

Bulletin

Entomological Society of Canada
Société d'entomologie du Canada

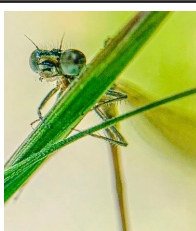
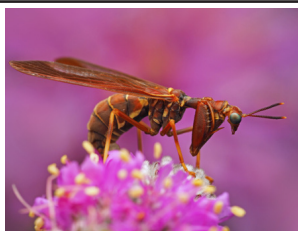
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My very first Entomological Society of Canada meeting was 1999 in Saskatoon.

I was twenty-three years old and completing the final half year of my BSc and also working part-time at the Agriculture and Agri-food Canada lab on the University of Saskatchewan (USask) campus. I can't remember exactly, but I think that was the job where I was picking grasshopper eggs out of egg masses. I had that job because I'd spent the previous summer working for a technician named Larry Grenkow in one of the entomology labs. That job I do remember. We measured damage from flea beetles on canola and we counted pea aphids on clover. One day that fall Larry contacted me and asked if I wanted to volunteer at some entomology meeting that was in town. By that point I think I had decided I wanted to work in entomology and I must have told Larry that, but I don't recall doing so. He said I could work at the registration desk and, for doing so, would get into the meeting for free. I'd also get a banquet ticket. That seemed like a pretty sweet deal for a few hours of work so I signed up.

I recall getting to know a lot of people at what was my first Joint Annual Meeting of the Entomological Societies of Canada and Saskatchewan. Working the registration desk certainly helped. It later occurred to me that I probably met folks there that I would later go on to work with, and who are now folks I'd consider friends as well as colleagues. I'm

Ma toute première réunion de la Société d'entomologie du Canada était en 1999 à Saskatoon.

J'avais vingt-trois ans, je terminais le dernier semestre de mon baccalauréat et je travaillais également à temps partiel au laboratoire d'Agriculture et Agroalimentaire Canada sur le campus de l'Université de Saskatchewan (USask). Je ne me souviens pas exactement, mais je pense que je ramassais les œufs de sauterelles dans les masses d'œufs. J'avais obtenu ce travail parce que j'avais passé l'été précédent à travailler pour un technicien nommé Larry Grenkow dans l'un des laboratoires d'entomologie. Je me souviens de ce travail. Nous mesurions les dégâts causés par les altises sur le canola et nous comptions les pucerons du pois sur le trèfle. Un jour de l'automne, Larry m'a contacté et m'a demandé si je voulais être bénévole à une réunion d'entomologie qui se tenait en ville. À ce moment-là, je pense que j'avais déjà décidé de travailler dans le domaine de l'entomologie et j'ai dû le dire à Larry, mais je ne me souviens pas de l'avoir fait. Il m'a dit que je pouvais travailler au bureau d'inscription et que, ce faisant, j'aurais accès à la réunion gratuitement. J'obtiendrais également un billet pour le banquet. Cela m'a semblé être une bonne affaire pour quelques heures de travail et je me suis donc inscrit.

Je me souviens d'avoir fait la connaissance de nombreuses personnes lors de ce qui était ma première réunion annuelle conjointe des Sociétés d'entomologie du Canada et de la Saskatchewan. Le fait de travailler à la table d'inscription m'a certainement aidé. Plus tard, je me suis rendu compte que j'y avais probablement rencontré des personnes avec lesquelles j'allais plus tard travailler et que je considère aujourd'hui comme des amis et des collègues. Je suis certain que certains d'entre vous qui lisez cette chronique ont été inscrits

certain that some of you reading this column were registered at that meeting, 24 years ago, by me. One person that certainly sticks out was meeting Ed Becker (namesake of the society's conference travel award). I was reading an article that someone had cut out of the Ottawa Citizen and had pinned to an unused poster board. The article was an interview with Ed on the occasion of his recent retirement from the Canadian National Collection. A man with a bow tie tapped me on the shoulder and told me not to believe everything I read; I realized it was the same person in the article as he walked away. The ESC's annual student conference travel award is named for Ed, who passed away in 2008, to honour his record streak of attending ESC meetings - somewhere over 50 if I recall.

My next Joint Annual Meeting was a different affair entirely. This was in 2000 and by this time I had moved east and started a degree at the University of New Brunswick. Our entire laboratory packed up into two trucks and made the drive from Fredericton to Montreal. For a prairie boy who'd never been east of Winnipeg until that spring this was quite the trip. The drive out included a detour through Hartland, New Brunswick to see the world's longest covered bridge. This meeting was the first time the ESC had met with our American cousins since 1982 and for me, it was like drinking from the firehose of entomology. The program book was the same size as the course catalog from the USask and I remember spending what seemed like hours mapping out which talks I wanted to see. I remember walking into a giant conference room that was packed to the gills in honour of some guy named 'John Borden' and then walking out because it was too full. We do silly things when we're 24.

A few years later I was in Edmonton and our meeting was in Kelowna. I drove there with a fellow named Greg Pohl from the Northern Forestry Centre in Edmonton where I was working on my PhD. I was the only person from my PhD lab at the University of Alberta to make that trip; my memory is that the rest

par moi à cette réunion, il y a 24 ans. L'une des personnes qui m'a le plus marqué est Ed Becker (qui a donné son nom à la bourse de voyage de la société). Je lisais un article que quelqu'un avait découpé dans l'Ottawa Citizen et avait épinglé sur un panneau inutilisé. Il s'agissait d'une entrevue d'Ed à l'occasion de sa récente retraite de la Collection nationale canadienne. Un homme avec un nœud papillon m'a tapé sur l'épaule et m'a dit de ne pas croire tout ce que je lisais. Je me suis rendu compte que c'était la même personne dans l'article alors qu'il s'éloignait. La bourse de voyage annuelle de la SEC pour les membres aux études est nommée en l'honneur d'Ed, qui est décédé en 2008, pour honorer son record de participation aux réunions de la SEC - quelque chose comme 50 si je me souviens bien.

La réunion annuelle conjointe suivante a été tout à fait différente. C'était en 2000 et, à ce moment-là, j'avais déménagé dans l'Est et commencé à préparer un diplôme à l'université du Nouveau-Brunswick. Tout notre laboratoire s'est entassé dans deux camions et a fait le trajet de Fredericton à Montréal. Pour un garçon des Prairies qui n'était jamais allé à l'est de Winnipeg avant ce printemps, c'était tout un voyage. Le trajet comprenait un détour par Hartland, au Nouveau-Brunswick, pour voir le plus long pont couvert du monde. C'était la première fois que la SEC rencontrait nos cousins américains depuis 1982 et, pour moi, c'était un torrent d'information sur l'entomologie. Le programme avait la même taille que le catalogue des cours de l'USask et je me souviens d'avoir passé ce qui m'a semblé être des heures à dresser la liste des conférences que je voulais voir. Je me souviens être entré dans une salle de conférence géante qui était pleine à craquer en l'honneur d'un certain John Borden, puis en être ressorti parce qu'elle était trop pleine. Nous faisons des choses stupides à 24 ans.

Quelques années plus tard, j'étais à Edmonton et notre réunion avait lieu à Kelowna. J'y suis allé en compagnie d'un certain Greg Pohl, du Centre de foresterie du Nord à Edmonton, où je préparais mon

of my labmates chose to attend a biodiversity meeting in Mexico at the same time. But I was a pest management person then (and now) and so off to Kelowna through an early fall snowstorm we went. I wasn't the only person from the UofA at that meeting though. Another graduate student from one of the other entomology labs was also there. I ended up marrying her, but that's a story for another day. I remember that meeting because it's the only time I won a President's prize. I came second for which I was awarded a T-shirt by Gail Anderson. Much later I got to serve with Gail on the Board of the ESC, and I still have the shirt.

But what's the point of this walk down memory lane?

This fall, our meeting will return to an in-person format of the national society and a regional entomological society. As luck and coincidence would have it, this meeting is not only in Saskatoon, but at the very same hotel where I attended my first meeting in 1999. So this will not only be a reunion of our society but also a homecoming for me, and I'm very excited.

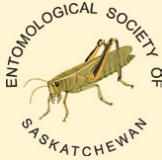
My experiences at our meetings have shaped my career as an entomologist. I've also found new colleagues and made great friends at our meetings (including the one who translated this column into French). I'm hoping that by reading this you'll be convinced to come to Saskatoon and, perhaps as my old supervisor Larry did, bring along a young person so that they can experience their first meeting. Perhaps it will lead to one or two more meetings for them. Me, I'd love to be reading this column in 24 years and see it written by the person who worked the registration desk in Saskatoon this fall. Wouldn't that be cool?

doctorat. J'étais la seule personne de mon laboratoire à l'Université d'Alberta à faire ce voyage ; je me souviens que les autres membres de mon laboratoire avaient choisi d'assister à une réunion sur la biodiversité au Mexique au même moment. Mais j'étais un spécialiste de la gestion des ravageurs à l'époque (et encore aujourd'hui) et nous sommes donc partis pour Kelowna dans une tempête de neige au début de l'automne. Je n'étais pas la seule personne de l'UofA à participer à cette réunion. Une autre étudiante des cycles supérieurs de l'un des autres laboratoires d'entomologie était également présente. J'ai fini par l'épouser, mais c'est une histoire pour un autre jour. Je me souviens de cette réunion parce que c'est la seule fois où j'ai gagné un prix du président. J'ai terminé deuxième, ce qui m'a valu un T-shirt offert par Gail Anderson. Bien plus tard, j'ai eu l'occasion de siéger avec Gail au CA de la SEC, et j'ai toujours ce tee-shirt.

Mais quel est l'intérêt de cette promenade dans le passé?

Cet automne, notre réunion reviendra à sa première réunion en personne dans notre format traditionnel de la société nationale et d'une société régionale d'entomologie. Par chance et coïncidence, cette réunion se tiendra non seulement à Saskatoon, mais aussi dans l'hôtel même où j'ai assisté à ma première réunion en 1999. Il s'agira donc non seulement d'une réunion de notre société, mais aussi d'un retour au pays pour moi, et je suis très enthousiaste.

Les expériences que j'ai vécues lors de nos réunions ont façonné ma carrière d'entomologiste. J'y ai également trouvé de nouveaux collègues et je m'y suis fait de grands amis (y compris celle qui a traduit cette rubrique en français). J'espère qu'en lisant ceci, vous serez convaincu de venir à Saskatoon et, peut-être comme mon ancien superviseur Larry l'a fait, d'amener une jeune personne pour qu'elle puisse vivre sa première réunion. Peut-être que cela l'amènera à participer à une ou deux autres réunions. Moi, j'aimerais bien lire cette rubrique dans 24 ans et la voir écrite par la personne qui a travaillé au bureau des inscriptions à Saskatoon cet automne. Ne serait-ce pas génial?



JOINT ANNUAL MEETING OF THE ENTOMOLOGICAL SOCIETIES OF CANADA AND SASKATCHEWAN

A Celebration of Canada's Diversity Through Communities

The Entomological Society of Saskatchewan and the Entomological Society of Canada take pleasure in inviting you to the 2023 Joint Annual Meeting in Saskatoon.

OCTOBER 15–18 , 2023 • SASKATOON, SK



We hope to see you there!

The event will be held at the Delta Hotels Saskatoon Downtown, located in the heart of downtown Saskatoon and just a block away from the South Saskatchewan River and the walking trails of Meewasin Valley Authority.

entsocsask.ca/esc/esc-ess.html





Réunion annuelle conjointe des sociétés d'entomologie du Canada et de la Saskatchewan

Une célébration de la diversité du Canada à travers les communautés

La Société d'Entomologie de la Saskatchewan et la Société d'Entomologie du Canada ont le plaisir de vous inviter à l'assemblée annuelle conjointe 2023 à Saskatoon.

Du 15 au 18 octobre 2023 Saskatoon Saskatchewan



Nous espérons vous voir là-bas!

L'événement aura lieu au Delta Hotels Saskatoon, situé au cœur du centre-ville de Saskatoon et à un pâté de maisons de la rivière Saskatchewan Sud et des sentiers pédestres de la Meewasin Valley Authority. entsocsask.ca/esc/esc-ess.html



STEP Corner / Le coin de la relève

Rowan French and Matt Muzzatti



Aperçu de la recherche

*** Note – L'aperçu de la recherche est actuellement en pause pendant que nous travaillons avec d'autres comités de la société pour créer un processus plus rationalisé pour le partage des publications étudiantes. ***

Research Roundup

***Note – the Research Roundup is currently on pause as we work with other committees within the Society to create a more streamlined process for sharing student publications. ***

Check out the ESC blog, [Facebook](#), and [Twitter](#) pages for the most recent featured articles and student author biographies. For regular updates about Canadian entomological research, join the [ESC Students Facebook page](#) or follow us on [Twitter @esc_students](#).

Getting Involved with the ESC

SEPAC is always keen to take on new members! Volunteering for SEPAC is a great way to get involved with the Society and to promote entomology across Canada. If you are interested in joining or just have suggestions for new initiatives in the coming year, email us at students@esc-sec.ca, or contact us personally at rowan.french@mail.utoronto.ca and mattmuzzatti@cmail.carleton.ca. We look forward to hearing from you!

Rowan & Matt

Consultez le blogue et les pages [Facebook](#) et [Twitter](#) de la SEC pour obtenir les articles les plus récents et les biographies des membres les ayant écrits. Pour obtenir des mises à jour régulières sur la recherche entomologique canadienne, rejoignez la page [Facebook des étudiants de la SEC](#) ou suivez-nous sur [Twitter @esc_students](#).

S'impliquer au sein de la SEC

Le comité des affaires étudiantes et des jeunes professionnels est toujours prêt à accueillir des membres! Le bénévolat au sein du comité est une excellente façon de s'impliquer dans la Société et de promouvoir l'entomologie au Canada. Si vous êtes intéressé à vous joindre à nous ou si vous avez des suggestions de nouvelles initiatives pour l'année à venir, envoyez-nous un courriel à students@esc-sec.ca, ou contactez-nous personnellement à rowan.french@mail.utoronto.ca ou mattmuzzatti@cmail.carleton.ca. Nous avons hâte de vous lire!

Rowan & Matt

Thesis Roundup / Foisonnement de thèses

SEPAC wants to recognize and celebrate the accomplishments of newly minted entomology grads! If you or a student you know has recently defended an entomology-related thesis at a Canadian University, please send the following details to students@esc-sec.ca student's name, date, degree, thesis title, supervisor(s), and university. This information will appear on the ESC website and in the next ESC Bulletin.

Le comité veut reconnaître et célébrer les réalisations des nouveaux diplômés en entomologie! Si vous, ou un étudiant que vous connaissez, a récemment soutenu sa thèse dans un domaine lié à l'entomologie dans une université canadienne, merci d'envoyer les informations suivantes à students@esc-sec.ca nom de l'étudiant, date, diplôme, titre de la thèse, directeur(s) et université. Cette information apparaîtra sur le site web de la SEC et dans le prochain Bulletin de la SEC.



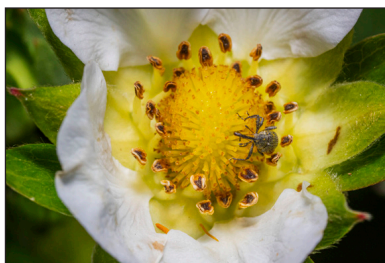
Entomological Society of British Columbia

ESBC Report: Focus on Agassiz Research Station

We are excited to share some updates from the entomology team at the Agassiz Research and Development Centre, Agriculture and Agri-Food Canada.

Small Fruit Entomology Research – Dr. Michelle Franklin

Spring is here and we are getting ready for another busy field season! We are preparing supplies for our partners that are helping with the second year of our strawberry blossom weevil (*Anthonomus rubi*) survey that is aimed at delimiting the distribution of this new invasive pest and associated natural enemies in Canada. Native to Europe, Asia, and North Africa, this weevil is relatively new to North America, with the first detection in the Fraser Valley in 2019. The weevil larvae feed inside of developing buds causing damage to strawberries, raspberries, and other cultivated and wild plants in the Rosaceae family. Along with the survey, we are also conducting studies to gain knowledge of the basic biology of this weevil that we will use to develop bioclimatic models to predict its future distribution in North America. In addition to weevil work, we are busy, in the lab, working on bioassays to test the efficacy of a baculovirus that infects blackheaded fireworm (*Rhopobota naevana*). Blackheaded fireworm is one of the most economically important pests in cranberries in Canada. Thanks to my predecessor, Dr. Sheila Fitzpatrick, this virus was first collected from fireworm in a cranberry field in British Columbia over 20 years ago. Baculoviruses have the advantages of being host specific, safe for non-target organisms, and compatible with organic agriculture. We hope to continue to contribute to research that will aid in the commercialization of this virus for use as a biopesticide in the coming years. Finally, we are starting work with collaborators, Dr. Jim Mattsson (Simon Fraser University) and Dr. Bryan Brunet (AAFC) to develop an assay to detect *Blueberry scorch virus* (BIScV) in aphids. This aphid-vectored virus is a widespread problem in blueberry growing regions in the Pacific Northwest. Plants do not recover from this virus and plant removal is required. We hope to improve our understanding of BIScV aphid transmission with this assay in future years.



Strawberry blossom weevil on strawberry.

W. Wong



Blackheaded fireworm on cranberry.

W. Wong

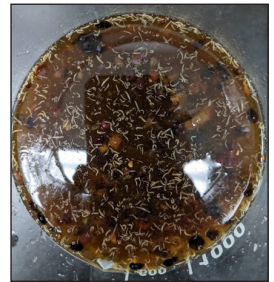


Michelle Franklin (and Paul Abram in the back).

W. Wong

Biocontrol Research – Dr. Paul Abram

Around the globe, the invasive spotted wing drosophila (SWD) has become a major problem for soft fruits. This fly lays its eggs inside of fresh fruit with its saw-like ovipositor and the larvae feed inside those fruit. Natural enemies can contribute to sustainable pest management of invasive pests. Here in BC, two potential candidate Asian larval parasitoids of SWD, the samba wasp (*Ganaspis brasiliensis*) and the ronin wasp (*Leptopilina japonica*) were found to be established in 2019, despite no intentional release. This has provided a unique opportunity to study the ecology of these parasitoids in the field. A couple of the questions that we are working to address are – “What constitutes the *Drosophila* parasitoid community in rotting fruit that has dropped to the ground?” and “What is the ecological host range of the adventive parasitoids?”. To answer these questions, we will continue to spend a lot of time with rotting fruit! This summer we will be collecting rotting dropped fruit and putting out sentinel fruit traps in bushes to examine the *Drosophila* parasitoid community. Fruit will be brought back to lab, *Drosophila* larvae reared, and puparia checked for parasitoid emergence. All this playing around with rotting fruit should help us to understand the impact of these parasitoids on spotted wing drosophila and other non-target *Drosophila*.



Floated out *Drosophila* larvae in brown sugar brine

P. Abram



Samba wasp on blueberry fruit.

W. Wong

Drone application of an entomopathogen for wireworm control – Todd Kabaluk

Wireworms are a pest problem that isn’t going away so we need to develop as many tools and tactics as we can for their control. Instead of targeting larvae directly, Todd Kabaluk has been using microbial pesticides to target the adult beetles with the expectation that this will reduce the recruitment of larvae (i.e., wireworms) into farm fields. Among the many approaches with which he’s experimented, he’s found that using a drone to apply an aqueous suspension of *Metarhizium brunneum* conidia is effective. Not only does this achieve beetle infection and mortality by directly contacting the beetles, but also by environmental transmission as beetles will pick up an infection by contacting spray droplets from the vegetation. Adding a small amount of sex pheromone prior to spraying will agitate male beetles and increase the *M. brunneum* conidia dose that they acquire. Applying a pest control product by drone is essential to accessing beetle refugia in field margins, areas from which beetles migrate. The *M. brunneum* strain used by Kabaluk, LRC112, is quite specific to Elateridae, and unthreatening to other fauna. Go to <https://www.youtube.com/watch?v=4tCfuXhVoGs> to see an animation of the field experiment conducted in 2022, which will be repeated in 2023.



Preparing the experimental area for spraying.

M. Vendrig



Todd Kabaluk.

Wim van Herk

I began work at the Agassiz Research and Development Centre (ARDC) in April 2003, as a summer student in Bob Vernon's lab. At the time I had no intention of a career in entomology or pest management, but that changed radically over that summer, and by September, I was enrolled in a graduate program at SFU. My mentors during this time were Bernie Roitberg (my senior supervisor), Gerhard Gries and Bob. After completing my PhD, I worked with Bob at ARDC as a research technician, and since 2017, as research scientist. My official mandate at present is to research field crop pest management, but my main interest is simply to learn about (and admire) insect behaviour and ecology. I seem to be attracted to soil insects and beetles. Most of my research has focused on the management of pest wireworms and cabbage root maggots, but lately our team (my technician Terisha Mitchell, and our wonderful summer students) have worked a little with western corn rootworms. Recent successes for our program are the identification of the sex pheromones for some of the main Canadian pest click beetles (thanks to a truly wonderful collaboration with Gerhard and Regine Gries, many participating great scientists in other provinces, and two excellent graduate students), publication of the first surveys of the predominant Canadian pest elaterids in many decades (similarly a very large team effort), and the identification (and registration) of novel, safe and effective insecticides for wireworm management.



Wim van Herk.

A. Jones (AAFC)



Entomological Society of Alberta

The Entomological Society of Alberta held its Spring Executive Board Meeting on 11 Feb. 2023. There has been a large turn over in board members, including a new secretary (Dr. Kulkarni) and a new treasurer (Dr. Musso). The mailing address for the Society has been changed to Dr. Boyd Mori at the University of Alberta. The “Insect Collector’s Guide” currently on the ESAlberta website will be republished as an Open Education Resource after a taxonomic update is incorporated. Outreach activities by ESAlberta outreach committee and other members include insect spreading and shadow box workshops and school presentations. The annual meeting of ESAlberta 2023 conference will be held in Edmonton on 18–19 August 2023. Planning for the ESC/ESAB JAM in Alberta in 2025 is underway.



Entomological Society of Saskatchewan

At the end of March, Saskatoon members of the ESS were involved in Youth and Amateur Encouragement outreach, participating in the Garden Experience program administered by Agriculture in the Classroom. There was also great participation at the Gardenscape (annual backyard garden show) booth showcasing our insect collection and leading school tours presenting, Good Bugs/Bad Bugs, for entomological outreach to the public. Tyler Wist presented on Beneficial Insects in your Garden in the speakers' hall.

The ESS held our annual spring meeting in person in Regina, 14 April 2023, with a tour of the Royal Saskatchewan Museum's collection of invertebrates and lab space (see photos). We were also treated to an overview of the paleontology work being conducted by Museum staff. Thank you to Dr. Cory Sheffield and Ryan Oram for taking us through this awesome resource and explaining their work to us and to Elyssa Loewen for opening our eyes to the insects in amber right here in Saskatchewan.

The ESS decided that we will have our fall meeting in 2023 in Saskatoon, tentatively scheduled for early December. The JAM planning committee continues with ESC-ESS preparations for the 15-18 Oct., Joint Annual Meeting, in Saskatoon, and we look forward to seeing you there! You can find details on our website meeting page: <http://entsocsask.ca/esc/esc-ess.html> and follow us on twitter @EntSocSK or EntSocSask on Instagram.



D. Stephens

Dr. Sheffield, curator of invertebrate zoology, shows ESS members through the RSM collection; naturally we started with the bees.



D. Stephens

Ryan Oram explains the handling and processing of samples and how he achieves the macro images taken for research and display purposes.



D. Stephens

We were challenged to see if we could spot the fake vs real amber with inclusions.

Life at a small university: Lessons in Entomological flexibility

Of the things I might have expected to be asked to do in my life, presenting the Gold Medal address (Figure 1) to this Society so close to my heart, was not one of them. I want to thank the people that nominated me, and the Awards Committee who selected me, for suddenly shooting me into a company I've long admired. I am humbled and honoured by their faith in me.

As a stream ecologist, I am intensely aware of the tendency for streams to meander across a landscape. Preparing this address led me to take the time to reflect on the meanderings of my own life and career, and to think of all the people I wished I'd spent more time thanking over the years. I'm grateful to the ESC for this opportunity to do so publicly.

In my search for a theme for this address, I was also struck by a twitter thread from an early career researcher I follow, which led me to ponder the connections we forge as Entomologists. This young researcher commented on how much they enjoy being asked to collaborate on projects, and how they have a hard time saying no to such requests. They reflected on how different it was from grad school training, since writing a thesis (or two) is a fairly solitary experience, by its very nature of emphasizing independent research. It might have been because I was already thinking a lot about this topic, but almost immediately afterwards, I noticed another thread about how our systems of training and experience-gathering make it very difficult to develop and sustain friendships and community, as we move from city to city or region to region for grad school and successive post-docs. I realized that this is something that we, as PIs working in our labs, need to keep front of mind as we recruit students and post-docs. Being passive is not enough. To recruit and retain young scientists of all backgrounds, we must not only provide the basics for their research, but also recognise the need for community building. I'd like to explore this idea with you a bit today, with examples from my own career.

To continue the stream metaphor, my own meandering path can be summed up pretty well by three words: the **Mentors** that gave their time and expertise, the **Community** that they fostered (including many amazing collaborators and students), and how being at a small university let me take advantage of many **Opportunities** that came along the way.

I have been extraordinarily lucky in my career in the people I have worked for and with, and I owe a lot to their willingness to give of their time and expertise to help me grow. I've noticed over the years that many Gold Medal awardees reported that they turned towards entomology because of a fabulous entomology course and/or prof in their undergrad, often taken as an elective in another program. I had two such courses, and these taken together derailed my early plans to specialize in Botany. The first was the General Entomology course taught by Gordon Pritchard (Figure 2) at the University of Calgary; the second was the Aquatic Ecology course taught by Richard Hartland-Rowe, also at the University of Calgary.

Gordon's dry wit made him an engaging teacher, and his obvious and infectious passion for insects was clear from the start. The focus from both



Figure 1. A photo from the audience during the Gold Medal Address, Vancouver, November 2022.

A. Eichert

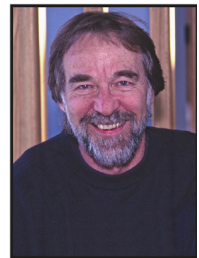


Figure 2. Gordon Pritchard.

J. Acorn

Gordon and Richard on field biology and aquatic insects was all I needed to tip me into my own lifelong passion – and a life of being able to make a career of “playing” in the water. Thanks to Gordon, I got my first job in entomology (nearly 50 years ago!), as a mosquito control tech for the Alberta government. Gordon also gave me my first research experience, as I did a 4th year project under his supervision. His attention to detail and willingness to give his time had a lasting impression on me. At the time, I thought of myself as a sort of a faceless undergrad, and these opportunities gave me the confidence I needed to pursue a career in aquatic ecology and aquatic entomology.

That first entomology job introduced me to another major mentor: for three summers I worked for Alberta Environment, surveying mosquitoes across Southern Alberta with Jock McIntosh (Figure 3). Jock introduced me to taxonomy, biodiversity studies, and field entomology. It was a dream job for a budding biologist! We hit every corner of southern Alberta, and I fell in love with prairies – surprising for a mountain kid like me – a region I would circle back to many years later when I co-edited two volumes of the Arthropods of Canadian Grasslands series of the Biological Survey of Canada.

The experience also led to full time employment in Entomology, working as an Agricultural Entomology tech for the Alberta Government. That early experience in Agricultural Entomology was valuable in collaborations later in my career, but I missed aquatic work. Consequently, I moved to a position with an environmental consulting firm that specialized in aquatic habitats. Here I got my first real taste of doing field biology in remote locations and in challenging seasons, working in northern Alberta and southern NWT.

It wasn't easy back then for a young woman to be involved in remote field work – a lot of guys simply refused to work in the field with women back then. I don't think it was so much that they were being sexist, in the ways that we think of it now... For example, you might notice that I'm a bit short. It was a common view that we just wouldn't be able to pull our weight through the long and often arduous days out in the field. Consequently, it was pretty typical for the “girls” to stay back in the lab sorting and identifying bugs and making figures for reports. I did a lot of that too, but I was happiest when I was out into the field.

Yet again, I owe a lot to some open-minded supervisors, especially Dan McCart and Dave Mayhood. They taught me that you didn't need brawn to do your job, as long as you could apply a bit of leverage! That came in handy when we needed to put the boats up onto the roof of the truck, or carry the outboard motor up from the water. They even provided me with my own little stool in the truck so I could reach to the top of the truck. This garnered a few laughs from co-workers, but it was also an early lesson in workplace accommodation.

There were also times when being short was an advantage – one time we were “picking” fish from nets set under the ice in lakes near Fort McMurray. The ice on the lake was nearly 3ft thick, but it was too cold to pull the nets right out of the water for picking – the fish froze as solid as a board, and couldn't be removed from the nets, meaning they had to be picked under water. So my colleagues held my legs to suspend me, face first down the hole in the ice, and I picked fish underwater and tossed them back up over my shoulder to the guys at the surface. I'm not sure how current Health and Safety committees would look on such practices today, but they gave me confidence to keep on in the profession, and keep pushing for field assignments.



Figure 3. Donna Giberson and Jock McIntosh checking a prairie pond for mosquitoes near Redcliffe Alberta, July 1978

P. Shollfield

It was at this time that I met Lynda Corkum, a senior scientist in the company, and a good friend to this day (Figure 4). I didn't realize until later how important it was for me to see another woman in a senior role to be able to see myself as a senior researcher some day. Lynda showed me that women could succeed in that mostly male-dominated world, and she encouraged me to go to grad school. Although I was loving the diverse work in consulting, I eventually followed her advice to go back to school and get my Master's.

For grad school, I was drawn to the University of Manitoba Entomology Department, mostly because of their connections with the highly regarded Freshwater Institute of the Department of Fisheries and Oceans. In hindsight, it was one of the best moves I could have made, since it introduced me to two men who further shaped my life and my career – My MSc supervisor Terry Galloway (Figure 5) and my PhD supervisor David Rosenberg (Figure 6). Both men taught me a lot about the practicalities of designing and carrying out research projects, but they also shared some life lessons. From Terry, I learned that it is absolutely ok to get excited about science and loving to teach, and that science doesn't have to be staid and dry. David taught me (among so many other things) not to take myself too seriously. They both also set examples of the importance of Service in our careers – basically encouraging us to just get involved! It's a lesson I've tried to follow and pass on to my own students.



P. Crawford

Figure 4. Donna enjoying a pint with Lynda Corkum in a pub in York, UK, September, 2006. (photo: Pat Crawford)



C. Galloway

Figure 5. Terry Galloway at the Tall Grass Prairie Preserve in Manitoba.



D. Giberson

Figure 6. Dave Rosenberg (right) with long time research partner Al Wiens getting ready to sample Southern Indian Lake, Manitoba, in July 1987.

The move to Manitoba was also a good one for me because of the example it set of establishing and maintaining a community of friends and colleagues. I'm grateful for the chance today to thank the people involved in the Entomology Department back then – Terry of course, but also Neil Holliday, Pat MacKay, Cam Jay, Reiny Brust, Grant Robinson, Mary Galloway, and Rob Roughley. Aside from the incredible support they all provided to us as grad students, they fostered an environment where we were all encouraged to interact and work with each other and help each other out. Today, we might call what we had at the U of M of the 1980s, "experiential education", since helping each other out in the lab and in the field taught us so much about so many different taxa and sampling and lab methods. In my first year, I helped count horseflies on cows, collect fleas from rodents and bird nests, search for stoneflies and water beetles from multiple aquatic habitats, harvest honey, and collect and rear black flies. And I can't remember many field trips to my study streams that I didn't have fellow students (and sometimes faculty members) lining up to

volunteer to help me out. Discussions on these trips were wide-ranging and often circled back to our research projects, turning into ad hoc brainstorming sessions. My own research abilities got better because of these sessions.

We had a lot of writing practise as well; something that we all loved to hate (those of us writing them, and I suspect also the ones that had to read them). I needed a bit of hindsight to recognise this commitment by the Faculty, who were willing to put so much time and effort into helping us improve our writing and presentation skills. They taught me the difference between marking and commenting designed to lift people up and help them improve, versus being critical and cutting them down. Who could have known (!) that I would end up teaching the scientific writing course at UPEI for most of my time there, drawing heavily on these early lessons? Thanks to U of M, I “grew up” scientifically in an environment where everyone was focused on helping you be better.

This image (Figure 7) hangs in the coffee room of the Entomology Department at the University of Manitoba. It shows the group we had at U of M back then as we returned from competing in a CBC scavenger hunt that was somehow based on a funny recording called “I hate bugs”; we showed the entomological flag to demonstrate that we loved bugs. I think of it as a great example of the spirit of community we had at the time.

At U of M, I learned that research is fun, research projects are enriched when people work on them together, and a supportive environment leads to good outcomes. I learned how much fun it could be to stay up most of the night with my supervisor watching mayfly eggs hatch! I learned that when I was struggling to find motivation to keep going, there was a community there to support me.

These lessons became especially important to me because some of my later experiences were not as positive. For example, in a different program at a much larger university, some colleagues and fellow students showed a darker side: hyper-critical, super-competitive, sometimes highly aggressive, and even toxic. With some, there was an impression that the more you could find fault in someone else’s work, the smarter you would look. Worse, it felt like one either had to embrace this toxic attitude or be left behind.

As an Associate Editor for several journals over the years, I’ve seen this attitude persist. I’ve been shocked by reviews that weren’t just critical, they bordered on vitriolic, with nasty comments taking the place of constructive ideas for improvement. It makes me wonder: When did we get to be so mean? I am grateful today to the ESC for giving me this platform to highlight this issue and ‘brainstorm’ some strategies we can employ to prioritize community and a support system.

I think we must help students learn how to be mentors in addition to being mentored. In one simple example, consider how many of us ask trainees to do critical evaluation of papers or proposals as parts of our courses or programs. How many also broaden the focus to ask trainees to celebrate the good parts of those readings, or provide constructive ideas of how to improve them as well as finding the potential flaws? An approach I found useful in my own lab was to involve my research students in reviews of journal papers (with the permission of the editors). This not only helped them hone their review skills, but also made them think about how to improve a project.



Figure 7. Students and Faculty of the Entomology Department of the University of Manitoba, after participating in a CBC scavenger hunt. This is a photograph of a photo hanging in the coffee room of the Entomology Department.

Similarly, I've been excited to see stronger emphasis on collaborative projects over the years, sometimes actually formalized as parts of student programs. This is a good step to encourage community building, but we need to remember that these programs don't flourish on their own – they need support and buy-in from all players in the program.

For the rest of my time today, I'd like to take you along some of my own journey as an entomologist at the University of Prince Edward Island, a little university on the east coast, which also just happened to be the only university in the province. Back in 1992, I jumped at the chance to work at UPEI. I loved the idea of teaching at a small, “primarily undergraduate” university, since I loved teaching and looked forward to small classes and lots of one-on-one contact, especially in field courses.

I knew there would be challenges in continuing with my research, since UPEI was an undergrad only school when I started there. But being an Aquatic Entomologist, and one working mainly in biodiversity studies, helped me here, since I didn't need a lot of space or resources. Although our administration liked the “idea” of us doing some research, there was no dedicated research space or funding. We could use teaching labs when they weren't being used, but couldn't really set anything up long term.

A bigger problem was finding time for research. Our main focus was on teaching and in common with other undergrad universities, course loads were high (six courses per year for the first several years, and five per year subsequently). We were also expected to be able to step in and teach a wide variety of courses when other colleagues were away on leave or otherwise unavailable. Over my 25 years at UPEI, I taught 23 different courses.

Another challenge was that UPEI didn't have a grad program. I knew that UPEI was an undergraduate only university when I arrived but was encouraged by suggestions that it was only a matter of time before we would be allowed graduate students. What I didn't realize was that it was actually against the law in Prince Edward Island for UPEI to have a grad program¹. When the University formed in 1969, other universities in the Maritimes were concerned that we were too small to support graduate studies, so they sought assurances it would be undergraduate only. The Government of PEI responded by writing that into the University Act! This would make life interesting later when we worked to introduce a grad program!

But being PEI's only university led to opportunities as well. A lot of local NGOs and Government Departments were keen on collaborating with us on research questions relating to Prince Edward Island, and these collaborations came with funding. That was powerful motivation to setting up a research program! In addition, turnover in faculty in the early 1990s meant that I was in a group of three new faculty members in Biology (a botanist, a geneticist, and me) which gave us sort of a ‘critical mass’ to push for a bit of dedicated research space. Our lobbying paid off: the Dean found us a large storage room that we could clean up and furnish from the surplus furniture room. We shared the space and equipment we were able to bring in, and had a space to share ideas and let students work on projects. The focus, of course, was on undergraduate research, but there was a clear demand for research opportunities. Early success in attracting students led to some interesting research on PEI and Maritimes insect distributions and ecology – enough to be successful in funding applications, including NSERC, who went on to support me through my entire career on PEI.

It is a truism that success can breed more success. A building upgrade in 2005 included dedicated (albeit limited) space for biological research. Development of a formal Honours program helped us to recruit and fund even more undergrad research students, and yes, to start pushing for our own graduate program. Working with colleagues from other Science departments, we jumped through the hoops to gain program accreditation from the governing body, the Maritime

¹This statement refers to the main campus of UPEI, and not the Atlantic Veterinary College on the UPEI campus, which did have a graduate program.

Provinces Higher Education Committee, and to persuade the government to change the University Act. The years of lobbying and proposal writing were intense and time-consuming, but we could supervise MSc students from 2000 onward, and PhD students a few years later! A key component was demonstrating our success in collaborative and interdisciplinary research, drawing on wide expertise to fill grad committees. For example, I often sat on student committees as “the biostats person”, leading to work on projects as diverse as species-at-risk (including plants and birds) to general ecology and toxicology, and even human nutrition studies involving school lunch programs. Projects tended to be student-driven, following their interests as long as we could find funding, and the focus was on helping each other succeed.

Funding opportunities were also important drivers of the type of research we carried out. NSERC funding was core to my own stream insect related research interests, but many projects were driven by questions and funding from the PEI government, Ducks Unlimited, Parks Canada or Environment Canada. These agencies often reached out with specific projects, sometimes in unexpected ways. One time, I received a phone call from our Minister of Environment on the last day of the fiscal year, saying that if I had an interesting project relating to PEI diversity, and could have a university approved proposal to him before end of business day, he had \$10,000 he could provide for it. It took a bit of scrambling, and it was probably only because we were a small place where we all knew each other that we were able to meet their deadline, but that funded our Odonata survey of PEI. Another time, I met the Chief Public Health Officer in the airport waiting room in Montreal, around the time of the big West Nile Virus scare – He asked me casually what mosquito species we had on PEI, and if they were important in West Nile Virus transmission. I told him that nobody had looked at them on PEI since the 1950s, so we didn't know. The next day, I had a call asking for a proposal for a fully funded study to survey mosquitoes on PEI.

The downside of this approach was that my research tended to be a bit scattered, covering a wide variation of taxa and questions (as a quick perusal of my publication list at <http://islandscholar.ca/people/giberson> will show). Some research granting agencies are not too keen on such a wide-ranging research background, and I received frequent notes with my NSERC reviews that I needed to focus a bit more. For example, try explaining to NSERC why an aquatic entomologist has a publication with her physiologist colleague on nutrition of school lunches... (in hindsight, perhaps I should have framed it as another example of studying foraging efficiency?). Being flexible has opened many doors for me that would not have been open. And what I'm proudest of here is that each of these represents relationships with students and collaborators that remain strong today.

Despite the range of taxa and studies, however, my major focus has been to try to fill in biodiversity gaps in poorly studied or sampled areas or habitats in Canada, with an emphasis on aquatic insects. These poorly studied areas included PEI (and some other areas of the Maritime Provinces), as well as arctic Canada.

It may be hard to believe that a province so well-served by road access could be understudied, but in fact, little work had been done on documenting PEI insects when I arrived on the Island and many species maps showed PEI as a clear white space with few or no “dots on the map”². My students and I, with regional, national, and international collaborators, have filled in a lot of gaps in biodiversity knowledge in PEI and adjacent provinces, contributing to the lists of mayflies, stoneflies, caddisflies, aquatic Diptera, bumblebees, Odonata, beetles, and biting flies. PEI's small size and good road access provides a unique opportunity to collect inexpensively in every corner of the province. An example is a long-running study on Odonata of PEI, which is currently standing at about 14,500 records from north to south and east to west in the province (Figure 8).

²This is not to say that no collecting had occurred on PEI – Colleagues such as Lawson Drake and Ninian LeBlanc at UPEI had organized Island-wide collecting programs with specimens deposited in the UPEI museum, and others had collected specimens for national or regional museums as well. There were just very few published accounts of PEI insects at that time.

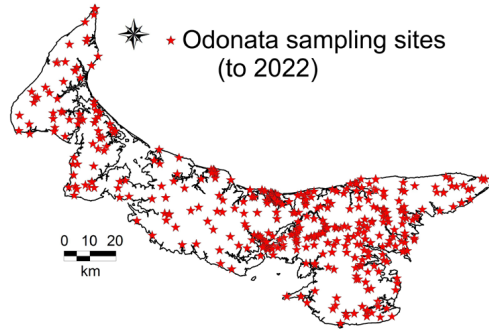


Figure 8. Prince Edward Island, showing locations of Odonata records from PEI up to the end of 2022.

My own chief passions have long been mayflies and streams, but living on PEI also let me fall in love with cold springs, bogs, salt marshes, and ponds, all of which could be easily accessed just minutes from the university. The proximity and easy access made these habitats perfect for undergraduate and graduate project work (Figure 9).



Figure 9. A snapshot of biodiversity work around PEI and adjacent Maritimes during my time at UPEI. Clockwise from upper left:

1. Donna Giberson showing students how to sample streams,
2. MSc Student Rachael Eedy sampling the West River PEI,
3. Sampling one of the many bubbling springs on PEI for Knysh's MSc work (helped by summer student Qi Liu),
4. Peter Adler (Clemson University) sampling the top of a waterfall on the Magdalene Islands for black flies,
5. Honours student Dylan Blacquiere hunting for salt marsh caddisflies in a PEI salt marsh,
6. A group of pitchers of a purple pitcher plant in Glenfinnan Bog, PEI, which was the base for several honours and master's projects,
7. Meghan Marriott and Harrison Carmichael collecting bumble bees for Harrison's Honours project,
8. One of the bumblebees (and a seven-spotted lady beetle) at Harrison's field site.



Figure 10. Agriculture-based collaborative work with Christine Noronha and Dave McCorquodale. Clockwise from upper left: 1. Christine Noronha (right) and MSc student Kathryn Dau-Schmidt at a collecting trip associated with an Acadian Entomological Society meeting, 2. Dave McCorquodale leading a "bug walk" for the Nova Scotia Naturalists, 3. Meghan Marriott checking for lady beetles as part of her MSc project, 4. Clayton D'Orsay sweeping for beetles in a Nova Scotia pasture as part of his MSc project, 5. Olivia Doran working in the Agriculture and Agrifood Canada field plots as part of her Honours research, 6. Kathryn Dau-Schmitt and coworkers in potato plots used for Kathryn's MSc research. Centre inset: Pitfall traps used by Clayton for his pasture project.

Ease of access also led to collaborative work with Christine Noronha of Agriculture and Agri-food Canada and Dave McCorquodale at Cape Breton University (Figure 10). These studies, though well out of my own comfort zone in their terrestrial focus, gave many students the opportunity to gain work and research experience doing applied field entomology studies. Targeted funding for biting fly, agriculture, and environmental assessment studies, and even marine projects, took me into other habitats and collaborations. It has kept me on my toes all those years, just keeping up with the different projects and the amazing students I was privileged to work with over the years.

If I had to pick the work that was the biggest highlight for my career, I have to say that it was the opportunity to carry out insect biodiversity studies in the Canadian North, a long-running collaboration with Doug Currie of the Royal Ontario Museum (Figure 11), and some other partners. Unlike the work on PEI, arctic work is truly remote and very expensive, so again, a bit out of my comfort zone at the time. The collaboration came about through one of my Service roles – we know how valuable it can be to be involved with national and regional committees, providing input into things that are important to us – but these can also forge connections that stay with us. Two important ones for me, in addition to my involvement with the ESC, have been COSEWIC and the Biological Survey of Canada (BSC). Our work in the north came out of a BSC Directors meeting, when Doug Currie mentioned he'd been trying for years to persuade people to join him in canoeing a central barrens river (the Horton River) from its source near Great Bear Lake to the Arctic Ocean, to collect aquatic insects along the north-south gradient. By the end of that



Figure 11. Doug Currie at the confluence of the Hanbury and Thelon Rivers, June 2002.

meeting, we had tentative plans for the trip, and in subsequent years we were able to visit other rivers and many more points north to collect our favourite insects: black flies for him and the mayflies and stoneflies for me (Figure 12).

These trips were life changing for me. It wasn't just the adventures (which were many) and encounters with amazing wildlife, incredible scenery, and my first experience of white-water canoeing (Figure

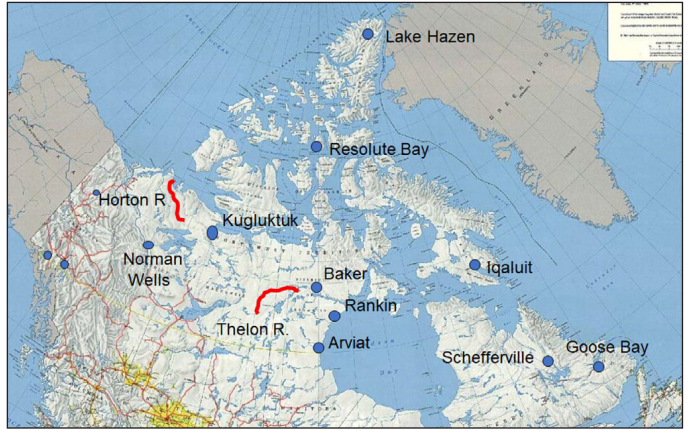


Figure 12. Locations sampled during our northern project work: 2000-2012

13), or even the specimens which filled in a lot of maps and biodiversity data gaps (Figure 14). The highlight for me will always be the opportunity to interact with local communities (Figure 15), and learn from them, even as we tried to give back as well. I had the chance to do training sessions with local youth, both formal and ad hoc, and spent many hours at kitchen tables with local elders,



Figure 13. Snapshots of the northern expeditions. Clockwise from upper left: 1. Donna running a rapid on the Horton River with guide Tim Gfeller, 2. Doug Currie and Peter Adler getting ready to launch the loaded canoes after breaking camp on the Thelon River, 3. Donna sorting bugs beside a tundra pond near Rankin Inlet, 4. Donna on the "honda" (quad bike) on one of the trails near Arviat, NU, 5. Donna sorting bugs in her portable "bug net" on the tundra near Rankin Inlet, NU (Jade Savage and Steve Burian are checking the Malaise trap in the background), Centre inset (6): Donna "picking bugs" on the side of the Horton River.

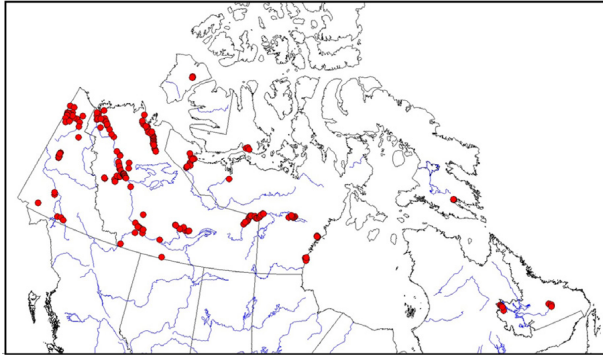


Figure 14. Northern Canada, showing locations where mayflies were collected during our northern project work, filling in many distribution gaps in the central arctic.



Figure 15. Interactions with community members. Clockwise from upper left: 1. Doug Currie showing a local elder the blackflies found in a local stream near Arviat, NU, 2. Doug Currie (Centre) and Peter Adler (right) explaining our project to local elders near Baker Lake, 3. Students sampling a local stream near Kugluktuk, NU, watched over by an elder monitoring for bears while we worked, 4. Donna helping one of the students from Kugluktuk to identify the insects he collected, 5. Steve Burian showing our "catch" to some local students from Rankin Inlet, NU.

drinking tea and learning about the land. A fun thing I was also able to do is donate stereoscopes to schools and teachers in some small communities we visited – I picked these up for little or no cost from university labs that were replacing their 'scopes and took them north to use on our community visits. The local kids loved looking at 'bugs' under the microscope, and it was a treat to tell them that they could keep the microscope to use through the year.

In closing, I would like to say thanks again for the opportunity to speak to you today, and just repeat again the lessons I've learned from my life as Entomologist at a small, generalist university: Be kind and support each other, Be mentors and train mentors, and most important, have fun and be flexible. Thank you.



S. Miller

Receiving the Bert and John Carr Award has had a profound impact on my academic and professional trajectory, and I am immensely grateful to the Entomological Society of Canada for this opportunity. During the final semester of my BSc Honours in Ecology at Laurentian University, I was honoured to receive this award, which served as a catalyst for my subsequent employment as a summer student within the Acari Unit at the Canadian National Collection of Insects, Arachnids and Nematodes (CNC) in Ottawa, Ontario. This has led to a MSc. position at Carleton University contributing to the [Canadian Soil Biodiversity Observatory \(CSBO\)](#) through metabarcoding soil mesofauna across Ontario and Quebec.

Soil mesofauna, which is often overlooked in biodiversity studies, is an important part of our ecosystems. I aim to contribute to the growing knowledge of mesofauna biodiversity, specifically in the southern grassland habitats of British Columbia. Thanks to the funding I received, I was able to conduct fieldwork in the Okanagan area of BC, where I collected Collembola specimens and soil samples from four grassland areas. The individual collembolan samples have undergone DNA extraction and will be sent for Sanger sequencing this summer, with further identification based on morphological features. The collected soil samples were sent to Ottawa where they were processed on Berlese funnels for mesofauna extraction. These samples then underwent next-generation

Tori Miller 2022 Award

La réception du prix Bert et John Carr a eu un impact profond sur ma trajectoire académique et professionnelle, et je suis immensément reconnaissante à la Société d'entomologie du Canada de m'avoir donné cette opportunité. Au cours du dernier semestre de mon baccalauréat spécialisé en écologie à l'Université Laurentienne, j'ai eu l'honneur de recevoir ce prix, qui a servi de catalyseur pour mon emploi ultérieur comme étudiante d'été au sein de l'unité des acariens de la Collection nationale canadienne d'insectes, d'arachnides et de nématodes (CNC) à Ottawa, en Ontario. Cela m'a conduit à un poste de maîtrise à l'Université Carleton, où je contribue à [l'Observatoire canadien de la biodiversité des sols](#) (OCBS) par le métabarcodage de la mésofaune du sol dans l'ensemble de l'Ontario et du Québec.

La mésofaune du sol, souvent négligée dans les études sur la biodiversité, est un élément important de nos écosystèmes. Mon objectif est de contribuer à la connaissance croissante de la biodiversité de la mésofaune, en particulier dans les habitats des prairies du sud de la Colombie-Britannique. Grâce au financement que j'ai reçu, j'ai pu effectuer un travail de terrain dans la région de l'Okanagan, en Colombie-Britannique, où j'ai collecté des spécimens de collemboles et des échantillons de sol dans quatre zones de prairies. Les échantillons individuels de collemboles ont fait l'objet d'une extraction d'ADN et seront envoyés pour séquençage Sanger cet été, avec une identification plus poussée basée sur les caractéristiques morphologiques. Les échantillons de sol collectés ont été envoyés à Ottawa où ils ont été traités sur des entonnoirs de Berlese pour l'extraction de la mésofaune. Ces échantillons ont ensuite fait l'objet d'un séquençage de nouvelle génération, et je suis actuellement en train d'analyser ces données. Les résultats sur la biodiversité des échantillons de sol seront présentés virtuellement en août 2023. Veuillez

sequencing, and I am currently analyzing these data. The biodiversity results of the soil samples will be presented virtually in August 2023. Please email me at tori.miller@agr.gc.ca if you would like to attend or discuss the above projects.

A special thanks is deserved for my CNC supervisor, Dr. Marla Schwarzfeld, who provided access to her lab and countless hours over the past year mentoring me. I would like to also thank Dr. Monica Young for her expertise in bioinformatics and invaluable assistance with R and the sequencing data. Finally, I extend my gratitude to my former employers, Dr. Brian Starzomski and Dr. John Reynolds, for allowing me to utilize their collection permits and spend time with the 2022 [BC iNaturalist](#) team.

m'envoyer un courriel à tori.miller@agr.gc.ca si vous souhaitez y assister ou discuter des projets susmentionnés.

Je tiens à remercier tout particulièrement ma superviseuse du CNC, la Dre Marla Schwarzfeld, qui m'a donné accès à son laboratoire et m'a encadré pendant d'innombrables heures au cours de l'année écoulée. J'aimerais également remercier la Dre Monica Young pour son expertise en bio-informatique et son aide inestimable avec R et les données de séquençage. Enfin, j'exprime ma gratitude à mes anciens employeurs, Brian Starzomski et John Reynolds, qui m'ont permis d'utiliser leurs permis de collecte et de passer du temps avec l'équipe [iNaturalist BC](#) en 2022.



R. Barour

Hadil Elsayed 2022 Award

Je suis très honorée et reconnaissante d'avoir reçu la bourse Bert et John Carr en 2022 pour soutenir ma recherche doctorale à l'Université de York. Le projet de recherche que ces fonds ont soutenu vise à déterminer comment les communautés d'insectes ont changé d'une période à l'autre dans les zones protégées et quel rôle joue la variation interannuelle dans ces changements.

Plusieurs études menées dans le monde entier ont mis en évidence le déclin de la biomasse et de la diversité des insectes. Ces déclins rapides à l'échelle mondiale menacent des fonctions écologiques essentielles et de nombreux services écosystémiques dont nous dépendons. Le déclin de la biomasse et de la diversité des insectes aura un impact direct sur les nombreux organismes qui dépendent des insectes pour se nourrir, menaçant ainsi des interactions et des fonctions écologiques essentielles. Ce déclin mondial est un dilemme à multiples facettes qui est influencé par les maladies, les pesticides, le changement d'utilisation des terres, l'introduction d'espèces exotiques et le changement climatique.

I am very honoured and grateful to have been awarded the Bert and John Carr Award in 2022 to support my PhD research at York University. The research project that these funds supported aims to determine how insect communities have changed between time periods within protected areas and what role interannual variation plays in these changes.

Several studies worldwide have documented declines in insect biomass and diversity. These rapid global declines are threatening essential ecological functions and many ecosystem services that we rely on. A decline in insect biomass and diversity will directly impact the

many organisms that rely on insects for food, threatening key ecological interactions and functions. This global decline is a multifaceted dilemma that is impacted by diseases, pesticides, land-use change, the introduction of alien species, and climate change.

In the early 1990s, insects were collected using malaise traps at various sites across Long Point, mainly the Long Point National Wildlife Area, and St. Williams Conservation Reserve. To assess how insect community composition has changed over 30 years, sampling methods were replicated at the same sites in 2021 and 2022, with 2023 to be sampled. To assess how interannual variation impacts insect community composition, a subset of sites was chosen for increased sampling, including aerial netting and visual surveys of Hymenoptera and Lepidoptera. Insect biomass and diversity from 2021 and 2022 show varying results when compared to 1992 and 1994. Results differ between sites, mainly driven by environmental variables such as landscape and vegetation. Looking at the changes in Order biomass between the two time periods, Orders like Lepidoptera, Coleoptera, and Orthoptera declined between the 1990s and the 2020s. However, Orders such as Diptera and Trichoptera showed large increases between the two periods. Looking at the impacts of interannual variation, total insect biomass decreased from 2021 to 2022 likely driven by the decline in summer precipitation between the two years. These results are largely preliminary; data from 1995 and the upcoming field season from this year, 2023, have yet to be included in the analysis.

The Carr award allowed me to conduct my fieldwork in 2022. It covered much of the mileage required to get down to Long Point from Toronto, as well as the purchasing of field equipment required including jars and vials to store the malaise trap samples. Thank you to the Entomological Society of Canada for supporting this work, and to Environment and Climate Change Canada, Long Point Bird Observatory, Nature Conservancy of Canada, and Ontario Ministry of the Environment, Conservation, and Parks for all their help with field work planning and site access.

Au début des années 1990, des insectes ont été collectés à l'aide de pièges Malaise sur différents sites de Long Point, principalement la réserve faunique nationale de Long Point et la réserve de conservation de St-Williams. Pour évaluer l'évolution de la composition de la communauté d'insectes en 30 ans, les méthodes d'échantillonnage ont été reproduites sur les mêmes sites en 2021 et 2022, et l'année 2023 fera l'objet d'un échantillonnage. Pour évaluer l'impact des variations interannuelles sur la composition de la communauté d'insectes, un sous-ensemble de sites a été choisi pour un échantillonnage accru, comprenant des filets aériens et des observations visuelles d'hyménoptères et de lépidoptères. La biomasse et la diversité des insectes de 2021 et 2022 présentent des résultats variables par rapport à 1992 et 1994. Les résultats diffèrent d'un site à l'autre, principalement en raison de variables environnementales telles que le paysage et la végétation. Si l'on examine les changements dans la biomasse des ordres entre les deux périodes, les ordres comme les lépidoptères, les coléoptères et les orthoptères ont diminué entre les années 1990 et les années 2020. En revanche, les ordres tels que les diptères et les trichoptères ont connu de fortes augmentations entre les deux périodes. En ce qui concerne l'impact des variations interannuelles, la biomasse totale d'insectes a diminué entre 2021 et 2022, probablement en raison de la baisse des précipitations estivales entre les deux années. Ces résultats sont largement préliminaires, les données de 1995 et de la prochaine saison de terrain de cette année, 2023, n'ont pas encore été incluses dans l'analyse.

La bourse Carr m'a permis de mener mon travail sur le terrain en 2022. Elle a couvert une grande partie du kilométrage nécessaire pour se rendre à Long Point depuis Toronto, ainsi que l'achat de l'équipement de terrain requis, y compris les bocaux et les flacons pour conserver les échantillons des pièges Malaise. Nous remercions la Société d'entomologie du Canada d'avoir soutenu ce travail, ainsi qu'Environnement et changement climatique Canada, l'Observatoire d'oiseaux de Long Point, Conservation de la nature Canada et le ministère de l'Environnement, de la Conservation et des Parcs de l'Ontario pour toute l'aide apportée à la planification du travail sur le terrain et à l'accès au site.

Leafy spurge and intelligent tinkering

Shane Sater

In much of North America, leafy spurge (*Euphorbia esula*) is a much-hated, noxious weed. This Eurasian plant has spread across millions of hectares of rangeland, reducing forage quality for cattle and posing a competitive threat to native plants (Gucker 2010). On a human scale of values, it might be tempting to say that leafy spurge, in North America, is “bad.”

But when it comes to ecology, things are rarely as simple as “good” and “bad.” And for leafy spurge, some observations I’ve made in recent years complicate the picture.

These observations are centered on a stream restoration site near Helena, Montana, USA, where spurge grows patchily in the disturbed riparian zone. Its bloom period here extends for several months, from mid-May into early August (Figure 1). And on any warm, sunny day during this period, these flowers are busy with a remarkable variety of insects.

Since 2021, I’ve collected 95 insect specimens from spurge inflorescences and photographed dozens more. Wasps, flies, and beetles are well-represented here; bees are relatively rare. I typically see insects visiting this plant’s prominent, easily accessible extrafloral nectaries, gathering sugars.

Ichneumonid wasps (Ichneumonidae) are especially common spurge visitors. This group contains over 5 000 North American species and is poorly studied (Claridge 2023). All are parasitoids: larvae develop on a particular host arthropod, eventually killing it. At this restoration site, leafy spurge is by far the most popular flower with the ichneumonids. Numerous species are present here.

In addition, I frequently see predatory wasps visiting spurge nectaries. Among these are the crabronid *Astata*, which provisions its nest with paralyzed bugs; *Oxybelus*, which hunts flies (Figure 2); and *Tachysphex*, which hunts grasshoppers or their relatives (Evans 1970). There are slender-bodied spider wasps (Pompilidae) such as the black-and-orange *Cryptocheilus* (Figure 3), which hunts wolf spiders (Lycosidae), and a dusty gray *Aporinellus*, which hunts jumping spiders (Salticidae).



Figure 1. *Euphorbia esula* on the Sevenmile Creek restoration site near Helena, MT.

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Figure 2. *Oxybelus* sp. (Hymenoptera: Crabronidae) collected from leafy spurge.

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Figure 3. *Cryptocheilus terminatus* (Hymenoptera: Pompilidae) collected from leafy spurge.



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Figure 4. An ichneumonid (Hymenoptera: Ichneumonidae) collected from leafy spurge.



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Figure 5. An ichneumonid (Hymenoptera: Ichneumonidae) collected from leafy spurge.



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Figure 6. An ichneumonid (Hymenoptera: Ichneumonidae) collected from leafy spurge.



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Figure 7. *Ichneumon ambulatorius* (Hymenoptera: Ichneumonidae) collected from leafy spurge.



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Figure 8. A soldier fly (Diptera: Stratiomyidae) collected from leafy spurge.

What does this look like in the field? It's 16 June 2022, a morning at the cusp of summer. Today I'm out on a foray, looking for flower visitors on the leafy spurge patches. The landscape is bursting with life, the hills green from recent rains. The meadowlarks are singing and the cottonwood leaves are out. Songbirds are everywhere.

Visiting the leafy spurge, I find one ichneumonid that is jet-black with red legs (Figure 4). Another is black with scattered patches of cream (Figure 5). There's a black ichneumonid with orange legs (Figure 6). One has a strikingly patterned abdomen, orange at the base followed by black and white stripes (Figure 7). I find an orange ichneumonid with dark-banded wings, and another whose abdomen is the deep red of a Bing cherry. This diversity is much more than just a pleasing kaleidoscope. Each species has its own life history, and each targets a specific type of insect as its host. If I could even begin to understand the ways that these wasps influence the local food web, it would be mind-blowing.

Although the ichneumonids are the most conspicuous and varied insects visiting leafy spurge today, they aren't alone. I catch an elongate, hairy black fly, which turns out to be a march fly (Bibionidae). As larvae, these species are generally scavengers or herbivores in the soil (Hardy 1981).

Another fly has a flattened body. Its thorax is covered with velvety golden hairs (Figure 8). This is a soldier fly (Stratiomyidae). Many species in this family are flower visitors; the larvae are typically aquatic or associated with decaying matter (James 1981).

The diversity is overwhelming. I catch a large, extremely wary fly with a polished, metallic-blue abdomen: a blow fly (Calliphoridae).

A few small, extremely active black wasps with iridescent blue wings are visiting the spurge. I manage to catch one. This wasp isn't an ichneumonid: the antennae are much less segmented (with just 12–13 apparent segments). It's a spider wasp (Pompilidae).

I stop in the shade of a chokecherry (*Prunus virginiana*) to finish some notes on the insects I've seen. When I'm finished, I head back towards the leafy spurge patches. But I have trouble getting there, because on the way I have to walk past the two-groove milkvetch (*Astragalus bisulcatus*). The huge, bushy purple clumps of this native legume are in full flower (Figure 9). They're busy with activity, as well: honey bees, two species of bumble bees, and a variety of other hairy bees are going from bloom to bloom. Today I'm trying to focus on the leafy spurge, but it would be very easy to get sidetracked watching insects on the milkvetch...

When I finally return to the leafy spurge clumps, I'm still finding more insect diversity. The tiny, iridescent cuckoo wasps (Chrysididae) are getting active now, traveling from flower to flower. I catch a small, fuzzy bee fly (Bombyliidae) with a dark stripe along the front of its wing.

And that's not all. By the end of the summer, I've found crane flies (Tipulidae) and syrphids (Syrphidae), stoneflies (Plecoptera), tumbling flower beetles (Mordellidae), sphecid wasps (Sphecidae), click beetles (Elateridae), blister beetles (Meloidae), and many more on the spurge.

What about the habitat context? This leafy spurge population grows within a degraded community dominated by smooth brome (*Bromus inermis*) and other exotic grasses. And within this system, it appears to be providing an important resource for a diversity of insects.

But is leafy spurge *actually* boosting this area's carrying capacity for flower-visiting insects? Or could it be that leafy spurge is simply "stealing" flower visitors from the few native plants that have managed to persist here, such as two-groove milkvetch and giant goldenrod (*Solidago gigantea*)? My qualitative observations on this site suggest that flower visitors overlap little between these plants—implying that spurge may, indeed, be increasing insect habitat within this system.

Tepedino et al. (2008) examined a similar question in a park in Utah. Focusing on bees, they found that native plants on their study site attracted different, more specialized pollinators than did non-native plants. Based on this work, they suggested that, at least under these conditions, the presence of non-native species may boost a landscape's carrying capacity for bees.

For wasps and leafy spurge, this is a question that remains open for investigation. But in the meanwhile, I propose that Aldo Leopold's principle of "intelligent tinkering" (Leopold 1966, p. 190) suggests a prudent course of action. Before we label a weed "bad" and try to eradicate it, let's consider what it's doing for insect diversity. And perhaps, instead of eradicating weeds, increasing native plant diversity would be a better management goal.



Figure 9. A bumble bee (Hymenoptera: Apidae: *Bombus* sp.) visiting two-groove milkvetch (*Astragalus bisulcatus*).

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Insect genomics: more than just a buzzword?

The *Bulletin* asks a practitioner: Michel Cusson

Bulletin: Would you please give us your definition of genomics?

M. Cusson: Strictly speaking, the term “genomics” refers to the study of an organism’s entire genome, with a focus on its structure and gene content. However, people working in this field, including myself, often use the word “genomics” to include various types of enquiries that examine only a portion of a genome (e.g., specific sets of nuclear or mitochondrial genes). In addition, the term “genomics” is often used in reference to modern DNA sequencing technologies, including high throughput approaches, as well as to the various methods and algorithms used to analyze DNA and identify genes and markers.

Génomique des insectes: plus qu’une simple tendance à la mode?

Le *Bulletin* pose la question à un praticien : Michel Cusson

Bulletin : Pourriez-vous nous donner votre définition du mot « génomique »?

M. Cusson : Dans son sens stricte, le terme « génomique » fait référence à l’étude du génome entier d’un organisme, avec une attention particulière à sa structure et à son contenu en gènes. Cependant, les gens qui travaillent dans ce domaine, dont moi-même, accordent souvent un sens plus large au terme « génomique » pour y inclure des études qui concernent une portion limitée du génome (par ex., groupes ciblés de gènes nucléaires ou mitochondriaux). Aussi, on utilise couramment le terme « génomique » en lien avec les méthodes modernes de décryptage de l’ADN, dont le séquençage à haut débit, ainsi qu’avec les diverses méthodes et algorithmes utilisés pour en faire l’analyse, identifier des gènes et identifier des marqueurs.

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Bulletin: An increasing number of entomologists resort to using genomics-based approaches to address their research questions. Is this justified or is it just a fad?

M. Cusson: There's no doubt in my mind that genomics is making key contributions to entomological research. Of course, with any emerging technology, there will always be individuals who just want to jump on the bandwagon so they can be perceived by their peers as being on the cutting edge, and some could possibly want to integrate genomics in their grant applications solely as a means of accessing some specialized sources of funding. However, I believe that such purely opportunistic use of genomics in insect science is now restricted to a fringe of grant applicants; indeed, most serious entomologists use genomics because of the various new avenues it offers to address research questions that were previously difficult or impossible to address due to a lack of appropriate tools. So, to get back to your question, I think the use of genomics in insect science is fully justified and represents far more than just a fad that will eventually pass.

Bulletin: Could you give examples of basic insect science themes that warrant the use of genomics to shed light on some entomological questions?

M. Cusson: Most significantly, genomics helps address various questions relating to insect evolution. Before the introduction of DNA sequencing technologies and, more recently, the advent of high throughput approaches to decrypt DNA, estimating the evolutionary path and ancestral origins of different insect taxa relied primarily on phenotypic (typically morphological) similarities among extant and fossil specimens. Although this approach has provided foundational knowledge for insect phylogeny, the use of molecular markers

Bulletin : De plus en plus d'entomologistes ont recours à des approches fondées sur la génomique pour aborder des thèmes de recherche. Est-ce justifié ou s'agit-il d'une mode passagère?

M. Cusson: Il n'y a aucun doute dans mon esprit que le recours à la génomique permet des contributions majeures à la recherche entomologique. Évidemment, comme cela se produit souvent avec des approches et technologies émergentes, certains individus peuvent être tentés de « suivre la parade » dans le but d'être perçus par leurs pairs comme étant à la fine pointe des développements; ainsi, certains scientifiques pourraient choisir d'intégrer la génomique à leurs demandes de subvention uniquement afin d'avoir accès à des sources spécialisées de financement. Cependant, je crois qu'une telle utilisation purement opportuniste de la génomique est limitée à une petite frange de demandeurs de subventions. En effet, la plupart des entomologistes sérieux utilisent la génomique en raison des nombreuses possibilités qu'elle offre de répondre à des questions précédemment difficiles à aborder faute d'outils appropriés. Donc, pour revenir à votre question, je pense que l'utilisation de la génomique en entomologie est pleinement justifiée et représente beaucoup plus qu'un simple engouement passager.

Bulletin : Pourriez-vous donner des exemples de comment l'utilisation de la génomique pourrait permettre de mieux faire la lumière sur des questions de science fondamentale en entomologie?

M. Cusson : À mon sens, l'apport le plus significatif de la génomique à l'entomologie fondamentale concerne les questions qui touchent l'évolution des insectes. Avant la venue des technologies de décryptage de l'ADN et, plus récemment, des méthodes de séquençage à haut débit, les efforts visant à tracer le parcours évolutif et les origines ancestrales de différents taxons d'insectes reposaient essentiellement sur les similitudes phénotypiques (habituellement morphologiques) entre spécimens existants et fossiles. Bien que cette approche ait permis l'acquisition de connaissances qui ont constitué

is now helping refine and, in some cases, substantially alter existing assessments of relatedness among insect taxa. This being said, the reliability of any DNA-based method must be assessed in the light of the type and number of molecular markers used and the method selected to estimate the most probable phylogenetic tree, and this is where some expert knowledge is necessary to make the call.

Beyond issues of phylogenetic inference, modern genomics also provides tools to track genetic differentiation among various populations of a given species, thereby allowing the elaboration of scenarios as to where a species initially arose, where and when it invaded new habitats, and whether geographically distinct populations form genetically recognizable units potentially representing subspecies on the path to speciation. High throughput DNA sequencing technologies have greatly facilitated this type of investigation as they enable the identification of very large numbers of genetic markers within each population, thereby improving their genomic characterization.

The sequencing of insect genomes is also of relevance to the study of insect evolution, particularly through comparative analyses of genomes from different species and taxonomic groups. This approach enables the identification of evolutionary shifts in genome structure (e.g., identification of chromosome fusion or fission events) and can reveal the appearance of novel genes along the evolutionary trajectory or show how some gene families have either expanded or retracted, with functional implications for the emergence or disappearance of some biological traits.

Bulletin: Could you give examples of how genomics has already provided applications in the field of insect pest management?

les fondements de la phylogénie des insectes, l'utilisation de marqueurs moléculaires permet maintenant de raffiner et, dans certains cas, de substantiellement modifier certaines évaluations du degré de parenté entre différents taxa d'insectes. Ceci étant dit, la fiabilité des méthodes fondées sur l'ADN doit être évaluée à la lumière du type et du nombre de marqueurs moléculaires utilisés et de la méthode employée pour estimer l'arbre phylogénétique le plus probable; ici, l'avis d'un expert en la matière peut s'avérer très utile, voire essentiel.

Au-delà des enjeux d'inférence phylogénétique, la génomique moderne fournit aussi des outils permettant de caractériser le niveau de différenciation génétique entre diverses populations d'une même espèce, permettant ainsi d'élaborer des scénarios quant à son origine géographique probable, où et quand elle a envahi de nouveaux habitats ou territoires, et la possibilité que des populations géographiques distinctes forment des unités génétiquement reconnaissables, potentiellement en voie devenir de nouvelles espèces. Les méthodes de séquençage à haut débit ont grandement facilité ce type d'investigation en permettant l'identification rapide d'un très grand nombre de marqueurs génétiques à l'intérieur de chaque population, améliorant ainsi leur caractérisation génomique.

Le séquençage de génomes joue aussi un rôle important dans l'étude de l'évolution chez les insectes, particulièrement par le biais d'études comparatives impliquant les génomes de différentes espèces appartenant à un ou plusieurs groupes taxonomiques. Une telle approche permet d'identifier des virages évolutifs dans la structure des génomes (par ex., identification d'événements de fusion ou de fission de chromosomes) et peut révéler l'émergence de nouveaux gènes le long d'une trajectoire évolutive au sein d'un groupe donné ou mettre en évidence des expansions ou retractions de familles de gènes ayant des implications fonctionnelles pour l'apparition ou la disparition de certains traits biologiques.

Bulletin : Pourriez-vous donner des exemples d'outils fondés sur la génomique qui trouvent une application dans le domaine de la gestion des insectes ravageurs?

M. Cusson: Not unlike what we've witnessed in the medical sciences (e.g., during the COVID-19 pandemic), the development of DNA-based diagnostic tools is where genomics has had its greatest practical impact in the field of insect pest management. Most people have heard of the PCR-based method widely used to diagnose SARS-CoV-2 infections. This method rests on a comparison of many sequenced viral genomes with the aim of identifying "molecular signatures" specific to the targeted virus. These signatures (i.e., species- or strain-specific sequences of nucleic acids) are then used to selectively amplify, by PCR, a portion of the genome that contains that molecular signature. In the case of the COVID-19 diagnostic approach, presence or absence of amplification of the targeted sequence was used to determine if a person was infected or not by the virus. Very similar approaches have been developed to help plant protection regulatory agencies (e.g., Canadian Food Inspection Agency) in their identification of intercepted insect material suspected of posing an invasive threat to North America; indeed, insect life stages found during inspections of foreign vessels that enter Canadian and U.S. ports are often difficult to identify on the basis of morphological characters, and this is where PCR-based molecular assays come in handy in preventing accidental introductions of potentially devastating invasive species. Of course, the reliability of such assays rests on a comparison of marker genes from several closely related species and from many different specimens of each species.

The approaches I referred to above to characterize genetic differentiation among various populations of a given species are also used to develop molecular assays aimed at the identification of the geographic origins of intercepted specimens considered to pose an invasive risk. Knowledge of the geographic source of a potentially invasive insect helps plant regulatory agencies map routes of accidental introductions

M. Cusson : Vous l'avez peut-être remarqué, c'est avec le développement d'outils de diagnostic moléculaire que le recours à la génomique semble avoir le plus grand impact dans le domaine des sciences médicales. Or, il en va de même pour l'entomologie appliquée. La plupart des gens ont entendu parler des méthodes fondées sur la PCR utilisées à grande échelle dans le diagnostic des infections au SARS-CoV-2. Ces méthodes sont basées sur la comparaison de multiples séquences de génomes viraux dans le but d'identifier des « signatures moléculaires » spécifiques au virus ciblé. Ces signatures (i.e., une séquence en acides nucléiques spécifique à un virus ou à un de ses variants) sont alors utilisées pour amplifier de façon sélective, par PCR, une portion du génome viral qui contient cette signature moléculaire. Dans le cas de l'approche diagnostique visant la COVID-19, la présence ou l'absence d'amplification de la séquence ciblée a été utilisée pour déterminer si une personne était infectée ou non par le virus. Or, des approches très semblables ont été développées en soutien au travail de surveillance d'agences gouvernementales ayant des mandats spécifiques en matière de protection des plantes (par ex., l'Agence canadienne d'inspection des aliments; ACIA), incluant l'interception d'insectes exotiques soupçonnés de poser un risque d'invasion en Amérique du Nord. En effet, les insectes interceptés lors d'inspections de navires étrangers dans les ports canadiens et américains sont souvent à un stade immature (ex. œufs), rendant leur identification sur la base de caractéristiques morphologiques presque impossible. Et c'est là que des essais moléculaires fondés sur la PCR se montrent utiles pour prévenir l'introduction accidentelle d'espèces exotiques envahissantes aux conséquences potentiellement désastreuses. Évidemment, la fiabilité de tels essais moléculaires repose sur la stabilité génétique des signatures moléculaires, lesquelles doivent être comparées parmi plusieurs espèces étroitement apparentées aux espèces ciblées et parmi de nombreux spécimens de chaque espèce.

L'approche visant la caractérisation des différences génétiques entre diverses populations d'une même espèce – approche à laquelle j'ai fait référence précédemment – peut aussi être utilisée pour développer un essai moléculaire permettant

and put in place sanitary measures with trading partners to help prevent future introductions.

Concerning the development of novel, environmentally sound pest-control products, the ever-increasing number of available insect genomes makes it easier to identify genes (and the proteins they encode) that could be selectively interfered with to fatally disrupt a key biological function in a given species or in a narrow range of species. “RNA interference” (“RNAi”) has drawn much attention in recent years as a means of selectively suppressing insect populations through interference with the expression of a specific gene. This technology relies on the use of a synthetic molecule (here, double-stranded RNA, “dsRNA”) that is designed to silence the expression of a target gene, thereby inhibiting the production of the protein it encodes. RNAi-based pest suppression has so far had commercial success in the development of transgenic crops that produce pest- and gene-specific dsRNA, but various sprayable dsRNA formulations are currently being assessed, including some that use insect viruses to vector the dsRNA.

Bulletin: What should you do if you’re an entomologist with no background in genomics, but whose research objectives would be best met using genomics approaches?

M. Cusson: I think the first step would be to acquire basic knowledge, at least at a conceptual level, of the genomics and analytical tools available to address a given research question. For instance, if you’re interested in species delimitation among

d’identifier l’origine géographique d’un spécimen intercepté et posant un risque d’envahissement. Une connaissance de la source géographique d’un insecte potentiellement envahissant permet aux agences comme l’ACIA de cartographier les routes d’introduction accidentelles et de mettre en place, avec les partenaires commerciaux, des mesures sanitaires qui visent à prévenir de futures introductions.

En ce qui concerne le développement de nouveaux produits antiparasitaires respectueux de l’environnement, la disponibilité croissante de génomes d’insectes décryptés facilite beaucoup l’identification de gènes (et des protéines qu’ils encodent) avec lesquels il serait possible d’interférer de façon sélective en vue de perturber de façon fatale une fonction biologique chez une espèce donnée ou chez un spectre étroit d’espèces. L’interférence par ARN (“RNA interference” ou “RNAi”) attire présentement l’attention de plusieurs entomologistes comme méthode de lutte via l’interférence avec l’expression d’un gène donné. Cette technologie repose sur l’utilisation d’une molécule synthétique (ici, de l’ARN double brin, “ARNdb”) conçue pour inhiber l’expression d’un gène donné, bloquant ainsi la production de la protéine qu’il encode. Des produits antiparasitaires fondés sur le RNAi ont déjà connu des succès commerciaux à travers le développement de cultures transgéniques qui produisent des ARNdb spécifiques à un gène chez un ravageur donné, mais plusieurs formulations d’ARNdb pulvérisables font présentement l’objet d’évaluations en laboratoire, dont certains produits qui utilisent un virus comme vecteur de l’ARNdb.

Bulletin : Comment un néophyte de la génomique peut-il envisager avoir recours à cette discipline lorsque celle-ci semble être le meilleur moyen d’atteindre ses objectifs de recherche en entomologie?

M. Cusson : Je pense qu’il faut d’abord songer à se familiariser avec certains concepts de base de la génomique, en accordant une attention particulière aux outils analytiques disponibles pour aborder une question de recherche donnée. Par exemple, si vous êtes intéressé par la délimitation des espèces au

closely related taxa, you'll need to get a sense of which markers (and how many of them) are necessary to provide a reliable assessment, how marker sequences can be obtained, and how they can be used to generate the phylogenetic analyses from which conclusions will be drawn. To this end, you may want to first consult websites and books that provide this kind of information, but you should ultimately sit down with a colleague who has appropriate knowledge and skills to help you define the scope of the work required to fully address the question at hand. In some cases, you'll realise that most of the marker sequences you need are already present in public data bases (and you can easily learn how to retrieve them), thus substantially reducing the extent of the marker acquisition work required. If the overall project can be easily and rapidly conducted by someone who has the relevant skills, you may be able to strike a collaboration with a colleague whereby you will provide funding for the marker acquisition steps (e.g., DNA extraction, PCR amplification and sequencing) and, if necessary, a stipend for a student who will work under the collaborator's supervision. With respect to the analytical work, you may wish to leave it in the expert hands of your collaborator or, if you are keen to acquire new skills, do it yourself after signing up for a phylogenetic analysis training session, either online or one offered at your institution.

For more extensive types of analyses, especially those involving the scanning of entire genomes, you may consider recruiting a postdoctoral fellow who has the set of skills needed to conduct the work. Alternatively, you may discover that there are opportunities to join a collaborative multidisciplinary project where the appropriate skills are available within the team or propose yourself as the instigator of such a project if an appropriate funding program can be

sein d'un groupe de taxons étroitement apparentés, il vous faudra réfléchir aux types de marqueurs (et à leur nombre) susceptibles de vous permettre d'obtenir une estimation fiable, à comment les séquences de ces marqueurs peuvent être obtenues et comment elles peuvent être utilisées pour générer les analyses phylogénétiques à partir desquelles vous serez en mesure de tirer des conclusions. À cette fin, vous pourrez initialement consulter des sites web et des livres qui traitent de ce genre de question, mais vous devriez ultimement approcher un collègue possédant des connaissances et compétences appropriées pour vous aider à définir l'envergure du travail nécessaire pour bien répondre à la question posée. Dans certains cas, peut-être réaliserez-vous que la plupart des séquences de marqueurs dont vous avez besoin sont déjà disponibles dans des bases de données publiques (et vous pourrez rapidement apprendre comment les récupérer), réduisant ainsi de façon substantielle le travail d'acquisition de ces marqueurs par des approches dites de génomique ou autres. Si, dans son ensemble, le projet peut être facilement et rapidement réalisé par quelqu'un ayant les compétences appropriées, vous serez peut-être en mesure d'établir, avec un collègue, une collaboration en vertu de laquelle vous n'aurez qu'à fournir le financement pour le travail d'acquisition des marqueurs (par ex., extraction d'ADN, amplification des marqueurs et leur séquençage) et, si nécessaire, une bourse à un étudiant qui sera embauché pour réaliser le travail sous la supervision du collègue. En ce qui concerne le travail analytique, peut-être souhaitez-vous le confier à votre collaborateur ou, si vous aimez acquérir de nouvelles compétences, peut-être préférerez-vous le faire vous-même après avoir suivi une session de formation en analyse phylogénétique offerte en ligne ou par votre institution.

Pour des analyses de plus grande envergure, particulièrement celles qui nécessitent des investigations à l'échelle du génome entier, vous pourrez considérer recruter un stagiaire postdoctoral possédant déjà les compétences nécessaires pour réaliser le travail. Alternativement, il est possible que des opportunités existent de vous joindre à un projet collaboratif multidisciplinaire où les compétences appropriées sont disponibles au sein de l'équipe, ou de devenir l'instigateur d'un tel projet, si un programme de financement approprié peut être

found and targeted. It's worth pointing out, here, that many DNA sequencing platforms, either commercial or institutional, now offer "turnkey" services for genome sequencing and assembly, and identification of genome-wide markers for population genomics analyses. In some cases, these platforms will even offer to do the DNA extraction for you, so you'll only need to provide the appropriate biological material to them. Given the rapid pace at which high-throughput sequencing technologies are evolving, such services are currently offered at surprisingly low cost.

Whatever your goals are, remember that you should seek the advice and collaboration of scientists who are considered experts in the type of work you wish to conduct. You should also cultivate a desire to acquire new knowledge and skills in the field of genomics. This can be done through attendance of relevant seminars and talks at conferences, and through regular interactions with colleagues who have a good track-record in genomics-based research. Finally, if you think I can provide you with some guidance, don't hesitate to contact me!

Here are some examples of genomics-based research conducted by M. Cusson's group to address questions relevant to both fundamental and applied insect science:

Basic science / Science fondamentale

Picq, S., Wu, Y., Martemyanov, V.V., Pouliot, E., Pfister, S.E., Hamelin, R., and Cusson, M. 2023. Range-wide population genomics of the spongy moth, *Lymantria dispar* (Erebidae): implications for biosurveillance, subspecies classification and phylogeography of a destructive moth. *Evolutionary Applications*, **16**: 638–656. doi:10.1111/eva.13522.

Béliveau, C., Gagné, P., Picq, S., Vernygora, O., Keeling, C.I., Pinkney, K., Doucet, D., Wen, F., Johnston, J.S., Maaroufi, H., Boyle, B., Laroche, J., Dewar, K., Juretic, N., Blackburn, G., Nisole, A., Brunet, B., Brandao, M., Lumley, L., Duan, J., Quan, G., Lucarotti, C.J., Roe, A.D., Sperling, F.A.H., Levesque, R.C., and Cusson, M. 2022. The spruce budworm genome: reconstructing the evolutionary history of antifreeze proteins. *Genome Biology and Evolution*, **14**(6). doi:10.1093/gbe/evac087.

Lumley, L.M., Pouliot, E., Laroche, J., Boyle, B., Brunet, B.M.T., Levesque, R.C., Sperling, F.A.H., and Cusson, M. 2020. Continent-wide population genomic structure and phylogeography of North America's

trouvé et ciblé. Il est important de souligner, ici, que plusieurs plateformes de séquençage d'ADN, autant commerciales qu'institutionnelles, offrent maintenant des services « clés en main » pour le séquençage et l'assemblage de génomes entier et pour l'identification de marqueurs à l'échelle du génome entier (pour des analyses de génomique des populations). Dans certains cas, ces plateformes offrent même de réaliser les extractions d'ADN pour vous, dans lequel cas, vous n'aurez qu'à leur fournir le matériel biologique. Étant donnée la vitesse rapide à laquelle les technologies de séquençage à haut débit évoluent, ces services sont présentement offerts à des prix étonnamment bas.

Peu importe vos objectifs, rappelez-vous que vous devriez chercher à obtenir les conseils et la collaboration de scientifiques considérés comme des experts dans le type de travail que vous souhaitez entreprendre. Vous devriez aussi cultiver un désir d'acquérir de nouvelles connaissances et compétences dans le domaine de la génomique. À cette fin, je vous conseille d'assister à des séminaires pertinents ou à des présentations dans les sections de génomique à des conférences; vous pourriez aussi essayer d'entretenir des interactions régulières avec des collègues qui ont fait leurs preuves dans le domaine de la génomique. Finalement, si vous pensez que je pourrais vous guider dans vos tâtonnements, n'hésitez pas à me contacter!

Voici ici quelques exemples de recherche fondée sur la génomique réalisée par l'équipe de M. Cusson pour aborder des questions de nature fondamentale ou appliquée:

- most destructive conifer defoliator, the spruce budworm (*Choristoneura fumiferana*). *Ecology and Evolution*, **10**: 914–927. doi:10.1002/ece3.5950.
- Picq, S., Lumley, L., Šíchová, J., Laroche, J., Pouliot, E., Brunet, B., Levesque, R.C., Sperling, F.A.H., Marec, F., and Cusson, M. 2018. Insights into the structure of the spruce budworm (*Choristoneura fumiferana*) genome, as revealed by molecular cytogenetic analyses and a high-density linkage map. *G3 (Genes Genomes Genetics)*, **8**: 2539–2549. doi:10.1534/g3.118.200263.
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Applied Science / Science appliquée

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- Djoumad, A., Tanguay, P., Régnière, J., Trudel, G., Morrison, A., Fournier, C., Carleton, D., Nisole, A., Stewart, D., and Cusson, M. 2021. Development of a qPCR-based method for counting overwintering spruce budworm (*Choristoneura fumiferana*) larvae collected during fall surveys and for assessing their natural enemy load: a proof-of-concept study. *Pest Management Science*, doi:10.1002/ps.6645.
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- Nisole, A., Stewart, D., Kyei-Poku, G., Nadeau, M., Trudeau, S., Huron, P., Djoumad, A., Kamenova, S., Smith, M.A., Eveleigh, E., Johns, R.C., Martel, V., and Cusson, M. 2020. Identification of spruce budworm natural enemies using a qPCR-based molecular sorting approach. *Forests* **11**: 621. doi:10.3390/f11060621.
- Picq, S., Keena, M., Havill, N., Stewart, D., Pouliot, E., Boyle, B., Levesque, R.C., Hamelin, R.C., and Cusson, M. 2018. Assessing the potential of genotyping-by-sequencing-derived single nucleotide polymorphisms to identify the geographic origins of intercepted gypsy moth (*Lymantria dispar*) specimens: a proof-of-concept study. *Evolutionary Applications*, **11**: 325–339. doi:10.1111/eva.12559.
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Freeman McEwen was an outstanding scholar, an administrator, a teacher, President of the Entomological Society of Canada, Dean of the OAC, friend, colleague, and family man. For me it is an honour to be asked to write an obit for this man. Freeman documented his life and times in a book that he wrote during Covid times (McEwen 2022). It is an excellent record of his family life, which I have briefly summarized.

Freeman was born in St. Peter's Harbour, Prince Edward Island, the fourth child in a family of farmers. Naturally, Freeman was interested in farming and after completing school, he applied for a summer job in plant pathology at the Agriculture Canada research station in Charlottetown. He found that the position had already been filled so he quickly took another in entomology, a binary decision that was the start of a long and fruitful career. Freeman started his higher education at the Prince of Wales College at the age of 16 and worked in ag-related jobs off and on to support his studies. After graduation, he entered Macdonald College of McGill University where he earned a bachelor's degree. He then accepted a graduate position at the University of Wisconsin and defended his PhD in December of 1953. After a stint in Geneva Research Station in New York state, and a sabbatical in Hawaii, Freeman accepted a position in entomology in the Zoology Department at the University of Guelph in 1968.

While at Guelph, Freeman was asked to establish the Department of Environmental Biology (ENVB) at the University of Guelph and was the first chair for 10 years. The focus in ENVB was pest management of weeds, arthropods, and microbiota. I first met Freeman in 1978 when I interviewed for a position in ENVB. I was very impressed that he took the trouble to meet me, a stranger in a strange land, at Pearson Airport and ride back to Guelph with me. I guess I must have made a good impression on Freeman because I was offered the position soon afterwards. I jumped into teaching the course *Pesticides and the Environment* a month after arriving and was grateful for the good guidance in the page proofs of a book written by Freeman and Gerry Stephenson, "*The Use and Significance of Pesticides in the Environment*" (McEwen and Stephenson 1979). As Chair of ENVB, and in his subsequent role as Dean of the Ontario College of Agriculture at the University of Guelph (1983-1991), Freeman was a "decider". He would listen to all sides of the discussion (AKA argument) and immediately decide what to do. No passing the task to committees or other delaying tactics. I admired this mental acuity and the fact that most of his decisions turned out to be correct. This is perhaps a hallmark of his approach to life, academia, and administration. Freeman retired in 1991 and took to more leisurely activities.

Freeman was strong promoter of entomology and insect pest management in North America. He was very active in the Entomological Society of Canada (ESC) and the Entomological Society of Ontario (ESO). From 1973 to 1977 he was elected as the ESC Director-at-Large and was chair of the Resolutions Committee. He took active roles in the Manpower Committee and the Nominations Committee, and he was named as a Fellow of ESC in 1975. His activities in support of entomology in Canada were recognized when, in 1983, he was the recipient of the ESC Gold



with permission from Grace McEwen

Freeman L. McEwen
(11 Nov. 1926 - 16 Sept. 2022)

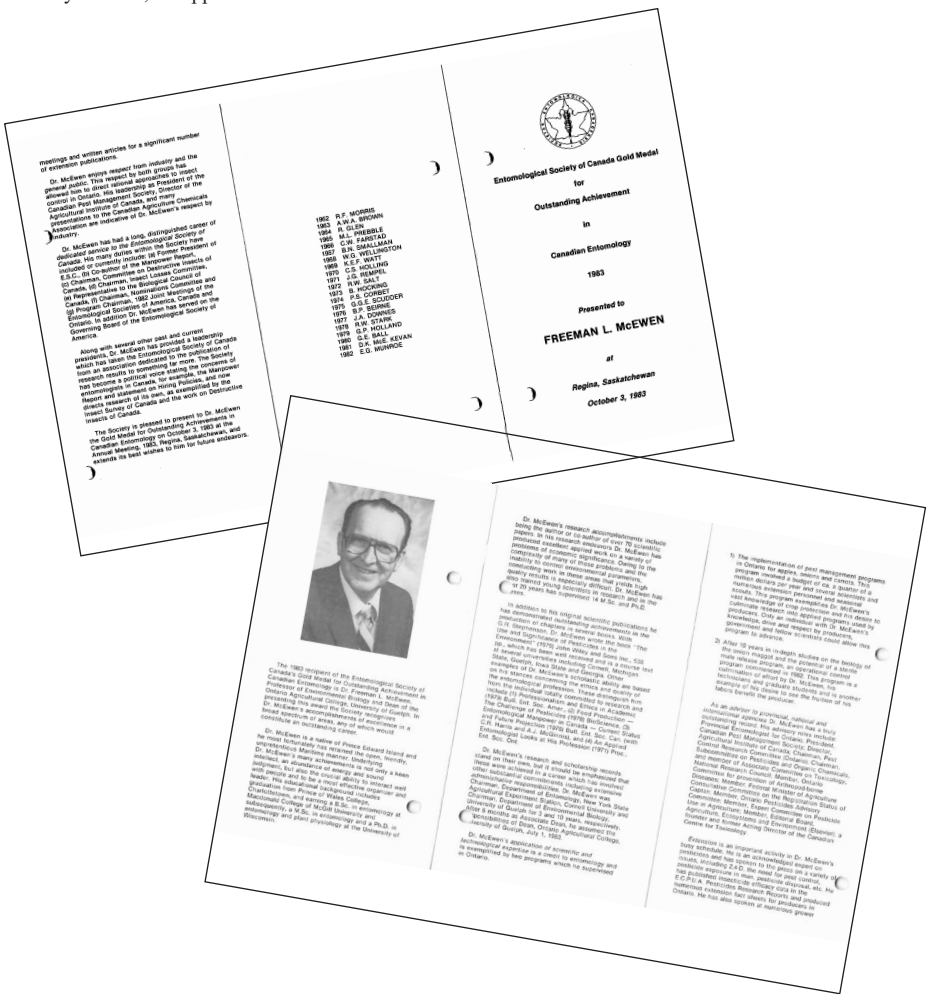
Medal for Outstanding Achievement and was elected as a fellow of the ESO in 2011. His work in the ESC and at the University of Guelph stimulated the growth of entomology in Canada and his contributions will carry into the future. His good humor, his quick wit, and his love of single malt will be remembered by all he met. Freeman was a *man among men; we shall not see his like again*.

Keith R Solomon, Professor Emeritus,
School of Environmental Sciences, University of Guelph

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McEwen, F. 2022. My Life, the First 94 Years. Pp 69

McEwen, F.L., and Stephenson, G.R. 1979. The Use and Significance of Pesticides in the Environment. John Wiley & Sons, 538 pp.



Books available for review / Livres disponibles pour critique

The ESC frequently receives unsolicited books for review. A list of these books is available online (<http://esc-sec.ca/publications/bulletin/#toggle-id-2>) and is updated as new books are received.

If you wish to review one of these books, please send an email to the Chair of the Publications Committee (Véronique Martel, veronique.martel@NRCan-RNCan.gc.ca).

You should briefly indicate your qualifications to review the topic of the book, and be able to complete your review within 8 weeks.

Preference will be given to ESC members.

La SEC reçoit fréquemment des livres non demandés pour des critiques. Une liste de ces livres est disponible en ligne (<http://esc-sec.ca/publications/bulletin/#toggle-id-2>) et est mise à jour lorsque de nouveaux livres sont reçus.

Si vous souhaitez critiquer un de ces livres, veuillez envoyer un message au présidente du comité des publications (Véronique Martel, veronique.martel@NRCan-RNCan.gc.ca).

Vous devez brièvement indiquer vos qualifications pour critiquer le sujet du livre, et être en mesure de terminer votre critique en 8 semaines.

La préférence est donnée aux membres de la SEC.

Guidelines

Book reviews should be approximately 800-1200 words in length. They should clearly identify the topic of the book and how well the book meets its stated objective. Weaknesses and strengths of the book should be described.

Formatting of the review should follow that of reviews in recent issues of the Bulletin. A scan of the book cover (jpeg or tiff format, about 500 kb) should be submitted with the review.

Lignes directrices

Les critiques de livre doivent compter entre 800 et 1200 mots. Elles doivent clairement identifier le sujet du livre et si le livre rencontre bien les objectifs énoncés. Les forces et faiblesses du livre devraient être décrites.

Le format des textes doit suivre celui des critiques des récents numéros du Bulletin. Une version numérisée de la couverture du livre (en format jpeg ou tiff, env. 500 kb) devra être soumise avec la critique.

Books available for review

- Blomquist, G., and Vogt, R. [Eds.]. 2021. *Insect Pheromone Biochemistry and Molecular Biology*. Elsevier Inc. ISBN: 978-0-12-819628-1. [e-book].
- Delaplane, K. 2021. *Crop Pollination by Bees, Volume 1. Evolution, Ecology, Conservation and Management*. CABI. ISBN: 9781786393494. [e-book].
- Hölldobler, B., and Kwapich, CL. 2022. *The Guests of Ants: How Myrmecophiles Interact with Their Hosts*. Harvard University Press. ISBN 9780674265516
- Kondo, T., and Watson, G. [Eds.]. 2022. *Encyclopedia of Scale Insect Pests*. CABI. ISBN: 978-1-80062064-3
- Marshall, S.A. 2023. *Hymenoptera: The Natural History and Diversity of Wasps, Bees and Ants*. Firefly Books. ISBN: 9780228103714.
- Wrigley, R.E., de March, L., and Huebner, E. 2022. *Tiger Beetles of Manitoba: Ecology, Life History and Microsculpture*. Robert E. Wrigley. ISBN: 978-1-7781065-0-7 [paperback].
- Ziska, L. 2022. *Invasive Species and Global Climate Change, 2nd Edition*. CABI. 978-1-80062-143-5. [hardcover]

Highlights of the April Board of Directors meeting

The ESC Board of Directors met by videoconference on 24 April 2023 with President Chris MacQuarrie chairing. The following summarizes the proceedings of the meeting.

The Board received updates on future Joint Annual Meetings (JAMs), including that organization of both the JAM 2023 (Saskatoon) and JAM 2024 (Québec City) are proceeding nicely. The Entomological Society of Saskatchewan reported that online registration for JAM 2023 will soon be available. In an Email ballot, the Board had approved a request from the Société d'entomologie du Québec for an increase from \$8,000 to \$10,000 in the ESC's advance for JAM 2024, because the venue hotel requires a larger-than-usual deposit. The Entomological Society of Alberta reported that, while early plans had anticipated that JAM 2025 would be held in Calgary, the ESAB has struggled to find volunteers for a local organizing committee. So, it is now likely that the meeting will be held in Edmonton, where there is a larger pool of potential volunteers. The Acadian Entomological Society has formally invited the ESC to co-host the JAM in 2027; and the Board voted to accept this invitation. President Chris MacQuarrie reported that discussions regarding a joint meeting with the Royal Entomological Society, the International Congress of Entomology, and the Entomological Society of America in 2028 were still ongoing with few details confirmed, and that an announcement about a potential joint meeting would likely be made in the Fall of 2023.

Following a presentation at the January BOD meeting and subsequent follow-up information provided by the ESC's investment portfolio manager, the Board voted to continue limiting ESC investments to ESG (Environmental, Social and Governance) companies. The Finance Committee noted that returns on ESC investments have begun to recover after a period of poor performance.

Following earlier decisions to hold a strategic planning session in association with the JAM 2023 in Saskatoon, the Board, in an email ballot, accepted the Executive Council's recommendation to hire CRG Strategies of Saskatoon as the facilitator of the strategic planning process. Board members were made aware that they would be receiving a questionnaire from CRG Strategies shortly after the meeting.

The ESC Task Force on Administrative Procedures reported that the Standard Operating Procedure Manual and the administrative calendar have been updated and distributed to ESC's association management company and the executive council members who will be using them. These documents will be distributed to Directors for information. As well, 1st Vice-President Colin Favret reported on the results from the survey sent to current and former directors and officers to assess the required time commitments of these positions in relation to what is considered reasonable. Several positions required more time than was considered reasonable. This information will help determine how to manage the workload of ESC volunteers and help reduce volunteer burnout.

Following a previous motion by the Board to consider charging membership dues for emeritus members, the Membership and Finance Committees proposed that the membership dues for emeritus members be equal to those for student membership. The supplement charged to emeritus members for access to The Canadian Entomologist (TCE), would be reduced so that the annual costs for an emeritus member with TCE access would remain unchanged. The Board approved a motion to recommend this fee structure change at the 2023 Annual Members Meeting and noted that the new pricing would take effect in 2025.

The Membership Committee was also asked to suggest ways the ESC may facilitate new options for supporting student memberships. The Committee suggested that changes to the membership form could be made to make it easier for supervisors to pay for the memberships of their students at the time of their own membership purchase/renewal. For members who may not supervise students but who may still wish to support students directly, the Membership Committee suggested that there could be additional options on the membership form for

donating a student membership that would then be disbursed to any eligible student. The Board was supportive of piloting this initiative for a year and directed the Membership Committee to work out the details of modifying the membership forms and communicating this change to the membership once implemented.

The Executive Council had additionally asked the Membership Committee to provide guidance on the potential expansion of auto-renew payment of membership to Student, Early Professional and Entomology Enthusiast memberships as a mechanism for retaining members who forget to renew. This change would be opt-in only, with no automatic enrolment in the auto-renew program. The Membership Committee suggested piloting this expansion for a year to determine the uptake of auto-renew in these membership categories, and to determine whether this causes an undue administrative burden due to tracking the status change of Student and Early Professional members. The Board voiced its support for this initiative.

Following the creation of the Entomology Enthusiasts membership category, a survey was distributed to enthusiast members by the Membership Committee in 2022. The results of that survey indicate that, overall, enthusiast members had a positive experience with the ESC, and the survey helped to identify some ways to support increased interaction between the enthusiast community and the rest of the ESC community, including a annual virtual meeting with members of the Board, hosting webinars and workshops, and the development of space in the Bulletin for entomology enthusiast member contributions.

The Board approved recommendations from the Bylaws, Rules and Regulations Committee for changes to the Committee Guidelines and Standing Rules. The most substantive changes were to remove references in the Standing Rules to the ESC Scholarship Fund and its trustees. Canada Revenue Agency expectations are that charitable organizations, such as the ESC Scholarship Fund Trust, will be entirely independent, and the Trust now has its own officers, trustees and standing rules. The details of changes to the ESC Standing Rules will be reported in the next issue of the Bulletin.

The Board received the report of the Achievement Awards Committee, regarding its selection of those to receive ESC Achievement Awards in 2023. The Board approved all the recommendations of the Committee. The Board was asked by the ESC Treasurer to determine the number of Becker JAM Participation Awards that would be provided to students for travel to the 2023 JAM. After discussion, the Board decided that 16 awards of \$500 each would be available in 2023. Eight of these awards will be awarded from funds made available to the ESC by the Dufault Foundation, and the ESC will provide funds for an additional eight.

The Nominations Committee reported that, despite significant effort, it had been unable to secure two candidates for two of the elected positions in time for the plebiscite, which begins June 1. The Board decided that, unless there is a change in this situation, the plebiscite would carry the name, picture and candidate statement of a single nominee for 2nd Vice-President and for Director for Equity, diversity and Inclusion (EDI), and that the plebiscite would not have a vote for these positions. In addition, the Board wishes to communicate to the membership that members may nominate themselves or other candidates for these or any other Director positions provided they can obtain signatures of at least 5% of the current voting membership in support and submit their proposal to the Board at least 21 days before the Annual Members Meeting in October 2023.

Due to a recent vacancy of the Director for EDI and Chair of the EDI Committee, the Board appointed Catherine Scott to fill both positions. Catherine's directorship appointment will extend until the Annual Members Meeting in October 2023, at which point the scheduled election for the Director for EDI position will be held. The Board conducted this item of business at the beginning of the meeting so that it could welcome Catherine to participate in the meeting.

ESC Co-Secretary Neil Holliday announced his intention to step down as Co-Secretary in fall 2023. A call for members to volunteer to fill the position vacated by Neil appears elsewhere in this Bulletin. Co-Secretary Erin Campbell will be continuing in her position.

73rd Annual Meeting of Members and Board of Directors Meetings (JAM 2023)

The Annual Business Meeting of Members of the Entomological Society of Canada is scheduled to occur in Room Michelangelo C, Delta Hotels Saskatoon Downtown, 405 20th Street East, Saskatoon, SK on Tuesday 17 October 2023, beginning at 1:00 PM CST. The incoming Board of Directors will meet in the same location on the same day, beginning at 2:00 PM CST. The outgoing Board of Directors Meeting will be in Room Michelangelo A Delta Hotels Saskatoon Downtown on Sunday 15 October 2023, beginning at 8:00 AM CST. The Annual Business Meeting will be in-person only; the two Board meetings will be in-person with a provision for online attendance. Matters for consideration at any of the above meetings should be sent to the Co-Secretaries of the Entomological Society of Canada (see inside back cover for contact details).

73^{ème} Assemblée annuelle des membres et réunions du Conseil d'administration (2023)

L'assemblée annuelle des membres de la Société d'entomologie du Canada se tiendra dans la salle Michelangelo C de l'hôtel Delta Saskatoon Downtown, 405 20th Street East, Saskatoon, SK, le mardi 17 octobre 2023, à partir de 13h HNC. Le conseil d'administration entrant se réunira au même endroit le même jour, à partir de 14h HNC. La réunion du conseil d'administration sortant aura lieu dans la salle Michelangelo A de l'hôtel Delta Saskatoon Downtown, le dimanche 15 octobre 2023, à partir de 8h HNC. L'assemblée annuelle des membres se tiendra en personne seulement; les deux réunions du CA se tiendront en personne, mais il sera possible d'y assister en ligne. Les questions à examiner lors de l'une ou l'autre des réunions susmentionnées doivent être envoyées aux cosecétaires de la Société d'entomologie du Canada (voir les coordonnées à l'intérieur de la couverture arrière).



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Executive Meeting - Call for Agenda Items

If members have any items they wish to be discussed at the next Board of Directors or Executive Council meeting, please send them to the to the Co-Secretaries (see inside back cover for contact details), as soon as possible.

Réunion du conseil exécutif – Points à l'ordre du jour

Si des membres aimeraient ajouter des points à l'ordre du jour pour discussion à la prochaine réunion du Bureau des directeurs ou du Conseil de l'exécutif, merci de les envoyer aux cosecrétaires (voir le troisième de couverture pour les informations de contact), le plus tôt.

Nominations for ESC Board of Directors / Nominations pour le Conseil d'administration de la SEC

The following candidates have been identified by the Nominating Committee as willing to stand for election. Their names and candidate statements will appear on the plebiscite webpage, which will be active from 1 June until 15 July for voting to select an individual who will stand in the election at the Annual Member Meeting on 17 October 2023. Where the Nominating Committee has been unable to identify a second candidate for a position, the candidate's name and statement will appear on the plebiscite page for information, but without the option to vote. ESC members are reminded that, under By-Law 16 and Standing Rule VI 2), members may submit additional nominations for any of the above positions, as long as they are submitted to the Co-Secretaries at least 21 days prior to the Annual Member Meeting and are signed by not less than 5% of the members of the Society.

Les personnes suivantes ont été identifiées par le Comité des candidatures comme étant prêtes à se présenter à l'élection. Leurs noms et déclarations de candidature apparaîtront sur la page web de plébiscite, qui sera active du 1er juin au 15 juillet pour le vote visant à sélectionner une personne qui se présentera à l'élection lors de la réunion annuelle des membres du 17 octobre 2023. Lorsque le Comité des candidatures n'a pas été en mesure d'identifier une seconde candidature pour un poste, le nom et la déclaration de la candidature apparaîtront sur la page du plébiscite à titre d'information, mais sans possibilité de voter. Il est rappelé aux membres de la SEC que, conformément au Règlement 16 et à la Règle permanente VI 2), les membres peuvent soumettre des candidatures supplémentaires pour l'un des postes susmentionnés, pour autant qu'elles soient soumises aux cosecrétaires au moins 21 jours avant la réunion annuelle des membres et qu'elles soient signées par au moins 5 % des membres de la Société.

Candidate for Societal Director / Second Vice-President : Candidature pour le poste de directeur / directrice sociétal(e) / seconde vice-présidence



Rob Johns
(CFS, Fredericton, N.B.)

Candidates for Director-at-Large : Candidatures pour le poste de conseiller ou conseillère



Leah Flaherty
(MacEwan University,
Edmonton, Alta.)



Julien Saguez
(CÉROM, Saint-Mathieu-de-
Beleuil, Que.)

Candidate for Director for Equity, Diversity, and Inclusion : Candidature pour le poste de Administrateur ou administratrice pour l'équité, la diversité et l'inclusion



Catherine Scott
(McGill University,
Montréal, Que.)

Members' discounts

Entomological Society of Canada members can enjoy discounts on publications from Annual Reviews, Elsevier, Cambridge University Press, and the Entomological Society of America. Details of how to benefit from these discounts are available on the member's area of the Entomological Society of Canada website at: <https://esc-sec.site-ym.com/>.

Remise pour les membres

Les membres de la Société d'entomologie du Canada peuvent bénéficier d'une remise lors d'achats de publications de : Annual Reviews, Elsevier, Cambridge University Press et de la Société d'entomologie d'Amérique. Les informations nécessaires pour profiter de ces remises sont disponibles dans la section des membres du site de la Société d'entomologie du Canada à : <https://esc-sec.site-ym.com/>.

Nineteenth Annual Photo Contest

The 19th Annual Photo Contest to select images for the 2024 cover of the *Bulletin of the Entomological Society of Canada* is now underway. The cover images are intended to represent the breadth of entomology covered by the Society's publications. Insects and non-insect arthropods in forestry, urban settings or agriculture; landscapes, field, laboratory or close-ups; or activities associated with physiology, behaviour, taxonomy or IPM are all desirable. A couple of 'Featured Insects' are also needed. If selected, your photo will grace the cover of the *Bulletin* for the entire year. In addition, winning photos and a selection of all submitted photos will be shown on the ESC website, and used in Society-related social media posts.

Contest rules:

Photos of insects and other arthropods in all stages, activities, and habitats are accepted. To represent the scope of entomological research, we also encourage photos of field plots, laboratory experiments, insect impacts, research activities, sampling equipment, etc. Photos should, however, have a clear entomological focus.

Digital images must be submitted in unbordered, high-quality JPG format, with the long side (width or height) a minimum of 1500 pixels.

Entrants may submit up to five photographs. A caption must be provided with each photo submitted; photos without captions will not be accepted. Captions should include the locality, description of activity, if the main subject is other than an insect (if appropriate), and any interesting or relevant information. Captions should be a maximum of 40 words.

The entrant must be a member in good standing of the Entomological Society of Canada. Photos must be taken by the entrant, and the entrant must own the copyright.

The copyright of the photo remains with the entrant, but royalty-free use must be granted to the ESC for inclusion on the cover of one volume (4 issues) of the *Bulletin*, and on the ESC website, and in various social media posts by the ESC (credited to the photographer, of course).

Rather than a judging committee, this year, the photo contest organizer will open voting on this website. Photographers of the top three photos chosen will be awarded the following prizes:

1st: \$200 gift certificate for Henry's Camera. **2nd:** \$100 gift card for Henry's Camera. **3rd:** \$50 gift card for Henry's Camera.

Submission deadline is 15 September 2023.

Submit photos at this URL: pollunit.com/polls/escsecphoto23

Dix-neuvième concours annuel de photographies

Le 19^e concours annuel de photographie visant à sélectionner des images pour la couverture du Bulletin de la Société d'entomologie du Canada pour 2024 est en cours. Les images de la couverture sont destinées à représenter l'étendue de l'entomologie couverte par les publications de la Société. Les images d'insectes et d'autres arthropodes en foresterie, en milieu urbain ou en agriculture; les paysages, le terrain, le laboratoire ou les gros plans; ou les activités associées à la physiologie, au comportement, à la taxonomie ou à la lutte intégrée sont toutes souhaitables. Nous avons également besoin de quelques « Insectes vedettes ». Si elle est sélectionnée, votre photographie fera la couverture du Bulletin pendant toute l'année. En outre, les photos gagnantes et une sélection de toutes les photos soumises seront présentées sur le site web de la SEC et utilisées dans les médias sociaux liés à la Société.

Règles du concours :

Les photographies d'insectes et autres arthropodes à tous les stades, activités et habitats sont acceptées. Afin de représenter l'étendue de la recherche entomologique, nous encourageons également les photographies de parcelles de terrain, d'expériences de laboratoire, d'impacts d'insectes, d'activités de recherche, de matériel d'échantillonnage, etc. Les photographies doivent toutefois être clairement axées sur l'entomologie.

Les images numériques doivent être soumises dans un format JPG de haute qualité, sans bordure, avec le grand côté (largeur ou hauteur) d'un minimum de 1500 pixels.

Chaque personne peut soumettre jusqu'à cinq photos. Une légende doit être fournie avec chaque photographie soumise; les photos sans légende ne seront pas acceptées. Les légendes doivent indiquer la localité, la description de l'activité si le sujet principal est autre qu'un insecte, et toute information intéressante ou pertinente. Les légendes doivent comporter un maximum de 40 mots.

Les personnes qui soumettent des photos doivent être membres en règle de la Société d'entomologie du Canada. Les photographies doivent être prises par la personne qui les soumet, et cette dernière doit en détenir les droits d'auteur.

Le droit d'auteur des photographies reste la propriété des photographes, mais une utilisation libre de droits doit être accordée à la SEC pour être incluse sur la couverture d'un volume (4 numéros) du Bulletin, sur le site web de la SEC et dans divers médias sociaux de la SEC (avec mention du nom de la personne qui a pris la photo, bien entendu).

Plutôt qu'un comité de jugement, cette année, l'organisation du concours de photographie ouvrira le vote sur ce site web. Les photographes des trois meilleures photos retenues se verront attribuer les prix suivants : 1^{er} : 200 \$ de chèque-cadeau pour Henry's Camera. 2^e : 100 \$ de carte cadeau pour Henry's Camera. 3^e : 50 \$ de carte cadeau pour Henry's Camera.

La date limite de soumission est le 15 septembre 2023.

Soumettez vos photographies à cette URL : pollunit.com/polls/escsecphoto23

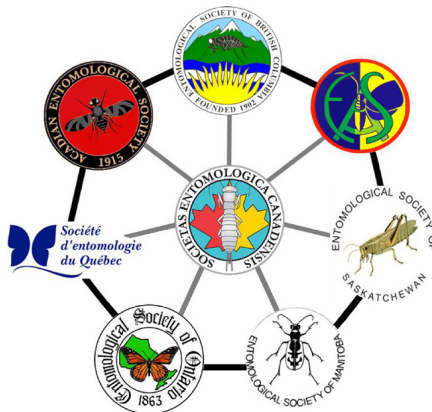


ESC Co-Secretary

The Entomological Society of Canada is looking for a member willing to serve in the position of Co-Secretary, starting in October 2023. The ESC's two Co-Secretaries share the secretarial duties in support of the President and Board of Directors by:

- Scheduling meetings of the Executive Council, Board, and the Members, preparing agendas, obtaining reports from Officers and others, sending out notices of meetings, attending the meetings, and recording minutes.
- Working with our Association Management Company (Strauss event & association management) to ensure that records of Society activities such as agendas, minutes, reports, and correspondence are preserved, and to prepare the Society's annual filings with Corporations Canada and other government agencies.
- Providing information on Society business to the Bulletin Editor, Webmaster, and Strauss for publication, posting, and circulation to the membership as necessary.
- Maintaining up-to-date lists and contact information for the Society's Board and Committees.
- Overseeing plebiscites to recommend candidates for nominations as Societal Director and Director-at-Large, and for any other questions on which votes may be required, and notifying of the results of voting. Advising affiliated societies when they need to provide names for nominations as Regional Directors.

A familiarity with the Society's by-laws, rules, and guidelines, past experience as a Board member, and the ability to work in French and English would all be assets. This is a great opportunity to serve one of the oldest biological societies in North America and to deepen your contacts with the Canadian entomological community. Any member interested in serving in this position may contact either of the current Co-Secretaries, Erin Campbell (Erin.Campbell@inspection.gc.ca) or Neil Holliday (Neil_Holliday@UManitoba.CA) for further information. Erin will be continuing in her position, and Neil will be stepping down. Applications should be made to the President, Chris MacQuarrie (cjkmacquarrie@gmail.com), by **31 July 2023**. The final selection will be made by an ad hoc committee convened by the President.



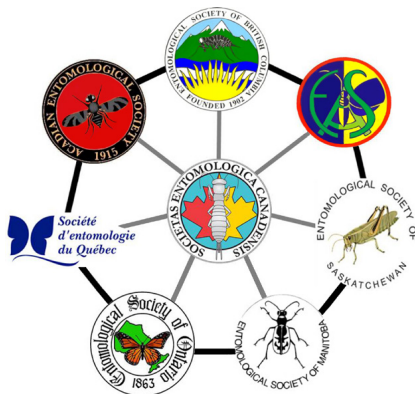
Cosecrétaire

La Société d'entomologie du Canada est à la recherche d'une personne membre souhaitant occuper le poste de cosecrétaire, à partir d'octobre 2023. Les deux cosecrétaires de la SEC se partagent les tâches de secrétariat en soutien à la présidence et au CA de la SEC :

Planifier les réunions du Conseil exécutif, du CA et des membres, préparer les ordres du jour, obtenir les rapports des dirigeants et dirigeantes et d'autres personnes, envoyer les avis de convocation, assister aux réunions et rédiger les procès-verbaux.

- Travailler avec notre société de gestion d'association (Strauss event & association management) pour s'assurer que les documents relatifs aux activités de la Société, tels que les ordres du jour, les procès-verbaux, les rapports et la correspondance, sont conservés et pour préparer les déclarations annuelles de la Société auprès de Corporations Canada et d'autres agences gouvernementales.
- Fournir des informations sur les activités de la Société au rédacteur du bulletin, au webmestre et à Strauss pour qu'ils les publient, les affichent et les fassent circuler parmi les membres si nécessaire.
- Maintenir à jour les listes et les coordonnées du CA et des comités de la Société.
- Superviser les plébiscites visant à recommander des candidatures pour les postes d'administration de la Société et de conseiller ou conseillère, ainsi que pour toute autre question nécessitant un vote, et notifier des résultats du vote. Conseiller les sociétés affiliées lorsqu'elles doivent fournir des noms pour les nominations aux postes d'administration régionale.

Une bonne connaissance des règlements, des règles et des lignes directrices de la Société, une expérience passée en tant que membre du CA et la capacité de travailler en français et en anglais sont autant d'atouts. Il s'agit d'une excellente occasion de servir l'une des plus anciennes sociétés biologiques d'Amérique du Nord et d'approfondir vos contacts avec la communauté entomologique canadienne. Toute personne membre intéressée par ce poste peut contacter l'un des cosecrétaires actuels, Erin Campbell (Erin.Campbell@inspection.gc.ca) ou Neil Holliday (Neil_Holliday@UManitoba.CA), pour de plus amples informations. Erin continuera à exercer ses fonctions et Neil se retirera. Les candidatures doivent être adressées au président, Chris MacQuarrie (cjkmacquarrie@gmail.com), avant le **31 juillet 2023**. La sélection finale sera effectuée par un comité ad hoc convoqué par le président.



List of Contents: Regional Journals / Table des matières : Revues des sociétés régionales

Contents of regional society journals

This regular feature highlights research published in the five regional society journals that include peer-reviewed papers. It should be noted that some regional society journals are not published on a regular basis and may not always include peer-reviewed articles.

Note: no new publication information has been submitted for this issue.

Contenu des revues des sociétés régionales

Cette rubrique régulière met en lumière la recherche publiée dans les cinq revues des sociétés régionales qui incluent des articles révisés par les pairs. Veuillez noter que certaines revues des sociétés régionales ne sont pas publiées sur une base régulière et peuvent ne pas toujours inclure des articles évalués par les pairs.

Note : Aucune nouvelle information sur les publications n'a été soumise pour ce numéro.



Announcements / Annonces

Advertising in the *Bulletin* / Publicité dans le *Bulletin*

The *Bulletin* welcomes enquiries regarding advertising within its pages.

For 2023, the advertising rates in the *Bulletin* have been set at \$235/annum for a half-page advertisement, and \$410/annum for a full-page advertisement, in each of the March, June, September and December issues.

For further information, please contact the *Bulletin* Editor (roitberg@sfu.ca).

Le *Bulletin* accueille les demandes de publicité dans ses pages.

Pour 2023, les tarifs publicitaires du *Bulletin* ont été fixés à 235 \$/an pour une demi-page et à 410 \$/an pour une page entière dans chacun des numéros de mars, juin, septembre et décembre.

Pour de plus amples informations, veuillez contacter le rédacteur du *Bulletin* (roitberg@sfu.ca).



Canadian Weed Science Society
Soci t  canadienne de malherbologie

CWSS-SCM Newsletter

The Society has adopted a new style for its newsletter so that there is no longer a Table of Contents. To see what's new in Canadian weed science since the last *Bulletin*, go to: <https://weedscience.ca/newsletters/>

April 2023

<https://c8x545.p3cdn1.secureserver.net/wp-content/uploads/2023/04/4April-2023-newsletter.pdf>





THE CANADIAN PHYTOPATHOLOGICAL SOCIETY
LA SOCIÉTÉ CANADIENNE DE PHYTOPATHOLOGIE

CPS-SCP News
VOL. 66, NO. 4 (June 2022)

<https://phytopath.ca/wp-content/uploads/2022/12/CPS-SCP-News-66-4-December2022.pdf>

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Meeting announcements / Réunions futures

In view of the COVID-19 situation, readers should check the meeting website to ascertain if the conference is still proceeding and, if so, in what format.

Ento23 (Annual Meeting, Royal Entomological Society)

University of Exeter, UK, 5-7 September 2023

<https://www.royensoc.co.uk/event/ento23/>

Benefits and Risks of Exotic Control Agents

University of Aveiro, Portugal, 11-14 September 2023

<https://brebca2023.web.ua.pt>

Entomological Society of Saskatchewan and Entomological Society of Canada JAM

Saskatoon, 15-18 October 2023

<https://esc-sec.ca/annual-meetings/>

31 North American Invasive Species Management Association

Lincoln, Nebraska, 16-19 October 2023

<https://conference.naisma.org/>

XII European Congress of Entomology

Crete, Greece, 16-20 October 2023

<https://ece2023.com/>

Entomology 23 (Annual Meeting of the Entomological Society of America)

National Harbor, Maryland, 5-8 November 2023

<https://www.entsoc.org/events/annual-meeting>

National Conference on Urban Entomology

Mobile, Alabama, 19-22 May 2024

<https://ncue.tamu.edu/>

XXVII International Congress of Entomology/ Le XXVII International Congress of Entomology

Kyoto, Japan

25-30 August 2024

<https://ice2024.org>

Entomology 24 (Annual Meeting of the Entomological Society of America)

Phoenix Arizona, 10-13 November 2024

Readers are invited to send the Bulletin Editor notices of entomological meetings of international, national or Canadian regional interest for inclusion in this list.

Les lecteurs sont invités à envoyer au rédacteur en chef des annonces de réunions entomologiques internationales, nationales ou régionales intéressantes afin de les inclure dans cette liste.

Bulletin of the Entomological Society of Canada

Editor: Bernard Roitberg
Assistant Editor: Donna Giberson

The *Bulletin of the Entomological Society of Canada*, published since 1969, presents quarterly entomological news, opportunities and information, details of Society business, matters of wider scientific importance and book reviews.

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www.esc-sec.ca/

The Entomological Society of Canada was founded in 1863 primarily to study, advance and promote entomology. It supports entomology through publications, meetings, advocacy and other activities.

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Submission deadline for the next issue: 31 July 2023



Bulletin de la Société d'entomologie du Canada

Rédacteur: Bernard Roitberg
Rédactrice adjointe: Donna Giberson

Le *Bulletin de la Société d'entomologie du Canada*, publié depuis 1969, présente trimestriellement des informations entomologiques, des occasions, des renseignements sur les opérations de la Société, des dossiers scientifiques d'importance et des analyses d'ouvrages.

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E-mail: info@esc-sec.ca
www.esc-sec.ca/fr/

La Société d'entomologie du Canada a été établie en 1863 principalement pour promouvoir l'étude et l'avancement de l'entomologie. Elle soutient l'entomologie par l'entremise de publications, de réunions et d'autres activités.

Envoyer vos soumissions à:
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ISSN: 0071-0741

Droits d'auteur 2023 Société d'entomologie du Canada

Date de tombée pour le prochain numéro: 31 juillet 2023

Officers of affiliated Societies, 2022-2023

Dirigeants des Sociétés associées, 2022-2023

Entomological Society of British Columbia

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|--|---|
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| Editor (Boreus) | Gabriella Zilahi-Balogh and Elton Ko |
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| Thompson Rivers University | |
| E-mail: robert.john.higgins@gmail.com | |
| http://entsocbc.ca | |

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| | |
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| Editor (Proceedings) | Heather Proctor |
| Webmaster | Micky Ahn |
| Secretary | Sharavari Kulkarni |
| E-mail: esalberta@gmail.com | |
| http://www.entsocalberta.ca | |

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| | |
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| Treasurer | Tyler Wist |
| Newsletter Editor | Marianna Horn |
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| Tel: (306) 933-7474 | |
| Email: Iain.Phillips@wsask.ca | |
| http://www.entsocsask.ca | |

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| | |
|--|-------------------------------|
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| Secretary | Jade Tanner |
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| 12 Dafoe Road, Winnipeg, Manitoba R3T 2N2 | |
| E-mail: entsocmanitobasecretary@gmail.com | |
| http://home.cc.umanitoba.ca/esm/ | |

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| | |
|--|-------------------|
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| E-mail: entsocont.membership@gmail.com | |
| http://www.entsocont.ca | |

Société d'entomologie du Québec

| | |
|--|----------------------------|
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| Vice-président | Maxime Lefebvre |
| Présidente sortante | Julie-Éléonore Maisonhaute |
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| Rédactrice (Antennae) | Louise Voynaud |
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| Tél : (579)224-3063 | |
| Email : secretaireseq@gmail.com | |
| http://www.seq.ca | |

Acadian Entomological Society

| | |
|--|--------------------------|
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| Vice-President | Joseph Bowden |
| Past President | Chris Cutler |
| Journal Editors | Sara Edwards & Rob Johns |
| Webmaster | Rylee Isitt |
| Secretary/Treasurer | Sara Edwards |
| Faculty of Forestry and Env. Management | |
| University of New Brunswick | |
| 3 Bailey Drive, | |
| P.O. Box 4400 Fredericton, NB E3B 5A3 | |
| E-mail: treasurer@acadianes.ca | |
| http://www.acadianes.ca | |

Editor's note: Society Directors and Officers are reminded to check these lists, and submit corrections, including the names and positions of new officers.



Just Say It: A Rant on Straight Talk

In Arlo Guthrie's *Alice's Restaurant Massacre* (Guthrie 1967), there is a line that goes something like: The sergeant talked for 45 minutes, and no one understood a word that he said. Guthrie's exaggerations of the kind of confusions that all of us have experienced are what gives the line its punch. In fact, when listening to jargon-spouting medical practitioners and lawyers, I have often found myself unnecessarily confused and have resorted to interrupting and asking whether I might paraphrase what I thought they were saying.

Turning the tables, when someone says something technical to you, do you just turn off? As a speaker who has frequently presented work on theoretical problems in biology, I am aware of the glazed eyes and white knuckles that these talks can generate, and I have made it a point of minimizing the jargon and the details; I pretend that I am a TED talker (TED Talks).

Early-stage authors often write in a wordy, flowery, and overambitious manner and for some, this approach remains a lifelong affliction. It is not clear whether this overreach stems from a desire to impress or inability to write scientifically. So, why do we so often resort to wordy jargon? It's not as if we are paid by the word, as was Dostoevsky (but not Dickens, according to yet another urban myth) thus, almost no one benefits from verbosity. Either way, this over-fabrication is something that we should try to avoid.

Il suffit de le dire : Une diatribe sur le franc-parler

Dans *Alice's Restaurant Massacre* d'Arlo Guthrie (Guthrie 1967), il y a une phrase qui dit quelque chose comme : « Le sergent a parlé pendant 45 minutes, et personne n'a compris un mot de ce qu'il a dit. »¹ Les exagérations de Guthrie sur le genre de confusions que nous avons tous vécues sont ce qui donne du punch à cette phrase. En fait, lorsque j'écoute des gens en médecine ou en droit qui débitent leur jargon, je me suis souvent trouvé inutilement confus et j'ai dû m'interrompre pour demander si je pouvais paraphraser ce que je pensais qu'ils étaient en train de dire.

Lorsque quelqu'un vous parle d'un sujet technique, est-ce que vous éteignez votre cerveau? En tant que conférencier ayant fréquemment présenté des travaux sur des problèmes théoriques en biologie, je suis conscient des yeux vitreux et des jointures blanches que ces conférences peuvent générer, et j'ai mis un point d'honneur à minimiser le jargon et les détails: je fais semblant d'être un conférencier TED (TED talks).

Les auteurs en début de carrière écrivent souvent de manière verbeuse, fleurie et trop ambitieuse et, pour certains, cette approche reste une affliction à vie. Il n'est pas évident de savoir si cette exagération provient d'un désir d'impressionner ou d'une incapacité à écrire scientifiquement. Alors, pourquoi avons-nous si souvent recours à un jargon verbeux? Ce n'est pas comme si nous étions payés au mot, comme l'était Dostoïevski (mais pas Dickens, selon un autre mythe urbain); ainsi, presque personne ne profite de la verbosité. Quoi qu'il en soit, cette façon d'écrire est quelque chose que nous devrions essayer d'éviter.

Le grand physiologiste des insectes Vincent Dethier, aujourd'hui décédé, peut nous servir de modèle. L'écriture de Dethier était élégante, éloquent et efficace; il ne gaspillait pas les

¹Traduction libre de l'anglais

The late, great insect physiologist Vincent Dethier can serve as a role model for all of us. Dethier's writing was elegant, eloquent, and efficient; he did not waste words. Take for example, the following statement from his 1993 Canadian Entomologist paper on caterpillar foraging, "If the hypothesis that chemoreception is irrelevant insofar as meandering is concerned is correct, caterpillars deprived of all known external chemosensory organs should behave in the field as do intact animals. The experiments reported here were conducted to test this hypothesis "(Dethier 1993). Dethier's straight talk was also employed when communicating with the non-scientific public; his short story, *The Moth and the Primrose* (Dethier 1980), was widely praised and was included in *The Best American Short Stories of 1981*. I have read this story several times with my keen editor's eye and can hardly find a word that I would delete.

The point of this long diatribe (here I am breaking my own rule for efficiency) is to remind you that, as scientists, we owe it to our public to write in clear, concise language that is easy to follow and digest. We can't all have the massive vocabulary of a Felix Sperling or the clever turn of phrases like the late Stuart McLean of Vinyl Café fame, however, we are all capable of speaking in a clear, direct manner. We should strive to do so.

The prose above introduces our new series, "How Do They Do That?", wherein noted entomologists are invited to demystify their work, in plain language. To start us off, I have invited recent Gold Medal recipient Michel Cusson to elucidate the highly technical field of genomics, in plain speak (page 82).

So, the next time someone asks you what you do for a living, remember to give them the straight goods on entomology and watch them nod appreciatively.

mots. Prenons par exemple l'extrait suivant de son article de 1993 sur la recherche de nourriture chez les chenilles : « Si l'hypothèse selon laquelle la chémoréception n'est pas pertinente en ce qui concerne les méandres est correcte, les chenilles privées de tous les organes chémosensoriels externes connus devraient se comporter sur le terrain comme les animaux intacts. Les expériences rapportées ici ont été menées pour tester cette hypothèse »¹ (Dethier 1993). Le franc-parler de Dethier a également été utilisé pour communiquer avec le public non scientifique; sa nouvelle, *The Moth and the Primrose* (Dethier 1980), a été largement saluée et a été incluse dans *The Best American Short Stories of 1981* (Les meilleures nouvelles américaines de 1981). J'ai lu cette nouvelle plusieurs fois avec mon œil d'éditeur et j'ai du mal à trouver un mot que je supprimerais.

Le but de cette longue diatribe (ici, j'enfreins ma propre règle d'efficacité) est de vous rappeler qu'en tant que scientifiques, nous devons à notre public d'écrire dans un langage clair et concis, facile à suivre et à assimiler. Nous ne pouvons pas tous avoir le vocabulaire massif d'un Felix Sperling ou les tournures de phrases astucieuses du regretté Stuart McLean du Vinyl Café, mais nous sommes tous capables de nous exprimer de manière claire et directe. Nous devrions nous efforcer de le faire.

La prose ci-dessus introduit notre nouvelle série « Comment font-ils cela? », dans laquelle des entomologistes de renom sont invités à démystifier leur travail, dans un langage simple. Pour commencer, j'ai invité le récent lauréat de la médaille d'or, Michel Cusson, à nous éclairer sur le domaine hautement technique de la génomique, en termes simples (page 82).

Alors, la prochaine fois que quelqu'un vous demandera ce que vous faites dans la vie, n'oubliez pas de lui parler franchement d'entomologie et regardez-le hocher la tête en signe d'appréciation.

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Front cover/Page couverture:

1. Caterpillar of the lobster moth, *Stauropus fagi* (Lepidoptera, Notodontidae), Delémont, Switzerland.
Chenille du bombyx du hêtre, *Stauropus fagi* (Lepidoptera, Notodontidae), Delémont, Suisse.
Photo: Tim Hays
2. Female *Physocephala tibialis* (Diptera, Conopidae) with three males trying to claim her. Brampton, Ontario.
Femelle *Physocephala tibialis* (Diptera, Conopidae) avec trois mâles essayant de la revendiquer. Brampton, Ontario.
Photo: Bob Noble
3. Brown Wasp Mantidfly (*Climaciella brunnea*, Neuroptera, Mantispidae) Locality: Municipality of Bifrost, Manitoba, Canada.
Mantispidé brun (*Climaciella brunnea*, Neuroptera, Mantispidae).
Localité : Municipalité de Bifrost, Manitoba, Canada.
Photo: Thilina Hetti Arachchige
4. Damselfly (Odonata, Coenagrionidae) taken in Burnaby, BC.
Demoiselle (Odonata, Coenagrionidae) prise à Burnaby, C.-B.
Photo: Taiga Morris
5. A weevil (*Curculio* sp., Coleoptera, Curculionidae) with its remarkably long snout, was drilling a hole through the ostiole of fig fruit (*Ficus benghalensis*) to lay its eggs inside the fruit. Kolkata, West Bengal, India.
Un charançon (*Curculio* sp., Coleoptera, Curculionidae) avec son museau remarquablement long, perceait un trou à travers l'ostiole du fruit de la figue (*Ficus benghalensis*) pour pondre ses œufs à l'intérieur du fruit. Kolkata, Bengale occidentale, Inde.
Photo: Supratim Laha
6. Masses of Small Square-gilled Mayflies (*Caenis* sp., Ephemeroptera, Caenidae) at light, Boone River, Iowa.
Masses de petites éphémères (*Caenis* sp., Ephemeroptera, Caenidae) à la lumière, Boone River, Iowa.
Photo: Gregory Courtney

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Back cover/Quatrième de couverture:

Ant woodlouse (*Platyarthus hoffmannseggii*, Isopoda, Platyarthridae). This blind, almost spectral-looking species of woodlouse lives exclusively within ant nests, where it feeds on detritus. The ants don't seem bothered by them, as the woodlice rush around keeping their host's nests clean of decaying organic material. Bristol, United Kingdom.
Le cloporte des fourmis (*Platyarthus hoffmannseggii*, Isopoda, Platyarthridae). Cette espèce de cloporte aveugle, à l'aspect presque spectral, vit exclusivement dans les nids de fourmis, où elle se nourrit de détritus. Les fourmis ne semblent pas être dérangées, car les cloportes s'empressent de nettoyer les nids de leurs hôtes des matières organiques en décomposition.
Bristol, Royaume Un.
Photo: Frank Ashwood