field work this past summer at Alexandra Fiord with a senior undergraduate student, supported by the Northern Scientific Training Program (NSTP). He circulated the latest ITEX newsletter. Recently published is a large monograph summarizing past ITEX work from all nations. Although ITEX work is thriving much of it is supported by U.S. National Science Foundation funds and Canadian funding is still poor. Dr. Olga Kukal and Ms. Valerie Bennett continued their work on Ellesmere Island, mainly studying *Gynaephora*. Dr. Ring circulated several publications of interest concerning northern species diversity and arctic activities. In particular, the report of the national task force on northern research was published [see ftp://ftp.nserc.ca/pub/nserc_pdf/nor/crisis.pdf] with specific recommendations to rebuild Canadian northern research, namely: to establish 24 university research chairs dedicated to northern research; to create 40 northern graduate scholarships and 40 postdoctoral fellowships; to support 70 strategic research projects of high social, industrial or environmental relevance; to build partnerships between north-

ern communities and university researchers; and to provide funding for critical equipment, infrastructure and logistical needs.

2. Other matters

The Committee also considered other recent information on topics such as international liaisons, membership of the Scientific Committee, a brief on standards for specimen data labels, operations of the Biological Survey Secretariat, and recent Survey and other publications of faunal interest.

The Canadian Biodiversity Network Conference

The Canadian Biodiversity Network Conference, "Canada's Natural Capital" was held March 1 to 4, 2001 in Ottawa. The goal of the conference was to develop an action plan to create a national biodiversity network. The network will involve many partners working together to expand and make electronically available extensive information on Canada's biota, from a strengthened base of facilities and personnel for research, education and reference.

As well as a number of speakers at plenary sessions, workshops were held with the aim of developing a strategic plan outlining the steps required to build Canada's biodiversity science and bioinformatics capacity.

Welcoming addresses were given by The Honourable Lyle Vanclief, Minister of Agriculture and Agri-Food and The Honourable David Anderson, Minister of the Environment. The plenary sessions addressed such topics as

* International perspectives and experiences
* Biodiversity science networks and capacities
* Bioinformatics needs and tools

The workshop themes were:

* Enhancing wildlife and habitat conservation
* Improving sustainable resource management
* Increasing the recognition of the importance of biodiversity to the economy and Canadian society
* Integrating traditional knowledge
* Biodiversity aspects of human health
* Developing commercial opportunities
* Creating a biodiversity information value system - ethics, intellectual property, etc.
* Education and the development of the human resource component of the future biodiversity agenda
* Management strategies for biodiversity protection
* Data sharing - from naturalists to decision makers: challenges and opportunities

More information on the conference and the Canadian Biodiversity Network, including speakers' texts, can be found at: http://www.nrc.ca/confserv/biodiversity/.

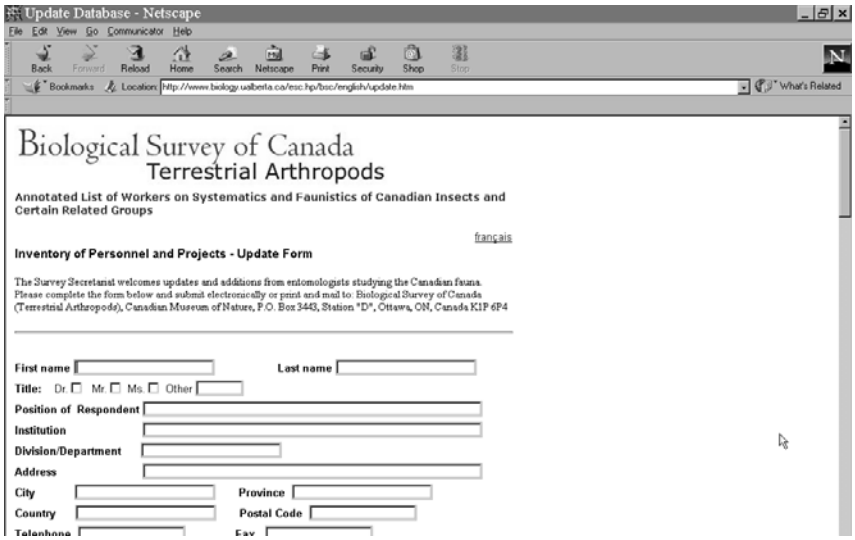
Biological Survey Website update

http://www.biology.ualberta.ca/esc/bschome.htm

The Fall 2000 issue of this newsletter announced the expansion of the Biological Survey's website. Since then some minor updates have occurred such as adding the web version of the Fall newsletter. More notably, the Annotated List of Workers on Systematics and Faunistics of Canadian Insects and Certain Related Groups has now gone live in the form of a searchable database. Because our current database was not designed for web usage some of the search engines (especially for taxa and ecological groups) are very slow. In the next year

the Survey plans to overhaul this system. In the meantime we invite you to review your listing and submit updates or corrections. An online form is available for this purpose. You can also communicate with us in the usual ways (see inside front cover). Other comments or suggestions for the website are most welcome.

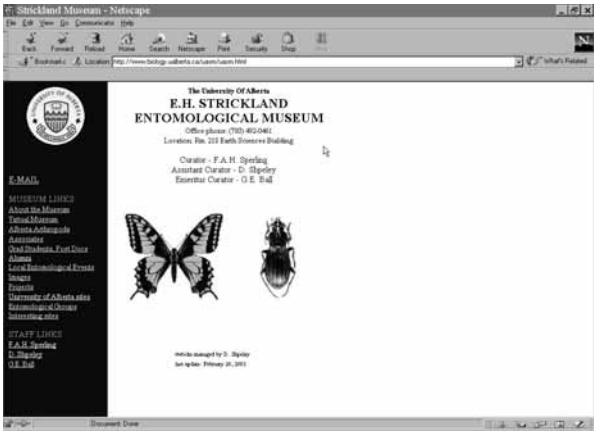
The Survey website is at: http://www.biology.ualberta.ca/esc/bschome.htm. The Annotated List can be found by following the menu item 'List of Workers (database)'.



Web watch: The E.H. Strickland Entomological Museum

http://www.biology.ualberta.ca/uasm/uasm.html

One of the purposes of this website is to provide electronic access to the University of Alberta's Strickland Entomological Museum, one of the most significant insect collections in western Canada. The collection contains approximately one million specimens and is made up of two sub-collections, the Research Collection and the Alberta Reference Collection.



The Research Collection includes principally Nearctic insects, representing most orders and the major families thereof. The beetle family Carabidae is especially well represented: included are about 400,000 specimens principally from the Nearctic region, but with an important Neotropical component, and fewer taxa from the remaining biogeographical regions. The Research Collection also contains specimens representing most of the species of butterflies and moths known from Alberta.

The website also contains interesting information on the history of the Strickland Entomological Museum, information on staff and students, local entomological events, and various relevant links.

Project Update - Arthropods of Canadian Grasslands

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The last project update on the Grasslands Project in the Fall, 1999 Biological Survey of Canada Newsletter (Vol. 18 (2): 57-59) provided a brief history of the project and an outline of the objectives. Since that time, the project has gathered momentum on several fronts.

Conference Presentations

An Informal Conference entitled "Arthropods of Grasslands: Current Status and Future Directions" was held at the Joint Annual Meeting of the Entomological Societies of America / Canada / Quebec in Montreal in December 2000. Four invited papers on grassland arthropod research were presented:

- Canada's Grasslands (Kevin Floate, Agriculture and Agri-Food Canada, Lethbridge, Alberta)
- The use of fire as a biodiversity and conservation tool in tallgrass prairies (Rob Roughley, University of Manitoba, Winnipeg, Manitoba)
- Diversity of *Meromyza* (Diptera: Chloropidae) in Canadian native grasslands (Terry Wheeler, McGill University, Ste-Anne-de-Bellevue, Quebec)
- Endemism and dispersal of short-horned bugs (Homoptera: Auchenorrhyncha) in Pacific Northwest intermontane grasslands (Andy Hamilton, Agriculture and Agri-Food Canada, Ottawa, Ontario)

Following the formal presentations, conference organizer Terry Wheeler gave a brief presentation on the history, current status and objectives of the Grasslands Project. This was followed by an open discussion on such issues as standardized sampling for ecological studies, coordination of fieldwork efforts, and additional collaborators. A more detailed summary of the conference and articles on some of the issues raised during the discussion appears in the 2001 issue of the Arthropods of Canadian Grasslands Newsletter.

The 2000 Annual Meeting of the Entomological Collections Network was held in Montreal in conjunction with the Joint Annual Meeting. Terry Wheeler gave a presentation at the ECN meeting entitled "Arthropods of Canadian Grasslands: A Biological Survey of Canada Megaproject"

Other Publicity

The grasslands project web page [http://www.biology.ualberta.ca/esc.hp/bsc/english/grasslands.htm] has been added to the Biological Survey of Canada website. The web page contains information on the objectives of the project, a summary of research projects in grasslands and on-line copies of all issues of the Grasslands Newsletter. Other information will be added on a regular basis.

Research

A list of recent and ongoing research projects in Canadian grasslands is maintained on the Project web page.

Field research by individual collaborators continues on several taxa, in grassland sites across the west. As samples from such studies accumulate, residues and collections will become an increasingly valuable source of specimens. One way to take advantage of this material is the establishment of a residue sorting network. A preliminary discussion of this network appears in the 2001 issue of the Arthropods of Grasslands Newsletter. It may also be helpful to

establish a database of the ever-expanding holdings of grassland arthropods in research collections. One of the anticipated products of the grasslands project is the compilation of electronic databases of material housed in collections; this will facilitate future research and exchange of material.

Although individual fieldwork will continue at several sites, a more ambitious effort is being coordinated by Rob Roughley (University of Manitoba) to assemble a team of collectors for a field meeting based in Onefour, Alberta during late June or early July 2001. The location will provide access to a diverse range of grassland habitats from the dry prairie and badlands around Onefour and the Milk River Valley to the considerably more boreal habitats of the Cypress Hills. Those interested in participating in this field meeting should contact Rob Roughley (rob_roughley@umanitoba.ca).

Funding

Funding is a major concern for a project of this scope. Although traditional research grants will support the activities of individual collaborators, support for more collaborative endeavours as well as publication and dissemination costs will require a more imaginative approach. A funding group headed by Kevin Floate has been exploring avenues of support for the project.

Upcoming Priorities

A formal symposium on Ecology of Arthropods in Canadian Grasslands is planned for the 2002 Entomological Society of Canada Annual Meeting in Winnipeg. The focus of the symposium will be ecological and habitat based studies on selected grasslands or taxa. We envision that the papers presented at the symposium will form the core chapters of a published volume on ecology of grassland arthropods to be published as soon as possible after the symposium. Although some symposium contributors and chapter authors have already been approached, additional authors and chapter titles are still welcome. Anyone with additional suggestions for titles, or requiring more information, should contact the symposium organizer, Terry Wheeler.

Photo by K. Floate

The Quiz Page

— test your knowledge of Canada and its fauna —

1. Give the approximate elevations above mean sea level of:
   Vancouver, BC
   Toronto, Ontario
   Ottawa/Hull, Ontario/Quebec
   Montreal, Quebec
   Calgary, Alberta

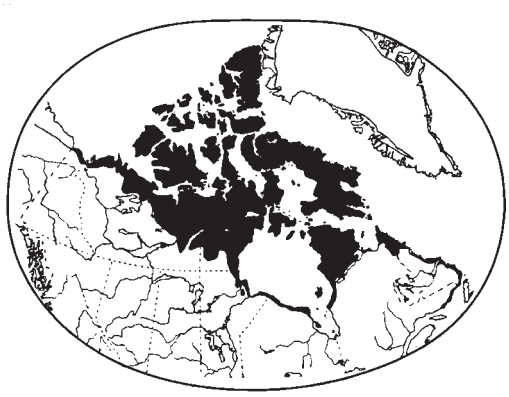
2. The dry valleys and south facing slopes of central British Columbia are characterized by bunch grasses and, depending on location, by several drought-resistant shrubs, the common names of which all end with the same syllable — name three of them.

3. In a series of generic names of Canadian terrestrial arthropods that increase progressively by one syllable (i.e. one-syllable name, two-syllable name, three-syllable name, etc.), how many syllables can you reach (if this exercise is too easy, confine yourself to one order or family).

4. What are the normal foods of the following species or groups:
   a) mosquito larvae
   b) adult female mosquitoes
   c) hawk moths
   d) Cecropia moths
   e) flea larvae
   f) shore bugs
   g) stink bugs
   h) lygaeid bugs

5. Concentration corner: This question requires concentration and a numerical answer.
   Read the following passage only once without looking back or ahead and then go to the Answers Page and respond to the question there.
   Houseflies are being swatted in an infested barn by several technicians, each of whom makes a deposit in a pile in a dish. Unfortunately some of the flies are only stunned, and so they recover and leave the pile again. One technician starts the pile with 17 flies but 5 recover and leave. Another adds 12 to the pile but 7 soon recover. Successive technicians catch 7 flies while 3 leave, and 11 flies while only one leaves. Another technician catches 20 flies but all but one recover. Twelve flies are added to the pile and 4 leave. The final technician adds 5 flies to the pile but none escape.

[Answers on p. 26]



ARCTIC CORNER

News about studies of arctic insects

Introduction

Recently the Biological Survey's newsletter *Arctic Insect News* was discontinued. Despite some support chiefly in theory for arctic initiatives in Canada, research in arctic entomology has remained strictly limited, by restricted funding, by additional permit requirements and more complex permit procedures, and by a lack of personnel. Moreover, much of the content of *Arctic Insect News* was coming from overseas.

Instead of publishing a separate newsletter, therefore, Canadian arctic interests will now be supported by including relevant submissions in this section of the main BSC newsletter. Contributions to *Arctic Corner* are welcomed by the Editor (see inside front cover).

Arctic Insects, Global Warming and the ITEX Program

Dr. Richard A. Ring, University of Victoria, Biology Department, Victoria, BC Canada V8W 3N5, raring@uvic.ca

Introduction

The International Tundra Experiment (ITEX) was established in late 1990 at a meeting of tundra ecologists as a response to predictions that human-enhanced greenhouse warming would occur earliest and to the greatest degree at highest latitudes. The initial objective was to monitor phenology, growth, and reproduction in major vascular plant species in response to climate variations and environmental manipulations at sites throughout the tundra biome. This large-scale field experiment in the Arctic was planned to be a long-term collaborative research effort by scientists from nine countries working at 26 research sites to examine the effects of enhanced summer warming on tundra vegetation. Investigators use a common experimental design, study a common set of species, and monitor common parameters of the ecosystem. Small, translucent, fibreglass open-top chambers (OTCs) are utilized to passively increase summer temperature, and these have proved effective in stimulating predicted climatic warming in Arctic environments.

The experiment was initiated by the conclusions of the Global Circulation Models of the time that predicted mean summer temperatures in northern regions would increase by 1.5º to 4.5ºC by the year 2030 (Mitchell et al. 1990). Indeed, these predictions now seem moderate compared to the analyses of current Global Circulation Models (Hengeveld, 2000). Such drastic climate change in so sensitive an area as the high Arctic could have a major impact not only on plant life but also on the arthropod fauna (Strathdee et al. 1993).

The effects of OTCs on insects and on insect/plant interactions have, therefore, been studied within the ITEX context. Insect specimens have been collected from six ecologically distinct plant communities at Alexandra Fiord,

a polar oasis on Ellesmere Island in Nunavut. The four main emphases of the program are:

(1) general collecting of actively flying insects by the use of Malaise flight-intercept traps at two of these sites on the lowlands,

(2) a comparison of the insect fauna within and without (i.e. control) the OTCs using yellow pitfall traps,

(3) since OTCs have physical effects such as excluding flying insects (many of which are known pollinators of arctic flowers), a comparison of the frequency of likely pollinators both within and without the OTCs using yellow pitfall traps, and

(4) an analysis of the direct effects of the OTCs on insect development and phenology, mainly within the soil micro-arthropods.

Site

Alexandra Fiord is a small (c. 8 km^2) lowland valley on the East Coast of Ellesmere Island in Nunavut, a Canadian Territory (78º 53′ N; 75º 55′ W) (Fig. 1). It is located approximately halfway up the eastern coast of Ellesmere Island near the transition from the exposed bedrock of the Canadian Shield to a younger sequence of sedimentary deposits. The lowland is near the mouth of Alexandra Fiord which deeply dissects the eastern coast of Ellesmere about 70 km south of Sverdrup Pass and 60 km west of Greenland. The Alexandra Fiord Lowland represents a terrestrial arctic oasis that is generally characterized by elevated summer temperatures and higher moisture levels compared to the surrounding "arctic desert". The lowland's physiography is largely responsible for the less inclement conditions; it is a periglacial outwash surrounded by steep mountains on all sides except to the north, which borders the sea (Fig. 2). Snow cover on the surrounding scree slopes and glaciers tends to reflect solar radiation into the lowland, increasing its temperature while the surrounding edges act as a wind foil. Water collected from glacial tongues, which spill out of the Ellesmere ice cap, drains through the gently sloping lowland and irrigates it through a network of small channels before flowing into the fiord. The lowland valley has a milder climate than surrounding areas, and is a good example of a high arctic oasis. The mean July temperature is 5.1ºC compared to an average of 4.4ºC for the surrounding "arctic desert" regions (Freedman et al. 1994). In addition to the increased temperatures, the topography of Alexandra Fiord allows a greater availability of moisture within the valley basin. Glacial and niveal runoff provides a source of ground water, which is highly restricted elsewhere in the high arctic. The plant and insect communities are consequently much richer in the Fiord lowland than in adjacent areas. Organisms are limited elsewhere by water and temperature constraints, which are eased somewhat in polar oases (Downes 1964). The climatic effects allow a greater diversity of species as well as a greater productivity to exist on the lowlands. The high relative abundance of organisms found in Alexandra Fiord compared to surrounding areas lends the area to the study of global change scenarios (Danks 1992).

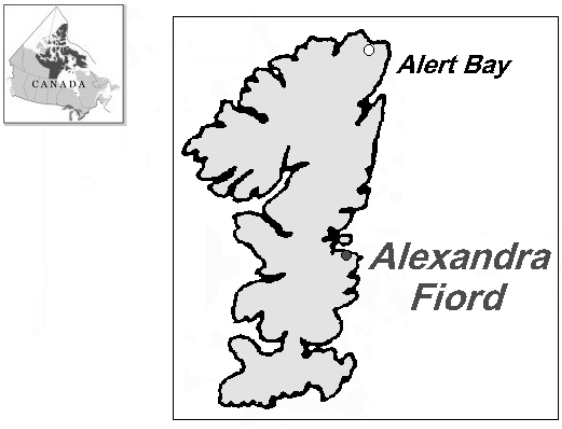


Fig. 1

Results and Discussion

(1) Malaise Trapping and Diversity

There is a relatively high diversity of insects for this latitude at Alexandra Fiord, comparable with other high arctic oases on

Fig. 2
The lowland with ITEX set-up

Ellesmere Island (Oliver 1963; Brodo 2000). Over 20,000 specimens were sorted from two locations, comprising 4 orders (Homoptera, Lepidoptera, Diptera, and Hymenoptera), 24 families, and well over 50 species. Insect abundance was highest in "mid-summer" (early July), and distinct phenological and abundance patterns were found in the two collection sites at the family, species, and sex level. Ten families of insects were found to be significantly different in total number (all collection dates combined), and 4 were highly abundant (Chironomidae, Culicidae, Icheumonidae, and Empididae), showing obvious phenological trends over the short growing season.

The insect fauna is dominated by the Diptera, especially the Chironomidae, which is not unexpected for the high arctic (Danks 1981). However, there was a surprising abundance of Empididae and Dolichopodidae, which are predators on other insects. The two species of mosquitoes (*Aedes impiger* and *Aedes nigripes*), were also seasonally abundant and showed some interesting trends even at the sex level. Males emerged earlier at both sites, but female abundance was much greater at the wet "Sedge Meadow" site later in July - important information for the ITEX workers carrying out their plant growth measurements! The main fungal feeding insects (Sciaridae and Mycetophilidae) were also present in moderate numbers, an observation supported by the number of mushrooms and other fungi collected in the lowlands.

Among the Hymenoptera, the insect parasitoids Ichneumonidae were the most speciose and abundant. Again, this is not unexpected considering the large number of potential hosts in Alexandra Fiord - caterpillars and dipteran larvae. Other authors have also found a very high rate of parasitism (up to 75%) when examining the relationships between the lymantriid caterpillars of *Gynaephora groenlandica* and *G. rossii* and their parasitoids, lending support to this observation. Although very few Lepidoptera were ever retrieved from the trap samples, this is more likely due to a factor in the trap design, because numerous butterflies and moths were collected in the attractive yellow pitfall traps in the same localities during the latter half of July. No Coleoptera were collected by the Malaise traps.

(2) Indirect Effects of OTCs.

Field studies employ OTCs to modify one or more environmental variables in order to examine the responses of enclosed plants and insects. Unfortunately, such experimental devices have the potential to produce unwanted environmental consequences or otherwise influence biotic interactions in ways that interfere with the intended experimental agenda. Insect collections from within and without OTCs at Alexandra Fiord indicate a consistent trend for larger numbers of insects to be trapped in control plots relative to the OTCs (Fig. 3). Differences among insect pollinators in particular, from both within and without the OTCs, have been compared and contrasted. Lepidoptera and Diptera are present in almost equal overall abundance, but significant differences have been found between insect pollinators collected in OTC plots versus control plots for some families (Fig. 4). Mean numbers of Lepidoptera per site suggest a 32-fold overall decrease within the OTCs. OTCs do not significantly affect the abundance of the majority of Diptera families, but *Bombus* specimens are found only in control plots.

Dipterans predominate in the samples, both in terms of overall abundance and number of families represented. Few specimens of other major orders are present, except for Lepidoptera. Of the Dipterans, the Muscoidea predominate within the samples. Species in this superfamily are important pollinators since they feed on nectar and have been shown to carry pollen among High Arctic flowers. These results indicate that reduced pollen deposition in some plant taxa and reduced pollinator visits in OTCs have the potential to influence plant species which are highly dependent upon outcrossing for successful seed production.

(3) Direct Effects Of OTCs

Observations on the arctic woolly bear *Gynaephora groenlandica* collected in recent years at Alexandra Fiord contradict some of the life-history information previously published for this species at the same site. Detailed analysis of larval head capsule width measurements and consideration of growth ratios indicate that there are 7 rather than 6 larval instars. Also, both field and laboratory-rearing indicate that larvae moult once per year, every year. These data and observations greatly simplify the life-history from that previously published, and

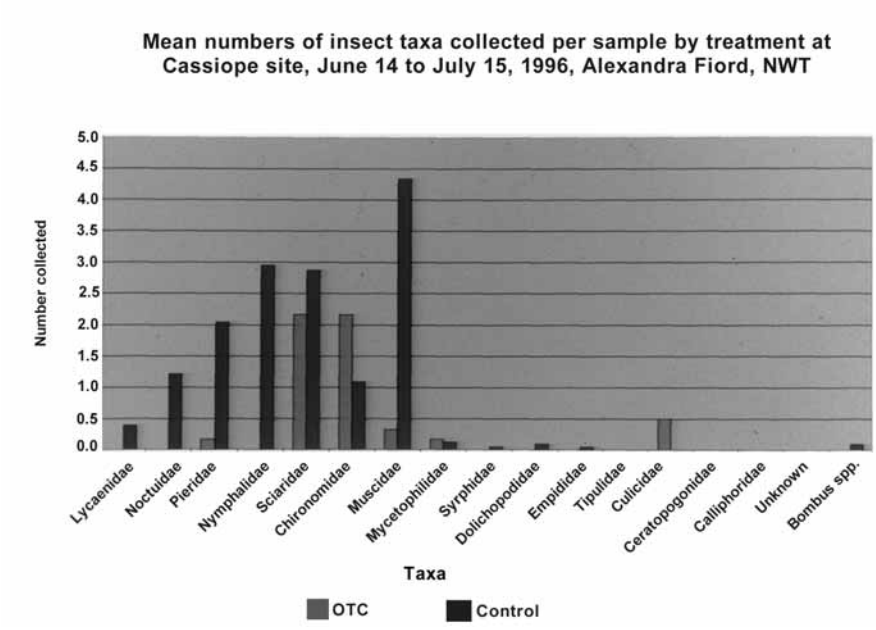


Fig. 3

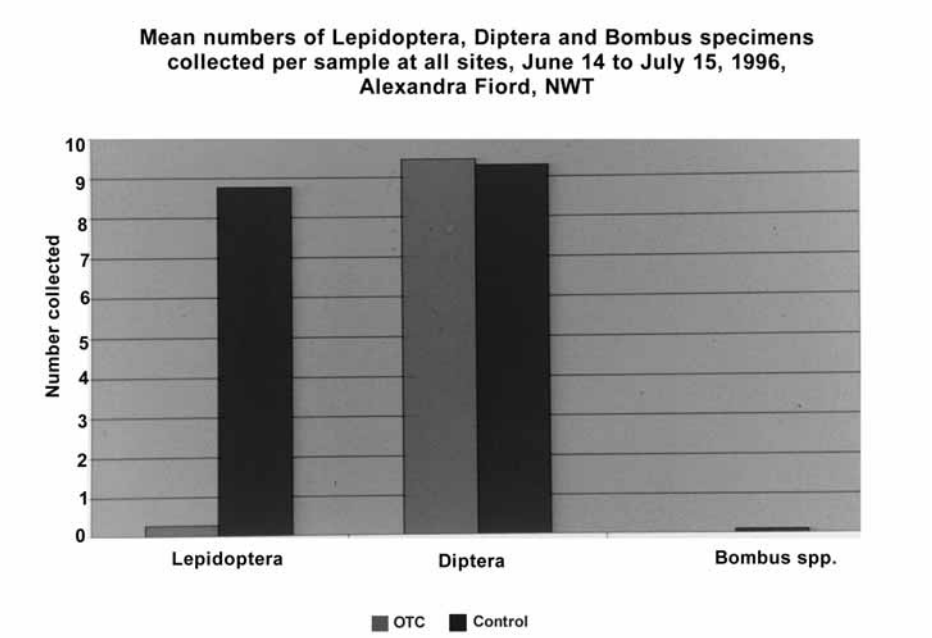


Fig. 4

suggest a life cycle of 7 rather than 14 years. In addition, growth, development, and behaviour were monitored for individual *G. groenlandica* larvae confined within both experimental and control corrals. Larvae were observed much more frequently within OTCs than within control plots, suggesting that they prefer the warmer conditions. Larvae confined within OTCs showed a shift in seasonal phenology (Fig. 6), corresponding with an earlier snowmelt, but the length of their active period did not differ significantly from that of larvae in control corrals. All larvae accomplished the same degree of development, namely a single moult; however, measurements of fresh body mass suggest higher average growth rates among larvae in OTCs versus controls (Fig. 6). These results also indicate that the warming produced by OTCs does not affect overall generation time for *G. groenlandica*, but does produce slightly larger individuals.

Although there is no evidence of significant direct effects of OTC warming on woolly bear caterpillar growth and development, there are some interesting *trends* that are obvious and should be monitored over successive years into the future. Even small changes in phenology and growth (as measured here) could, when multiplied from year to year, eventually have significant effects on the life cycle of this species.

(4) Soil Micro-Arthropods

The results for soil micro-organisms from soil cores in Alexandra Fiord are very preliminary, and further studies continue. The key, or indicator, species are found among the mites and Collembola, but individual species have not yet been identified. Wingless Thysanoptera, and perhaps other less well-represented taxa, may also be useful indicators in global warming scenarios in the High Arctic.

A great deal of variability was found within each site, making comparisons among sites difficult. The Willow Site produced a greater number of individuals, both within and without the OTCs. This site was also the only one where Thysanoptera were represented. Without the OTCs, all Thysanoptera found were developmentally immature, while those within the OTCs were mature. Also, within the OTCs, Diptera larvae were conspicuously absent. Oribatids were generally not common, although they were dominant in one sample from within an OTC. Some of the most abundant soil mites identified were: *Trichoribates polaris*

Ceratozetidae immatures, *Iugoribates gracilis*, *Liochthonius sellnicki*, *Cyta latirostris*, *Moritzoppia clavigera*, *Epidamaeus* sp. near *longitarsalis*, and *Hermannia scabra*. At every site, the most abundant categories included both "other mites" and Collembola sp. 1. Abundance of Thysanoptera, Diptera, predatory mites, and oribatids was relatively low. Collembola sp. 2 was common only in the Willow Site.

The main differences among the samples from within the OTCs were the developmental maturity of the Thysanoptera and the absence of the Diptera. The maturity of Thysanoptera was probably a direct result of the increased temperature. It has been demonstrated that thrips reach maturity faster at a higher temperature. One Finnish thrips, *Limnothrips denticornis*, when raised at a temperature of 25°C, will reach maturity in half the time required by wild populations. This increased rate of maturation could have an effect on the reproductive abilities of arctic thrips in a warmer climate. In many thrips, the number of eggs laid and generations per annum are dependent on temperature. Furthermore, mites have been shown to be more resistant to climate change than collembolans (Coulsen et al. 1996; Hodkinson et al. 1996). Therefore, if climate change leads to significantly drier conditions in the High Arctic, mites would be expected to become more abundant in the soil.

Acknowledgments

I wish to thank the many students who have been involved in insect studies at Alexandra Fiord over the last decade, including Dean Morewood, Adrian DeBruyn, Jeff Lemieux, Jason Spears, James Miskelly and Greg Pierce. A special thanks to Dr. Greg Henry, U.B.C., for his knowledge of the ITEX Program and sharing his facilities at the research station in Alexandra Fiord. I gratefully acknowledge NSERC for their continued financial support, P.C.S.P. for their invaluable logistic support, and the NSTP Program for supporting most of the above-named students.

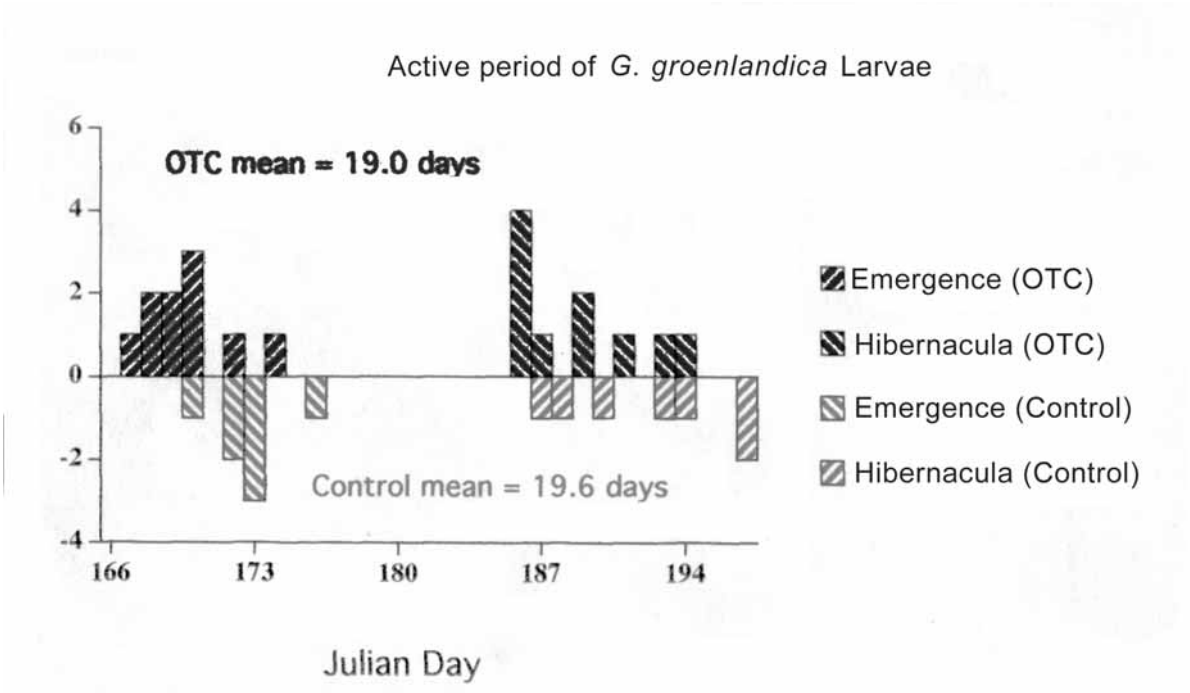


Fig. 5

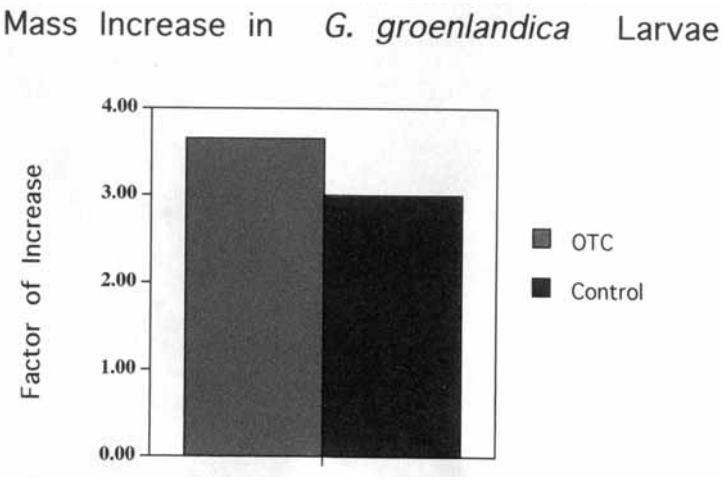


Fig. 6

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Selected Future Conferences

Organization	Date	Place	Contact
Entomological Conferences			
Entomological Society of Canada	**2001**, 21-24 Oct.	Niagara Falls, ON	(with the Entomological Society of Ontario) Dr. Cynthia Scott-Dupree, Dept. of Environmental Biology, University of Guelph, Guelph, Ontario N1G 2W1 csdupree@evb.uoguelph.ca
	2002	Winnipeg, MB	(with the Entomological Society of Manitoba) Robert Lamb, Scientific Program Chair, rlamb@em.agr.ca
Entomological Society of America	**2001**, 9-13 Dec.	San Diego, CA	ESA, 9301 Annapolis Rd., Lanham, MD 20706-3115; meet@entsoc.org
	2002, 10-15 Dec.	Philadelphia, PA	ESA, see above
7th International Symposium on Thysanoptera	**2001**, 2-7 July	Reggio Calabria, Italy	http://www.keele.ac.uk/depts/aep/thrips2001 Dr. R. Marullo, Dipartimento di Agrochimica ed Agrobiologia, Università degli Studi di Reggio Calabria, Piazza San Francesco di Sales N. 4 I-89061, Gallina (Reggio Calaria), Italy; rmarullo@unirc.it
15th International Symposium of Odonatology	**2001,** 10-14 July	Novosibirsk, Siberia, Russia	Dr Oleg Kosterin, Institute of Cytology and Genetics of the Siberian Branch of the Russian Acad. Sci., Lavrentiev Ave. 10 RUS - 630090, Novosibirsk, Russia; Tel / Fax: 383-(2) 33-12-7833-34-66, E-mail: kosterin@bionet.nsc.ru
2nd WDA International Symposium of Odonatology	**2001**, 22-27 July	Gällivare, Sweden	Dr. Göran Sahlén, Systematic Zoology, Evolutionary Biology Centre, Uppsala University, Norbyvägen 18d, SE-752 36 Uppsala, Sweden; goran.sahlen@ebc.uu.se
International Joint Meeting of X International Conference on Ephemeroptera and XIV International Symposium on Plecoptera	**2001,** 5-11 Aug.	Perugia, Italy	http://olympus.unipg.it/maystone/index.htm 2001 International Joint Meeting, Dipartimento di Biologia Animale ed Ecologia, via Elce di Sotto, 06123, Perugia (Italy); maystone@unipg.it

Organization	Date	Place	Contact
International Conference on Orthopteroid Insects	**2001**, 19-22 Aug.	Montpellier, France	http://os2001.cirad.fr or Le Corum, service Congrès, Esplanade Charles de Gaulle, B.P. 2200 - 34027 Montpellier cedex 1, France gestion@corum-montpellier.com
5e Conference Internationale Francophone d'Entomologie (CIFE) and Société d'entomologie du Québec	**2002,** 14-18 July	Montréal, Québec	Dr. Daniel Coderre, Département des Sciences Biologiques, Université du Québec à Montréal, C.P. 888, Succ. Centre-ville, Montréal, Québec, H3C 3P8 coderre.daniel@uqam.ca
XXII International Congress of Entomology	**2004**, 15-20 Aug.	Brisbane, Australia	Jim Cullen, CSIRO Entomology, j.cullen@ento.csiro.au Myron Zalucki, University of Queensland, Australia m.zalucki@mailbox.uq.edu.au
Collections / Museums / Systematics			
Association of Systematics Collections Annual Meeting	**2001,** 8-9 June	Chicago, IL	Association of Systematics Collections, 1725 K Street NW, Suite 601;Washington, DC 20006-1401; asc@ascoll.org
Society for the Preservation of Natural History Collections Annual Meeting	**2001,** 21-26 June	San Francisco, CA	Jean DeMouthe, California Academy of Sciences, Golden Gate Park, San Francisco, CA 94118 jdemouthe@calacademy.org
Other subjects (especially those relevant to Survey projects)			
North American Benthological Society 48th Annual Meeting	**2001,** 3-8 June	LaCrosse, Wisconsin	http://www.benthos.org/Meeting/ William B. Richardson, Program Co-Chair, USGS, Upper Midwest Environ. Science Center, 2630 Fanta Reed Road, La Crosse, WI 54603; William_Richardson@usgs.gov

Answers to Faunal Quiz

[See page 16]

1. The approximate elevations above mean sea level of these cities, which are the five largest in Canada, are:
   Vancouver: 2 metres
   Toronto: 35 metres
   Ottawa/Hull: 38 metres
   Montreal: 17 metres
   Calgary: 329 metres

2. Common names of drought-resistant shrubs in dry valleys and south-facing slopes of central British Columbia include:
   Sagebrush (*Artemisia* species)
   Antelopebrush (*Purshia tridentata*)
   Rabbitbrush (*Chrysothamnus* species)

3. There are many possibilities for a sequence of generic names increasing progressively by one syllable, e.g. *Sphex* (1), *Aphis* (2), *Colias* (3), *Dendroctonus* (4), *Conocephalus* (5), *Stictochironomus* (6), *Parapegomyia* (7), *Heterotrissocladius* (8).
   The longer names usually have prefixes, as in *Heterosminthurus* and *Oligophlebodes* (6), *Paraleptophlebia* and *Eobrachychthonius* (7), for example.

4. a) The normal food of mosquito larvae is bacteria.
   b) Adult female mosquitoes feed on blood and nectar.
   c) Hawk moths typically take nectar of crepuscular flowers with deep corollas such as honeysuckle.
   d) Cecropia moth adults, like other saturniids, do not feed.
   e) The food of flea larvae varies according to species but ranges from detritus and host by-products to other arthropods.
   f) Shore bugs prey on other insects.
   g) Stink bugs, depending on the species, feed on plant material, other insects or both.
   h) Most lygaeids feed on seeds.

5. Concentration corner
   Answer the question: How many technicians are there?
   (Most responses to this question suggest that people tend to concentrate at any one time on the most obvious possibility, a potential danger in experiments.)

Quips and Quotes

Only dead fish swim with the stream. (Anon.)

What's another word for thesaurus? (Steven Wright)

Time lines

Time is a file that wears and makes no noise. (English proverb)

Lose an hour in the morning and you'll be all day hunting for it. (Proverb)

Those who make the worst use of their time are the first to complain of its brevity. (Bruyère)

Time is nature's way of keeping everything from happening at once. (Anon.)

The future isn't what it used to be. (Anon.)

The butterfly counts not months but moments
and has time enough. (Rabindrath Tagore – *Fireflies*, 1928)

Two former biologists play at dice. In the center of the table there are several banknotes from a prize they had won a few years before they dropped out of science. The rule of the game is that each player gets a banknote whenever he correctly predicts how many throws it will take after throwing a 6 to throw the next 6. One of the two players, a former theoretical biologist, remembers that the frequency of throwing a 6 is one in six, so he always foretells that the waiting period will be 6. The other player's cause for failing in science was opposite: he believed in superstitions. As his lucky number is three, he guesses after each 6 that the next 6 will occur three throws later. Which of the two fellows will recover more from the prize money? And is there a waiting period that could be predicted that would make more money?

[Abstract from: K. Basler 2000. Waiting periods, instructive signals and positional information. *EMBO Journal* 19(6): 1169-1175]

Bargain basement

I wish people who have trouble communicating would just shut up. (Tom Lehrer)

List of Requests for Material or Information Required for Studies of the Canadian Fauna 2001

This list is intended to facilitate cooperation among entomologists by encouraging those who visit suitable areas while engaged in other studies to collect material of particular interest to workers elsewhere. Similar lists that were circulated in previous years prompted the transmission of several useful sets of material, and the efforts of the various cooperators were much appreciated.

Minimum data requested with all specimens are, of course, locality, date, collector and habitat.

(**denotes address reference; listed on page 36)

	Material Requested	Areas of Interest	Collecting Methods, Notes	Name of Requester	**
1	Acari (free living and parasitic terrestrial and aquatic mites)	Anywhere, but especially subarctic 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	1
2	Adelgidae (conifer woolly aphids)	Anywhere	Preserve insects and bark, needles or galls in 70% ethanol. Specimen records and host plant records.	R. Foottit	1
3	Aleyrodidae (whiteflies)	North America	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. Foottit	1
4	Anthomyiidae	North America	Specimens with biological data (especially reared specimens) in the genera *Strobilomyia* (conifer cone maggots), *Lasiomma* (larvae mainly in dung or bird nests), *Egle* (larvae in willow and poplar catkins), *Chirosia* (incl. *Pycnoglossa*) (larvae phytophagous in ferns), and *Acrostilpna* (biology unknown).	G.C.D. Griffiths	2

	Material Requested	Areas of Interest	Collecting Methods, Notes	Name of Requester	**
5	Anthomyzidae	New World	Adults from any habitat, but often associated with graminoids. Preservation in 70% ethanol preferred. Maliase and especially pan trap residues are acceptable and valuable. General description of herbaceous cover and soil moisture advantageous.	K.N. Barber	3
6	Aphididae (aphids)	Anywhere	Preserve in 70% ethanol. Specimen records and host plant records.	R. Foottit	1
7	Asilidae (robber flies)	North America	Pinned adults.	R.A. Cannings	4
8	Braconidae	Anywhere	Pointed or in ethanol.	M. Sharkey	5
9	Bumble bees	Anywhere in Canada	Include floral host if any. Collect and preserve dry (but specimens that have already been put into ethanol are acceptable).	R.C. Plowright	6
10	Butterflies (see also 34)	Arctic	Preserve papered or pinned (collecting / preserving information supplied on request) [for Alaska Lepidoptera Survey]	K.W. Philip	7
11	Ceratopogonidae	Anywhere in Canada	Send in fully topped-up vials of 70% ethanol. Reared material is especially valuable; provide type of substrate or habitat if material is reared.	A. Borkent	8
12	Cercopidae (froghoppers, spittlebugs)	Canada and Alaska	Specimens (preferably not in ethanol if possible), records and host records.	K.G.A. Hamilton	1
13	Chalcidoids, especially Eupelmidae	Holarctic	Incl. sweep-net samples (see also 43) (collect into ethanol). Reared material is especially useful.	G.A.P. Gibson	1
14	Chironomidae: *Larsia* (Tanypodinae)	Nearctic and Palearctic fresh waters	Reared material preferred but will accept all stages in ethanol or on slides.	B. Bilyj	9
15	Chironomidae: *Eukiefferiella*, *Tvetenia* (Orthocladiinae)	All areas, especially Ontario	Include sampling method, habitat information.	W.B. Morton	10

	Material Requested	Areas of Interest	Collecting Methods, Notes	Name of Requester	**
16	Chrysomelidae (leaf beetles)	Anywhere, but especially in Canada	Mounted or unmounted and preserved in acetic alcohol (70 ethanol: 25 water: 5 parts glacial acetic acid). Include accurate (species level) host plant information.	L. LeSage	1
17	Cicadellidae (leafhoppers)	Canada and Alaska	Specimens (preferably not in ethanol), records and host records.	K.G.A. Hamilton	1
18	Coccoidea (scale insects)	North America	Preserve insect and host plant material in 70% ethanol. Specimen records and host plant records.	R. Foottit	1
19	Coleoptera (adults or immatures)	Canada	For teaching. Material from mass collections accepted. (Kill larvae in boiling water removed from the heating element, let cool and transfer to 70% ethanol.)	Y.H. Prévost	11
20	Coleoptera (identified)	Northern Canada	Will collect S. Ont. in exchange; has N.W.T. duplicates to exchange for identification.	A. Morgan	12
21	Curculionidae (weevils)	Anywhere, but especially northern Canada	Adults can be pinned, pointed, or preserved in ethanol. Record host plant information if possible.	D.E. Bright	1
22	Cynipidae: insect galls from domestic and wild roses	Anywhere	Maturing to mature galls. Remove galls from plants and place in plastic bags. Try to segregate galls of different species. Preserve any emergents in 70% ethanol.	J.D. Shorthouse	13
23	Dermaptera: *Forficula auricularia* (perce-oreille européen / European earwig)	Amérique du Nord et autres régions si possible	A sec ou dans l'alcool.	J.C. Tourneur	14
24	Diprionidae (diprionid sawflies)	North America	Living diprionid sawflies of any species, identified or unidentified. Record foodplant. Contact in advance about shipping.	L. Packer	15
25	Dytiscidae (predaceous diving beetles)	Canada, Alaska and northern USA	Adults and larvae; adults should be pinned or if in ethanol preliminarily sorted.	D.J. Larson	16
26	Eupelmidae: *Anastatus*	North America	Reared materials with associated sexes are particularly important, regardless how few in number.	G.A.P. Gibson	1
27	Formicidae (ants)	Anywhere	Record type of habitat and nest site. Include brood if possible (preserve in ethanol).	A. Francoeur	17

	Material Requested	Areas of Interest	Collecting Methods, Notes	Name of Requester	**
28	Fungal pathogens of insects (esp. of deuteromycetes and ascomycetes)	Anywhere	Place any fungus-infected specimens in a vial. (Identification of the fungus available on request.)	D. Strongman	18
29	Halictidae (sweat bees) brown and black spp. only	North America	Particularly from blueberries. Pinned or preserved. Include flower record if available.	L. Packer	15
30	Hemiptera: Heteroptera (bugs)	Anywhere	Aquatic and semi-aquatic Heteroptera from acid waters (an indication of pH would be useful). Terrestrial Heteroptera from bogs. Preserve in ethanol.	G.G.E. Scudder	19
31	Insects on snow	Especially western mountains	*Chionea* (Tipulidae), *Boreus* (Mecoptera), Capniidae (Plecoptera): preserve in 70% ethanol.	S. Cannings	20
32	Isoptera (termites)	N. America incl. Mexico	Preserve in 75% ethanol; try to collect as many soldiers as possible.	T.G. Myles	21
33	Leiodidae (=Leptodiridae)	Northern forest and tundra areas; prairies and grasslands	Most easily collected by window traps or flight intercept traps; and car nets (*Can. Ent.* 124: 745, 1992) (collect into ethanol).	S.B. Peck	22
34	Lepidoptera (see also 10)	Arctic	For revisionary work on the holarctic fauna.	J.D. Lafontaine	1
35	Lepidoptera	Manitoulin Island and surrounding islands	Records for use in monograph of the region. Information on old records from collections would be particularly welcome.	J.K. Morton	23
36	Lygaeidae	Anywhere	Material can be collected in ethanol.	G.G.E. Scudder	19
37	Mallophaga	Anywhere	Preserve specimens in 70% ethanol; host species is extremely important.	T.D. Galloway	24

	Material Requested	Areas of Interest	Collecting Methods, Notes	Name of Requester	**
38	Microlepidoptera (excluding Pyralidae and Tortricidae)	North America, esp. west in dry/arid habitats and prairies (CNC deficient in all western species)	Include collecting method and time of day collected. Kill with ammonia fumes. Field-pin; instruction leaflet and field kit available on request.	J.F. Landry	1
39	Milichiidae	Anywhere	Malaise traps are particularly productive; also any found in association with ant nests extremely appreciated. Preserve in 70% ethanol.	J. Swann	25
40	Odonata (dragonflies)	North America	Include 2-3 word habitat description. Adults preferably in envelopes or papered, prepared by immersing in acetone for 24 hours, then dried; larvae in 70% ethanol.	R.A. Cannings	4
41	Opiliones (harvestmen)	Canada and adjacent states	Preserve in 75% ethanol, especially adults with notes on habitats.	R. Holmberg	26
42	Orthoptera	Anywhere		J-T. Yang	27
43	Parasitic Hymenoptera	Anywhere	Including selected unsorted Malaise, suction, pan or pitfall trap collections (pan trap kits and instructions supplied free on request).	L. Masner	1
44	Phoridae	Anywhere; especially boreal	Collect into 70% ethanol: especially interested in Malaise trap samples from boreal forest.	B.V. Brown	28
45	Pipunculidae (big-headed flies)	Anywhere in North America	Adults can be pinned, pointed or preserved in ethanol.	E. Georgeson	29
46	Psyllidae	North America	Preferably preserve in glycerine or dried. Specimen records and host plant records.	R. Foottit	1
47	Pteromalidae: *Pachyneuron*	North America	Reared materials with associated sexes are particularly important, regardless how few in number.	G.A.P. Gibson	1
48	Salticidae (jumping spiders)	Canada	Adult specimens preseved in 70% ethanol. Include habitat information, specific location of collection, collecting method.	C. Buddle, D. Shorthouse	30
49	Scelionid egg parasites of Orthoptera	Anywhere	Especially from Grylloidea; preserve in ethanol.	L. Masner	1
50	Silphidae	Canada	Include habitat and trapping method. Malaise trap material welcome.	R. Lauff	31

	Material Requested	Areas of Interest	Collecting Methods, Notes	Name of Requester	**
51	Simuliidae (black flies)	North America, esp. western and northern species	Preserve larvae in Carnoy's solution (1 glacial acetic acid: 3 absolute ethanol). Reared adults with associated pupal exuviae preferred. Instructions available on request.	D.C. Currie	25
52	Siphonaptera (fleas)	Anywhere	Preserve specimens in 70% ethanol; host species is extremely important.	T.D. Galloway	24
53	Solpugida (sun spiders)	Canada	Preserve in 75% ethanol, especially adults with notes on habitat.	P. Holmberg	26
54	Sphaeroceridae	Anywhere, esp. arctic or high elevations	Collect into ethanol. Acalyptrate fraction of trap samples welcomed.	S.A. Marshall	32
55	Symphyta (sawflies)	Boreal and arctic Canada	Larvae and adults collected by Malaise trap, sweeping, etc. (collect into 70% ethanol). Identify larval food plant as far as possible.	H. Goulet	1
56	Tabanidae	Canada	Include habitat and trapping method. Malaise trap material welcome.	R. Lauff	31
57	Thysanoptera (thrips)	North America	(Preserve in 70% ethanol). Specimen records, habitat, host plant records where applicable.	R. Foottit	1
58	Trichoptera (caddisflies)	Anywhere	Larvae, pupae and adults, especially collections that might lead to species identification of larva through association with adult. Preserve adults dry or in 80% ethanol, larvae and pupae in Kahle's fluid or 80% ethanol.	G.B. Wiggins	25
59	[Identifications]	High Arctic	Specimens of soil animals in return for identifications	G. Søvik	33

Cooperation Offered

a.	Identification of groups of interest in return for a sample of duplicate specimens.	Most but not all of entries in list above.
b	Willing to sort material from certain residues, bulk samples, etc.	See entries 5, 13, 19, 43, 50, 54, 56 above
c.	Field kits or instructions available on request.	See especially entries 38, 43, 51 above.
d.	Exchange of specimens.	Several requesters, including entries 7, 20, 40, 52 above.
e.	Limited collecting in Coppermine area, N.W.T., if particular material required.	A. Gunn (address 34 below).
f.	Soil animals from Ellesmere and Axel Heiberg Island, Island, arctic Canada.	G. Søvik (see entry 59 above)
g.	Material in exchange for identifications.	G. Søvik (see entry 59 above)
h.	Caterpillars, larval sawflies, aphids and mites available on request from trapnests for solitary bees and wasps.	P. Hallett (address 35 below)

List of Known Email Addresses

(by requester name)

Barber, K.N.. . . . . kbarber@nrcan.gc.ca

Behan-Pelletier, V.M.. . . . . behanpv@em.agr.ca

Borkent, A. . . . . aborkent@jetstream.net

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