Newsletter of the Biological Survey of Canada

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The Newsletter of the BSC is published twice a year by the Biological Survey of Canada, an incorporated not-for-profit group devoted to promoting biodiversity science in Canada.

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From the Editor's desk

Donna Giberson

As I write this note to introduce our Winter 2021 issue of the BSC *Newsletter*, we are apparently entering a new phase in the Covid-19 pandemic, with the rise of the new Omicron variant. Covid has put a stop to many of our regular BSC activities, including annual BioBlitzes and Symposia, but the BSC Board has been forging ahead in spite of Covid, and you'll see some of the activities reported on in this issue. For example, former BSC President Greg Pohl has been working on a new *Biota of Canada* product for our website and invites you to explore it (see p. 6). An initiative to have BSC members note their BSC afiliation when uploading observations to I-Naturalist is also underway, with 54 people contributing an incredible 367,889 observations of 18,249 species (p. 16). And plans are underway to host an urban BioBlitz in Vancouver during the 2022 Joint Annual Meeting of the BC, Canadian, and American Entomological Societies!

If you have been wanting to be more involved in the BSC, consider joining us as our new Treasurer! Our current Treasurer, John Klymko, is looking at stepping down at the end of his term, and would like to train a new treasurer before he retires. See p. 5 for more information.

Check out our website http://biologicalsurvey.ca/

Questions? Please contact us at biologicalsurvey@gmail.com

D.Giberson

Tiger beetles on Blooming Point Beach, PEI.

The Newsletter of the Biological Survey of Canada is published twice a year (summer and winter) by the Biological Survey of Canada, an incorporated not-for-profit group devoted to promoting biodiversity science in Canada, particularly with respect to the Arthropoda.

Send submissions to:
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Newsletter of the Biological Survey of Canada
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550 University Ave., Charlottetown, PE C1A 4P3

Masthead image: Tricoloured Bumblebee, *Bombus ternarius* photographed on lupins in PEI in 2010, D.Giberson

Biological Survey of Canada: Documenting Canada's Biodiversity

The Biological Survey of Canada (BSC) has been collecting, collating, analyzing and disseminating information about Canada's biological diversity since 1977. The BSC is a Canadian non-profit, charitable organization consisting of biodiversity scientists across Canada, and in other countries, who have an interest in Canadian biota. The BSC prides itself in identifying and filling biodiversity information needs using a bottom-up organizational structure, whereby front-line workers identify the needs and work to address them. The BSC has successfully demonstrated its capacity to advance national level biodiversity science and knowledge concerning terrestrial arthropods, which account for >60% of Canadian species, and is now reaching out to the broader biological community to bring together those who are experts with other taxa and who share a common vision and goal of making biodiversity information more accessible.

Are you a member of the BSC?

You may be on the mailing list to receive BSC newsletters, but may not be a member! To become a member, **send a request for membership to the BSC Secretary** (see below). Remember to request membership before the AGM so you are eligible to vote. If you don't hear from us within a couple of weeks, please contact us again, to be sure your request has been received.

To Join the BSC:

Send an email to Donna Giberson, Secretary, BSC.
biologicalsurvey@gmail.com

- In the subject line, write "BSC Membership"

- In the body of the message, give your full name and contact information, a valid email address and some information on your background and Canadian biodiversity interests.

- Include the line below in your email *(required for the BSC to conform with Canada's Anti-Spam legislation)*

I agree to receive emails from the BSC relating to BSC activities and publications.

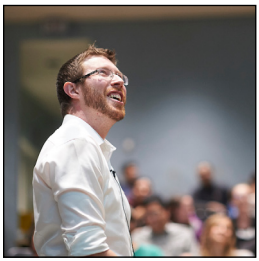
Remember to update the BSC if you change email addresses.

Check out the BSC website!

http://biologicalsurvey.ca/

President's report

Dan Peach
Postdoctoral Fellow, Dept. of Zoology
University of British Columbia
Vancouver, BC



This is my first report as President of the BSC, so let me start off by introducing myself. I am currently a Postdoctoral Fellow in Ben Matthews Lab in the Department of Zoology, UBC, after finishing my PhD at Simon Fraser University. My expertise is in the ecology and biogeography of mosquitoes, particularly in western Canada. I have performed extensive work surveying the mosquitoes of British Columbia and the Yukon and have been involved in many bioblitzes as both a participant and an organizer. I have also been serving as an assistant editor for the *Newsletter of the Biological Survey of Canada* and as a director of the Entomological Society of BC.

As former President, Greg Pohl, reported in the June 2021 Newsletter, many of our regular BSC activities have been on hold during the Covid pandemic. However, we held a productive Annual General Meeting on June 23, with 20 members present, where we discussed on-going projects and some of our goals for the future. Greg expressed his thanks to the outgoing Board members, Syd Cannings, Terry Galloway, Don Henne, Dave Langor, and Felix Sperling, and welcomed new members Scott Gilmore, Morgan Jackson, Julia Mlynarek, Armin Namayandeh, and me (Dan Peach). This year as well, our student representative, Emily Hanuschuk, retired and was replaced by Shawn Abraham, and James Glasier has retired as our Webmaster, with Cass Chowdhury taking over the Website. I'd like to add my own thanks to all our retiring members for the work they've done (and continue to do) for the BSC!

These changes mean there are a lot of new faces on the Board, so we have been meeting regularly by Zoom to get up to speed. The new executive (see p. 5) was elected at our first meeting of the Board on July 22nd.

John Klymko, our Treasurer, has also noted that he would like to step down as Treasurer at the end of this term, so the BSC is searching for a new Treasurer (see p. 5). If you would be interested in taking on this role in the BSC, please contact us for details at biologicalsurvey@gmail.com.

With hopes that the current pandemic restrictions are winding down, the BSC is making plans to hold an urban bioblitz in association with the upcoming ESC/ESBC/ESA JAM in Vancouver next year, and an associated symposium. Please stay tuned to the *Newsletter* for more information on this.

Work continues on our new website, where we will host more detailed information on the biota of Canada (see article on p. 6), and will continue to host the Canadian Journal of Arthropod Identification. This process has proved to be more complicated than we originally envisioned, but is proceeding well, and we hope to have more updates for you in the coming months.

I hope you enjoy this issue of the *Newsletter*, which includes articles representing habitats in both eastern and western Canada, and taxa from crustaceans and insects to stream fish.

BSC Business

Membership Update

Thanks to all the members and newsletter subscribers who responded to our recent email asking you to provide explicit permission to receive occasional emails from the BSC, to ensure that the BSC is in compliance with Canada's Anti-Spam Legislation. Granting permission to the BSC is a requirement for membership/newsletter subscription going forward, and all new members are now asked to provide permission when they register as a member. Those who responded that they did not wish to receive emails (or did not respond at all) will be notified that their membership in the BSC will terminated if they don't respond with permission within 20 days, following the guidance in the BSC by-laws.

Currently, the BSC has 124 active members, and an additional 100 people on our active-Newsletter mailing list.

Seeking New Treasurer

The BSC is seeking a new Treasurer as our current Treasurer, John Klymko, is looking to step down by the end of his term. The Treasurer has generally been an elected member of the Board of Directors, but is not required by our by-laws to be a Director. The treasurer prepares quarterly financial reports to the the Directors, manages our investments, and prepares our annual charitable/not-for-profit tax return for Revenue Canada.

If you are interested in getting involved in the BSC and would like to take on this role (or have questions about the role), please contact the Secretary, Donna Giberson, at biologicalsurvey@gmail.com.

New Board of Directors elected at June 2021 AGM

(term: June 2021 to June 2023)

Shawn Abraham (Student Rep, non-voting)
Cass Chowdhury (Webmaster,, non-voting)
Donna Giberson (Secretary, Newsletter Editor)
Joel Gibson
Scott Gilmore
Morgan Jackson (Vice-President)
John Klymko (Treasurer)
Julia Mlynarek
Armin Namayandeh
Dan Peach (President)
Greg Pohl

The Board would like to acknowledge the outgoing Board members, Syd Cannings, Terry Galloway, Don Henne, David Langor, and Felix Sperling, as well as outgoing Student Rep, Emily Hanuschuk and outgoing Webmaster, James Glasier. Thank you all for your service to the BSC!

Announcing *The Biota of Canada*: a new BSC website

by Gregory Pohl[1] and Timothy Quinn[2]
[1]Natural Resources Canada, Edmonton AB
[2]Darkdataproject.org

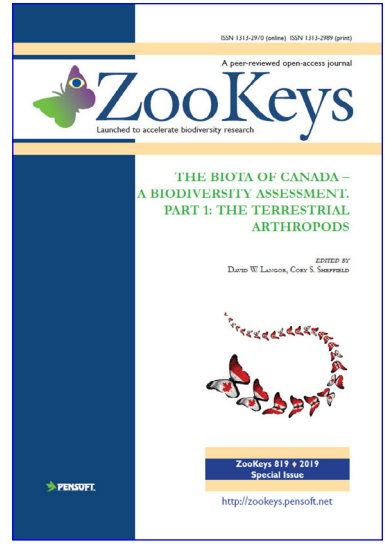
Biodiversity and conservation workers have been hampered by lack of readily available information on the species that live in Canada. A fair bit of good information exists – much of it produced by the Biological Survey of Canada – but there is no sole source of information to answer the basic question: "what lives here?". There is a need for a clearinghouse of biodiversity information – a basic summary of Canada's biodiversity, and a directory, by taxonomic group, to authoritative information including available identification keys. To fill that need, we're pleased to announce that we've built a basic framework and directory of biodiversity information: a new website entitled "*The Biota of Canada*".

https://biotaofcanada.darkdataproject.org

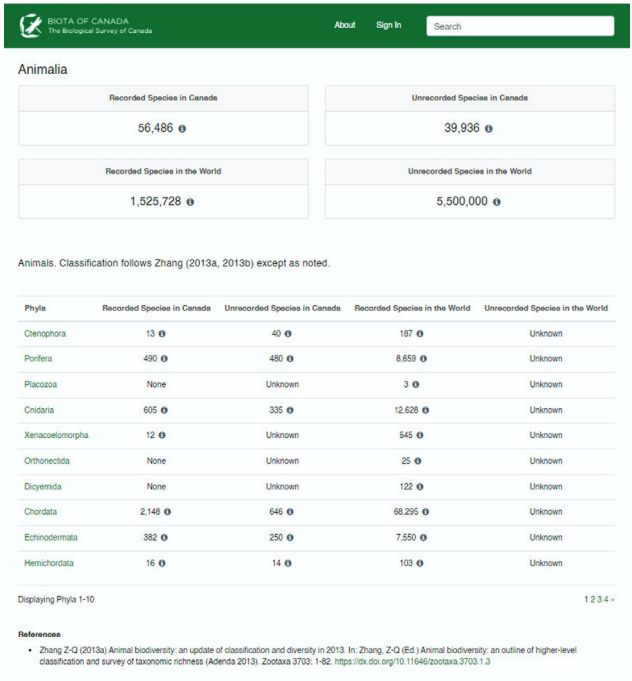
The website was conceived by Gregory Pohl, and designed and written by Timothy Quinn of the Dark Data Project (darkdataproject.org), for the Biological Survey of Canada. Baseline data was compiled by Gregory Pohl and Laura deHaas, with the assistance of the National General Status Working Group of the Canadian Wildlife Service, Environment and Climate Change Canada. The link above is a temporary home; it will move to the BSC website once an ongoing upgrade of the BSC website is completed.

The Biota of Canada website is structured as a drill-down series of pages, following the taxonomic hierarchy from kingdom to family. The website is written to handle further taxonomic levels all the way to species, but for now we will limit content to families and above. A header near the top of each page allows easy access to higher taxonomic levels, so it's very simple to traverse the tree of life. For each taxonomic group, a short summary will be given, and the number of species known and expected in Canada and in the world. When the cursor is hovered over a little "i" button beside each species count, a pop-up window provides information on the source of that number. References to taxonomic works and identification keys at the bottom of each page will direct users to the latest works on the group, so once the website is fleshed out a little more, it will function as a directory to authoritative information on all living organisms in Canada. A search feature locates any taxonomic group that exists in the hierarchy. The taxonomic architecture follows the most recent synopses of life on earth, primarily Zhang, editor (2013) and Ruggiero et al. (2015).

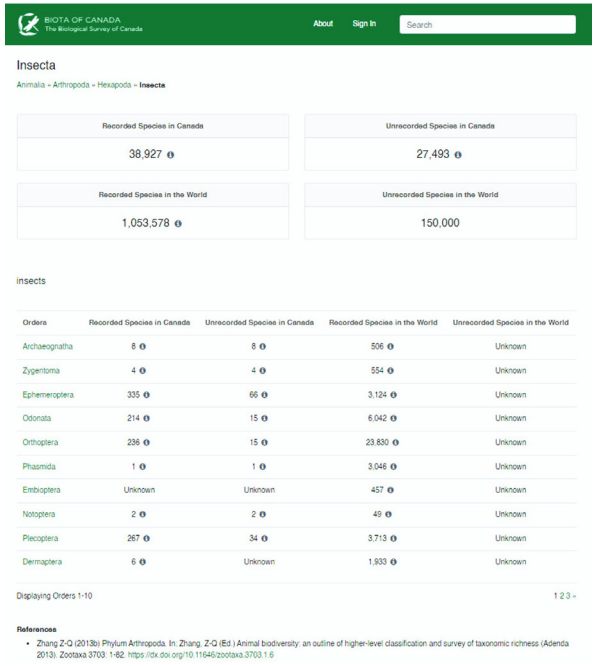
For terrestrial arthropods, the website draws very heavily on the recent ZooKeys special issue published by the BSC: "The Biota of Canada - A Biodiversity Assessment (part 1)" (Langor & Sheffield, editors, 2019). From that monograph, we have compiled the number of species known and expected in Canada, for each of the 1137 families of terrestrial arthropods known to occur here. All the chapters of that ZooKeys Special Issue are cited throughout the website as the authoritative sources of information. For all other life forms, we've compiled available information only as far as the kingdom and phylum levels. Currently some aspects of the site haven't been completely fleshed out, such as the brief descriptions of each group, and most of the "world" species totals in the deeper levels of the taxonomic hierarchy. For that, and to help populate some of the other branches of the tree of life we seek your assistance.



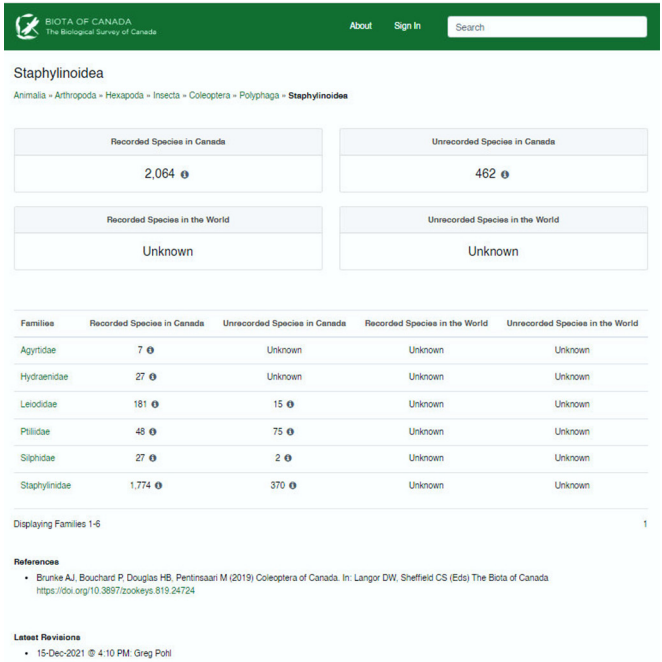
Example page for kingdom Animalia. Each phylum name is a link to a sub-page.



Page for class Insecta. Near the top, each step in the taxonomic sequence from Animalia to Insecta is a link to the page on that taxonomic group. Note there are 3 pages of insect orders (see the page buttons at bottom right). Each order name is a link to a page on that taxon, which in turn leads through suborders and superfamilies, to the family level.



Example page for the beetle superfamily Staphylinoidea. Each family name is a link to a summary page where more information can be found.



We need your help!

We would like to see these pages expanded to fill in missing information and deeper taxonomic levels, by crowdsourcing the work to BSC members and other experts. We hereby invite the authors of the 2019 Biota of Canada monograph to become fully-credited authors of the sub-pages on terrestrial arthropod orders on the website. If you are knowledgeable in a particular group of organisms, and are interested in becoming a curator of a taxonomic group on this site, please get in touch with the BSC [biological-survey@gmail.com].

As a minimum, we would ask curators to flesh out the thumbnail descriptions, provide a few references and perhaps images, and provide an annual update of the known and estimated Canadian and worldwide species counts at the family level. In exchange for taking on these duties, curator(s) will be credited as author(s) of that sub-page, along with any previous curators as co-authors. We hope that in the future we will be able to accept content below the family level, for curators who wish to delve more deeply into a group.

The web page has been set up such that the basic components can be edited directly by anyone who is granted a password-protected login, and all changes are tracked. A Biota of Canada editorial committee will oversee the curators and provide guidance. We're still working on a formal agreement for curators, but it will include basic guidelines and expectations, and seek a commitment to a two-year renewable term.

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BSC on Facebook and Twitter

The BSC is active on Facebook (www.facebook.com/biolsurvey1can) and Twitter (https://twitter.com/BiolSurCan). We regularly share news about new biodiversity research in Canada and updates from the BSC. Like and Follow the Biological Survey of Canada!

If you have content you would like to share with the BSC please email knyshk@gmail.com.

BSC Student Corner

Students and Early Career Researchers - Do you have a Biodiversity Project you'd like to have highlighted in the BSC Newsletter?

Contact the BSC Student Rep (Shawn Abraham, smabraha@ualberta.ca) or the editor (giberson@upei.ca) to inquire about contributing.

Articles can be on preliminary data, experiences in the field, or any other aspect of your work or study. We welcome notes on sampling methods or interesting habitats as well, and illustrations are encouraged.

In this issue, we highlight a research project on syrphid flies in Alberta by Rachel Pizante and one from Prince Edward Island on brook trout by Bruno C. C. Mendonca.

Examples of other student articles can be found in this issue, or on pp.27-35 in Vol 29(2) (http://biologicalsurvey.ca/newsletter/bscfall2010.pdf), pp.7-19 in Vol 34(1) (http://biologicalsurvey.ca/newsletter/bscsummer2015.pdf), and pp. 7-13 in vol 38(1) (https://biologicalsurvey.ca/newsletter/bsc.vol39(1).pdf).

STUDENT CORNER:
1. A story of research in crop pollination

Rachel Pizante
University of Alberta

If someone had told me two years ago that I would be focusing my research on flies and loving it, I wouldn't have believed them. But here I am, a year into my MSc, and I'm doing just that.

Crops, and flowers, and syrphids... oh my!

Originally, my plan was to study bees in canola crops and adjacent margins. When canola blooms, the amount of floral resources available to flower-visiting insects increases dramatically, and this has consequences for the pollinator community (Dieköt-ter et al., 2010; Holzschuh, et al., 2011). Additionally, mass-flowering crops (and crops in general) require large amounts of land, leaving behind only small pieces of non-crop habitat along their margins. In landscapes that lack planted wildflower strips such as the aspen parkland in Alberta, these margins shoulder the responsibility of providing floral (and nesting and larval) resources when the crop is not in bloom (Proesmans et al., 2019). I say "responsibility" in jest, but I think it's an adequate description of the importance of these non-crop habitats for pollinators, especially for bees who are limited in their foraging range as they need to return to a nest after each foraging bout (Garibaldi et al., 2011). If there are not enough flowers to sustain pollinators when the crop isn't in bloom, then they won't be there to pollinate the crop when it is, and crop yield can go down (Blaauw & Isaacs, 2014; Garibaldi et al., 2014; Morandin & Winston, 2005). Therefore, we need to question whether the current margins along canola fields in Alberta are adequate for pollinators, and if so, why are they adequate and does that result in more pollinators using the adjacent crop. Using this information, we can design management strategies to ensure healthy pollinator communities in canola crops.

As I started to dive in deep into the literature for my research topic, I came across mentions of the Dipteran family Syrphidae, a group of pollinators that is often found in higher or similar abundance to bees in agroecosystems (Arthur et al., 2010; Rader et al., 2020; Rader et al., 2009). Have you ever thought you were being relentlessly followed by a bee, but it is hovering in the air, rapidly beating its two wings faster than any bee could? If so, you were probably being followed by a syrphid, also known as a hover fly or flower fly (Figure 1). Syrphids caught my eye because they have fundamental differences in their biology when compared to bees, which would likely result in them reacting differently to mass-flowering crops than bees. Unlike bees, syrphids have no nest and do not care for their larvae, so the adults are free to fly as far as their wings will take them (Rader et al., 2011). This means that syrphids may not be limited by resources in the surrounding environment the same way bees are. While there has been research on bees in crops in Alberta, there is little research that focuses on syrphids. We don't understand how they are using margins and how they are using crops. Considering that

John Acorn

Figure 1. A syrphid (*Temnostoma excentrica*) visiting a flower.

they are extremely common floral visitors and contribute to crop pollination (Jauker & Wolters, 2008), I decided to ask the following questions in my thesis:

1) How do flowers and vegetation in field margins support syrphid communities near canola crops?
2) How does the syrphid community and fecundity of a multivoltine species change with canola bloom? And
3) How does margin vegetation and mass-flowering crop bloom affect movement of syrphids between canola crops and their margins?

It takes a village

I completed field work this past summer alongside Pilar Jimenez, a PhD student working on similar questions, but focusing on ground beetles, spiders, and wasps. Pilar was my rock this summer, always reassuring me that we had time and that we could do it when I would get anxious that we didn't have time and that we could not do it. Her positive attitude, strong work ethic, and warm personality were essential in me surviving my first field season. We also worked with a field assistant, Jessica Lagroix, whose plant knowledge and quick-thinking skills were instrumental in our ability to complete the field work successfully. Throughout the summer I was constantly reminded of the importance of working with good, smart people. I feel very privileged to have worked alongside these amazing women.

Together we journeyed almost every weekday out of Edmonton in a large Ford-150 to our field sites. At each site we would collect the contents of two Malaise traps, one placed in a herbaceous margin and one in a treed margin. Two of us would walk four 30m transects: one in a herbaceous margin, one in a treed margin, and two in the canola field itself, and collect flower visitors. Most accessible crop margins are alongside township and range roads where our nets, jars of insects, and "strange looking tents" would often garner attention from curious passers-by (Figure 2). One gentleman even stopped his truck, asked if I was planning on "sleeping in that thing", and when I answered, "no it's for collecting insects", he huffed and drove off without saying another word. I still can't tell if he was joking or not. Nevertheless, getting to spend most of the summer outside collecting insects and being able to call it work was unreal, and it is an experience I hope to replicate, although on a smaller scale, next summer.

Carol Frost

Figure 2. Pilar Jimenez (left) and me setting up a Malaise trap next to a township road along a herbaceous margin.

As a new grad student, I am learning to appreciate the amount of work that goes into collecting even one data point. Even though I'm no longer physically collecting specimens, I am still gathering data by taking the specimens and transforming their information into a row in an excel file on which I finally perform the analysis needed to answer my research questions. This is a long process and once again, I am not alone in performing these tasks. I am lucky to be joined by another incredibly smart and talented research technician, Olivia DeBourcier, who is going through the contents of Malaise trap after Malaise trap, sifting through the soup of insects and pulling out the syrphids. I am also fortunate enough to have six volunteers who also sort insects from the Malaise traps. By the time the excel files are complete and the jars of collected Malaise traps are empty, thousands of hours will have gone into collecting and processing data.

So far, I have found research to be a very rewarding endeavor and I am excited to see what the conclusions of my thesis will be. My supervisors Carol Frost and John Acorn

have provided excellent support throughout every step whether it is helping identify particularly challenging specimens, providing insightful comments on drafts, or general words of encouragement.

Syrphids are important pollinators for both wildflowers and crops alike, but they are surprisingly under-represented in pollination studies. The goal of my research to provide a basic understanding of syrphids in canola crops in Alberta so that they can be included in pollinator management strategies if necessary. I have really become fascinated with this family of bee-mimickin', pollinatin', and hoverin' flies. Next time a bee is following you, I invite you to take a moment and investigate the curious insect further. You might find it's not a bee after all.

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2. When or where to emerge? A brook trout (*Salvelinus fontinalis*) emergence trap survey in Prince Edward Island streams.

Bruno C. C. Mendonca and Michael Van Den Heuvel
Freshwater laboratory. Biology Department, Environmental Science PhD program.
University of Prince Edward Island.

Streams in Prince Edward Island (PEI) are generally low gradient, short in length and fed primarily from groundwater sources. These features, coupled with a glacial history that saw the Island completely covered by ice about 10,000 years ago and then rapidly cut off from dispersal sources on the mainland, have limited the diversity of freshwater fish that can be found here. In most streams, the only fish species found year-round are three native species (brook trout (*Salvelinus fontinalis*), juvenile Atlantic salmon (*Salmo salar*), and three-spined stickleback (*Gasterosteus aculeatus*)), as well as the non-native rainbow trout (*Oncorhynchus mykiss*). The three salmonid species have been the most studied on PEI due to their importance to the sport fishery (Curry et al. 1995; Guignion et al. 2010). For example, Atlantic salmon declines in the Maritime provinces have been linked to anthropogenic activities that affect stream habitat, such as intensive agriculture and logging (Guignion et al. 2010, Roloson et al. 2018), and these declines along with the introduction of rainbow trout have had an impact on the native fish populations. Streams on PEI have been altered by agricultural runoff (sediment and agricultural chemicals) as well as water withdrawal for agriculture and residential consumption Curry and Gautreau 2008).

Despite these alterations, wild brook trout have remained ubiquitous across PEI (Guignion et al. 2010, Alberto et al. 2017) and have been considered fairly resilient due to their high relative abundance and broad distribution in Island streams. A major factor in their success is their ability to shelter in sites with active groundwater discharge during high temperature events, and also for spawning (Curry and Noakes 2011); groundwater discharge helps to keep spawning redds (nests) clear of sediment and also moderates the water temperature (warmer than the surrounding waters in winter and cooler in summer). Therefore, potential linkages between the spawning behaviour (and redd site-selection) and water withdrawal activity has triggered our interest in how seasonal water withdrawal may cause potential shifts of dominance between native species (e.g., the autumn spawning brook trout) and an invasive species (e.g., the spring spawning rainbow trout). This question has led to part of my thesis research at the University of Prince Edward Island, investigating how stream fish are affected by water withdrawal activity in their basin, with a focus on brook trout as a sentinel species. The first part of this work, looking at factors affecting timing and success of juvenile brook trout emergence from the gravel in the spawning redds, is presented here. Brook trout eggs are deposited in redds in autumn, develop through the winter, and then hatch in the spring to tiny juveniles (called alevins) that still have a yolk sac attached. Alevins remain in the gravel until the yolk is used up, then emerge from the gravel to forage in the stream.

Study sites:

The North River is one of the main watersheds in PEI which provides water for consumption by residents of Charlottetown (Figure 1). Our study sites are located in the Coles Creek sub-basin (Figure 2), where the Milton Station is located; this station has been pumping water for the city for more than a decade, and Coles Creek hydrological regime has been monitored since 2016 by the Government of PEI and the UPEI Freshwater research group.

Trout emergence monitoring

Brook trout emergence (emergence of the alevins from the gravel) was monitored using emergence traps. These consist of a circular metal 0.5 m diameter frame with a 1000 µm mesh funnel leading to a pvc bottle in which the emerging alevins are trapped

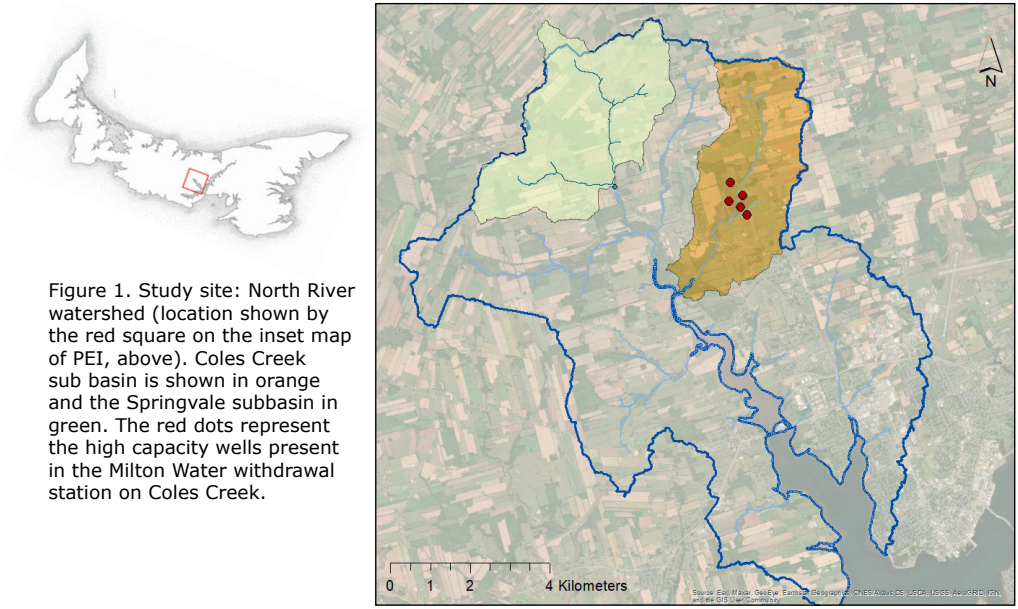

Figure 1. Study site: North River watershed (location shown by the red square on the inset map of PEI, above). Coles Creek sub basin is shown in orange and the Springvale subbasin in green. The red dots represent the high capacity wells present in the Milton Water withdrawal station on Coles Creek.

Figure 2. Location where traps were deployed in the Coles creek (stream at the right; east), Springvale (stream at the left; west) and the Milton (middle) branches of the North river watershed. The blue dots indicate the trap locations, and the red dots represent the traps in which alevins were captured.

(Figure 3). Each trap was anchored to the streambed surface with re-bar to avoid being flushed by higher flows or by the impact with sediment and debris. The traps were deployed in the second half of March 2021, and were checked at 24–48 hour intervals until the first week of May. Temperature was monitored between December 2020 and May 2021 in each redd selected to conduct the trap survey using HOBO® TidbiT temperature loggers inserted in the streambed at the same depth at which the eggs were present. A total of 20 of these traps were deployed along a longitudinal profile: 10 in Coles Creek, seven in Springvale, and a three in a section of the Milton branch of the North River. Prior to deployment, redds were cautiously checked for presence of eggs.

Bruno Mendonca

Bruno Mendonca

Figure 3 Emergence trap deployed at Coles creek, showing the trap and funnel apparatus.

Initial results

Preliminary results showed surprisingly low emergence success, as well as high variability in the abiotic factors measured in the streambed sites. Only four out of 20 traps showed alevins (Figure 4), in different sections of different streams. Among the 20 redds monitored, the mean depth of the redds was 20 cm and the intragravel temperature ranged from -1.21 °C and 12.10 °C (average: 5.03 °C) (Table 1). In traps where alevins were captured, the temperature range in the redd with the highest number of alevins was between -0.62 °C and 10.07 °C (Coles Creek near a spring input at the lowest section of the surveyed streams: n=85; Table 1). The other three traps which produced alevins were located at the Springvale branch, at a middle section of this stream (n=50). The peak abundance occurred on April 22nd at the lowest trap on Coles Creek. Peak emergence at the Springvale branch occurred on April 9th.

Bruno Mendonca

Figure 4. Brook tout alevins captured in the emergence traps in the Coles creek lowest section, North river, PEI.

Table 1: Temperaure values and number of alevins captured in the emergence trap survey in Coles creek and Spingvale branch (North River watershed, PEI).

Redd	**Temperature range (°C)**			**Sample**
Site	Max	Min	Average	Total number of alevins
Coles 1	10.07	-0.62	6.79	85
Springvale 2	8.51	1.04	6.30	6
Springvale 3	8.96	1.18	7.91	28
Springvale 4	8.36	0.52	5.07	16
All 20 Redds	12.10	-1.21	5.03	135

Conclusion

We believe that the low trapping success in our study was related to timing; it is likely that traps were deployed too late in the season, so we caught the final phase of the emergence period in these streams. Because of the low trapping success, it is difficult to be conclusive on questions such as distribution of the most productive redds, or the timing and synchronicity of emergence. Interestingly, the trap which caught the most individuals during our survey was the one closest to a spring input, what reinforces the importance of groundwater discharge for brook trout reproductive success. In addition, the trapping method used allowed us to answer the logistic question of finding a trap design that would withstand winter conditions and water flows, so will allow us to carry out longer term studies in more sites to address our study questions.

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Project Update: Join our BSC Project on I-Naturalist

The BSC is exploring ways we might get involved in promoting citizen/community science. Towards that end, we are interested in exploring how our members interact with iNaturalist. We have created a "project" there called "Biological Survey of Canada member observations", and we encourage you to "join" the project so that we can see how many observations and identifications are being made by BSC members. If you're already on iNaturalist, it's as simple as going to the project here and clicking "join" at the top right:

https://www.inaturalist.org/projects/biological-survey-of-canada-member-observations

If you're not yet on iNaturalist, we encourage you to consider creating a user account, and getting involved.

So far, 54 people have joined the BSC project, and have contributed an incredible 367,889 observations of 18,249 species.

New Project

Secret Sowbugs: Help Document the Distribution and Diversity of Terrestrial Isopods in the Prairie Provinces

Hannah Stormer[1], Heather Proctor[2]
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We are conducting the first survey of terrestrial isopods (Isopoda: Onsicidea, aka sowbugs, roly-polies or woodlice) in Alberta, Saskatchewan, and Manitoba to document the diversity and distribution of species in the prairie provinces. Based on BugGuide[1,2,3] and iNaturalist[4,5,6] photos, sowbugs are present at various sites in the prairie provinces, yet the most recently published surveys (Jass and Klausmeier 2000, Snyder 2014, Floate et al. 2017) indicate that they are absent from Alberta, Saskatchewan, or Manitoba. This could be because past published surveys did not include urban areas (Floate et al. 2017) which are home to synanthropic sowbug species (Szlavecz et al. 2018), or because sowbugs are relatively recent arrivals. Prairie provinces likely lack native sowbug species due to past glaciation, and so terrestrial isopods in these areas are most likely non-native imports. Observations by long-term residents in Alberta suggest sowbugs may have been introduced to this province within the last 50 years (pers. obs., HP; pers. comm., John Acorn).

We are surveying both urban and natural areas to investigate the distribution and diversity of sowbugs in the prairie provinces. If these sowbugs are recent non-native introductions, distributions should center around human habitations for two reasons. First, the most likely species to be transported accidentally by humans are those that live near humans. Second, since sowbugs have limited cold tolerance they may be dependent on suitable overwintering sites near buildings to survive the cold winters (Wright 1997). It is also possible (though unlikely) that native sowbug species survived glaciation in isolated refugia, as is the case for aquatic isopods in Alberta (Clifford and Bergstrom 1976). Our preliminary collections and morphological identification (Figure 1) have determined

Figure 1. Species of sowbugs (Isopoda: Oniscidea) found in Alberta. From left to right: *Cylisticus convexus*, *Porcellio spinicornis*, *Trachelipus rathkii*, and *Porcellio scaber*.

[1]https://bugguide.net/adv_search/bgsearch.php?taxon=14&location[]=AB
[2]https://bugguide.net/adv_search/bgsearch.php?taxon=14&location[]=SK
[3] https://bugguide.net/adv_search/bgsearch.php?taxon=14&location[]=MB
[4] https://www.inaturalist.org/observations?place_id=6834&subview=table&taxon_id=48147&view=species
[5] https://www.inaturalist.org/observations?place_id=7953&subview=table&taxon_id=48147&view=species
[6] https://www.inaturalist.org/observations?place_id=7590&subview=table&taxon_id=48147&view=species

that there are at least four species in Alberta: *Cylisticus convexus* (De Geer), *Trachelipus rathkii* (Brandt), *Porcellio spinicornis* Say and *Porcellio scaber* Latreille. Only one of these is capable of fully rolling into a ball (*C. convexus*). All are native to Europe and were found near human habitation. Based on iNaturalist and BugGuide observations[1,4,6], at least two more non-native species are likely present in the prairie provinces (*Armadillidium vulgare* and *Porcellionides pruinosus*) and there may be many more.

We are requesting help from the BSC membership to collect OR photograph terrestrial isopods from Alberta, Saskatchewan and Manitoba, and send them to us for identification (both morphologically and molecularly). Specimens should be preserved using the methods below, and photos should show the features indicated in Figure 2. If you are a long-time resident of a prairie province (>10 years) we would also like to hear the first time you noticed sowbugs in your region and the approximate location (i.e., nearest town/city).

Hannah Stormer

Figure 2. Representative photos of a *Trachelipus rathkii* female taken with an iPhone 6. Photos are of the minimum quality necessary for morphological identification. Arrows indicate uropods and antennal flagella segments in the photo on the left, the number of lung pairs in the middle photo (5 pairs in this case), and the telson shape in the photo on the right.

In addition to documenting the distribution and diversity of sowbug species in the prairie provinces, we are also investigating the routes of entry of introduced sowbugs, in particular whether greenhouses serve as sites of primary introduction. Greenhouses may also contain species that are unable to survive outdoors during the winter. We are therefore also interested in greenhouse-collected specimens as well as those found outdoors or in houses.

We thank you for any and all specimens/photos - happy hunting!

Isopod Photography Protocol

1. Isopods can be found under logs, concrete, bricks, bags of mulch/soil, etc., as well as in compost heaps and under cow pats. Most species require moist habitats. They also frequently occur in basements.
2. (optional) Place the isopod in a plastic sandwich bag to make it easier to photograph the ventral side. The bag can be placed on a sheet of paper to ensure the isopod is visible.

3. Photograph the dorsal and ventral sides of the isopod. Ensure that the antennal segments, lung pairs (if present), uropods, telson shape, and the colour patterns are each visible in at least one of the photos (Figure 1). If these were observed but are not visible in the photos, please describe them when the photos are emailed. Photos taken under a dissecting scope are ideal, but a standard phone camera alone can be effective if the isopod is well-lit.
4. Email the photos to hstormer@ualberta.ca. Please also note:
   a. The date the photo was taken
   b. The approximate collection location (nearest town/city)
   c. Where the isopod was found (i.e. urban/natural area, in a greenhouse, under a log, in a house, etc.).
   d. Whether the isopod rolled into a ball when disturbed

Isopod Preservation Protocol

1. Isopods can be found under logs, concrete, bricks, buckets, bags of mulch/soil, etc., as well as in compost heaps and under cow pats. Most species require moist habitats. They also frequently occur in basements.
2. Place the isopod(s) in a leak-proof vial and fill with ethanol (70-95%). Label the vial with one label on the outside and another (written in pencil) on the inside. Please indicate:
   a. Number of specimens in the vial
   b. Date of collection
   c. Approximate collection location (nearest town/city)
   d. Where the isopod was found (i.e. urban/natural area, in a greenhouse, under a log, in a house, etc.).
   e. Whether the isopod(s) rolled into a ball when disturbed
3. Change the ethanol after 24 hours and remove most ethanol immediately prior to mailing. Ensure the lid of the vial is on tight.
4. Pack vials in a box or envelope and send to:
   Dr. Heather Proctor
   Department of Biological Sciences
   Biological Sciences Building, Centre Wing CW405
   University of Alberta
   Edmonton, AB, Canada T6G 2E9

If you have a large number of specimens and the cost of postage is prohibitive, contact HP to coordinate compensation for postal or courier costs.

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Feature Photos

A selection of photos from Greg Courtney

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Ames, Iowa

Greg Courtney

"Torrent" fly larva (Diptera: Oreoleptidae: *Oreoleptis torrenticola*), South Santiam River, Oregon, 17 April 2021.

This monotypic family was first described in 2005 based primarily on specimens from Alberta. (When they were first collected they generated a bit of debate about what family they were in!)

For more information, see **A long-overdue "re-discovery" of *Oreoleptis torrenticola***, by Greg Courtney, pp 5-8 in Vol. 66 of Fly Times: https://dipterists.org/assets/PDF/flytimes066.pdf

Greg Courtney

Deer ked (Diptera: Hippoboscidae: *Lipoptena depressa*), Ship Peak, Orcas Island, Washington, 22 July 2021.

Lipoptena depressa is widespread in western North America, including many records from southern British Columbia. As the common name implies, its primary host is deer. Although known to occasionally bite humans, none of the 20 or so that landed on Greg attempted to feed.

Greg Courtney

Fishfly larva (Megaloptera: Corydalidae: *Orohermes crepusculus*), South Santiam River, Oregon, 17 April 2021.

This monotypic genus is endemic to the Pacific coastal region (i.e., Oregon and California), where larvae frequent the riffles of clear, mid-sized to large rivers. This specimen was found at the same location as the *Oreoleptis* specimen shown above.

Feature Article
Longhorns in the Bushes

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Robert Wrigley

Trigonarthris subpubescens on a flower head of Spirea.

Introduction and Methods

In mid-June of 2021, I checked several white-flowering Spirea (*Spiraea alba*) bushes in a local Winnipeg park to see what long-horned and other beetles might appear. There were few other spring-flowering species of plants on the edge of this deciduous riparian forest, and since the blooming period of Spirea lasts less than two weeks, there were sometimes concentrated periods of activity of beetles, bees and flies around the flower heads, busily gathering pollen and nectar before the tiny petals faded and showered down to the ground. Bright sunlight and warm temperatures definitely increased insect visitation and time spent feeding, so I attended the site around mid-day every couple of days. Beetles and other insects were collected using a telescoping insect net for about 45 to 60 minutes on each of six days. Species of cerambycids were identified using keys in Bousquet et al. (2017). Results for this sampling period were also compared to results from previous years.

It was challenging to determine why there were more beetles present on some days than others, even when the weather conditions seemed much the same. Also confusing was why certain Spirea bushes, with plenty of beautiful fresh flower heads, were completely ignored (at least while I was there), while other nearby bushes were a hub of insect activity. Perhaps the latter flowers were currently producing abundant nectar and attractive scents, rather than just presenting a white visual cue. As I stood observing the action, several species of long-horned beetles continually arrived and departed.

Results and Discussion

One hundred and fifty-two cerambycid individuals in ten species were collected on seven visits, with the greatest diversity and abundance recorded on June 16 (Table 1). Many additional long-horned beetles escaped or were out of reach of my net, and no doubt numerous others arrived at the bushes when I was absent. This summer's severe drought appeared to have had negative effects on the abundance of species in the area – a fact that I observed while collecting insects at other localities in southern Manitoba. The dry conditions may have driven the focus of insects towards the few flowering shrubs that I was attending. (Note: *Trigonarthris subpubescens* was until recently known in the literature as *T. minnesotana* (Bousquet et al. 2017)).


Robert Wrigley

Trigonarthris subpubescens in the net, revealing a yellow dusting of pollen.

By June 26, the flower heads on the Spirea bushes were finished for the season and insect activity transferred to the large, fresh, white flower heads of several adjacent tall Japanese Lilacs (*Syringia reticulata*). Numerous *Trigonarthris subpubescens* flew among the flower heads at heights beyond the reach of my net so I was able to collect only a sample of those present.

Table 1. Cerambycid species collected over six visits to white-flowering Spirea (*Spiraea alba*) and Japanese Lilacs (*Syringia reticulata*) bushes in a local Winnipeg park, June, 2021.

Date	Host species	Species collected	Number
June 16 (Total: 93)	*Spiraea alba*	*Anoplodera pubera*	43
		Trigonarthris subpubescens	26
		Cyrtophorus verrucosus	6
		Stenocorus vittiger	5
		Clytus ruricola	4
		Trigonarthris proxima	3
		Trachysida mutabilis	2
		Grammoptera subargentata	2
		Brachysomida bivittata	1
		Gnathacmaeops pratensis	1
June 17*	*Spiraea alba*		0
June 18 (Total: 23)	*Spiraea alba*	*Trigonarthris subpubescens*	14
		Anoplodera pubera	9
June 21 (Total: 7)	*Spiraea alba*	*Trigonarthris subpubescens*	3
		Anoplodera pubera	2
		Cyrtophorus verrucosus	1
		Clytus ruricola	1
June 24 (Total: 6)	*Spiraea alba*	*Trigonarthris subpubescens*	4
		Anoplodera pubera	2
June 26 (Total: 17)	*Syringia reticulata*	*Trigonarthris subpubescens*	14
		Trigonarthris proxima	1
		Brachysomida bivittata	1
		Stenocorus vittiger	1
June 28 (Total: 6)	*Syringia reticulata*	*Trigonarthris subpubescens*	5
		Anoplodera pubera	1

*I checked the Spirea bushes after dark (11:00 pm, 22°C) in the hopes of observing some night-active cerambycids, but none appeared on the flower heads.

Trigonarthris subpubescens (66 specimens) and *Anoplodera pubera* (57 specimens) were by far the most abundant cerambycids collected (Table 1). Both species were seen mating on the flower heads. The setiferous forequarters of the former species were coated liberally with yellow pollen. *Trigonarthris subpubescens* was among the largest of the beetles and spent more time circulating around the flower heads than other species observed. This species is a strong flyer (with large flight wings), so it may have had a broader foraging area, and arrived at the bushes from greater distances, than the smaller species of long-horned beetles.

Robert Wrigley

One *Anoplodera pubera* (black) feeding on a rose flower, along with 8 *Orsodacne atra* (Orsodacnidae) (3 pairs mating), and 1 *Pedilus elegans* (Pyrochroidae) (black with a red pronotum).

All the species taken at flowers in the present study were pollen/nectar feeders (Craighead (1923; Wrigley 2019) and therefore could have been affected by the unusually dry conditions felt across the Canadian west in 2021. Adults live for relatively short periods, generally 10–20 days (Bousquet et al. 2017). The short-lived species that required food sources in the current study therefore had a narrow and time-sensitive feeding period if Spirea and Japanese Lilac were the only or main source of nutrients.

Other insects observed on the Spirea and Lilac flowers were several species of hover flies, the shield bug *Elasmostethus cruciatus*, the scarab *Trichiotinus assimilis*, the meloid *Epicauta pensylvanica*, flies, bees, a Bald-faced Yellowjacket (*Dolichovespula maculata*), which was devouring an insect (possibly a long-horned beetle), and a clubtail dragonfly which kept patrolling and perching on an extended twig, ready to pounce on unsuspecting insect prey.

Four of the ten species collected on these bushes in 2021 are also species I have collected in bushes and a spruce woodpile at my Winnipeg home, a few kilometres from the park (Wrigley 2019); these are *Anoplodera pubera, Brachysomida bivittate, Trigonarthris subpubescens*, and *Cyrtophorus verrucosus*. Additional species found around my home include *Meriellum proteus* (an estimated emergence of 2000 individuals), *Purpuricenus humeralis*, *Phymatodes dimidiatus*, *Saperda candida*, and *Stenocorus schaumii*.

In addition to the collections noted above, this summer I collected two unusual cerambycid species (new to me) by sweeping bushes and grasses in other Manitoba localities. Both species are among the tiniest (at 4 mm) of all cerambycids – *Hyperplatys aspersa* (at La Barriere Park in Winnipeg) and *Psenocerus supernotatus* (in the Portage Sandhills, south of Portage la Prairie). These ant-sized

Larry de March

Larry de March

Hyperplatys aspersa and *Psenocerus supernotatus*.

species present a marked contrast to two of the largest members of the family that I have in my collection – the Sabertooth Longhorn (*Macrodontia cervicornis*) up to 177 mm in length, and the Titan Beetle (*Titanus giganteus*), up to 167 mm, both found in the Amazonian rain forests.

Robert Wrigley

Macrodontia cervicornis (major and minor) and *Titanus giganteus*.

The Cerambycidae is one of the largest family of beetles, estimated to include over 35,000 species, 105 of which have been recorded in Manitoba (Bousquet et al. 2017). No doubt, additional species will be added to this list. Due to the great variety of colour patterns, morphology, and fascinating life-history of long-horned beetles, the group is highly popular with beetle enthusiasts. For information on identification and life history of North American cerambycids, I refer often to four excellent books by Yanega (1996), Hanley (2005), Lingafelter (2007), and Bousquet et al. (2017). These have allowed me to characterize the diversity of this important group in several areas of southern Manitoba.

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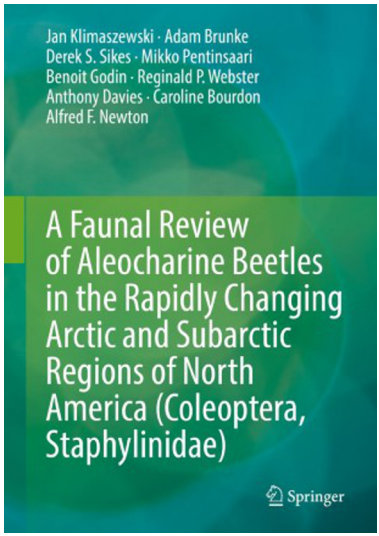
Serge Laplante (Ottawa Research and Development Centre, Agriculture and Agri-Food Canada) kindly identified several specimens for me.

New Book Notice



A Faunal Review of Aleocharine Beetles in the Rapidly Changing Arctic and Subarctic Regions of North America (Coleoptera, Staphylinidae)

Authors: Jan Klimaszewski, Adam Brunke, Derek S. Sikes, Mikko Pentinsaari, Benoit Godin, Reginald P. Webster, Anthony Davies, Caroline Bourdon, Alfred F. Newton

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We are very pleased to inform you that the book has been published and is available on https://link.springer.com/book/10.1007/978-3-030-68191-3.

- The first comprehensive book about arctic and subarctic aleocharine beetles of North America
- Provides necessary knowledge base required for monitoring and analyzing climate change in the northern part of North America using a well represented indicator group of insects
- An invaluable source for entomologists, taxonomists, ecologists, conservationists, and biodiversity specialists to study ecosystem change in North America

Arctic and Subarctic North America is particularly affected by climate change, where average temperatures are rising three times faster than the global average. Documenting the changing climate/environment of the north requires a structured knowledge of indicator taxa that reflect the effects of climate changes.

Aleocharine beetles are a dominant group of forest insects, which are being used in many projects as indicators of environmental change. Many species are forest specialists restricted to certain microhabitats, some are generalists and others are open habitat specialists. They represent many ecological niches and, as such, are good indicators for many other species as well. The majority of Canadian aleocharine beetle species (about 600 spp.) has been studied and published by Jan Klimaszewski et al. (2018, 2020), mainly from southern, central, and western Canada, while the northern taxa remain poorly known and documented.

The aim of the present book is to summarize the knowledge on this insect group in the Arctic and Subarctic North America and to provide a diagnostic and ecological tool for scientists studying and monitoring insects in northern Canada and Alaska. The book includes a review of the literature, information on 238 species and their habitats, taxonomic review, images, and identification tools.

Canadian Journal of ARTHROPOD IDENTIFICATION

A product of the Biological Survey of Canada

2021 papers in the Canadian Journal of Arthropod Identification:

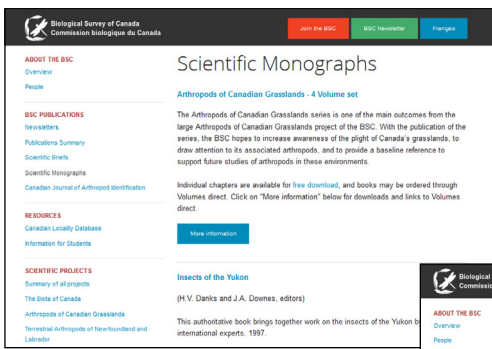
Wallace, C. 2021. An illustrated identification key to the genera of Ulidiidae (Diptera: Tephritoidea) of the United States and Canada. Canadian Journal of Arthropod Identification 45: 94 pp. http://dx.doi.org/10.3752/cjai.2021.45

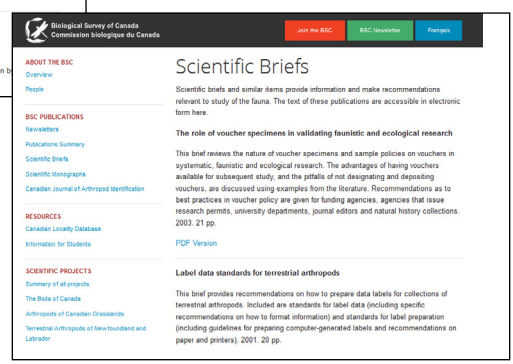
Haberski, A., Woller, D.A., and Sikes, D.S. 2021. Orthoptera of Alaska: A photographic key, new records, and synonym of Melanoplus gordonae. Canadian Journal of Arthropod Identification 44: 51 pp. http://dx.doi.org/10.3752/cjai.2021.44

Peach, D.H., McCann, S., & Belton, P. 2021. A Guide to the Mosquitoes (Diptera: Culicidae) of the Yukon. Canadian Journal of Arthropod Identification 43: 48pp. http://dx.doi.org/10.3752/cjai.2021.43

Reminder of BSC Publications

The BSC has produced a number of monographs and briefs on various topics relating to biodiversity. Briefs and some monographs are available as downloadable pdf documents from our website: http://biologicalsurvey.ca/home





Notices

Books available from the Biological Survey of Canada

These are available for download on the BSC website, and most are also available as softcover bound versions. See http://biologicalsurvey.ca/monographs for information:

Arthropods of Canadian Grasslands series

Volume 1: Ecology and Interactions in Grassland Habitats.
Volume 2: Inhabitants of a Changing Landscape
Volume 3: Biodiversity and Systematics, Part 1
Volume 4: Biodiversity and Systematics, Part 2

A Handbook to the Ticks of Canada (Ixodida: Ixodidae, Argasidae)

The Biological Survey of Canada: A personal history

The Biota of Canada: Terrestrial Arthropods

Agriculture and Agri-Food Canada Entomological Monographs

The Entomological Society of Canada has published a number of entomological monographs (including some of the popular Insects and Arachnids of Canada Series) on their website. To access these, go to:

http://esc-sec.ca/publications/aafc/

If you prefer the monographs in bound format, these can still be obtained on a print-on-demand process though an agreement with Volumes Direct (http://www.volumesdirect.com/). Visit their website, and search for title or author.

Call for Proposals for a Biological Survey of Canada BioBlitz

A BioBlitz is a great way to start or implement a faunal inventory of a region.

If you are interested in organizing a BioBlitz for next summer, or have a BioBlitz planned that you'd like to coordinate with the Biological Survey (for example, the 2017 BioBlitz was held in the Cypress Hills of Saskatchewan in conjunction with the BioBlitz Canada 150 programme), please contact the Biological Survey of Canada: **biologicalsurvey@gmail.com**

Who we are:

The Biological Survey of Canada is a Not-for-Profit Corporation dedicated to promoting biodiversity science in Canada

- The BSC consists of an elected board of directors and a membership representingall areas of biodiversity science. The historical focus has been on Arthropods, but with the ongoing Biota of Canada initiative, the focus has expanded to the entire Biota.
- We produce a newsletter twice per year, organize events such as the annual BSC Symposium at the Entomological Society of Canada (ESC) meeting, a "Curation Blitz" at some ESC meetings, and assist in organizing BioBlitzes when possible. Anyone can receive the newsletter, by sending a request to the Secretary (address below).
- Membership is free, and includes this newsletter and the right to vote at the Annual General Meeting. All members are encouraged to become actively involved in BSC projects, propose new projects, or to run for the positions on the Board of Directors. (A nominal membership fee may be charged in future to cover infrastructure costs).
- The Annual General Meeting is held virtually each summer (generally mid-June)

To Join the BSC:

Send an email to Donna Giberson, Secretary, BSC.
biologicalsurvey@gmail.com

- In the subject line, write "BSC Membership"

- In the body of the message, give your full name and contact information, a valid email address and some information on your background and Canadian biodiversity interests.

- Include the line below in your email *(required for the BSC to conform with Canada's Anti-Spam legislation)*

I agree to receive emails from the BSC relating to BSC activities and publications.

Remember to update the BSC if you change email addresses.