

NEWSLETTER OF THE BIOLOGICAL SURVEY OF CANADA (TERRESTRIAL ARTHROPODS)

Table of Contents

General Information and Editorial Notes	(inside front cover)
News and Notes	
BSC 2008 Curation Blitz at the Canadian Museum of Nature	41
Biological Survey of Canada symposium at ESC annual meeting.....	41
Summary of the Scientific Committee meeting	42
Project Update: The BSC's BioBlitz program	48
Little beetles and big headaches . . . (Staphylinidae: Aleocharinae)	51
Arthropod inventory work in Labrador	61
Arctic Corner	
Northern Insect Survey	63
Selected Future Conferences	65
Requests for Cooperation (form)	66

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 2009 issue is January 30, 2009.

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.

*This newsletter is available on the Survey's website at:
<http://www.biology.ualberta.ca/bsc/bschome.htm>*

To receive this newsletter via email (as an Adobe Acrobat file) instead of a paper copy please send an email message to bsc@mus-nature.ca.

News and Notes

Biological Survey of Canada 2008 Curation Blitz at the Canadian Museum of Nature

The Biological Survey of Canada is hosting a Curation Blitz at the Canadian Museum of Nature on Monday, October 20th from 6–10 PM (in conjunction with the Entomological Society of Canada annual meeting). This event will take place at the Natural Heritage Building in Gatineau, Quebec, where CMN collections are housed. This is a short drive across the river from Ottawa and transportation is available upon request.

The Canadian Museum of Nature houses a world-class Coleoptera collection with par-

ticular strengths in scarabs and weevils. The CMN collections are strong in Neotropical and Nearctic material with reasonable coverage from other parts of the world.

Anyone interested is encouraged to attend – from experts who can identify material to novices who just want to browse the collection.

If you are interested in attending this event, please contact Andrew Smith at asmith@mus-nature.ca

BSC 2008 symposium at the Entomological Society of Canada annual meeting in Ottawa – Wednesday, October 22nd from 8:00-9:45 AM

List of presentations

Andrew Smith,

Biological Survey of Canada, Canadian Museum of Nature

An overview of the Biological Survey of Canada

Steve Marshall and Dave Cheung

University of Guelph

Canadian Journal of Arthropod Identification and cost-effective identification of Canadian arthropods

Douglas C. Currie¹, Donna J. Giberson²,

Christopher M. Buddle³

¹Royal Ontario Museum, ²University of Prince Edward Island, ³McGill University

The Northern Insect Survey: reassessing Canada's northern arthropod biodiversity

David B. McCorquodale¹, Chris G. Majka², S.M. Marriott¹, D.J. Giberson³

¹Cape Breton University; ²Nova Scotia Museum; ³University of Prince Edward Island

Has the arrival of non-native lady beetles (Coleoptera: Coccinellidae) altered the distribution of native species in the Canadian Maritime provinces?

Andrea Dechene

McGill University

Recent work on oribatid biodiversity in Quebec

Zoë Lindo¹ and Neville Winchester²

¹McGill University, ²University of Victoria
Patterns of arboreal biodiversity across spatial scales

Marla Schwarzfeld,

University of Alberta

Patterns of ichneumonid diversity in a boreal forest ecosystem

Summary of the Meeting of the Scientific Committee for the Biological Survey of Canada (Terrestrial Arthropods), April 2008

The Scientific Committee met in Ottawa on 24–25 April 2008.

Long-term future of the BSC

Mr. Roger Baird, Director, Collection Services, Canadian Museum of Nature explained that the Museum would need to alter the manner in which they would be able to support the operations of the Biological Survey after the current fiscal year. For the fiscal year beginning 1 April 2009 the CMN's support to the BSC will be reduced to approximately one-quarter of its current support with the understanding that the Survey will have in place partnership arrangements with other member institutions or other parties willing to contribute to the administrative and operating costs of the BSC. There is no financial commitment beyond March 2010. Dr. Smith's term of employment will finish in March 2009. The CMN remains committed to in-kind support with such things as office space. Much of the Committee meeting was therefore devoted to discussing the direction and actions that the BSC needs to take to sustain the organization.

The Committee engaged in some discussion as to whether as a long-term strategy the Biological Survey should have a broader taxonomic focus. However, groups from other disciplines have been approached with the idea of forming additional modules, especially earlier in the Survey's history, but the need for additional funding has always prevented such an expansion. The Entomological Society of Canada and many other taxonomically disciplined based societies have concerns about long-term sustainability and it was suggested that the BSC could be the organization to begin encompassing them. A Biological Survey of Canada without the terrestrial arthropod focus would have a broader appeal especially when fund raising. As well, it might also be beneficial to involve like-minded people in some projects.

In terms of broader partnerships, the Federal Biodiversity Information Partnership (FBIP) is preparing a Memorandum to Cabinet to request funding to set up an ongoing agency. The BSC, especially with a broader mandate, has the potential to form some sort of partnership with FBIP and take advantage of this funding. Dr. Shorthouse and Dr. Scudder met with Dr. Geoff Munro, Chair of the Federal Biodiversity Information Partnership, on the last day of the Committee meeting to discuss this idea.

The Committee concluded that the other main direction for the BSC should be to look for funding for the northern insect project. Other things to be pursued include funding for other projects and investigating other potential partnerships.

It may take some time and experimentation to determine a final alternative model. Given the immediate constraint the Committee also discussed some short-term strategies for ensuring the continuity of operations.

Given the limited funding available next year it seems unlikely that the current practice of two scientific committee meetings per year will be possible. Some possibilities were considered including limiting the meeting to a subcommittee meeting, hosting a symposium in the same time frame, holding a workshop to plan the northern insect survey, and limiting meetings to being held in conjunction with the annual ESC meeting or another society meeting.

In terms of immediate priorities, it was thought that some of the core functions that should be maintained include at least one Committee meeting, the web site, the newsletter, and a focused number of key projects such as the northern insects survey (with a climate change connection), the *Canadian Journal of Arthropod Identification*, and invasive alien insects; all of which encompass specimen-

based research and/or databasing. Some ideas to temporarily fill the role of the Head were discussed. If necessary, certain members of the Scientific Committee agreed to consider doing this on a part-time temporary basis.

Scientific Projects

1. *Grasslands*

All chapters for the first grasslands volume, *Arthropods of Canadian grasslands: ecology and interactions in grassland habitats*, have been revised and the volume should be ready to go to press in the near future. Chapters for the second volume dealing with altered or changing grasslands are in process. The goal is to have the book ready to send to the publisher by 30 April 2009 with a publish date by the summer or fall 2009. Planning for volume 3, the focus of which is to be native landscapes and species diversities for grassland habitats, is set to begin. An editor is required. The issue of the relationship between volume 3 and the EMAN prairie ecozone species assessment publication needs to be determined.

2. *Insects of the arctic*

The plan for the large collaborative project is to recreate the last northern insect survey done more than 50 years ago. How the project will unfold will rely initially on the future of the BSC and success in finding supporting partners. Funding will first be sought from industry. Another option would be to try for NSERC funding.

There is an International Polar Year project called Arctic WOLVES (Arctic wildlife observations linking vulnerable ecosystems) whose objective is to look at the importance of bottom-up (resources) and top-down (predators) forces in structuring these arctic food webs, and how climate affects these trophic linkages. Dr. Chris Buddle offered to coordinate requests for taxa that have been sorted and are available to interested parties.

The Biological Survey has submitted its name as a collaborator with the Polar Barcode

of Life Initiative (PolarBOLI). Dr. Doug Currie is the liaison.

3. *Canadian Journal of Arthropod Identification*

Three new issues have been published: CJAI04 – Photographic Key to the Adult Female Mosquitoes (Diptera: Culicidae) of Canada, CJAI05 – Identification Atlas of the Vespidae (Hymenoptera, Aculeata) of the Northeastern Nearctic Region, and CJAI06 – The Bee Flies (Diptera: Bombyliidae) of Ontario, with a Key to the Species of Eastern Canada. Dr. Marshall has received positive feedback on the quality of the CJAI issues published. A wide range of submissions will be considered. The Committee supported the step to make the journal compliant with the standards for the International Code of Zoological Nomenclature and accept descriptions of new taxa. There was some discussion about page charges for issues that were code compliant to help defray the cost of printing but it was decided that this need not be done yet.

Mr. Dave Cheung presented a template and simple instructions for making an interactive key using PowerPoint that he developed. This useful tool is now available online as part of the instructions to authors.

Discussions have been ongoing with John Pickering concerning possible synergies between the CJAI and the “Discover Life” and “Global Mapper” initiatives that he has been developing over the last decade. These discussions will continue.

4. *Terrestrial arthropods of Newfoundland and Labrador*

Much collecting is being done with many specimens being sent to Dr. Langor’s laboratory. The most progress has been made with the beetles. There is strong interest in the Lepidoptera with some collecting and work in the collections planned this summer. The aim is to produce a checklist and eventually keys to the Lepidoptera of Newfoundland and Labrador. Dr. Jose Fernandez Triana has started some work on the Microgastrinae.

Some smaller publications are planned for the near future. Dr. Langor and Mr. Greg Pohl will conduct a survey conducted in Labrador including the Torngat mountains, funded by the Newfoundland Department of Environment and Conservation. Next year will be the 60th anniversary of the Fenno-Scandinavian expeditions that went through Newfoundland in 1949 and 1951. Dr. Langor is exploring the possibility of obtaining some funding from the Swedish Academy to repeat the collecting from that expedition.

5. Forest arthropods

Volume 4 of the *Arthropods of Canadian Forests Newsletter* should be issued in the spring. This may be the last issue of this newsletter. The project database which resides on the BSC web site continues to be updated. The 2005 symposium proceedings are due to be published in the July issue of *The Canadian Entomologist*. Work on the Cerambycidae of Canada and Alaska has been an ongoing collaboration between Dr. McCorquodale, Dr. Yves Bousquet, Serge Laplante, and Jim Hammond. This is progressing well with the keys essentially finished. Distribution maps should be finished this year and most of the collections in Canada have been databased. Colour photographs of all the species have been taken by Mr. Klaus Bolte.

6. Invasions and reductions

The final package of peer-reviewed, revised manuscripts from the proceedings of the symposium on Ecological Impacts of Non-Native Insects and Fungi on Terrestrial Ecosystems held at the 2006 Joint Annual Meeting was submitted to the journal *Biological Invasions* in March 2008.

There has been some significant progress on the coccinellid project. Most of the Ontario and Quebec material in the CNC has been databased. A student will be looking at material from across Canada to quantify data on some of the changes of introductions and range contractions of native species. Data from other researchers is becoming available.

At the Canadian Forest Service there has been much cataloguing of non-native species of terrestrial arthropods in Canada. So far they have catalogued over 1900 species in Canada. A paper on species on woody plants is in press. Similar papers on the other non-native fauna are anticipated. Other products include a web site (<http://www.exoticpests.gc.ca/>) on Forest Invasive Alien Species in Canada which will have more content added in the near future, a poster featuring some of the tree species across Canada, and synthesis papers. Funding has been received to database some university collections including the University of Guelph, McGill University, and perhaps the University of British Columbia. A new initiative dealing with introduced Coleoptera in eastern Canada including Quebec and the Maritime provinces has begun. At Agriculture and Agri-Food Canada initiatives include a list of invasive alien species that are relevant to agriculture, keys and revisions of pests and biocontrol agents and 12 projects that deal with invasive alien species.

7. BioBlitzes

The 2008 BioBlitz at Bruce Peninsula National Park (19–23 June) was promoted in the BSC Newsletter and on the BSC web site. Mr. Scott Parker at Bruce Peninsula National Park has been very accommodating. (See also p. 48). This BioBlitz will be an opportunity to add to the existing species list compiled over many years by Dr. Marshall.

Some of the previous BioBlitzes, such as Waterton Lakes, have continued to yield data, researchers have continued to do work there and therefore have become more of an ongoing survey rather than a one time event. The collecting permits for Waterton Lakes National Park and Gros Morne National Park have been renewed. Further information is available from Dr. Langor. The BSC plans to continue to pursue work with national parks. Some thought will be put into pursuing a more formal partnership with Parks Canada.

The BSC would like to continue to have BioBlitzes but given the amount of follow-up

work required in processing and identifying material it was recognized that it need not be an annual event. Given the uncertain future of the BSC, any decision about future BioBlitzes will be deferred.

8. *Curation Blitz*

A curation blitz in association with the ESC/ESO meeting in Ottawa in October 2008 is being planned. One of the possibilities being discussed is to visit the collections at the Canadian Museum of Nature. Another possibility is to have people bring material to Ottawa and set up an event to have experts to help with identifications such as is done at the annual meeting of the North American Benthological Society.

9. *Faunal analysis*

There has been little progress on this project. A new subcommittee has agreed to review this project and report at the fall meeting.

10. *Arthropods of the Gulf of St. Lawrence Islands*

This project has been broadened to include the maritime islands. There is ongoing but limited work and will be removed from the regular agenda for now.

20. *Collecting locality database*

The first version of the database of common and historical collecting localities within Canada is now done and has been posted on the BSC web site in the format of an Excel spreadsheet. Users of this database are invited to submit corrections, additions, notations, or alterations.

21. *Endangered species*

The purpose of this agenda item had been to consider a long-standing proposal for a publication dealing with endangered species in Canada. Dr. Marshall argued that the *Canadian Journal of Arthropod Identification* is critical to considering arthropods under species at risk legislation because the first prerequisite to a species being considered a candidate should be that it is covered by a decent accessible review. Therefore the goal of this topic would be better

served to continue to add reviews to CJAI in a proper context.

Dr. Sperling and Dr. DeClerck-Floate had reviewed the Canadian Monarch Butterfly Conservation Plan as well as a COSEWIC report.

Dr. Giberson and Dr. McCorquodale are members of the COSEWIC Species Specialist Subcommittee for arthropods. Suggestions for candidate species may be addressed to them. What species goes on the list to be put forward to COSEWIC is greatly influenced by the amount of data available. Species that might be data deficient will not go forward.

22. *Biodiversity sampling brief*

Because of the availability of good reference material it was decided that it was unnecessary to prepare a revision of the Survey's 1994 biodiversity brief on planning a study and recommended sampling techniques. However, a reference list giving the various new sources for techniques is in process and will be posted on the BSC web site.

23. *Brief on the importance of insect collecting*

Mr. Greg Pohl is working on a BSC brief on the importance of insect collecting. This brief had its genesis when, as president of the Alberta Lepidopterists' Guild, Mr. Pohl was asked to respond to a local naturalists group trying to mount a campaign against insect collecting of all kinds. Mr. Pohl did respond with a lengthy letter which was also published in some newsletters. A proposal to expand the letter into a brief for wider distribution was approved by the Scientific Committee in the fall of 2007.

Liaison and exchange of information

1. *Canadian Museum of Nature*

Mr. Roger Baird, Director, Collection Services reported that work continues and is on schedule for the rehabilitation of the Victoria Memorial Museum Building which is on track for a May 2010 reopening with new gallery spaces. The CMN and its colleagues

in the Alliance of Natural History Museums of Canada continue to work on a collections development strategy and communications initiatives. The Alliance is also seeking to broaden its membership. The Council of Canadian Academies has agreed to investigate the "State and Trends in Biodiversity Science in Canada: Are we Equipped to Understand the Challenges of our Biodiversity Resources?" The results could have major implications for the science conducted in natural history museums and in the academic community in the future. This assessment will help museums, universities, governments, and industry plan strategically to train experts, fund research, house collections, and make data and information accessible to enhance Canada's scientific readiness and meet its international obligations

The CMN was one of 17 federal organizations directed to undertake a strategic review of its programs and spending in 2007. This was part of a new four-year cycle introduced by the Government of Canada to review spending across all departments, agencies and crown corporations. The 2008 budget reduced the CMN's appropriations and in addition it appears that 5% of the Museum's total expenditures will have to be reallocated to the cluster of national museums as a result of the program review.

2. *Entomological Society of Canada*

Dr. Terry Shore, President of the Entomological Society of Canada reported that the current focus for the Society has been its financial situation, and in particular to develop a strategy to stop the financial losses from *The Canadian Entomologist*. The Society is searching for a new secretary to replace Dr. Rick West. [After the meeting it was learned that Dr. Annabelle Firlej will assume this role.] Dr. West will be replacing Dr. Barry Lyons as the ESC Webmaster.

3. *Agriculture and Agri-Food Canada*

Dr. Jean-François Landry reported that Agriculture and Agri-Food Canada will be starting a strategic review in 2008. The Invertebrate Biodiversity Team, which essentially encompasses all systematic entomologists at the CNC,

just entered the second year of a 4-year project funded by AAFC.

Dr. Ales Smetana, retired coleopterist and honorary research associate at the CNC, received a medal for outstanding achievement at the 20th Symposium Internationale Entomofaunisticum Europaeae Centralis in Cluj, Romania for editing the 8-volume Catalogue of Palaearctic Coleoptera (co-edited with Ivan Löbl from Geneva). Dr. Eduard Jendek, an *Agrilus* expert, will be working with Dr. Vasily Grebennikov (Entomology – Ontario Plant Laboratories, C.F.I.A.) for the next three years. Dr. Andy Hamilton is preparing an ecological checklist of Homoptera-Auchenorrhyncha to supplement the Checklist of the Hemiptera of Canada and Alaska published in 2000.

The first AAFC web site on an insect (cicadas) has been completed and updated; it just awaits posting. Dr. Gary Gibson completed a list of the families, genera and species of Chalcidoidea present in the CNC is now accessible to anyone at http://www.canacoll.org/Hym/Staff/Gibson/CNCList/CNC_List.html. Dr. Henri Goulet is working on a revision of the Western Hemisphere Siricidae (Horntail wasps) in collaboration with USDA-SEL and N. Schiff from Europe. There will be 6 summer students working in the CNC this summer, to do a general inventory of the CNC. The last (and only) time the CNC holdings were assessed in a comprehensive manner was in the late 1970s and the results were compiled in the now widely cited and used *Canada and its Insect Fauna*. The main goal for the summer 2008 is to tally the number of genera and species represented. The collection survey will continue over the next two to three years and will eventually add more detailed information such as geographic representation, estimated or actual specimen counts, etc. A comprehensive Collections Policy was developed to ensure the long-term preservation and value of the CNC holdings and to address a requirement of the 2003 Auditor General's report on National Collections. Also being developed are additional policy components on Electronic Data

Entry and Destructive Sampling to embrace new uses for the collections.

Dr. Donald Bright and Dr. Pat Bouchard have published *Coleoptera Curculionidae Entiminae, Weevils of Canada and Alaska* – volume 2 as part of the handbook series. Dr. Yves Bousquet and Mr. Serge Laplante have published the *Coleoptera Histeridae* identification guide.

4. *Federal Biodiversity Information Partnership*

Mr. Geoff Munro, Chair of the Board of the Federal Biodiversity Information Partnership (FBIP) provided an overview of that organization and their attempt to position the FBIP initiative as a deliverable under the federal Science and Technology Strategy. The intent is to go forward to cabinet this fall. If they get approval in principal that this is an appropriate initiative, the process of seeking money from Cabinet and Treasury Board will proceed with the goal of funding for a new agency included in the 2009 federal budget. One of their goals will be to coordinate biodiversity work in the federal government, which is currently fragmented across several departments. The BSC will enter into discussions in how it could become part of the FBIP network.

5. *Alberta Biodiversity Monitoring Institute*

Dr. Tyler Cobb, Curator of Invertebrates Zoology at the Royal Alberta Museum and project manager for the Alberta Biodiversity Monitoring project provided an overview of the Alberta Biodiversity Monitoring Institute and its relationship with the Royal Alberta Museum.

The aim of the project is to sample all 1655 sites in the province every five years. At full capacity the project should be sampling 331 sites every year. Further details can be found on their web site (www.abmi.ca). In general the goal is to look at the spatial and temporal variation in the abundance and diversity of a range of focal taxa in order to inform policy decision making surrounding natural resource and land use management. The focal taxa include mam-

mals, songbirds, vascular and non-vascular plants including bryophytes and lichens, fungi, phytoplankton, and zooplankton. The invertebrates being considered are springtails, oribatid mites, and aquatic macroinvertebrates. Dr. Cobb provided an overview of what was sampled in 2007 and the plan for 2008. Residuals are available and interested people should contact Dr. Cobb although everything, including by-catch, must be retained at the Royal Alberta Museum for two years. Producing taxonomic keys are also a goal of the project and Dr. Cobb sees the potential of submitting material to the CJAI. Mr. David Walter gave an overview of the oribatid mite component of the project.

Other matters

The Committee briefly discussed other matters such as the Canadian University Biodiversity Consortium, the BSC web site, the BSC newsletter, general developments in databasing, the BSC scholarship, a BSC symposium, BSC publicity, some regional developments, and general operations of the Survey secretariat. The annual meeting of the Biological Survey Foundation was also held.



Andrew Smith looking for floating beetles at the 2008 BioBlitz, Bruce Peninsula National Park (see p. 48) (photograph by F. Génier)

Project Update: The Biological Survey of Canada's BioBlitz Program

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For the past several years, the Biological Survey of Canada has organized annual BioBlitzes to complement ongoing scientific projects and to survey protected areas. Seven BioBlitzes have been held so far, with the majority located in the Prairie Provinces. Participants in these events have collected thousands of specimens, many of which have been studied and authoritatively identified by taxonomic experts. The resulting data records have significantly increased our knowledge of the distribution and natural history of Canadian species. BioBlitzes have also been an excellent opportunity for researchers and entomology students to get together to exchange information and collaborate on research of common interest.

The original purpose of BSC BioBlitzes was to enhance knowledge of the fauna of grasslands habitats in Canada to complement our ongoing research project on grasslands. BioBlitzes from 2001–2005, and then again in 2007 were all in grassland habitats in the Prairie Provinces (a BioBlitz was planned for southern Manitoba in 2002 but cancelled due to widespread flooding in the area). Over the past four years, the focus has shifted to survey and inventory work in national parks. There are many advantages to working in national parks – the habitats within are generally protected from non-natural habitat alteration, the parks are usually located in areas that have exceptional biological and landscape features, parks are more intensely studied so there are possibilities for collaboration and comparisons over long time periods, and park staff are very

knowledgeable about the areas and can provide advice and support.

Summary of BSC BioBlitzes:

2001 – Onefour, Alberta

2003 – Peace River grasslands, Alberta

2004 – Aweme, Manitoba

2005 – Waterton Lakes National Park, Alberta

2006 – Gros Morne National Park,
Newfoundland

2007 – Riding Mountain National Park,
Manitoba

2008 – Bruce Peninsula National Park,
Ontario

The BioBlitzes in Waterton Lakes National Park (2005) and Gros Morne National Park (2006) have evolved into ongoing biological surveys with numerous follow-up visits to both parks. Permits are now in place to allow scientists to collect in both parks and contribute to these ongoing surveys. Contact David Langor <dlangor@nrca.gc.ca> if you would like more information or are interested in collecting arthropods at either of these parks. Please note that there are rules and restrictions so contact should be made well in advance to ensure that your plans are compatible with the permits issued.

Reports from past BioBlitzes can be found on the Biological Survey web site at: <http://www.biology.ualberta.ca/bsc/english/bioblitz.htm>

BioBlitz 2008

The 2008 BioBlitz took place in Bruce Peninsula National Park from 19–23 June and was organized by Steve Marshall (University of Guelph). One of the main purposes of this particular BioBlitz was to enhance a longer term Bruce Peninsula Insect Survey Project. See: <http://www.uoguelph.ca/debu/brucepeninsula.htm> for the project website. The Bruce Peninsula BioBlitz brought in 20 participants from a number of Ontario institutions and even one researcher all the way from the Czech Republic. In the days leading up the BioBlitz, some of us were nervously watching the very cold wet weather forecast for the Bruce Peninsula on the Internet and were worried that the collecting might not be good. Fortune smiled on the event though with completely unexpected warm and sunny weather throughout the entire BioBlitz.

The BioBlitz participants stayed both at Emmett Lake Cabin in the park and at Steve Marshall's cottage (located just north of the park on Dunks Bay). The Emmett Lake Cabin was billed as being "very rustic," which conjured up all sorts of images of beaten-down shacks – however, the cabin was very clean and in excellent condition, had a large common area and kitchen, and even had running water and a generator for electricity. This suited our purposes well and served as centre of operations for the BioBlitz participants. All were very grateful for the hospitality of both the park staff and Steve Marshall, who opened up his own cottage to BioBlitzers.



Platycerus virescens (Fabricius), a species of lucanid beetle, was found in rotting logs.
(Photograph by A. Smith)



Night collecting using ultraviolet lights near the Singing Sands dunes.
(photograph by A. Smith)

As in past years, the BioBlitz gave participants the chance to promote entomology, the BioBlitz program, and the Biological Survey of Canada. Participants interacted with park staff and with the public, and I gave a public presentation at the park interpretive center one evening. The presentation was heavily illustrated with Steve Marshall's insect photography – the vast majority of which was taken right there on the Bruce Peninsula.

On the first full day of the BioBlitz, participants met with Scott Parker, Bruce Peninsula National Park Ecologist and Research Coordinator, to pore over maps of the area and work out logistics. The park staff were extremely supportive and had lots of helpful suggestions for collecting localities. BioBlitz participants were even offered the opportunity to accompany Scott on one of the park boats to some of the islands off the tip of the Bruce Peninsula. An obvious perk to holding a BioBlitz in a national park! Several participants went on the boat tour and collected specimens from a few different islands. On the peninsula, there were lots of forested habitats, sand dunes, ponds, bogs, fields, streams, and other habitats to sample. Participants used

insect nets, flight intercept traps, baited pitfall traps, mosquito traps, ultraviolet lights, beating sheets, sand sifters, dip nets, and several other techniques for catching insects. The focal taxa of most participants were flies and beetles, but there was also interest in other groups such as ants, moths, and wasps. François Génier and I were after scarab beetles and caught an impressive 346 specimens representing 17 different species. The specimens collected by the various participants will all be deposited in insti-

tutional collections (mainly the University of Guelph and the Canadian Museum of Nature) and specimen data is being added to the Bruce Arthropod Database maintained by Steve Marshall. The overall consensus was that the 2008 BioBlitz was a huge success and the scientific results will greatly enhance the Bruce Peninsula Insect Survey



BioBlitz 2008 participants, from left to right – Vincent Belluz (University of Guelph), Jan Sevcik (Silesian Museum, Czech Republic), Andrew Smith (Canadian Museum of Nature), Kevin Barber (National Research Council), John Klymko (University of Guelph) (in back row), Adam Brunke (University of Guelph), Hui Dong (University of Guelph), Sarah Hendershott (University of Guelph), Chris Ho (University of Guelph) (in front row), Leyla Thielman (Brock University), Margie Wilkes (Pinery Provincial Park) (seated in middle row), Aynsley Thielman (Brock University), Lauren Pinault (Brock University), Gil Miranda (University of Guelph), François Génier (Canadian Museum of Nature), Steve Marshall (University of Guelph), Gary Umphrey (University of Guelph). Missing from picture: Jeff, Heather, and Susan Cumming (Canadian National Collection of Insects).

(Photograph by A. Smith)

Little beetles and big headaches, or how to understand one of the most successful groups of terrestrial beetles in Canada (Staphylinidae: Aleocharinae)

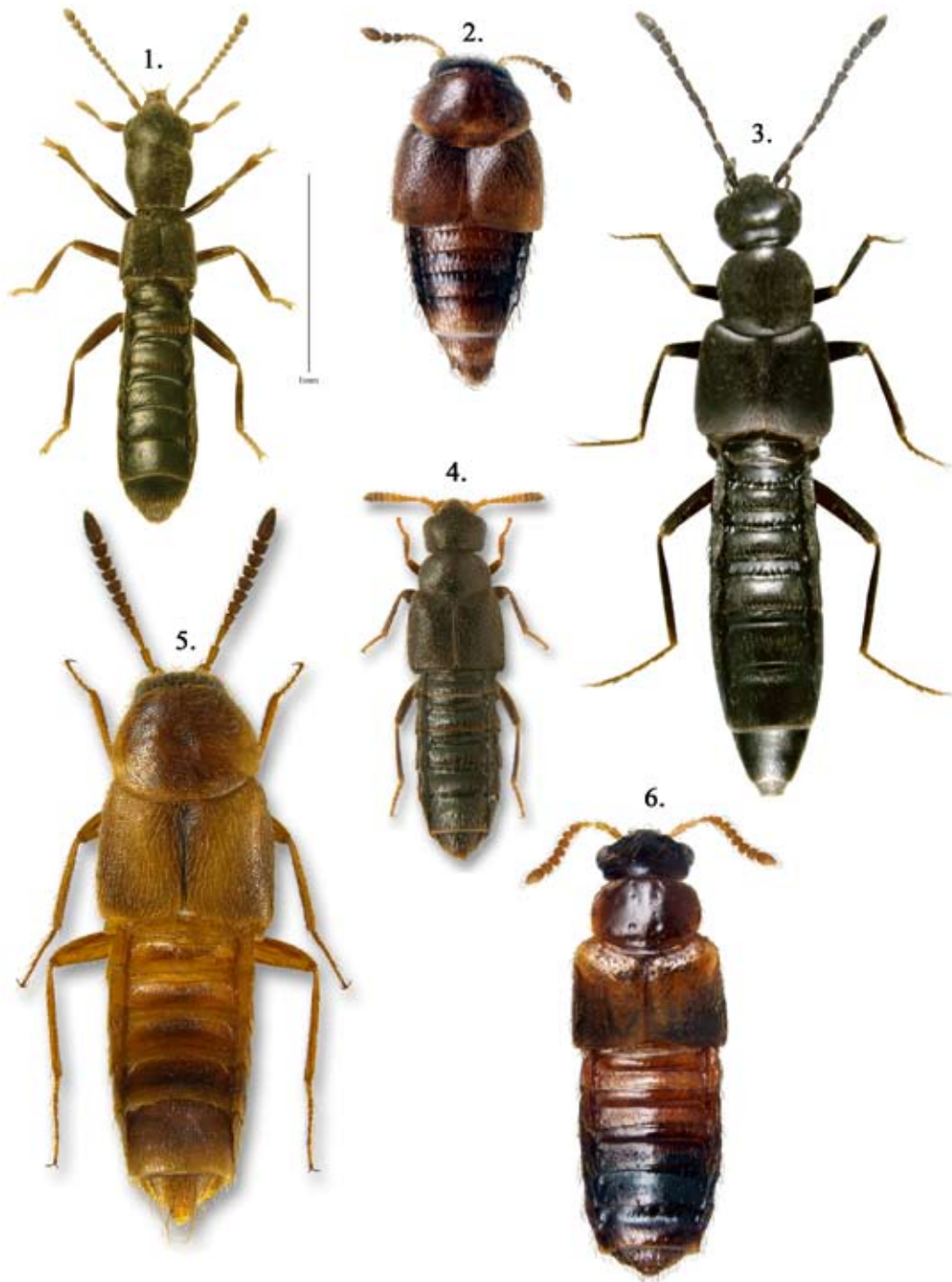
Jan Klimaszewski

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When in 1973 I visited my family in Canada and started working on the aleocharine beetles under the leadership of Ales Smetana and John Milton Campbell (Biosystematics Research Institute, Ottawa), the field was wide open, and it was truly the “El Dorado” of the Canadian Coleoptera. Since that time, I have been able to work on this group – but really significant progress on the Canadian fauna was made when I joined the Laurentian Forestry Centre in Quebec City in 1998. One of my main responsibilities was to work on the poorly known litter inhabiting beetles in the boreal forest of Canada. The aleocharines, the biggest group of poorly known rove beetles, were the best candidates for this type of research.

Rove beetles (Figs. 1–6), along with weevils, leaf beetles, and the ground beetles, are one of the largest and biologically most diverse beetle families (Klimaszewski 2000, Gouix and Klimaszewski 2007). The world fauna includes over 46 200 known rove beetle species, classified in some 3 200 genera (Newton et al. 2001). In Canada and Alaska, there are 1 374 recorded rove beetle species in 274 genera and 23 subfamilies (Klimaszewski 2000). Many groups of rove beetles, and particularly the aleocharines, were the subjects of intensive studies in recent years (Table 3), and the number of described and documented rove beetle species in Canada and Alaska now exceeds 1 400, including over 400 species of aleocharines. Rove beetles are very successful in competing with other arthro-

pods due to several of their biological and morphological features. They have a small, narrow, and flexible body (flexible because of the shortened elytra); elongate, flexible abdomen; well-developed wings in most species with very good dispersal abilities; and most of the aleocharine species have defensive glands with chemicals to deter predators (Klimaszewski 2000). The majority of adults are nocturnal and generally avoid contact with light, and prefer moist habitats. Most rove beetles, including the great majority of aleocharines, are general predators of other arthropods, but some groups/species have specialized in using other food resources. Oxyporinae species are obligate inhabitants of fresh mushrooms, and Gyrophaenina species are exclusively mycetophagous, feeding on fungal spores and hyphae (Seevers 1978; Ashe 1984, 2001). All Scaphidinae are also obligate or facultative inhabitants and consumers of fungi (Newton 1984). Osoriinae and Oxytelinae feed mainly on decomposing organic material (Klimaszewski 2000). A number of species are saprophagous (some Oxytelinae) or phytophagous (some Omaliinae, Osoriinae, Oxytelinae, Paederinae) (Klimaszewski 2000, Frank and Thomas 1991). Larvae of *Aleochara* species are ectoparasitoids on pupae of cyclorrhaphous Diptera (Klimaszewski 1984). Some species occur and pry under the bark of trees or logs (e.g. *Homalota*, *Dexiogyia*, *Gnathusa*). Many other species are affiliated with ants (some members of Athetini and Oxypodini). The



Figures 1-6. Examples of the Canadian aleocharine species illustrating their enormous morphological diversity: 1, *Diglossa mersa* (Haliday), a Palaearctic species recently discovered on the Atlantic coast of Canada; 2, *Holobus vancouveri* Klimaszewski, a new species discovered in the Carmanah Valley, Vancouver Island, BC; 3, *Gnypeta nigrella* (LeConte), an eastern Nearctic species recently discovered in eastern Canada; 4, *Euvira micmac* Klimaszewski and Majka, recently found at Lake Ponhook (Nova Scotia) inside spherical galls on red oak in a mixed hardwood forest; 5, *Oxypoda grandipennis* (Casey), a generalist species and one of the most common species in forest litter across Canada; and 6, *Gyrophana keeni* Casey, a common species found across Canada on polypore fungi.

primary feeding mode (trophic affiliations) of adults and larvae of rove beetles are presented and discussed by Klimaszewski (2000).

Rove beetles occur in most terrestrial habitats but are best represented in forest litter (Klimaszewski 2000). Aleocharines represent one of the largest and taxonomically the most diverse lineages of the rove beetles. There are at least 52 tribes, 1 000 genera and over 12 000 described species worldwide (Seevers 1978, Ashe 2001, Klimaszewski 2000). The true diversity of this group is probably much higher with thousands of species still to be discovered throughout the world, and particularly in the tropics. Gouix and Klimaszewski (2007), in the first comprehensive catalogue of aleocharine rove beetles from Canada and Alaska, reported 389 valid species (including 362 synonyms), classified in 92 genera and 14 tribes (Table 1), but many more species remain unrecorded or undescribed. In 2008, the list of described aleocharine species in Canada exceeded 400 – but the true number of aleocharines in Canada may even exceed 500. The number of recorded species for each tribe and the total number of species and genera per province, territory, and state of Alaska are listed in Table 2 (Gouix and Klimaszewski 2007).

The major factor responsible for the progress in the taxonomy and classification of the aleocharines is the use of the genital character states in species recognition. There are clusters of closely related species, which are externally very similar to each other, and their separation by external morphology alone is difficult and often impossible. Fortunately for us, one of the mechanisms preventing hybridization between the species is differently shaped male genital organs and associated internal sclerites of the internal sac (the median lobe of the aedeagus and the internal sac structures), and differently shaped female spermathecae. By studying these structures we can precisely identify species in this group including sibling and synonymic species that were previously undetected. Using these methods, we were able to revise the majority of the aleocharine species in Canada (Table 3) and provide a reliable list of

Table 1. The number of valid genera, species, and synonyms within tribes, reported from Canada and Alaska (Gouix and Klimaszewski 2007).

Tribe	Valid genera	Valid species	Synonyms
Gymnusini	1	7	4
Deinopsini	1	3	0
Aleocharini	2	32	90
Hoplandriini	1	3	4
Oxypodini	23	73	44
Hypocyphtini	2	2	0
Myllaenini	1	8	10
Liparocephalini	4	8	4
Autaliini	1	3	3
Homalotini	9	47	30
Placusini	1	8	6
Athetini	35	172	137
Falagriini	5	10	25
Lomechusini	6	13	4
Total	92	389	361

synonyms (Table 1), but the task is not yet fully complete. The second factor responsible for the progress was the group efforts of my Canadian colleagues who contributed to these studies by providing specimens with ecological and associated data and assisted in the production of scientific papers. The list of collaborators is long but I will mention only those without whom this progress would have not been possible: Chris Majka, Nova Scotia Museum (inventory of the aleocharines from the Maritime Provinces excluding Newfoundland); Dave Langor, Northern Forestry Centre, Canadian Forestry Service (aleocharines of Alberta and Newfoundland); Jon Sweeney, Atlantic Forestry Centre, Canadian Forestry Service; Reggie Webster, Fredericton, New Brunswick (aleocharines from New Brunswick); Anthony Davies, Agriculture Canada (help with CNC specimens and literature assistance); Benoit Godin, Environment Canada (aleocharines from the Yukon); and Neville Winchester, University of Victoria (aleocharines from British Columbia). My support staff, Karine Savard and Georges Pelletier, assisted me in all technical aspects of my work and our Centre's

English editor, Pamela Cheers, edited all my manuscripts. I am endlessly indebted to these individuals because they deserve much credit for the advancement of my work. The progress on the taxonomy of Canadian aleocharines is presented in Table 3, with reference to the genera, number of valid and newly described species and references to the latest revision or review. Our efforts led to the discovery, descriptions, revisions, and cataloguing of the poorly-known species of aleocharine rove beetles, the development of new methods and tools for their identification, the use of this group in new studies on the impact of forestry practices on biodiversity, and enabled the detection of introduced species. For the last 10 years, my collaborators and I have provided new information on over 400 previously poorly-known Canadian species – including the discovery of

62 species new to science and over 300 new distributional records from different provinces of Canada. These species are now available for other applications, e.g. studies on the influence of forestry practices on biodiversity, detection of exotic species, monitoring for climate change, biological control of some insect pest species, and general inventory of the Canadian fauna. Since 1978, there has been evident progress in the taxonomy and classification of the Canadian aleocharine species but the mission is far from being completed. I hope that within the next few years a manual for identification of over 400 Canadian aleocharine species will become a reality and you will all join me in drinking grappa to celebrate. Until then, have fun and think of me when you suffer trying to identify species of this extraordinary group of beetles.

Table 2. The number of species for each tribe and a total number of species and genera per province, territory, and state of Alaska (Goux and Klimaszewski 2007).

Tribe	AK	YT	NT	NU	BC	AB	SK	MB	ON	QC	NB	PE	NS	NF
Gymnusini	5	5	4	1	2	2	0	5	5	5	3	0	3	5
Deinopsini	0	0	0	0	0	0	0	0	3	1	1	0	1	1
Aleocharini	8	7	3	0	23	13	8	12	20	22	13	3	10	6
Hoplandriini	0	0	0	0	0	0	0	0	1	3	0	0	0	0
Oxypodini	20	12	16	0	33	15	3	8	24	25	10	0	11	5
Hypocyphtini	0	0	0	0	2	0	0	0	0	0	0	0	0	0
Myllaenini	2	1	2	0	4	3	1	1	5	5	3	0	2	0
Liparocephalini	8	0	0	0	4	0	0	0	0	0	0	0	0	0
Autaliini	0	0	0	0	3	1	0	0	1	1	1	0	0	0
Homalotini	4	0	0	0	14	4	0	6	17	20	10	2	9	0
Placusini	0	1	1	0	6	1	0	0	5	7	1	0	2	0
Athetini	67	39	22	0	55	18	0	27	11	36	26	3	10	20
Falagriini	0	0	0	0	3	3	2	1	6	4	2	0	2	0
Lomechusini	1	0	0	0	4	5	1	4	10	6	1	0	0	0
Total of species	115	65	48	1	153	65	15	64	108	135	71	8	50	37
Total of genera	35	22	19	1	54	30	7	23	35	42	24	5	18	16

Table 3. Major publications on Candian aleocharine genera (in alphabetic order).

Taxon	Currently recognized species in Canada	Species described as new to science	Type of contribution	Reference	Region of Canada
<i>Aleochara</i>	29	6	Taxonomic revision, faunistic review	Klimaszewski 1984, Klimaszewski and Winchester 2002	All
<i>Aleodorus</i>	3	-	Taxonomic revision	Hoebeke 1985	All
<i>Alfocalea</i>	1	1	Taxonomic revision	Klimaszewski and Pelletier 2004	Western
<i>Aloconota</i>	2	1	Taxonomic review	Klimaszewski and Winchester 2002	Western
<i>Anatheta</i>	2	-	Taxonomic review	Ashe and Gusarov 2003	Eastern
<i>Atheta</i>	67	21	Taxonomic revision, faunistic review	Gusarov 2003a, Klimaszewski and Winchester 2002, Klimaszewski et al. 2005a, 2006b, 2007a, 2008a, Majka et al. 2006a, Majka and Klimaszewski 2008a, b, Majka et al. 2008	All
<i>Autalia</i>	3	-	Taxonomic revision	Hoebeke 1988, Hoebeke and Ashe 1994	All
<i>Betocalea</i>	1	1	Taxonomic revision	Klimaszewski and Pelletier 2004	Western
<i>Boreophilia</i>	12	3	Taxonomic revision	Lohse et al. 1990	All
<i>Boreostiba</i>	2	-	Taxonomic revision	Lohse et al. 1990	All
<i>Clusiota</i>	2	1	Taxonomic revision	Klimaszewski et al. 2008a	All
<i>Cordalia</i>	1	1	Taxonomic revision	Hoebeke 1985	Eastern
<i>Cratarea</i>	1	-	Faunistic review	Klimaszewski et al. 2007b	All
<i>Cypha</i>	2	1	Faunistic review	Klimaszewski et al. 2008a	All

Taxon	Currently recognized species in Canada	Species described as new to science	Type of contribution	Reference	Region of Canada
<i>Dalotia</i>	1	-	Taxonomic revision, faunistic review	Gusarov 2003a, Klimaszewski et al. 2007b	All
<i>Deinopsis</i>	3	2	Taxonomic revision	Klimaszewski 1979	All
<i>Devia</i>	1	-	Taxonomic revision	Gusarov 2003a	All
<i>Dochmonota</i>	1	-	Taxonomic revision	Gusarov 2003a	All
<i>Drusilla</i>	1	-	Taxonomic revision	Gusarov 2003a	All
<i>Earota</i>	1	-	Taxonomic revision	Gusarov 2002b, Klimaszewski and Winchester 2002, Klimaszewski et al. 2005a	All
<i>Emmelostiba</i>	1	-	Taxonomic revision	Gusarov 2003a	Western
<i>Euvira</i>	1	1	Taxonomic revision	Klimaszewski and Majka 2006	Eastern
<i>Falagria</i>	2	-	Taxonomic revision	Hoebeke 1985	All
<i>Gennadota</i>	2	-	Taxonomic revision	Klimaszewski and Peck 1986, Klimaszewski and Pelletier 2004, Majka et al. 2006b	Eastern
<i>Geostiba</i>	2	1	Taxonomic revision	Gusarov 2002a	Eastern
<i>Gnypeta</i>	18	6	Taxonomic revision	Klimaszewski et al. 2008b	All
<i>Goniusa</i>	3	1	Taxonomic revision	Gusarov 2003d, Maruyama and Klimaszewski 2004b, 2006	Western
<i>Gymnusa</i>	7	3	Taxonomic revision	Klimaszewski 1979	All
<i>Holobus</i>	1	1	Faunistic review	Klimaszewski and Winchester 2002	Western

Taxon	Currently recognized species in Canada	Species described as new to science	Type of contribution	Reference	Region of Canada
<i>Homalota</i>	1	-	Faunistic review	Klimaszewski et al. 2007b, Klimaszewski et al. 2007b	All
<i>Hoplandria</i>	3	1	Taxonomic revision	Génier 1989	All
<i>Hydrosmecta</i>	1	1	Taxonomic revision	Lohse et al. 1990	All
<i>Hylota</i>	1	1	Taxonomic revision	Klimaszewski et al. 2006a	All
<i>Ilyobates</i>	1	-	Faunistic review	Assing 1999, Majka and Klimaszewski 2008b	Eastern
<i>Isoglossa</i>	1	1	Taxonomic revision	Klimaszewski and Pelletier 2004	Western
<i>Leptusa</i>	9	3	Taxonomic revision	Klimaszewski et al. 2004	All
<i>Liogluta</i>	4	3	Taxonomic revision	Lohse et al. 1990	All
<i>Lypoglossa</i>	3	-	Taxonomic revision	Gusarov 2004	All
<i>Megaocalea</i>	1	1	Taxonomic revision	Klimaszewski and Pelletier 2004	Western
<i>Meotica</i>	2	-	Faunistic review	Klimaszewski et al. 2007b, Majka and Klimaszewski 2008b	Eastern
<i>Metocalea</i>	1	1	Taxonomic revision	Klimaszewski and Pelletier 2004	Western
<i>Myllaena</i>	8	-	Taxonomic revision	Klimaszewski 1982	All
<i>Myrmecocephalus</i>	3	1	Taxonomic revision	Hoebcke 1985	All
<i>Myrmoecia</i>	3	1	Taxonomic revision	Klimaszewski et al. 2005b, Maruyama and Klimaszewski 2006	All
<i>Nehemitropia</i>	1	1	Taxonomic revision	Klimaszewski et al. 2007b	All
<i>Neothetalia</i>	5	2	Taxonomic revision	Klimaszewski and Pelletier 2004	Western

Taxon	Currently recognized species in Canada	Species described as new to science	Type of contribution	Reference	Region of Canada
<i>Neotobia</i>	1	1	Taxonomic revision	Ashe 1992	Eastern
<i>Ocalea</i>	1	1	Taxonomic revision	Klimaszewski and Pelletier 2004	Western
<i>Oxypoda</i>	39	8	Taxonomic revision, faunistic review	Klimaszewski et al. 2006a, 2008a	All
<i>Paradilacra</i>	1	-	Taxonomic revision	Gusarov 2003a	All
<i>Paragoniusa</i>	1	1	Taxonomic revision	Maruyama and Klimaszewski 2004a, 2006	Western
<i>Parocalea</i>	2	2	Taxonomic revision	Lohse et al. 1990, Klimaszewski and Pelletier 2004	All
<i>Pella</i>	5	1	Taxonomic revision	Klimaszewski et al. 2005b	All
<i>Placusa</i>	8	4	Taxonomic revision	Klimaszewski et al. 2001	All
<i>Platyusa</i>	1	-	Taxonomic revision	Klimaszewski et al. 2005b	Eastern
<i>Psammotiba</i>	2	1	Taxonomic revision	Gusarov 2003b	Western
<i>Seeviersiella</i>	1	1	Taxonomic revision	Gusarov 2003c	All
<i>Silusa</i>	6	1	Taxonomic revision	Klimaszewski et al. 2003	All
<i>Strophogastra</i>	1	1	Faunistic review	Klimaszewski et al. 2005a	Eastern
<i>Tachyusa</i>	6	2	Taxonomic revision	Pańnik 2006	All
<i>Tarphiota</i>	3	-	Taxonomic revision	Klimaszewski et al. 2006b	Western
<i>Tinotus</i>	3	-	Taxonomic revision	Klimaszewski et al. 2002	All
<i>Tropimenelytron</i>	2	2	Taxonomic revision	Gusarov 2002c	All
<i>Zyras</i>	1	-	Taxonomic revision	Klimaszewski et al. 2005b	All

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Arthropod Inventory Work in Labrador

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In the summer of 2008, the two of us (Canadian Forest Service), and Kevin Robertson (Newfoundland Department of Environment and Conservation), undertook an arthropod survey trip to Labrador, funded jointly by the Canadian Forest Service and the Government of Newfoundland and Labrador (NL). The purpose of the trip was to collect in poorly sampled areas of Labrador to gather specimens and data to contribute to a long-standing survey of NL. The original plan was for us to join a team of biologists stationed at Konrad Lake, on the edge of the tree line approximately 50 km west of Nain on the northern Atlantic Coast.

We arrived in Happy Valley/Goose Bay on July 28th with all of our gear. The first insect we saw was a dead *Tragosoma deparium* (Linnaeus) (Cerambycidae) under the lights of a gas station, a new record for Labrador and a good start to our collecting. We set out the next morning to the nearby float plane base, for the 300 km flight to Konrad Lake. However, the weather was so bad at our destination that the plane would not take off. We set out to do some local collecting, but had to remain near

Goose Bay in case conditions changed and the plane had a window of suitable weather. This pattern was repeated for the next several days – check in at the float plane base, find out that the weather was still terrible, do some local collecting (the weather was generally nice in the Goose Bay area), check back regularly with the float plane base until mid-afternoon until the pilot pulled the plug on any chance of a flight that day, and then travel a little further afield for additional collecting.

In spite of these problems, we managed to do a considerable amount of collecting in the Goose Bay area. One of us (Dave Langor) was collecting primarily aquatic and terrestrial beetles, but collected many other insects in his sweeps (especially Hymenoptera and Hemiptera). The other (Greg Pohl) was concentrating on Lepidoptera when the weather was good, and beetles when conditions were unsuitable for flying insects. Kevin Robertson helped out with all groups, but was particularly interested in dragonflies and damselflies. Most of our collecting was done by hand, but we deployed pitfall traps for the duration of our

trip, and set out light traps on several evenings. During our time in the Goose Bay area, we managed to collect along every road within two hours of town. We collected some bogs, river margins, and lakeshores along the Northwest River Road, and sandy habitats, streams, and ponds on the Churchill River along the Trans-Labrador Highway. However, the site that turned out to be the most productive for moths was a restaurant (Maxwell's Sports Bar) in Happy Valley, which was located near some nice forest and river-edge habitat. The green, wood-clapboard building had several massive mercury vapour lights installed on the sides which attracted many moths. Every morning and every evening, we made several circuits of the building, picking insects off the walls. Over the course of seven days we collected an estimated 70-80 species of moths. Spruce budworm moths (*Choristoneura fumiferana* [Clemens]) (Tortricidae) were particularly abundant. Our activities raised a few eyebrows and prompted several enquiries. The restaurant manager came out to see what we were up to, but had no objections to our activities. He told us that in 2007, spruce budworm moths were very abundant and gained access to the interior of the building under the door. The air was so full of scales that breathing was difficult, and it was necessary to shovel several bucketfuls of moths up before they could open for business.

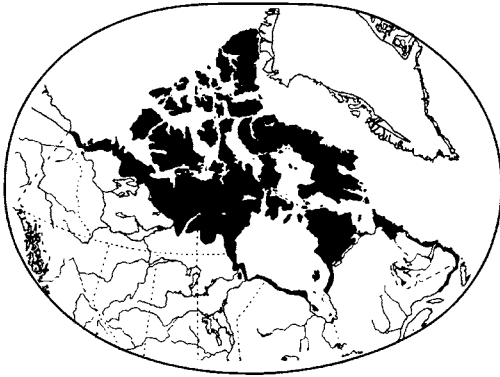


Dave Langor chasing insects.
(photograph by G. Pohl)

Our plans to fly to Konrad Lake were cancelled on August 2nd. Of course we were disappointed, but at least we were no longer tied to the vicinity of the float plane base. We immediately set out on a three day road trip to Churchill Falls. On the way there, we collected many sandy sites, rivers, and pond margins on the Trans-Labrador Highway. In the Churchill Falls area, we collected at the falls (or at least what remains of it) and at several sites on the Ossokmanuan Reservoir. A side trip to the scenic Muskrat Falls on the Churchill River was a highlight of the trip back to Goose Bay. Once back in Goose Bay, we did a day trip along the new section of the Trans-Labrador Highway that runs from Goose Bay, through the mealy Mountains, to Cartwright. Although the road was not yet officially open, we were able to drive approximately 50 km, making what are likely the first insect collections in several localities.

Most of our material has been pinned, but awaits labeling and identification. We had identified a series of extremely tiny moths that we were curious about. They were collected on *Kalmia*, and they were so small (approximately 3 mm wingspan) that it took some time to even notice them in the sweep net. They turned out to be *Coptodisca kalmiella* Dietz (Heliozelidae), previously known in Canada only from Ontario and Quebec, and a new record of this family for NL. The remaining insect species await further work this winter. If there are colleagues who would be interested in seeing material from our trip, please contact Greg Pohl (gpohl@nrcan.gc.ca) or David Langor (dlangor@nrcan.gc.ca). Dave also has on loan the entire insect collection from Memorial University of Newfoundland, which also has other material from Labrador and much from the island of Newfoundland. All this is also available for loan.

Dave is already working on another trip to Labrador next year. There may be opportunities for others to join him. If you have interest in being part of an expedition, please let him know.



ARCTIC CORNER

News about studies of arctic insects

Introduction

Arctic Corner provides a forum for news and updates on research involving arctic arthropods. Contributions to *Arctic Corner* are welcomed by the Editor (see inside front cover).

Northern Insect Survey

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Introduction

The Biological Survey of Canada has maintained a research focus on arctic insects throughout its existence. To advance this tradition, a large-scale effort is planned to survey insects across Canada's far north. The document below was created by the Scientific Committee of the Biological Survey of Canada to promote the project. For more information on the Northern Insect Survey, please contact Doug Currie: dc.currie@utoronto.ca.

The Arctic is among the most fragile ecosystems on Earth; it is also under immense environmental pressure as the effects of global warming are felt most acutely at northern latitudes. With their diversity and potential for rapid population growth, arthropods (insects, spiders and their relatives) can serve as barometers of environmental change. The Biological Survey of Canada (BSC) will document changes in Canada's arthropod fauna by repeating the half century old Northern Insect Survey (NIS) – an unprecedented initiative that sampled diversity at 58 arctic and subarctic localities at a time when climate change was not yet a global concern. The current Northern Insect Survey will

complement the Federal Government's geo-mapping program in the Arctic, and provide further evidence of Canada's sovereignty in the north.

Objectives

1. Inventory arthropod diversity at up to 58 arctic and subarctic localities sampled during the original Northern Insect Survey;
2. Generate curated and databased biological collections for major national and provincial institutions, thereby providing the basis for future monitoring initiatives;



Adult stonefly – a holarctic species that is widespread on the arctic mainland.
(photograph by D.J. Giberson)

3. Provide science-based advice for sustaining native biodiversity in Canada's Arctic and Subarctic ecoregions; and;
4. Disseminate results in BSC publications, which will document, measure, and predict changes in northern arthropod diversity.

Why the need for another Northern Insect Survey?

The Canadian north is experiencing profound and irreversible changes due to global warming. No group of animals is as sensitive – or responds as rapidly – to changes in temperature as arthropods. However, recent anecdotal observations of southern insects colonizing the North (e.g., yellow jacket wasps on Baffin Island) fail to measure the intensity and extent of distributional changes over time. The approximately two million specimens collected during the first Northern Insect Survey offers an unrivalled opportunity to accurately gauge biotic changes (i.e., range expansions and contractions) in Canada's north. Such knowledge is fundamental for developing predictive models about how biodiversity in the north will respond to global warming.

Strength through collaboration

With a secretariat based at the Canadian Museum of Nature, our network forges collaborations among federal and provincial departments and museums, and academic institutions. The BSC has a 30-year history of scientific credibility and of high productivity of scien-

tific publications about Canada's biological wealth – especially with respect to arthropods. Although the North has long been a focus of BSC research, most activities have been scattered or directed toward particular geographical regions (e.g., the Yukon). The current scope and intensity of biotic changes demand a more coordinated effort. By making the Canadian north a priority, the BSC aims to undertake a series of field expeditions to more rigorously document changes in arthropod diversity over the last half century. Archiving of specimens and baseline data will add to the original survey data, providing a critical benchmark for future studies.

Projects

The BSC envisions a 4 to 5 year timeframe to adequately replicate the original Northern Insect Survey. Financial and logistical constraints dictate that only a subset of the original 58 localities be revisited, with emphasis on sites that were foci of the most intensive collecting efforts or in areas that are predicted to experience the greatest impact due to climate change. The results of this survey and an analysis of biotic changes over the last half century will be made available in a major multi-authored publication by the BSC. In addition, numerous other publications will result from this initiative, including keys to various groups of northern arthropods in the electronic journal *The Canadian Journal of Arthropod Identification*.



D.J. Giberson on the banks of the Meliadine River
(photograph by S. Burian)



Selected Future Conferences

Organization	Date	Place	Contact
ENTOMOLOGICAL CONFERENCES			
Entomological Society of Canada	2008, 19–22 Oct.	Ottawa, ON	with the Entomological Society of Ontario http://www.canacoll.org/JAM2008/index.html
	2009, 18–21 Oct.	Winnipeg, MB	with the Entomological Society of Manitoba
Entomological Society of America	2008, 16–19 Nov.	Reno, NV	http://www.entsoc.org/am/cm/index.htm
	2009, 13–17 Dec.	Indianapolis, IN	http://www.entsoc.org/am/fm/2009/index.htm
Entomological Collections Network	2008, 15–16 Nov.	Reno, NV	http://ecnweb.org/
13th International Symposium on Trichoptera	2009, 22–27 June	Białowieża, Poland	http://www.biol.uni.lodz.pl/trichoptera2009/
11th International Symposium on Tardigrada	2009, 2–7 August	Tübingen, Germany	http://www.tardigrada-symposium-2009.org
OTHER SUBJECTS (especially those relevant to Survey projects)			
Canadian Society of Zoologists	2009, 12–16 May	Scarborough, ON	http://www.csz-scz.ca/cszanglais/engmeeting.htm
North American Benthological Society	2008, 25–30 May	Salt Lake City, UT	http://www.benthos.org/Meeting/
Society for Integrative and Comparative Biology Annual Meeting	2009, 3–7 January	Boston, MA	http://www.sicb.org/meetings/2009/index.php3
REGIONAL SOCIETIES			
Entomological Society of Alberta	2008, 6–8 November	Edmonton, AB	http://www.biology.ualberta.ca/courses.hp/esa/meet2008.htm
Entomological Society of Manitoba	2008, 13–14 November	Winnipeg, MB	http://home.cc.umanitoba.ca/~fieldspg/meet.html
Société d'entomologie du Québec	2008, 20–28 November	Québec, QC	http://www.seq.qc.ca/activites/reunions/seq2008/index.htm



**Biological Survey of Canada
(Terrestrial Arthropods)**

Request for Cooperation

Please complete this form and return to:
Biological Survey of Canada (Terrestrial Arthropods)
Canadian Museum of Nature
P.O. Box 3443, Station "D"
Ottawa, ON K1P 6P4; fax 613-364-4022

This form is available in pdf format on the BSC web site.

Name:

Address:

Email:

Telephone:

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

Collecting and preserving methods and other information requested for above:

Cooperation offered - if there is anything specific you might be able to exchange for material requested above (e.g. identifications, material) please indicate it here:

Residual specimens available for loan, exchange, or to give away. Please specify as much detail as possible, e.g. collecting localities, collecting method, taxon (if known), amount of material, and how the samples are preserved.

How long would you like the above posted on the BSC web site?