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Captions for cover photos can be found on the back cover.

La légende des photos de la couverture se situe sur la couverture arrière.



The face of a robber fly (Diptera: Asilidae) that was basking on a fence rail in August at Mission Creek Park in Kelowna, British Columbia.

Le visage d'une mouche Asiliide (Diptera: Asilidae) qui se prélassait sur une clôture en août au parc Mission Creek à Kelowna.

[Photo: Bob Lalonde]



To be an entomologist

It's a good thing we have butterflies to distract us during these strange and strained times, as well as beetles, bumblebees, belostomatids and blastobasids. Each of them is busy with their wonderfully varied lives, paying little attention to humans while we return the compliment by being preoccupied by war, economics and Twitter. We do affect each other, of course, with us causing escalating declines in insect populations, and their innumerable species enriching our lives while also competing for the essentials of life. But few people know more than a handful of the thousands of insect species in their neighborhood, much less could consistently communicate their names. That makes us entomologists a special bunch. We are the stewards of half of the species diversity known from our planet. It's a huge job, although it means that many of us know exactly why we get up in the morning – so many bugs, so little time. As Oliver Wendell Holmes famously observed, no one is a credible entomologist in much more than their own corner of the world. Fortunately, there are ways to lighten that load, and among the most enjoyable are entomology conferences where we reconnect with or meet new members of our bug-appreciating fellowship. So, I'm delighted to report that preparations for our Joint Annual Meeting in Vancouver this November are progressing very well.

Our 2022 Entomology JAM will be an

Être entomologiste

Heureusement que nous avons des papillons pour nous distraire en ces temps étranges et tendus, ainsi que des scarabées, des bourdons, des belostomatides et des blastobasides. Chacun d'entre eux est occupé par sa vie merveilleusement variée, ne prêtant que peu d'attention aux humains, alors que nous leur rendons le compliment en étant préoccupés par la guerre, l'économie et Twitter. Bien sûr, nous nous influençons mutuellement, car nous provoquons un déclin croissant des populations d'insectes, tandis que leurs innombrables espèces enrichissent nos vies tout en se disputant les éléments essentiels à la vie. Mais rares sont les personnes qui connaissent plus d'une poignée des milliers d'espèces d'insectes présentes dans leur voisinage, et encore moins celles qui pourraient communiquer leur nom de manière cohérente. Cela fait de nous, entomologistes, un groupe spécial. Nous sommes les gardiens de la moitié de la diversité des espèces connues sur notre planète. C'est un travail énorme, même si cela signifie que beaucoup d'entre nous savent exactement pourquoi nous nous levons le matin - tant d'insectes, si peu de temps. Comme l'a fait remarquer Oliver Wendell Holmes, personne n'est un entomologiste crédible dans plus que son propre coin du monde. Heureusement, il existe des moyens d'alléger cette charge, et parmi les plus agréables figurent les conférences d'entomologie, qui nous permettent de renouer avec les membres de notre communauté d'amateurs d'insectes ou d'en rencontrer de nouveaux. Je suis donc ravi d'annoncer que les préparatifs de notre réunion annuelle conjointe, qui se tiendra à Vancouver en novembre prochain, vont bon train.

Notre réunion annuelle conjointe 2022 sur l'entomologie sera un événement organisé par les Sociétés d'entomologie d'Amérique, du Canada et de la Colombie-Britannique (<https://entsoc.org/events/annual-meeting>). La date limite

extravaganza organized by the Entomological Societies of America, Canada and British Columbia (<https://entsoc.org/events/annual-meeting>). The early June deadline for submitting presentations is fast approaching, while early registration continues until September. It will be our first return to a primarily in-person conference in 3 years, with the added benefit that all recorded on-demand content will be available by in-person and virtual registrants for a year after the conference. The theme this year is “*Entomology as Inspiration: Insects through art, science, and culture*” and it will be the perfect opportunity to reflect on the human component of our science and our shared fascination with all things entomological. In addition to individually submitted presentations from far and wide, we’ve invited plenary speakers who will showcase the potential for diversity in entomology in Canada and the world. We’ll also be recognizing the inspiring new generation of entomologists who are keeping our field vibrant. And we’ve selected an exciting array of dozens of organized symposia that will reflect the extraordinary range of cultural, ecological, economic and taxonomic themes that bugs have bestowed upon us. Outside of the confines of the conference itself, there will be a number of opportunities to explore the entomological and human side of the Vancouver area. The 2022 JAM will be a chance to make new friends and catch up with our extended entomology families in an environment that will be constructively responsive to any health concerns in the ever-changing world we inhabit. And the welcoming, supportive, playful bug fest that so many of us have missed from past years will be back in full force.

Entomologists, like everyone else these days, have many conflicting pressures on their time. These pressures pull us in different directions as we try to fulfill our personal and professional priorities within larger groups that have limited appreciation of the things we hold dear. For example, many

de soumission des présentations, début juin, approche à grands pas, tandis que les inscriptions anticipées se poursuivent jusqu’en septembre. Ce sera notre premier retour à une conférence principalement en personne depuis 3 ans, avec l’avantage supplémentaire que tout le contenu enregistré à la demande sera disponible pour les inscrits en personne et virtuels pendant un an après la conférence. Le thème de cette année est « *L’entomologie comme source d’inspiration : Les insectes à travers l’art, la science et la culture* ». Ce sera l’occasion idéale de réfléchir à la composante humaine de notre science et à notre fascination commune pour tout ce qui est entomologique. En plus des présentations individuelles soumises de partout, nous avons invité des conférenciers et conférencières qui mettront en valeur le potentiel de la diversité en entomologie au Canada et dans le monde. Nous rendrons également hommage à la nouvelle génération d’entomologistes qui contribue à la vitalité de notre domaine. Enfin, nous avons sélectionné un éventail passionnant de douzaines de symposiums organisés qui refléteront l’extraordinaire répartition des thèmes culturels, écologiques, économiques et taxonomiques que les insectes nous ont légués. En dehors des limites de la conférence elle-même, il y aura un certain nombre d’occasions d’explorer le côté entomologique et humain de la région de Vancouver. La réunion annuelle conjointe de 2022 sera l’occasion de se faire de nouveaux amis et de retrouver nos familles entomologiques élargies dans un environnement qui répondra de manière constructive à toute préoccupation de santé dans le monde en constante évolution dans lequel nous vivons. Et la fête des insectes accueillante, solidaire et ludique qui a manqué à tant d’entre nous les années précédentes sera de retour en force.

Les entomologistes, comme tout le monde de nos jours, subissent de nombreuses pressions contradictoires. Ces pressions nous poussent dans différentes directions alors que nous essayons de réaliser nos priorités personnelles et professionnelles au sein de groupes plus larges qui ont une appréciation limitée des choses qui nous sont chères. Par exemple, de nombreux

academic entomologists exist in biology or natural resource departments where few of our colleagues self-identify as entomologists, even if they happen to work on insects, as do many ecologists. But I've always thought that one of the best bioassays for identifying a true entomologist is that they take the time to attend entomology conferences. They also take the time to contribute to sustaining the community of entomologists. One of the finest true entomologists I know is our indefatigable *Bulletin* Editor, Cedric Gillott, who has graciously and perspicaciously served in this role for 12½ years, including an extra 6 months until our incoming Editor, Bernie Roitberg, could be available to take the torch. This is Cedric's last *Bulletin* issue as Editor, and we will miss his efficient, effective and ever-cheerful personal approach to a task that has been essential to keeping our whole community connected through challenging times. Cedric, we wish you all the very best in your second retirement. I would also like to express my sincere appreciation to all the other entomologists who have contributed so diligently to keeping our Entomological Society of Canada and our community afloat through the continuing challenges that are an integral part of being an entomologist.

entomologistes universitaires travaillent dans des départements de biologie ou de ressources naturelles où peu de nos collègues s'identifient comme entomologistes, même s'il leur arrive de travailler sur les insectes, comme le font de nombreux écologistes. Mais j'ai toujours pensé que l'un des meilleurs tests biologiques pour identifier un véritable entomologiste est qu'il prend le temps d'assister aux conférences sur l'entomologie. Il prend également le temps de contribuer au soutien de la communauté des entomologistes. L'un des meilleurs vrais entomologistes que je connaisse est notre infatigable rédacteur du *Bulletin*, Cedric Gillott, qui a gracieusement et avec perspicacité assumé ce rôle pendant 12½ ans, y compris 6 mois supplémentaires jusqu'à ce que notre nouveau rédacteur, Bernie Roitberg, soit disponible pour reprendre le flambeau. Il s'agit du dernier numéro du *Bulletin* de Cédric en tant que rédacteur en chef, et nous nous ennuierons de son approche personnelle efficace, efficiente et toujours pleine de bonne humeur d'une tâche qui a été essentielle pour garder notre communauté entière connectée pendant des périodes difficiles. Cedric, nous te souhaitons le meilleur dans ta seconde retraite. J'aimerais également exprimer ma sincère reconnaissance à tous les autres entomologistes qui ont contribué avec tant de diligence à maintenir la Société d'entomologie du Canada et notre communauté à flot malgré les défis constants qui font partie intégrante du métier d'entomologiste.



A butterfly to distract us: *Papilio machaon* *dodi* on scarlet mallow, *Sphaeralcea coccinea*, Dry Island Buffalo Jump Provincial Park, Alberta (2017)

Z. Macdonald

Joint Annual Meeting 2022 / Reunion annuelle conjointe 2022



We invite you to attend the 2022 ESA, ESC, and ESBC Joint Annual Meeting!

The 2022 Joint Annual Meeting will take place in beautiful Vancouver, British Columbia, from **13-16 November 2022**. With a theme of **Entomology as inspiration: Insects through art, science, and culture**, this meeting represents a unique opportunity to share your research, gain exposure, and collaborate across borders and across Societies. Connect with over 3,000 scientists and researchers from around the globe over the 4 science-filled days.

Full meeting details, important deadlines and up to date information can be found on the meeting website: <https://www.entsoc.org/events/annual-meeting>

We look forward to seeing you in Vancouver!

Nous vous invitons à assister à la réunion annuelle conjointe ESA, SEC et SECB 2022!

La réunion annuelle conjointe 2018 se tiendra dans la magnifique ville de Vancouver, Colombie-Britannique, **du 13 au 16 novembre 2022**. Avec le thème **L'entomologie comme source d'inspiration: Les insectes à travers l'art, la science et la culture**, cette réunion représente une chance unique de partager votre recherche, d'avoir de la visibilité et de collaborer au-delà des frontières et des Sociétés. Soyez en contact avec plus de 3000 scientifiques et chercheurs de tout le globe durant 4 journées remplies de science.

Les détails complets de la réunion, les dates limites importantes et de l'information à jour se trouvent sur le site web de la réunion : <https://www.entsoc.org/events/annual-meeting>

Au plaisir de vous voir à Vancouver!



Research Roundup

Are you an ESC student member looking to spread the word about your newly published paper? If so, we'd love to hear from you! We continue to publicize graduate student publications to the wider entomological community through our Research Roundup initiative. As part of this initiative, we invite students to submit (1) a brief (<240 character) summary of their paper, (2) one image related to the paper, (3) a one-sentence description of their thesis research, and (4) one sentence about (a) the aspect of their research they find most fascinating or (b) why they love insects. Check out the ESC blog, [Facebook](#), and [Twitter](#) pages for the most recent featured articles and student author biographies. If you would like your recently published paper to be featured, send us an email at students@esc-sec.ca. 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

SEPEC is always keen to take on new members! Volunteering for SEPEC is a great way to get involved with the Society and 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@gmail.com. We look forward to hearing from you!

Aperçu de la recherche

Vous êtes membre étudiant de la SEC et vous souhaitez faire connaître votre article récemment publié? Si oui, nous serions ravis de vous entendre! Nous continuons à faire connaître les publications en provenance de la communauté étudiante à l'ensemble de la communauté entomologique par le biais de notre initiative Aperçu de la recherche. Dans le cadre de cette initiative, nous invitons les étudiants à soumettre (1) un bref résumé (<240 caractères) de leur article, (2) une image liée à l'article, (3) une description en une phrase de leur recherche de thèse, et (4) une phrase sur (a) l'aspect de leur recherche qu'ils trouvent le plus fascinant ou (b) pourquoi ils aiment les insectes. Consultez le blogue et les pages [Facebook](#) et [Twitter](#) de la SEC pour obtenir les articles les plus récents et les biographies des étudiants auteurs. Si vous souhaitez que votre article récemment publié soit mis en vedette, envoyez-nous un courriel à students@esc-sec.ca. 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 de nouveaux 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@gmail.com. Nous avons hâte de vous lire!

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.

Congratulations to the following graduate student for successfully defending their entomologically oriented thesis!

Justis Henault. 2021, MSc. University of Winnipeg. Endangered *Oarisma poweshiek* butterfly larval foraging and adult habitat interactions in Manitoba, Canada. <https://doi.org/10.36939/ir.202112221602>. Supervised by Richard Westwood (University of Winnipeg).

Le comité des affaires étudiantes et des jeunes professionnels veut reconnaître et célébrer les réalisations des nouveaux diplômés en entomologie. Si vous ou un étudiant que vous connaissez a récemment soutenu une thèse en entomologie dans une université canadienne, veuillez envoyer les détails suivants à students@esc-sec.ca : nom de l'étudiant, date, diplôme, titre de la thèse, superviseur(s) et université. Ces informations seront publiées sur le site web de la SEC et dans le prochain bulletin de la SEC.

Félicitations à l'étudiant des cycles supérieurs suivant pour avoir défendu avec succès sa thèse à orientation entomologique!



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Entomological Society of British Columbia

Many members of the Entomological Society of British Columbia have been busy with preparations and planning for the Joint Annual Meeting with the ESC and the ESA, set for 13–16 November 2022. The theme this year is “*Entomology as Inspiration: Insects through art, science, and culture.*” and judging by the preliminary program, it looks like it will be an amazing conference – hopefully we will see many of you there.

For those of you who cannot travel to Vancouver this fall, you can still keep up with recent entomological research in the west by checking out the current issue of the Journal of the ESBC (<https://journal.entsocbc.ca/index.php/journal>). I asked Claudia Copley and Robb Bennett of the Royal British Columbia Museum in Victoria, and Jaime Pinzon from the Northern Forestry Centre in Edmonton, to provide a summary of their work:

If the most recent issue of the Journal of the ESBC is used as a guidepost, then the west is currently a hotbed of arachnological research, with almost a third of the submissions focused on spiders. These range from a scientific note about the first record of *Pholcus opilionoides* (Figs 1 and 2) in Canada (Pinzon et al. 2021a), to a redescription of *Robertus arcticus* (Pinzon et al. 2021b), and, finally, an annotated checklist of the more than 900 species of spiders reported from British Columbia (Bennett et al. 2021).



Figure 1. A specimen of *Pholcus opilionoides* captured and photographed by Ryan Chubaty.



Figure 2. Using iNaturalist records and collaborating with citizen scientists, Dr Jaime Pinzon was able to obtain voucher specimens of *Pholcus opilionoides*.

This last publication is the result of many years of surveys in some very difficult-to-reach regions of the province, but is still by no means the complete picture. Since 2008, most field work for the BC spider checklist has focused on alpine areas, where baseline information on distributions and patterns of abundance is especially valuable because species may be particularly vulnerable to the impacts of climate change. The checklist also serves to highlight areas where additional effort needs to be concentrated in order address imbalances in sampling and it will be used to guide future fieldwork.

Of interest to researchers of other taxa may be the fact that, as part of the spider field work, broad collections are made of terrestrial arthropods in general from these remote sites, so anyone

with an interest in high-elevation entomofauna may also benefit. All specimens are housed at the Royal BC Museum and readily available for future research. For more details on the BC alpine field work please visit the December 2020 issue of the Biological Survey of Canada newsletter (<https://biologicalsurvey.ca/newsletter/bsc.vol39.2.pdf#>).

References

- Bennett, R., D.R. Copley, and C.R. Copley. 2021. [Checklist of the spiders \(Araneae\) of British Columbia](#). Journal of the Entomological Society of British Columbia, **118**: 25–52.
- Pinzon, J., K. Kent, and R. Bennett. 2021a. [First record of *Pholcus opilionoides* \(Schrank\) \(Araneae: Pholcidae\) in Canada, with notes on its biology](#). Journal of the Entomological Society of British Columbia, **118**: 53–56.
- Pinzon, J., K. Kent, D.J. Buckle, and R. Bennett. 2021. [Redescription of the spider *Robertus arcticus* \(Chamberlin & Ivie\) \(Araneae: Theridiidae\), with the first description of the female](#). Journal of the Entomological Society of British Columbia, **118**: 3–11.



Entomological Society of Alberta

The ESA spring board meeting was held on 28 April 2022.

The ESA hosted an Insect Pinning/Shadowboxing Workshop on 7 May 2022 at the Alfred H. Savage Centre in Edmonton. At the workshop, attendees learned to pin butterflies and create a shadowbox.



Entomological Society of Manitoba

Denice Geverink (Department of Environmental Sciences, University of Manitoba) received the 2021 Orkin Award from the Society. Introduced in 1986, the annual award is presented by Orkin Canada to an undergraduate student pursuing Entomology at one of the universities in Manitoba. Its

purpose is to foster and encourage interest in Entomology, particularly in natural methods of insect control and the proper use of insecticides.

Sheila Wolfe (AAFC) has agreed to act as Scientific Chair for the 78th Annual Meeting of the ESM. Details on the meeting will be forthcoming and reported on the Society's website.



Entomological Society of Ontario

ESO Communications Committee

The Communications Committee is always looking for photos and opportunities to promote Ontario scientists studying in entomology. If any ESC member has photos, or social media post ideas they think may be of interest to share, please email them to Jennifer Grixti (esocomms@gmail.com).

ESO Equity Diversity and Inclusion (EDI) Committee

As with the ESC, in fall 2021, the ESO created an EDI Committee which represents an opportunity to take steps to create a more inclusive society.

New Editor-In-Chief (EIC) for the Journal of the Entomological Society of Ontario (JESO)

The JESO is seeking a new EIC to begin sometime within the next 24-36 months. The current EIC (Chris MacQuarrie) would be interested in persisting in a co-EIC role for a period to assist with a handover of the reins, and to complete some long-delayed tasks (i.e., DOI assignment, upload of material at the Biodiversity Heritage Library). If you or anyone you know is interested in this position and would like more information, they can reach out to Chris MacQuarrie at [cjkmacquarrie\(at\)gmail.com](mailto:cjkmacquarrie(at)gmail.com).



Acadian Entomological Society

The 79th Annual Meeting of the Acadian Entomological Society will take place 22 July 2022 on the Dalhousie University Agricultural Campus in Truro, Nova Scotia. There will also be an online option for registrants to participate virtually. Register here: <https://www.acadianes.ca/about.php>. We look forward to seeing everyone in Truro in July!

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The challenges and rewards of pursuing parallel paths of entomological enquiry

As probably happens to most scientists when they are progressing towards the end of their career, I have recently felt the need to sit back and take stock of the work accomplished. Today, I find myself in the privileged position to do so as an ESC Gold Medal Award recipient, inasmuch as the *Bulletin* is offering me an ideal forum to examine my entomological journey. If I am in this position, however, it is because some of my colleagues rolled up their sleeves to put together a nomination package and because the ESC Achievement Awards Committee selected me for this award in 2020. Thus, I would like to begin by expressing my deepest gratitude to all those who made this happen.

Either by choice or because of fortuitous events arising in one's personal or professional life, many of us, insect enthusiasts, develop a career with a life-long focus on one particular area of entomology. However, my own professional trajectory has been far more sinuous, now precluding easy slotting of my scientific identity into one of the usual categories (e.g., insect systematist, behavioral ecologist, biocontrol specialist). Although such a career path comes with significant challenges, the rewards usually make up for them. Here, I want to take you through the meanders of my entomological research adventure, with a focus on the decisions that led me to bifurcate into new areas while maintaining efforts in older ones, highlighting the important roles played by mentors, colleagues and students at each of these branching points (see Figure 1).

Like many of my colleagues, I developed an interest in entomology as a teenager through insect collecting activities, but the decision to pursue a career in this field came later, during my undergraduate studies at the University of Sherbrooke. It was an invited lecture by Prof. Jeremy McNeil that ignited my desire to follow an academic path leading to a job in insect science.

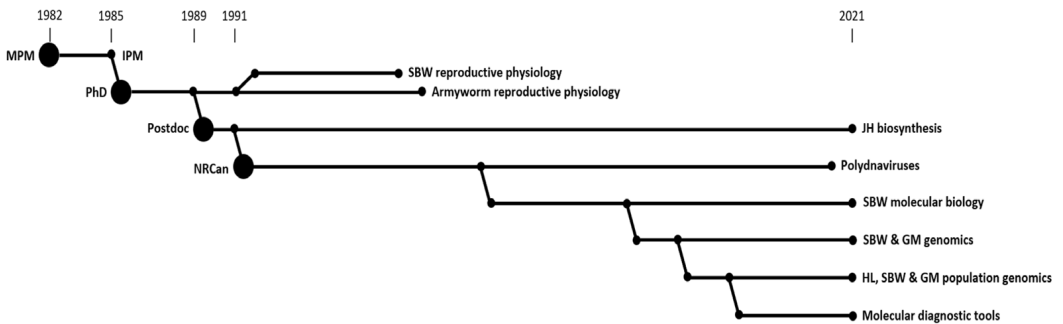


Figure 1. Diagram showing some of the parallel paths of entomological research I have pursued after completing my Master of Pest Management (MPM) degree in 1982. Abbreviations: IPM, integrated pest management; NRCan, Natural Resources Canada; SBW, spruce budworm; JH, juvenile hormone; GM, gypsy moth (now called “spongy moth”); HL, hemlock looper.

*The Award was presented in 2020, but the Gold Medal Address was postponed until 2021 because of the COVID-19 pandemic.

Unknowingly, Jeremy transmitted to me his contagious enthusiasm about entomology, in both its fundamental and applied facets. I soon found myself working for him as a summer student, getting first-hand experience in the use of several insect monitoring techniques.

In view of my strong interest in applied entomology at the time, Jeremy recommended that I seek admission in the Master of Pest Management (MPM) program at Simon Fraser University, which he thought would be a good first step towards achieving my professional goals. And he was right. Besides providing me with a broad overview of all aspects of insect pest management, the MPM program gave me the opportunity to meet many outstanding scientists, including the one who would become my Master's advisor, behavioural ecologist Prof. Bernard Roitberg. My research project focused on the development of a sampling approach aimed at overcoming challenges associated with the edge-biased field distribution of a chrysomelid potato pest, the tuber flea beetle, a topic suggested by my co-supervisor, Dr Bob Vernon (AAFC). Notwithstanding the applied nature of this project, my daily interactions and discussions with Bernie and his group led to a shift in my research interests towards the fundamental underpinnings of the problem at hand, namely insect movement. Thus, after developing a monitoring scheme that addressed the above edge-effect issue, I examined the dynamics of short-range movement as a factor contributing to the observed spatial distribution. Interestingly, my readings on insect movement soon got me interested in long-range insect movement – migration – which would eventually lead me to undertake a PhD under Jeremy's mentorship at Laval University.

The focus of Jeremy's lab, back then, was the migration of a noctuid moth, the true armyworm, which was believed to undertake spring/northward and fall/southward long-distance displacements between the southern United States and Canada. Although my initial intention was to study the behavioural aspects of this migration, Jeremy quickly convinced me to tackle these long-range movements from a reproductive physiology angle. Indeed, his group's work on seasonal variation in sex pheromone production and emission had suggested a strong interdependence between reproduction and migration. As I had no formal training in insect physiology, Jeremy provided opportunities for me to travel to other labs where I could get first-hand experience in some areas of reproductive physiology and endocrinology. In the course of my PhD degree, I was then able to show, for the first time in a moth, the dependence of pheromone biosynthesis and emission on the presence of juvenile hormone (JH). As a similar dependence was not observed in sedentary Lepidoptera, my findings were strongly suggestive of a JH-associated "oogenesis-flight syndrome" in the armyworm, whereby trade-offs between reproduction (egg production) and migration are orchestrated by seasonal modulations in JH biosynthesis.

During my doctoral studies, a stint in the lab of Prof. Stephen S. Tobe, a world-renowned JH expert, opened my eyes to the vast and fascinating field of insect endocrinology and JH research. So much so that, after receiving my PhD, I decided to return to Steve's lab to do a postdoc at the University of Toronto. There, I carried out investigations on some of the factors involved in the regulation of JH production, both in the Lepidoptera and the Blattodea. Importantly, it was during my postdoctoral fellowship that I developed a career-long interest in the biochemical intricacies behind the production of the "ethyl-branched" JHs unique to the Lepidoptera (Fig. 2a). A great deal was already known about the biosynthetic pathway leading to these singular sesquiterpenoids, but much remained to be discovered.

After my 2-year postdoc in Toronto, I moved to Quebec City to start my first "real job" as Research Scientist for "Forestry Canada" (now known as the Forest Sector of Natural Resources Canada; NRCan). There, I was given a comfortable degree of freedom in choosing my research directions, so I tried to make choices that would allow me to remain active in the field of insect endocrinology. Thus, I quickly found myself delving into the reproductive physiology of the spruce budworm, in collaboration with my next-door colleague, Dr Johanne Delisle, while

maintaining a collaboration with Jeremy to complete the work we had initiated earlier on the role of JH in armyworm migration (Figure 1). However, I simultaneously began to develop two distinct arms of what would become the main thrust of my research program at NRCan.

As alluded to above, I decided to undertake investigations of the factors responsible for the production of lepidopteran JHs, focusing on the enzymes involved in their synthesis. While the most common form of JH, JH III, is derived from a key cholesterol precursor, farnesyl diphosphate (FPP), the ethyl branches seen on the unique lepidopteran JHs are not added to this FPP carbon skeleton subsequent to its synthesis. Rather, they are already present on the substrates (“isoprene units”) that undergo condensation in a reaction catalysed by FPP synthase (FPPS; Figure 2b). It follows that a lepidopteran version of FPPS should have a catalytic cavity capable of accommodating bulkier ethyl-branched substrates. I reasoned that, should this hypothesis be correct, it may enable the design of Lepidoptera-specific FPPS inhibitors capable of blocking JH production and induce precocious metamorphosis. Such inhibitors could then be used as active ingredients of novel insecticides selectively targeting caterpillar pests. To begin exploring these possibilities, I sought the collaboration of bio-organic chemist Prof. Stephanie Sen (now at The College of New Jersey) who shared my interests in this area of insect biochemistry. Along with molecular biologist Catherine Béliveau, who had just joined my lab, we then embarked on a search of the “lepidopteran FPPS holy grail”.

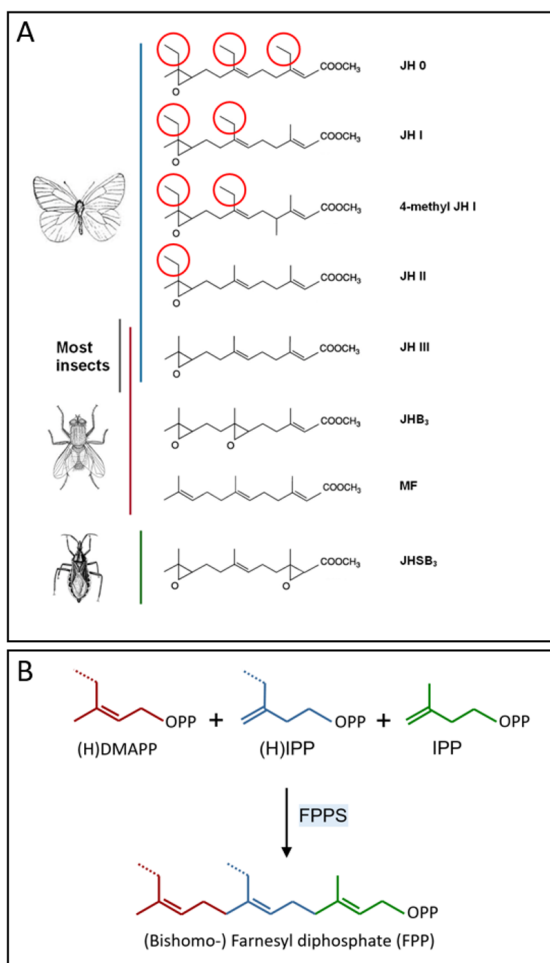


Figure 2. Lepidopteran juvenile hormones (JHs) and their homo-farnesyl diphosphate precursors. **A.** Structures of the known juvenile hormones, including four that are found only in the Lepidoptera, each bearing one to three ethyl branches (red circles). The simplest form, JH III, is produced by most insects, while the higher Diptera and the Heteroptera synthesize two different bis-epoxide versions of JH III (JHB₃ and JHSB₃, respectively). In the higher Diptera, a JH III precursor, methyl farnesoate (MF), displays JH-like activity. **B.** Farnesyl diphosphate synthase (FPPS) typically catalyzes the head-to-tail condensation of three isoprene units (C₅), namely dimethylallyl diphosphate (DMAPP) and isopentenyl diphosphate (IPP) to generate the C₁₅ product FPP. In the Lepidoptera, ethyl-branched isoprene units (C₆; homo-DMAPP and homo-IPP; dotted branches) can substitute for their C₅ equivalents. In the example shown here, FPPS catalyzes the production of bishomo-FPP, the precursor of JH I.

We first discovered that the spruce budworm and the silkworm both featured genes encoding two very different FPPS homologs, a finding in contrast with earlier reports pertaining to non-lepidopteran insects, in which FPPS was encoded by a single gene. With the contribution of PhD student Aline Barbar, it soon became clear that the presence of two unambiguously distinct FPPS types was a common feature in the Lepidoptera. Interestingly, while the Type-1 FPPS was found to be expressed in all sampled tissues of the silkworm, expression of the Type-2 homolog was confined to the JH-producing glands, the corpora allata. From that point on, the Type-2 enzyme was considered the one involved in lepidopteran JH biosynthesis. Stephanie then synthesized several potential FPPS inhibitors (bis-phosphonates), featuring R-groups of different lengths, with the aim of comparing their ability to inhibit, *in vitro*, the activities of recombinant mammalian, dipteran and lepidopteran (Type-2) FPPSs. As predicted, the bis-phosphonates with the bulkier R-groups could inhibit spruce budworm FPPS (*i.e.*, gain access to the active site), but not block the activity of the other two enzymes, thus confirming the greater capacity of lepidopteran FPPS to accommodate large substrates such as ethyl-branched isoprene units. To further explore the structural features of lepidopteran type-2 FPPS, I sought the collaboration of Prof. Rong Shi (Laval University), a protein biochemist and x-ray crystallographer, with whom I recruited PhD student Marie-Ève Picard to work on this project. Marie-Ève recently succeeded in crystallizing the spruce budworm FPPS and solving its 3D structure in the presence of different inhibitors. Her work revealed several structural properties unique to the lepidopteran enzyme and likely responsible for its ability to accept bulkier substrates than other FPPSs, including an unusually high degree of conformational plasticity. Marie-Ève is now using her 3D FPPS model for the *in silico* design of more selective and more potent inhibitors.

At the outset of my career at NRCan, in spite of the latitude I was given in shaping my research program, I was expected to devote some of my time to the study of physiological interactions between the spruce budworm and its principal natural enemies. Given my background and interest in insect endocrinology, I quickly turned my attention to some ichneumonid budworm endoparasitoids known to block the metamorphosis of their host; such developmental arrest was indeed expected to result from a disruption of the hormonal program that drives the larval-adult transformation. In conducting my literature search on this topic, I soon found myself completely enthralled by the fascinating world of polydnviruses. These highly unconventional dsDNA viruses are carried (asymptomatically) by some species of endoparasitic wasps and injected by adult females into their caterpillar hosts during stinging (oviposition; Figure 3). The virions then gain access to host cells, where some of their genes are expressed. This viral gene expression induces a depression of the host immune response towards the immature wasp and/or an arrest of host development to allow the parasitoid to complete its own development prior to host metamorphosis. My first summer at NRCan coincided with the tail end of a spruce budworm outbreak in Quebec; so, I took advantage of it to collect several specimens/species of budworm parasitoids. I then contacted the “father of polydnvirology”, Prof. Don Stoltz (Dalhousie University), in the hope he would be interested in examining some ichneumonids I had collected and spotted as potential carriers of polydnviruses. Using his electron microscopy skills, Don quickly confirmed the presence of polydnvirus virions in the female oviducts of both species and expressed a strong interest in collaborating with my lab on the characterization of these viruses and their impacts on budworm physiology.

Our work initially focused on the ichneumonid wasp *Tranosema rostrale*, a frequent parasitoid of the spruce budworm in Quebec. Two graduate students, Daniel Doucet and Marlène Laforge, were successively recruited to characterize the immune/developmental and hormonal effects, respectively, of the *T. rostrale* polydnvirus (“TrIV”) on the budworm. Unlike other

polydnnaviruses examined earlier, TrIV was observed to have surprisingly little impact on its host's immune response, but caused severe disruption of its development, the latter being associated with an inhibition of JH degradation and ecdysone production. Thus, the budworm/*T. rostrale* host-parasitoid complex was offering an ideal system to identify polydnnaviral genes specifically involved in host developmental perturbations. Our initial transcriptional analyses, conducted in collaboration with Prof. Guy Bellemare (Laval University), revealed the overwhelming dominance of a single TrIV transcript ("TrV1"), which encoded a secreted protein that we immediately suspected of being the effector of host developmental arrest. While subsequent studies conducted by graduate students Asieh Rasoolizadeh, Anic Levasseur and Frédéric Dallaire revealed the presence of many other TrIV transcripts in parasitized budworms, evidence that TrV1 was likely the key factor responsible for inhibition of metamorphosis was provided later by postdoctoral fellow Madjid Djoumad, who used RNA interference to show that TrV1 inhibits cell division.

As polydnnaviruses were known to have relatively large genomes, potentially containing several dozens of genes with functions waiting to be discovered, interest in sequencing and characterizing them started to grow when high-throughput sequencing technologies were about to emerge.

As such, polydnnavirus genome sequencing provided me with a point of entry into the field of genomics. After recruiting postdoctoral fellow Renée Lapointe, I initiated a collaboration with the lab of Prof. Bruce Webb (University of Kentucky) with the aim of sequencing several polydnnavirus genomes, including those of TrIV and GfIV, the latter being a virus produced by another budworm parasitoid, *Glypta fumiferanae*. These two viruses were of special interest because they are carried by wasps belonging to two distinct subfamilies (Campopleginae and Banchinae) and their virions display striking morphological differences suggestive of distinct evolutionary paths. Not surprisingly, the sequencing of these genomes revealed substantial

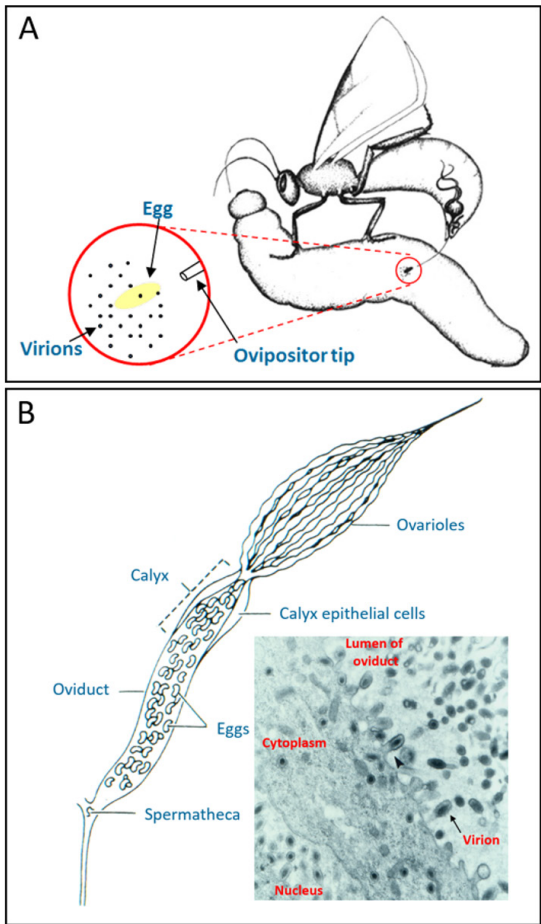


Figure 3. Production and transmission of polydnnaviruses by endoparasitic wasps. **A.** Drawing representing a female wasp in the process of parasitizing (stinging) a caterpillar host. In this process, she co-injects an egg and a small volume of "calyx fluid" containing polydnnavirus virions. **B.** Polydnnavirus replication and virion assembly take place in nuclei of the ovarian calyx, after which virions migrate through the cytoplasm, before being released into the lumen of the oviduct by exocytosis.

differences in the number and types of genes they carried as well as in the degree of their segmentation (polydnavirus genomes are made up of multiple “segments” of circular dsDNA). These differences, subsequently confirmed through the sequencing and analysis of a second banchine polydnavirus genome by Madjid, provided the impetus for another fascinating research project conducted in collaboration with French colleagues Drs Jean-Michel Drezen (CNRS) and Nathalie Volkoff (INRA). Using a combination of genomics, transcriptomics and proteomics approaches, together we sought to determine whether campoplegine and banchine polydnaviruses had distinct evolutionary origins. As polydnavirus genomes are vertically transmitted via a copy integrated in the wasp’s chromosomes, an answer to this question would ultimately have to be found in the genomes of the carrier wasps. It was the painstaking work of Catherine, in my lab, that eventually led to the discovery of regions, within the genome of *G. fumiferanae*, harboring genes encoding virion capsid proteins displaying the same molecular signatures as those found in the genome of campoplegine wasps, thereby pointing to a common origin of the two virus types in spite of their many morphological and genomic differences.

Having developed a taste for genomics, I seized the opportunity offered to me in 2010, by Prof. Roger Levesque, to undertake the sequencing of the spruce budworm genome, using Laval University’s newly acquired Roche 454 sequencing instrument. Much of the work conducted in my lab at that time addressed questions requiring molecular biology approaches to clone insect genomic regions (including in the budworm) or cDNAs. Thus, availability of a budworm genome assembly was going to greatly facilitate many aspects of our research. To further augment the genomic resources available to our group, we concomitantly took steps to generate a transcriptome. The initial phase of this work involved several collaborators at Laval University and NRCAN, plus colleagues at the University of Alberta (Prof. Felix Sperling), McGill University (Prof. Ken Dewar) and UNICAMP, Brazil (Prof. Marcelo Brendão). This effort yielded multiple draft versions of the genome, some of which were used as “reference” in several population genomics and phylogenetic studies conducted by members of our collaborative team. However, production of a more complete, less fragmented assembly had to await the advent of newer sequencing and assembling/scaffolding technologies. Thus, when bioinformatician Patrick Gagné joined my lab in 2017, he launched new assembly runs using PacBio long reads as starting material. Following implementation of different scaffolding procedures, this effort yielded a chromosome-scale assembly, where each chromosome corresponds to one of the 30 linkage groups identified earlier by postdoctoral fellow Sandrine Picq. This assembly has recently been annotated and used by our group in an attempt to reconstruct the evolutionary history of tortricid antifreeze proteins, using a comparative genomics approach.

With a budworm genome assembly in hand, we were in a solid position to assess spatial genetic structure among spruce budworm populations across the species’ continental range. In view of earlier allozyme-based assessments that had suggested a very limited degree of population structure in Canada, likely as a consequence of the high mobility of adult moths, a new population genomics analysis, using a large collection of genome-wide markers, seemed like the logical next step to better understand regional differences in outbreak behaviour. After completing a PhD in Felix Sperling’s lab, Dr Lisa Lumley joined my group as a postdoc to undertake this formidable task, one that would involve extensive budworm sampling across its nearly coast-to-coast geographic range. But the effort was worthwhile as Lisa generated the best assessment of budworm population genomic structure available to date: while her work confirmed the limited degree of population structure across Canada and the northeastern USA, Lisa identified three subpopulations corresponding to western, central and eastern regions of the species’ continental range, showing varying degrees of genetic integrity. Importantly, differentiation between the central and eastern subpopulations was associated with a linkage block on chromosome 4.

Because of the expertise we had developed in insect genomics and population genetics, Prof. Richard Hamelin (UBC) came knocking at our lab's door to seek our participation in two Genome Canada-funded projects aimed at the development of genomics-based tools for species and geographic source identification of alien invasive pests, including the spongy moth, *Lymantria dispar*. Don Stewart along with Audrey Nisole and Madjid Djoumad, three molecular biologists currently in my group, played key roles in developing two qPCR-based assays for the identification of species and subspecies within the spongy moth species complex, including a portable version for on-site diagnostic. These assays are now routinely used by the CFIA (Canada) and APHIS (USA) for molecular diagnostic work targeting this group of insects. Interestingly, these assays recently served as model for the design of a similar tool aimed at the identification of spruce budworm natural enemies, as part of a research project conducted in collaboration with Dr Véronique Martel (NRCan). An ability to identify the geographic sources of spongy moth specimens intercepted during vessel inspections at Canadian ports has been identified as a key priority by the CFIA. Development of genomics-based tools enabling this type of molecular diagnostic first required a characterization of *L. dispar*'s population structure across its Holarctic range, in a manner similar to that described above for the budworm. This gigantic undertaking was initiated and brought to completion by Dr Sandrine Picq (now full-time Research Scientist at NRCan), achieving unprecedented resolution for this species' population structure. In collaboration with Dr Arnaud Capron, from Dr Hamelin's group, Sandrine is now developing an assay for source identification; her analyses indicate that this assay will be able to identify the geographic origins of specimens with ~95% accuracy.

After examining the foregoing account of my professional experience as a research entomologist, it is appropriate to ask whether pursuing parallel paths of enquiry, as I did, is a good thing. Such an approach certainly comes with significant challenges, including difficulties in keeping up with the literature in different sub-disciplines and in staying current with new analytical tools. It also involves a heavy workload resulting from an involvement in several different collaborative projects. Ultimately, one may also lose his/her "scientific identity", whereby others have difficulty to find a label that can appropriately be attached to you. However, pursuing parallel paths of enquiry also comes with substantial rewards, including the constant intellectual stimulation resulting from the broad variety of projects one is involved in. It also provides a wide perspective on the field of entomology and many opportunities for interactions with colleagues having very different skills. Importantly (at least for me), this approach led to varied and rich human interactions with fantastic students, postdocs and colleagues. I'm not sure whether such a career path would suit everyone, but in looking back at my career, I'm sure happy things turned out this way!

Note: papers reporting on the work described here may be obtained by contacting Michel at michel.cusson@nrcan-rncan.gc.ca or michel.cusson297@gmail.com.



Wider aspects of a career in entomology. 18. My introduction to Canada's fauna and environments, continued

Hugh V. Danks

This series of articles outlines some ancillary aspects of my entomological career, for the potential amusement of readers. It reports the sometimes unexpected challenges of working in new places and in the real world, an approach that serves also to expose some conclusions about entomological activities, and some information about insects and their environments. This article recounts further encounters with the Canadian fauna, featuring moths and dragonflies.



Many insects in addition to the butterflies noted in the previous article (ESC *Bulletin* 54: 11–20) crossed my path as I camped and hiked in Canadian habitats. They included moths, several groups of which were familiar to me from activities as an amateur in England, where nearly all of about 2 500 species are already known. Canada has well over 5 500 known species, but many additional species remain to be distinguished.

Therefore, even though most species are nocturnal and concealed or camouflaged during the day, moths are varied and abundant. Moreover, some of the large species are relatively easy to identify. Identifications are always important, because they allow access to the full range of information indexed under each scientific name.

The large maple spanworm (Figure 1) was found more than once, although it is nocturnal. The larvae feed on various kinds of trees and other plants, highlighting a recurring theme (also evident in butterflies): that insects exploiting widespread food sources, and tolerating a range of habitats, tend to be common and widely distributed, and thus are encountered more frequently.

Other geometrid moths were met with too—more than 500 species of the family occur in Canada¹. Typical species adopt a characteristic posture with spread and flattened wings, and most have banded or disruptive camouflage patterns. Markings on the forewings and hindwings match, appearing continuous across all four wings when the moth is resting. In the large



Figure 1. Large maple spanworm moth, the geometrid *Prochoerodes lineola*. Wingspan 4.5 cm.

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¹The diversity of geometrids is confirmed by the fact that the large maple spanworm, the maple spanworm, and the lesser maple spanworm all occur in Canada. Although the common names are similar, the species belong to three different genera, and only the lesser maple spanworm feeds mainly on maple.

Hugh Danks (hughdanks@yahoo.ca) retired in 2007 after many years as head of the Biological Survey of Canada. In that role, he helped to coordinate work on the composition and characteristics of the arthropod fauna of the country, and to summarize the results. In addition, his research studied cold hardiness, diapause, and other adaptations to seasonality in northern regions.

maple spanworm, the markings mimic a dead leaf and its midrib, but the background colour is extremely variable. Such intraspecific variation potentially mimics different leaves, but also would prevent predators from developing a search image. Caterpillars of some geometrid species prompt similar theories because they have several different colour morphs (green, brown, and grey).

Camouflage disguises many moths when they rest on the bark of trees, or on substrates such as litter, lichens, and moss. Nevertheless, even small individuals were often detected during my hikes if they settled on contrasting backgrounds after being disturbed (e.g., Figure 2)—although few of the species seemed easy to recognize². However, I failed to notice most of the hundreds of moths (in multiple families) that are even smaller!

Typical caterpillars too are concealed or camouflaged during the day, but some can be discovered because they attack specific plants (many species are monophagous) and create characteristic patterns of damage. Different species feed in particular ways, and favour seedlings, leaf edges, shoot tips, buds, or flowers, for example.

However, no special knowledge was needed to identify the extreme damage to trees caused by the introduced spongy moth (formerly called the gypsy moth³) (Figure 3). This species is known for sporadic outbreaks, and populations in southern Ontario built up recently over several successive years, resulting in the death of some trees⁴.

Late-instar larvae tend to move down from the canopy on to the bark during the day, but after defoliating a tree they spread out to adjacent plants, even those that are not normal hosts (Figure 4)⁵. Oak is preferred, but the caterpillars will eat many kinds of trees, including conifers⁶. In the worst-affected places, large numbers of the diurnal males could be seen flying rapidly about during July, in their characteristic zig-zag way, searching for the flightless females.



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Figure 2. Small moths with camouflage patterns: the geometrid *Xanthorhoe ferrugata* (top) (larvae eat several kinds of herbaceous plants); and the herminiine erebids *Phalaenophana pyramusalis* (middle) and *Chytolita morbidalis* (bottom) (larvae feed chiefly on leaf litter). Wingspans about 2–3 cm.

²Greg Pohl kindly identified or verified the species shown in Figure 2.

³The Entomological Societies of Canada and America have withdrawn the common name gypsy moth (as have many other organizations), because it is deemed hurtful to the Romani people. The replacement name is spongy moth, which aligns with the French spongieuse, reflecting the way egg masses are felted with hair.

⁴Even deciduous trees can withstand only one or a few complete defoliations before being seriously weakened.

⁵Each caterpillar consumes about one square metre of leaves during its lifetime, chiefly in the final instar. The total leaf area of temperate trees is usually 3–5 times the area of the ground underneath them. Therefore, the group of about 90 caterpillars visible in Figure 4 (if unconstrained by natural enemies) could fully defoliate a tree canopy 5 or 6 m in diameter.

⁶Ash is not attacked—but many of those trees have been killed instead by the emerald ash borer.



Figure 3. Flowering tree during May (L); and the same tree in June after complete defoliation by caterpillars of the spongy moth. This tree did not recover.

Mated females typically oviposit on bark, and the cold-hardy egg-masses, densely covered with hair, overwinter there. Eggs complete development before winter, but larvae remain inside the egg shell until spring. The success of overwintering and other life stages depends partly on weather, and warming climates may have played a role in the severity of the recent outbreak. In dense populations, young caterpillars disperse in spring by ballooning on silken threads, potentially for up to a kilometre or more, before starting to feed. Multiple traits therefore contribute to the species' potential for rapid increase and spread. An important modern addition is transport of egg masses laid on firewood, outdoor equipment, and vehicles.



Figure 4. Caterpillars of the spongy moth, the lymantrine eretid *Lymantria dispar*: resting on bark during the day (L); and an individual, length about 4.5 cm, that had moved to an adjacent plant after a nearby tree was defoliated.

The caterpillars were so abundant during the outbreak that the forest was filled with pattering sounds, caused by frass falling to the ground. Similar sounds were heard in stands of overmature balsam fir during outbreaks of the spruce budworm, especially in the 1970s, as frass rained down from the thousands of larvae feeding overhead.

Other moth larvae that leave diagnostic indicators on hostplants include native eastern tent caterpillars, which build unsightly webs on trees and shrubs (Figure 5). Populations fluctuate widely and sometimes reach outbreak numbers, but seldom damage hostplants to the same extent as the spongy moth.

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Figure 5. Tent of the eastern tent caterpillar.



Ryan Hodnett (CC BY-SA 2.0)

Figure 6. Eastern tent caterpillar, the lasiocampid *Malacosoma americanum*. Length about 5 cm.

This species has several remarkable adaptations. The female oviposits around branches, where the eggs will overwinter, and coats the egg mass with a secretion that is mixed with air to make a foamy covering, known as spumaline, that subsequently hardens. Spumaline can absorb water directly from the air, preventing desiccation of the unhatched first-instar larvae, which (as in the spongy moth) overwinter fully developed inside the eggs.

The multilayered tent becomes warmer than the surrounding air, and plays an essential role in modifying the temperature of the growing larvae. In particular, it allows caterpillars to warm up sufficiently on cool spring days to support feeding and digestion, and caterpillars also adjust their temperatures by aggregating. They leave the tent to forage, and can lay down pheromone trails to recruit tentmates to good food sources. Individuals (Figure 6) were often encountered fully grown, after descending to the ground and travelling widely to find protected pupation sites.

Frequently travelling about, too, were final-instar larvae of the banded woollybear (Figure 7), seeking sheltered places to overwinter. The species extends northward into Arctic regions. As in other common and widely distributed moths, the host range is particularly wide, and caterpillars will feed on grasses and trees as well as herbaceous plants.

The roaming caterpillars are distinctive. Folklore claims that the width of the coloured band, or the direction of travel, predicts the severity of the coming winter. The claims are not supported by scientific evidence, but are so appealing that popular mentions of the species usually highlight them!

Large caterpillars of the pandora sphinx moth are also strikingly coloured. Especially when approached, a caterpillar withdraws its head and first two segments into the third thoracic segment (Figure 8). The habit is generally supposed to protect its head from predators⁷, but I wondered if the trait is related to parasitism by tachinid flies with macrotype eggs. Those eggs remain on the surface of the host until they hatch. Some noctuid caterpillars are most susceptible to eggs deposited just behind the head (cf. my note in *ESC Bulletin* 51: 92) because—unlike eggs



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Figure 7. Banded woollybear, the arctiine eravid *Pyrrharctia isabella*, moving in search of an overwintering site. (Disturbed larvae stop and shorten, and may curl up.) Length about 5 cm.

⁷If touched, a larva may also lash about and even regurgitate.



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Figure 8. Larvae of the pandora sphinx moth, the sphingid *Eumorpha pandorus*, on Virginia creeper: feeding posture (top); and head withdrawn. Length about 9 cm.

However, eventually many of the species I had seen were identified⁸, leading to information that helped me to interpret my observations. A great deal of knowledge about ranges, habitats, behaviour, mating systems, sexual selection, and other features of a wide range of species has come from the efforts of both professional and amateur entomologists on several continents.

Colouration depends on one or a combination of pigments, structural colours, and pruinescence, and differences also stem from ultraviolet reflectance, providing cues visible to the insects but not to human observers. In many species, the colours of males and females are markedly different. Such sexual dimorphism is exemplified by eye-catching blue males but less brightly coloured females (e.g., Figure 10), and reflects the fact that males are more attractive to females if they are ostentatious, whereas females attract fewer predators if they are less visible⁹.

The chalk-fronted corporal (Figure 11) is sexually dimorphic too, but the key markings are white, and (as the common name implies) come from pruinescence. The species often perches on the ground, and unlike others tolerates the close presence of humans.

⁸Rob Cannings kindly identified or verified many of my photographs of dragonflies.

⁹Similar differences, attributed to the same selective pressures, are also well known in butterflies.

elsewhere—the caterpillar cannot reach them to destroy hatching larvae. This is the area protected in the pandora sphinx. Unusual features of the insects discovered during my hikes raised a variety of such unanswered questions.

Dragonflies and damselflies were often observed, but for years their complex colours and behaviours confused me. Moreover, many were difficult to identify during casual observation; Ontario alone has more than 170 species. Even photographs might be inadequate, and in any event all dragonflies have excellent vision and some species will not allow a close approach. Obtaining focussed images of the large hawker dragonflies, such as the species shown in Figure 9, is unusually challenging on hot sunny days.



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Figure 9. Lake darter dragonfly, the aeshnid *Aeshna eremita* (male). Length about 7 cm. This species, like many common dragonflies, inhabits a range of mostly still waters.



Gaill Hampshire (CC BY 2.0)

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Figure 10. Blue dasher dragonfly, the libellulid *Pachydiplax longipennis*: male (top); and female. Length about 4 cm.



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Figure 11. Chalk-fronted corporal dragonfly, the libellulid *Ladona julia*: male (top); and female. Length 4.3 cm.

In contrast to butterflies and moths, most dragonflies (especially males) change colour as they mature, increasing the difficulty of identification. For example, as the chalk-fronted corporal matures and darkens, from predominantly light reddish brown to the forms shown in Figure 11, the male develops the characteristic white pruinescence on the top of the thorax and first few abdominal segments, whereas the female acquires only a dusting of grey pruinescence on the abdomen.

The male autumn meadowhawk is yellowish brown soon after emergence, but matures to a bright red (Figure 12). Males of most



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Figure 12. Autumn meadowhawk dragonfly, the libellulid *Sympetrum vicinum*: immature and mature males (top L and R); and females (bottom). Length about 3.0–3.5 cm.



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Figure 13. Cherry-faced meadowhawk dragonfly, the libellulid *Sympetrum internum* (male). Length about 3 cm. (This individual was north of the known Ontario range of *S. rubicundulum*, which looks identical.)



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Figure 14. Four-spotted skimmer dragonfly, the libellulid *Libellula quadrimaculata* (male). Length about 4.5 cm.

species of that genus undergo similar changes, and in a few of them (e.g., Figure 13) prominent black triangles contrast dramatically with the red colouration.

Wing colour can also change with age. For example, the original amber colour of the wings decreases (and the body becomes duller) in the four-spotted skimmer (Figure 14). In this species, the sexes are similar.

Conspicuous behaviour is associated primarily with feeding and with mating. Extraordinarily proficient flight is used to catch flying insects, although damselflies often pluck prey off vegetation. Most adults can live for several weeks or more, and older adults continue to fly strongly even when worn (e.g., Figure 15).

Mating takes place in the distinctive “wheel position” (Figure 16): the male grasps the back of the female’s head (dragonflies) or her prothorax (damselflies) with his terminal claspers, and the female applies her terminalia to his secondary genitalia on the second abdominal segment. This location includes an aedeagus, and houses sperm transferred there from primary genitalia at the end of the abdomen.



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Figure 15. Halloween pennant dragonfly, the libellulid *Celithemis eponina* (female), with worn wings. Length about 4 cm. Even in this condition they are strong fliers.



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Figure 16. “Wheel position” of mating odonates (exemplified here by coenagrionid damselflies).

Paul Ritchie (CC BY-ND 4.0)

Males of many species are territorial, allowing them to mate with females entering the areas they control. Some species defend an area, conspicuously dashing about or darting from perches to chase off intruding males; others jostle each other for favoured perches. Spectacular colours, like bright blue or red, might signal to other males as well as to females how competent an individual is. Size is also an advantage (and possibly a signal too) in species like the blue dasher (Figure 10), because larger males can more easily drive away competitors for mates or food.

Nevertheless, although males of most species are aggressive towards other males, there are wide differences in the degree of territoriality. In some species, males simply patrol without any site attachment, as in the lake darner (Figure 9). In others, individuals can switch between territorial and non-territorial modes.

Female adaptations are equally complex. Some species have two forms, one of which resembles the male (e.g., Figure 17). This feature is supposed to reduce the extent to which females are harassed by males trying to mate, which interrupts their foraging. Consistent with this interpretation is that male-form females of some species prevail in high density populations where the level of harassment is high, but are less common when males are in short supply and females might not find a partner.

Males have higher visibility, so the advantage to females of mimicking them is likely to be offset by higher predation. Potential predators are not only vertebrates: active species of dragonflies, such as the lake darner (Figure 9) and the four-spotted skimmer (Figure 14), prey on smaller species as well as on insects of other orders.

Female dragonflies normally fly far away from the aquatic habitats in which they developed, thereby avoiding the harassing males; they return later only for oviposition. Some limit detection when ovipositing by staying amongst emergent vegetation. Females of a few species, when approached by unwanted males, even drop and immediately become immobile. “Feigning death” to avoid copulation is a popular description of this behaviour!

Competition for mating success continues during mating. Females of most species mate more than once, and copulating males remove or disadvantage previously deposited sperm. Commonly, the male does this by scraping out sperm from the female’s bursa copulatrix before depositing his own. The aedeagal structures used for this purpose vary among species, but the behaviour occurs even in ancient lineages, confirming the strong role of mating competition in odonates. The fact that sperm will be replaced through subsequent pairing allows females of some species to mate with less desirable “satellite” males, but they do not lay eggs until mated with stronger territorial males.

Competition often continues after copulation too, when the male may guard the female to prevent other males from mating with or disturbing her as she oviposits. Some species remain

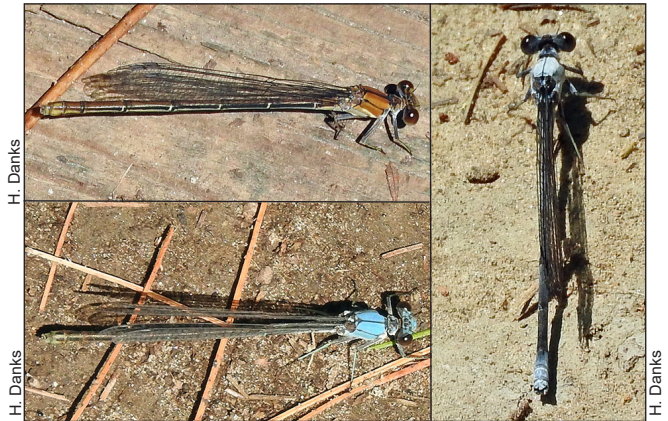


Figure 17. Powdered dancer damselfly, the coenagrionid *Argia moesta* (found mostly along rocky rivers and streams): brown form female (top L); and blue form female (bottom L), which resembles the male (R). Length about 4 cm.



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Figure 18. Widow skimmer dragonfly, the libellulid *Libellula luctuosa* (male). Length 4.7 cm.



H. Danks

Figure 19. Ebony jewelwing damselfly, the calopterygid *Calopteryx maculata* (which inhabits slow-moving wooded streams): male adopting a “cross position” during the mating display (top); and female displaying its different colour and markings. (Resting individuals hold the wings together over the back.) Length about 5 cm.



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joined in tandem; in others the male perches or hovers nearby; but in some the male simply departs. Even members of the same genus differ: most species of *Libellula* skimmers guard, but the widow skimmer (Figure 18)—although it is territorial—seldom does so, and only when other males are abundant. The dark wing bands and territorial flight pattern of that species are distinctive (some people have even mistaken it for a butterfly), and it became familiar to me beside ponds, lakes, and marshes, where the larvae develop chiefly in muddy substrates.

A female’s choice of partner can depend not only on the quality of the male, but also on the quality of the male’s territory as potential larval habitat. This influence is most evident in species with males that do not just aggressively seize any female they see.

The distinctive males of the ebony jewelwing, with blue-green iridescence and black wings, try to attract females by a characteristic display in which they hold the hindwings out and raise the forewings and abdomen (Figure 19). Subsequent courtship follows a complex sequence. As might be expected, females are less showy than males.

Males of the variable dancer (Figure 20) are distinctively coloured too. However, only specimens from northern areas (including Canada) have the violet colour and clear wings shown in the figure. Southern populations are less colourful and the wings are dark or smoky, as echoed in the specific epithet. Other species differ among populations in



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Figure 20. Variable dancer damselfly, the coenagrionid *Argia fumipennis* (male). Length about 3 cm.

body colour or, like the blue dasher (Figure 10), in wing colour.

Such variations have generally been formalized by naming subspecies. However, some North American odonatologists are reluctant to use the subspecific names because, although they capture geographical variation in species like the variable dancer, the subspecies may interbreed and intergrade where they overlap, without geographical separation or mating restriction. In any event, the reasons for such variation (including the possible effects of climate) remain largely unknown.

In summary, despite universal themes, some elements are not understood even in well-known odonates. Particularly striking to me were the wide differences among species. Clearly, as revealed by scientific work of all kinds (including my own studies of adaptations for cold hardiness and life-cycle control), ecological and other challenges are diverse, and any particular challenge can be met in a number of different ways.

The majority of my sightings were common species, of course, because I was merely wandering about in nature rather than seeking insects. However, adults of one dragonfly (larvae of which inhabit large rivers) tend to stay in treetops, and are so seldom seen that the common name is the “elusive” clubtail (Figure 21).

Dragonflies and butterflies can be more easily recognized and observed than most other groups of insects, and so some people have called them “honorary birds”. That designation is supported by the fact that a substantial number of the species I noticed during my general explorations belonged to those groups!

Nevertheless, there are conspicuous insects in other taxa. Some of them will be introduced in the next article in this series.



H. Danks

Figure 21. Elusive clubtail dragonfly, the gomphid *Stylurus notatus* (male). Length about 6 cm.

Heritage Sleuthing: In search of the insect collection of the Reverend Dr Thomas W. Fyles

B. Staffan Lindgren

On 16 January 2022, former ESC President Kevin Floate received an email from Mss. Lynda Fransham-Nugent and Vanessa Nugent asking for help to track down the insect collection, illustrations, and written contributions at entomological meetings of Lynda's Great Grandfather, the Reverend Thomas W. Fyles. The following day Kevin responded to Lynda with a copy to me and ESC Secretary Neil Holliday. His response included some information about Reverend Fyles that he had found on the internet, and he referred the issue to me as Chair of the ESC Heritage Committee.

Lynda and Vanessa knew that the insect collection had been donated late in Reverend Fyles' life to the "Québec Parliament Buildings", but that is where their trail ended. I turned to Google and found some additional information that I sent to Lynda and Vanessa, including some biographical information.

Thomas William Fyles was born at The Hermitage, Enfield Chase (now north end of Greater London), Middlesex, England on 1 June 1832¹. He emigrated to Canada in 1861, where he settled in Montreal. In 1862 he married Mary Fyles (nee Myers). They had 11 children, including Lynda's grandmother Winnifred, and Faith Myles, who became a botanist and botanical illustrator². Thomas Fyles was ordained as a minister in 1864, and spent more than a decade in several communities in the Eastern Townships of Montreal (Bethune 1921). In 1883, he was appointed

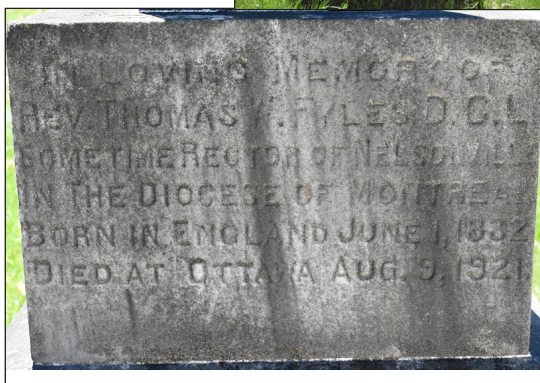


Figure 1. Fyles' family grave (top) and panel with Thomas Fyles inscription (bottom), which reads: In loving memory of Rev. Thomas W. Fyles D.C.L. sometime rector of Nelsonville in the diocese of Montreal born in England June 1, 1832 died at Ottawa Aug. 9, 1921. From <https://www.findagrave.com/memorial/189751730/thomas-william-fyles>. Accessed 14 February 2022.

¹Several sources indicate 1831 as the birth year, including [Ancestry](#). Bethune (1921) states 1832, however, which is also consistent with the [inscription](#) on Fyles' grave (Figure 1).

²Faith authored [Principal Poisonous Plants of Canada](#), which was reprinted in 2016, "selected by scholars as being culturally important".

Staffan Lindgren (bslindgren@gmail.com) is a professor emeritus at the University of Northern BC, where he taught and conducted research on bark beetles and other forest insects. Following his retirement in 2015, he and his wife moved to Nanaimo where he is active in the local naturalist club. He has been a member of the ESC for over 40 years, and is currently Chair of the ESC Heritage Committee.

Immigration Chaplain, and moved to Levis, Québec, across the St. Lawrence River from Québec City. He remained there until his retirement in 1909³ (Bethune 1921), and he lived in Hull and Ottawa until his death in August, 1921.

Dr Fyles was a keen naturalist, with a particular fondness for insects, and spent much of his free time in nature. He had a significant impact on the development of entomology in Québec and Ontario. In 1897 he formed an entomological society along with other anglophone enthusiasts. This became a branch of the Entomological Society of Ontario (ESO)⁴ (Perron 1998). Fyles acted as its President, and after his departure in 1909 this society slowly died, pointing to the essential role that Fyles played (Bethune 1921). Before leaving, Fyles donated his insect collection to the Museum in the Québec Parliament Buildings (Bethune 1921).

Fyles was a consistent contributor to the ESO, and he published regularly in *The Canadian Entomologist* or in the Annual Reports of the Society. At one time, he contributed one publication every year for 34 years (Bethune 1921)! He served as its President from 1900-1903.

Apart from the scientific publications that Reverend Fyles generated, he was also “*not a mean artist*” (Bethune 1921, Pal 1991) as evidenced by his many illustrations.

He used these for his presentations, which were always very well received (Bethune 1921). He was also a poet, publishing several works.

Thomas Fyles was recognized by various honours for his many contributions, including Honorary Professor of Biology in Morrin College, Québec, Fellow of the Linnean Society (FLS) of London, and the honorary Degree of DCL⁵ by Bishops University, Lennoxville, Québec. From 1900 to 1903⁶ he was [President](#) of the Entomological Society of Ontario, and he was ESO’s delegate to the Royal Society of Canada in 1890, 1894 and 1895. He served on the Council of the ESO and was a member of the Editing Committee of *The Canadian Entomologist* for many years. Further details can be found in Fyles’ detailed obituary (Bethune 1921).

Using what little information we had, I sent requests for possible leads to the other members of the ESC Heritage Committee, as well as to former ESC President Peter Mason. Neil Holliday then suggested that I contact Étienne Normandin, Coordonnateur, Collection entomologique Ouellet-Robert, Université de Montréal. He in turn contacted three colleagues, including Joseph Moisan-De Serres, Laboratoire d’expertise et de diagnostic en phytoprotection (LEDP), Québec Ministry



Thomas W. Fyles

Figure 2. Pen and ink drawing of Reverend Dr Thomas W. Fyles, DCL FLS (Pal 1991).

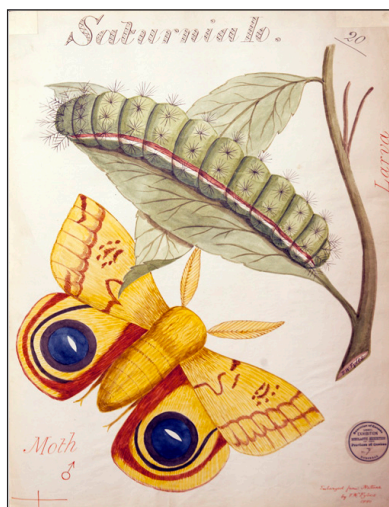


Figure 3. Water colour drawing by Reverend T.W. Fyles of male and caterpillar of io moth, *Automeris io* (F.) from University of Guelph Library Archives. From <https://news.uoguelph.ca/2013/10/library-exhibit-honours-canadian-entomology/> Accessed 15 February 2022.

³Pal (1991) gives 1905 as Fyles’ year of retirement.

⁴The ESC was formed in 1863, but was re-named [Entomological Society of Ontario](#) in 1871. The ESC of today was formed in 1950.

⁵[Doctor of Civil Law \(D.C.L.\)](#)

⁶Bethune (1921) states 1899 to 1902.



Figure 4 Attendees at the 50th meeting of the Entomological Society of Ontario, 1913. The Reverend Dr Thomas W. Fyles is seated second from the left in the front row. From Baker (1939).

of Agriculture, Fisheries and Food (MAPAQ). Joseph responded promptly, and offered to contact Lynda and Vanessa directly with the news that “...that all the specimens he gave to the Québec government are located in the *Collection d’Insectes du Québec* and, despite their age are still in excellent condition.” The drawings were not in Québec, however. Through internet searches it seems clear that the majority are held in the archives of the University of Guelph library (Pal 1991), including a selection of about 100 sheets bound together under the title “Illustrations in Natural History” (Fyles 1906). With respect to Dr Fyles’ written contributions, a search of “T.W. Fyles” in *The Canadian Entomologist* archives, which have been digitized, returns 64 items, 48 of which are articles or correspondence by Fyles. The remaining 16 include his obituary (Bethune 1921) and works where Fyles was mentioned in the title or the abstract. A search of “Fyles” in the full text returns 232 items adding citations etc. Many additional contributions were made in the annual reports of ESO.

In all, this exercise to find the insect collection had taken a mere 4 days, demonstrating the benefit of the network that the Entomological Society of Canada provides to us. As Lynda stated “*What a great team collaborative effort and successful determination of the whereabouts of my great-grandfather’s donated insect collection!*” In addition, the request by Lynda and Vanessa made us revisit the importance of this remarkable entomological ancestor, and his significant role in promoting entomology in Canada. As a bonus, the important contributions to Canadian botany by Fyles’ daughter Faith, whose wonderful illustrations are readily available on the internet, came to light.

References

- Baker, A.W. 1939. A short history of the Entomological Society of Ontario. *The Canadian Entomologist* **71**: 14–20.
- Bethune, C.J.S. 1921. Obituary. The Rev. Thomas W. Fyles, DCL, FLS. *The Canadian Entomologist*. **53**: 262–264.
- Fyles, T.W. 1906. *Illustrations in natural history*. Lévis, Québec, 107 pp.
- Pal, G. 1991. *Illustrations in natural history*. Pages 30–34 in *Collections Update No. 14*. Edited by Carol Goodger-Hill, University of Guelph Library, Guelph, ON, 44 pages. <https://hdl.handle.net/10214/24752> Accessed February 14, 2022.
- Perron J.-M. 1998. Heritage lecture. The birth of entomology in Québec in the 19th century. *Bulletin of the Entomological Society of Canada*. **30**: 152–160.

In memory / En souvenir de

William Davidson Seabrook was born on 2 April 1935 in Ottawa, Ontario, and died at 86 on 23 July 2021 in Fredericton, New Brunswick. Bill is survived by his wife, Janet Seabrook (Appleton) and sons David (Nule Setthanan) and Stephen; his granddaughters Lilly and Molly; and his brother Thomas.

Bill completed his MSc degree in Biology at Carleton University under the supervision of Professor Herbert Hugh John Nesbitt (1913–2002) whose name has adorned Carleton's Biology building since 2002. Bill's research was on the structure of the brain in the northern crayfish *Orconectes virilis* (Crustacea, Decapoda). For his doctoral studies, Bill and his family migrated to England, settling at Silwood Park, the rural campus of Imperial College London. He was funded by a George Henry Plimmer Fellowship as well as a British Council Scholarship. Bill's mentor was Professor Owain W. Richards, F.R.S. He continued studying the nervous system of invertebrates, this time in the terminal abdominal segments of the desert locust *Schistocerca gregaria* (Orthoptera, Acrididae). He also studied the role of the abdominal giant fiber system using an electrophysiological approach.

His arrival at the University of New Brunswick (Fredericton) in 1967 led to a career spanning some 33 years until his eventual retirement. He was made Professor Emeritus in Biology at UNB's Convocation Ceremony on 19 October 2006. When he took up his post in the Biology Department, we (PJA and BKM) were both in the final year of our BSc in Biology and interested in pursuing graduate studies. Bill was in the process of setting up his research lab at the time and we both inquired into the possibility of continuing our studies with him. He decided to accept both of us as his first MSc students in the Fall of 1968. Since his physiological equipment was still in the process of being acquired, and the specialized grounded room needed to provide the electrically 'quiet' environment for electrophysiological recordings was still being built, we began our studies on the head and thoracic neuromuscular systems of the spruce budworm male moth and the chemosensory structures on the antennae and the legs. When the new lab became fully functional, we moved on to electrophysiological studies of the male moth olfactory and taste sensilla. We both extended our stays and converted from MSc to PhD programs. PJA went on to do a postdoctorate with R.Y. Zacharuk at the University of Regina and BKM went on to do a postdoctorate with L.M. Schoonhoven at Wageningen University in The Netherlands.

At the time, we did not fully realize how special it was to be involved in the early stages of the development of a research lab or how positive a learning experience this would be. Bill let us in on everything, even listening to the advice of two novices, when our suggestions made sense. He even indulged us when some of our 'solutions' were useful mostly in helping us learn from our mistakes. The 'home-built' lab air conditioner comes to mind. In future years, we often remarked how important this whole experience was when it came time to start our own labs in Montreal and Edmonton. Bill was keenly aware of the crucial importance of the social side of scientific research, and regularly encouraged his students to get involved with scientific societies. With his urging, guidance and support, we gave our first papers at the Acadian Entomological Society and still remember his careful, much needed critiques as we were required to do "dry runs" of our papers under his watchful eye. In keeping with this strong sense of scientific endeavour as community, Bill was also determined to make sure that his students met as many scientists as possible.



**William (Bill) D. Seabrook
(1935–2021)**

Given the reality of NRC (National Research Council) grants at the time, this usually meant travelling by car, which was no problem because Bill loved to drive and was always prepared to use the family car. Two memorable trips will illustrate the point. Together, we attended the Canadian Society of Zoologists meeting at Memorial University in Saint John's. We first arrived at Port aux Basques and got to traverse the entire island of Newfoundland twice, Bill driving every kilometre. Later, Bill decided to introduce us to some of his former colleagues at Carleton University and at Agriculture Canada. The journey from Fredericton to Ottawa must have been routine to Bill because we had time for a leisurely coffee at the lab before setting off at around 10:30 in the morning. Younger readers will be forgiven for not fully understanding the moment of a brisk road trip through the Eastern Townships of La Belle Province circa 1970, mais nous, nous en souvenons. It was a surprise to us when Bill pulled into the parking lot at Jarry Park, just in time for a Montreal Expos Game – his treat to us. We did make it to Ottawa, and to Bill's family home, late that night and were welcomed by Bill's mother who seemed completely at ease with our tardiness. She was to be our gracious host for the next couple of days, and, in retrospect, must have been in on this whole plan.

What we did not know until a few years later, was that Bill was also fully involved during those early years as a major force in developing the ICWI (International Chemoreception Workshop on Insects). Later, this grouping of keen researchers in insect chemosensory behaviour and physiology became a must-attend annual event. Through this highly successful group of senior and junior scientists, often along with their grad students, many of us in this small field were able to get to know each other well. Bill strongly supported the style that these meetings adopted, based on the example of the more famous Gordon Conferences – morning and evening sessions with afternoon workshops and more social sessions in the evening.

Back in the lab, now with numerous other students, Bill continued his work on the spruce budworm *Choristoneura fumiferana* (Lepidoptera, Tortricidae) using electroantennograms (EAG) to examine the responses of the male antenna to differing sex pheromone concentrations, the effects of age and of juvenile hormone analogues on the antennal responses of male as well as female antennae. Various EAG studies on the dynamics of pheromone perception in males and females were supplemented by behavioural field experiments with caged moths to examine possibilities for achieving mating suppression in this species by using different concentrations of the sex pheromone. Other work examined the perception of carbon dioxide by larvae of the wood borer *Orthosoma brunneum* (Coleoptera, Cerambycidae) using both electrophysiological and behavioural techniques. The perception of different terpenes by adults of the sawyer beetles *Monochamus notatus* and *M. scutellatus* (Coleoptera, Cerambycidae) was also examined in various studies. More recent work in Bill's lab was centered on the blueberry leaf-tier moth *Croesia curvalana* (Lepidoptera, Tortricidae). This involved EAG studies of pheromone sensitivity as well as field studies.

We were privileged to have Bill as a mentor for 4 years. He was a dedicated supervisor who always took an active interest in our work while allowing us the freedom to explore. His interests also extended to community work, and we recall the hard work he and Jane did in contributing to the development of a daycare on campus. We remember the many meals we were treated to, and have never forgotten Jane's delicious soufflés. Bill continued his contributions to his community as president of both the Fredericton Aquanaut Swim Club and the New Brunswick branch of the Canadian Amateur Swimming Association (CASA). He was also a president of the Fredericton Botanic Garden, having helped establish the garden near O'Dell Park. Over the years, we kept in touch with Bill, especially via the annual ICWI meetings. One of these was held in Fredericton, and we recall a wonderful visit to the pine log cabin he built at Indian Lake. More recently, while on a visit to Fredericton before he became ill, we invited Bill and Jane to dinner at the Lord Beaverbrook hotel. We all had a wonderful time reminiscing about the 'old days'.

Paul J. Albert (Pointe-Claire) and Bev K. Mitchell (Fredericton)

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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, environ 500 kb) devra être soumise avec la critique.

Books available for review

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- Delaplane, K. 2021. Crop Pollination by Bees, Volume 1. Evolution, Ecology, Conservation and Management. CABI. ISBN: 9781786393494. [e-book].
- Eiseman, C. 2019. Leafminers of North America. [e-book].
- Forman, R.T.T. 2019. Towns, Ecology and the Land. Cambridge University Press. ISBN 978-1-316-64860-5 [paperback].
- Frank, B., Klikman, J.A. and Marchini, S. 2019. Human-Wildlife Interactions. Turning Conflict into Coexistence. Cambridge University Press. ISBN: 978-1-108-40258-3 [paperback].
- Gibson, D.J. and Newman, J.A. [Eds.]. 2019. Grasslands and Climate Change. Ecological Reviews. Cambridge University Press. ISBN: 978-1-316-64677-9 [paperback].
- Kaufman, A.B., Bashaw, M.J. and Maple, T.L. [Eds.]. 2019. Scientific Foundations of Zoos and Aquariums: Their Role in Conservation and Research. Cambridge University Press. ISBN: 978-1-316-64865-0 [paperback].
- Keddy, P.A. and Laughlin, D.C. [Eds.]. 2022. A Framework for Community Ecology. Cambridge University Press. ISBN 978-1-009-06831-4 [e-book or paperback]
- Klimaszewski J., et al. 2020. Synopsis of Adventive Species of Coleoptera (Insecta) Recorded from Canada. Part 5: Chrysomeloidea (Cerambycidae, Chrysomelidae, and Megalopodidae). Advanced Books. [e-book] doi: 10.3897/ab.e50613.

- Kondo, T. and Watson G. [Eds]. 2022. Encyclopedia of Scale Insect Pests. CABI. ISBN: 978-1-80062064-3
- Pettorelli, N., Durant, S.M. and du Toit, J.T. [Eds.]. 2019. Rewilding. Cambridge University Press. ISBN: 978-1-108-46012-5 [paperback].
- Volis, S. 2019. Plant Conservation: The Role of Habitat Restoration. Cambridge University Press. ISBN: 978-1-108-72733-4 [paperback].
- Wilson, K., Fenton, A., and Tompkins, D., eds. 2019. Wildlife Disease Ecology. Linking theory to data and application. Cambridge University Press. ISBN: 978-1316-50190-0 [paperback].
- Wrigley, R.E. 2020. Chasing Nature: An Ecologist's Lifetime of Adventures and Observations. Robert E. Wrigley and Friesen Press. ISBN: 978-1-5255-5586-2 [hardcover], 978-1-5255-5587-9 [paperback], 978-1-5255-5588-6 [e-book].
- 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].
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S. McCann

Six-spotted fishing spider (*Dolomedes triton*; Araneae: Pisauridae) feeding on a stickleback.

Highlights of the recent Board of Directors meeting

The ESC Board of Directors met by videoconference on 26 April 2022. The Board received reports on past and future joint annual meetings (JAMs). There was final confirmation of the financial success of the 2021 JAM, which was the first online JAM in the Society's history. The meeting was able to repay the ESC's financial advance and generate a modest surplus, despite paying the hotel deposit that was forfeited when it became obvious that an in-person would be poorly attended. The ESC's share of the surplus cannot be regarded as "profit" as it was less than the amount paid to ESC's association management company to provide registration, payment, and paper submission services to the meeting. Organization of the 2022 JAM, joint with the Entomological Societies of America and British Columbia, is progressing well. Symposia for the meeting have been selected from among those submitted and are now posted on the meeting website. Submissions from ESC members are well represented at all symposium levels. Organization of the 2023 JAM is also progressing well, with a theme and logo about to be selected; the 2023 meeting is joint with the Entomological Society of Saskatchewan, and will be in Saskatoon, 15–18 October 2023. The Board welcomed the news that Société d'entomologie du Québec, which will host the JAM in 2024, has appointed a general chair of the organizing committee for the meeting.

The Board approved a document detailing the procedures to be followed in the event that there is a complaint made about a breach of the JAM Meeting Code of Conduct, a code that is agreed to as a condition of registration at a JAM. The complaints handling document is the third of three documents dealing with the code and all three documents will be posted in the members' area of the ESC website.

The Board received reports from all ESC officers and committees and considered the recommendations contained in those reports. The ESC Treasurer reported on steps to protect the Society from the effects of inflation. The target balance that the Society holds in its chequing account was reviewed, and will be kept sufficient to avoid incurring bank fees and to cover costs incurred between the two widely separated episodes of income that characterize the Society's cash flow. Amounts above the target balance will be transferred to the Society's investment portfolio. The target cash allocation in that portfolio will be reduced, as funds in the cash allocation do not generate sufficient income to keep pace with inflation.

The Board took actions to follow up from the report of the Task Force on Financial Sustainability of *The Canadian Entomologist* (TCE). The Board heard that the existing endowment fund was renamed to the C.P. Alexander (TCE) Endowment Fund to identify clearly that the fund is for the support of TCE, and that it is the result of a bequest from C.P. Alexander, a dipterologist who died in 1981. The Fund had formerly been used to cover the costs of page charges for invited submissions to TCE. The Board learned that the donor wished the fund to be managed so that sufficient income-generating capital would be retained to maintain the value of the fund in the face of inflation; accordingly, payments from the fund are restricted to \$4,000 p.a. The Board approved establishment of a second fund — the TCE Contingency Fund — to support TCE in times of financial difficulty. The TCE Contingency Fund will receive income from the profits received from the publisher of TCE and the \$4,000 p.a. from the C.P. Alexander (TCE) Endowment Fund. It is intended, over time, to grow the Contingency Fund to equal twice the annual salary of the TCE's technical editor.

The Board received the report of the Achievement Awards Committee and approved all of its recommendations. The Board approved changes to the ESC's Standing Rules, details of which appear elsewhere in this issue of the *Bulletin*. It also approved changes to the Committee Guidelines for the newly-established Communications Committee and consequential changes

to the guidelines for the Public Education Committee, which will no longer be responsible for E-media. The Board was informed that the micro-grants program initiative of the Equity, Diversity and Inclusion (EDI) Committee had not been implemented in the 2021–22 financial year, and agreed that funding for the initiative, now called “Open Spaces”, will be budgeted in the 2022–23 financial year. The Board also agreed that a letter of thanks should be sent to the Centre for Race and Culture to acknowledge the Centre’s generosity in providing input to the EDI Survey of ESC members. In response to a request from the Publications Committee, funds were approved for commissioning line art to be featured on the cover of individual TCE articles issued in the new E-journal format.

The Board discussed at length a series of questions posed by the Physical Assets Committee. Among these questions was the future of the complete series of printed TCE which had formerly been displayed in the ESC Headquarters Building, but are now held in a storage locker in Ottawa. It was noted that there is nowhere to display this series, that more than 50 volumes of the series are not bound, that the cost of binding them is likely to be prohibitive, and that apart from a few institutions that already have a complete print series of the journal, there are no institutional libraries that could be relied upon to retain the series in perpetuity if the series were entrusted to them. It was agreed to retain the complete series within the storage locker, but to house the series in waterproof containers to prevent damage from moisture. An incomplete series of TCE, also housed in the storage locker, will be offered to members for the cost of shipping. Print issues of the Memoirs of the ESC will be retained in the storage locker, as sales of them are continuing. The Board also addressed questions related to the disposition of unused ESC computer equipment, and to ESC archival material held in the storage locker and in the archives of the University of Guelph.

The Board received a report of a recent Meeting of the Entomological Societies in Canada that had focussed on the future format of JAMs. That meeting had concluded with an action item to establish a sub-committee of the ESC’s Annual Meeting Committee. The sub-committee will stay informed about how other societies are handling scientific conferences in an era of shifts to online meetings, and keep abreast of technological developments and associated costs for online delivery of meeting content. The sub-committee will have representation from each of the regional affiliate entomological societies.

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 Secretary, Neil Holliday (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 au secrétaire, Neil Holliday (voir le troisième de couverture pour les informations de contact), le plus tôt.

Nominations for ESC Board of Directors and election of Honorary members / Nominations pour le Conseil d'administration de la SEC et élection des membres honoraires de la Société d'entomologie du Canada

The following have been nominated and agreed to stand for election in 2022 for the indicated positions.

In accordance with our By-laws under the Canada Not-for-profit Corporations Act, a plebiscite/vote first will be held to 'select candidates' for a slate of Directors. The slate will then be presented for formal election at the Annual Meeting of Members.

In addition, three ESC members, have been nominated to be Honorary Members of the Society. Conferral of Honorary Membership requires approval of nominees by the majority of ESC members voting in an election.

The current ballot will select candidates for a Director-at-Large and a Societal Director (Second Vice-President) and seek approval of Honorary Membership nominees. Members will receive more details on this year's process by email. Profiles of the nominees are included in the election material.

The plebiscite will be conducted electronically, with the webpage for balloting active from **1 June to 15 July 2022**. PLEASE REMEMBER TO VOTE!

To vote, use the following link:

<https://docs.google.com/forms/d/e/1FAIpQLSchOXaMtwjQ4-7smPnmBAUq3uyU2y-24QuGQEZ1uo2vAYaGCA/viewform>

Les personnes suivantes ont été proposées et ont accepté de se présenter aux élections de 2022 pour les postes indiqués.

Conformément à notre règlement administratif en vertu de la Loi canadienne sur les organismes à but non lucratif, un plébiscite/vote sera d'abord organisé pour sélectionner des candidats pour une liste d'administrateurs et administratrices. Cette liste sera ensuite présentée pour une élection formelle lors de l'assemblée annuelle des membres.

En outre, trois membres de la SEC ont été proposés pour devenir membres honoraires de la Société. L'attribution du titre de membre honoraire requiert l'approbation des personnes proposées par la majorité des membres de la SEC votant lors d'une élection.

Le scrutin actuel permettra de sélectionner les candidatures aux postes de conseiller/ conseillère et de direction sociétale (deuxième vice-présidence) et d'obtenir l'approbation des candidatures au titre de membre honoraire. Les membres recevront plus de détails sur le processus de cette année par courriel. Les profils des candidatures sont inclus dans le matériel électoral.

Le plébiscite se déroulera par voie électronique, la page web pour le vote étant active **du 1^{er} juin au 15 juillet 2022**. N'OUBLIEZ PAS DE VOTER!

Pour voter, utilisez le lien suivant :

<https://docs.google.com/forms/d/e/1FAIpQLSchOXaMtwjQ4-7smPnmBAUq3uyU2y-24QuGQEZ1uo2vAYaGCA/viewform>

Candidates for Societal Director / Second Vice-President : Candidats pour le poste de directeur / directrice sociétal(e) / second vice-président



Joseph Bowden
(CFS, Corner Brook, Nfld.)



Christine Noronha
(AAFC, Charlottetown, P.E.I.)

Candidates for Director-at-Large : Candidats pour le poste de conseillère



Jessica Gillung
(McGill University,
Montréal, Que.)



Catherine Scott
(McGill University,
Montréal, Que.)

ESC Scholarship Fund

Once again the Society would like to thank and acknowledge the very generous donors to the ESC Scholarship Fund. These donations are very important to the Society, as it is only because of these donations that the scholarship fund is self-sustainable. Donations can be made at any time and a receipt for income tax purposes in Canada will be issued. Please make cheques payable to the Entomological Society of Canada Scholarship Fund. Donations can also be made online via the Members' Area (<https://esc-sec.site-ym.com/donations/>).

Le Fonds de bourses d'études de la SEC

La Société tient à remercier, une fois de plus, les très généreux donateurs et donatrices au Fonds de bourses d'études de la SEC. Ces dons sont très importants pour la Société, puisque c'est seulement grâce à ces dons que le Fonds de bourses d'études est autosuffisant. Les dons peuvent être faits en tout temps, et un reçu pour fin d'impôt vous sera envoyé. Veuillez libeller votre chèque à l'ordre du Entomological Society of Canada Scholarship Fund. Des dons peuvent également être faits via la section des membres (<https://esc-sec.site-ym.com/donations/>).

2021 Donors – Donateurs et donatrices pour 2021

Albert, Paul J.	Gibson, Gary	Poland, Therese
Behan-Pelletier, Valerie	Gillespie, David R.	Richards, Miriam
Borden, John	Holliday, Neil J.	Roitberg, Bernard
Cameron, E. Alan	Horton, David R.	Safranyik, Laszlo
Cloutier, Conrad	Lindgren, Bo Staffan	Sawinski, Ted
Cusson, Michel	Marshall, Valin, George	Scott, Catherine
Devine, Alexandra	Morewood, William Dean	Soroka, Juliana J.
Fields, Paul G.	Otani, Semach Jennifer	Sweeney, Jon
Freitag, Richard	Peschken, Diether P.	Thistlewood, Howard M. A.
Galloway, Mary M.	Philogene, B.J.R.	Uriel, Yonathan

... and those who preferred to remain anonymous.

... et ceux et celles qui ont préféré rester anonyme.

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/>.

Announcement of Changes to the ESC Standing Rules

At its meeting of 26 April 2022, the Board of Directors of ESC approved two changes to the Standing Rules to bring them in line with previous decisions of the Board or Executive Council.

As the intent is to divide the duties of the ESC Secretary among two co-Secretaries, throughout the Standing Rules, current references to “the Secretary” will be changed to “the co-Secretaries” or “the Secretaries”, whichever substitution is most appropriate in the context.

As the newly-formed Communications Committee has now taken over the functions previously performed by Social Media Administrators who were listed as officers of the society, section VII (m) Social Media Administrator(s) of the Standing Rules has been deleted, and the following section of VII Officers, has been renumbered.

Annonce de changements dans les règles permanentes de la SEC

Lors de sa réunion du 26 avril 2022, le Conseil d'administration de la SEC a approuvé deux modifications des Règles permanentes afin de les mettre en conformité avec les décisions antérieures du CA ou du Conseil exécutif.

L'intention étant de répartir les tâches du secrétariat de la SEC entre deux co-secrétaires, dans l'ensemble des Règles permanentes, les références actuelles au « secrétaire » seront remplacées par « les co-secrétaires » ou « les secrétaires », selon la substitution la plus appropriée au contexte.

Étant donné que le nouveau Comité des communications a pris en charge les fonctions précédemment exercées par les Administrateurs des médias sociaux, qui figuraient sur la liste des Dirigeants de la société, la section VII (m) Administrateur(s) des médias sociaux des Règles permanentes a été supprimée, et la section suivante de VII Dirigeants, a été renumérotée.

72nd Annual Meeting of Members and Board of Directors Meetings (JAM 2022)

The Annual Business Meeting of Members of the Entomological Society of Canada is scheduled to occur in Room 211, Vancouver Convention Centre, 1055 Canada Place, Vancouver, British Columbia on Tuesday 15 November 2022, beginning at 2:30 PM. The incoming Board of Directors will meet in the same location immediately following the Annual Business Meeting of Members. The outgoing Board of Directors Meeting is planned to be in Oceanview Suite 2 of the Pan Pacific Hotel, 999 Canada Place, Vancouver, British Columbia on Sunday 13 November 2022, beginning at 8:00 AM. Matters for consideration at any of the above meetings should be sent to Neil Holliday, Secretary of the Entomological Society of Canada (see inside back cover for contact details).

72^e assemblée annuelle des membres et réunions du CA (réunion annuelle conjointe 2022)

L'assemblée annuelle des membres de la Société d'entomologie du Canada aura lieu dans la salle 211 du Centre des congrès de Vancouver, 1055 Canada Place, Vancouver, Colombie-Britannique, le mardi 15 novembre 2022, à partir de 14h30. Le nouveau Conseil d'administration se réunira au même endroit, immédiatement après la réunion annuelle des membres. La réunion du conseil d'administration sortant est prévue dans la suite Oceanview 2 de l'hôtel Pan Pacific, 999 Canada Place, Vancouver, Colombie-Britannique, le dimanche 13 novembre 2022, à partir de 8h00. Les propositions de sujets de discussion pour l'une des réunions ci-dessus doivent être envoyées à Neil Holliday, secrétaire de la Société d'entomologie du Canada (voir les coordonnées à l'intérieur de la couverture arrière).

ESC Co-Secretary

The Entomological Society of Canada is looking for a member willing to serve in the position of Co-Secretary, starting in September 2022. The current Secretary position will be split into two Co-Secretary positions, and the current Secretary will continue as one of the Co-Secretaries. The two Co-Secretaries will 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 the current Secretary, Neil Holliday (Neil.Holliday@UManitoba.CA) for further information. Applications should be made to the President, Felix Sperling (Felix.Sperling@ualberta.ca), by **30 June 2022**. The final selection will be made by an ad hoc committee convened by the President.

Co-secrétaire de la SEC

La Société d'entomologie du Canada est à la recherche d'une personne membre de la SEC et prête à occuper le poste de co-secrétaire, à partir de septembre 2022. Le poste actuel de secrétaire sera divisé en deux postes de co-secrétaires, et le secrétaire actuel continuera à être l'un des co-secrétaires. Les deux co-secrétaires se partageront les tâches de secrétariat pour soutenir la présidence et le CA, soit :

- Planifier les réunions du Conseil exécutif, du CA et des membres, préparer les ordres du jour, obtenir les rapports des dirigeants et autres, 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 dossiers des 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 affaires de la Société à l'éditeur du bulletin, au webmestre et à Strauss pour la publication, l'affichage et la diffusion aux membres, au besoin.
- Garder à jour les listes et les coordonnées des membres du CA et des comités de la Société.
- Superviser les plébiscites visant à recommander des candidats pour les nominations aux postes de Directeur sociétal et de Conseiller, et pour toute autre question sur laquelle un vote peut être requis, et notifier les résultats du vote. Conseiller les sociétés affiliées lorsqu'elles doivent fournir des noms pour les nominations en tant que directeurs régionaux.

Une bonne connaissance du règlement administratif, des règles permanentes et des lignes directrices de la Société, une expérience antérieure en tant que membre du CA et la capacité de travailler en français et en anglais sont des 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 de la SEC) intéressée à occuper ce poste peut contacter le secrétaire actuel, Neil Holliday (Neil.Holliday@UManitoba.CA) pour de plus amples informations. Les candidatures doivent être envoyées au président, Felix Sperling (Felix.Sperling@ualberta.ca), avant le 30 juin 2022. La sélection finale sera effectuée par un comité ad hoc convoqué par le président.

Eighteenth Annual Photo Contest

The 18th Annual Photo Contest to select images for the 2023 cover of the *Bulletin of the Entomological Society of Canada* is now underway. Things are changing a bit, as you will see below, but the cool thing is there will be prizes this year! 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, subject identification as closely as is known, 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 arrange for a popular choice judging website, where ESC members can vote on their favourites. 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 2022. Entries should be submitted as an attachment to an email message; the subject line should start with "ESC Photo Contest Submission". Send the email message to: photocontest@esc-sec.ca.

Dix-huitième concours annuel de photographies

Le 18^e concours annuel de photographie visant à sélectionner des images pour la couverture du Bulletin de la Société d'entomologie du Canada pour 2023 est en cours. Les choses changent un peu, comme vous le verrez ci-dessous, mais ce qui est cool, c'est qu'il y aura des prix cette année! 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.

Règlements du concours

Les photographies d'insectes et autres arthropodes à tous les stades, dans toutes les activités et les 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.

Les participants peuvent soumettre jusqu'à cinq photos. Chaque photographie doit être accompagnée d'une légende. Les photographies sans légende ne seront pas acceptées. Les légendes doivent inclure la localité, l'identification du sujet dans la mesure où elle est connue, la description de l'activité si le sujet principal n'est pas un insecte, et toute information intéressante ou pertinente. Les légendes doivent comporter un maximum de 40 mots.

Le participant doit être un membre en règle de la Société d'entomologie du Canada. Les photos doivent être prises par le participant et le participant doit en détenir les droits d'auteur.

Le droit d'auteur de la photographie reste la propriété du participant, 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 du ou de la photographe, bien sûr).

Plutôt qu'un comité de jugement, l'organisation du concours de photographie prévoit cette année un site web de jugement par choix populaire, où les membres de la SEC pourront voter pour leurs favoris. Les photographes des trois meilleures photos choisies se verront attribuer les prix suivants : 1^{er} prix – 200\$ en carte-cadeau chez Henry's Camera; 2^e prix – 100\$ en carte cadeau chez Henry's Camera; 3^e prix – 50\$ en carte-cadeau de 50\$ chez Henry's Camera.

La date limite de soumission est le 15 septembre 2022. Les soumissions doivent être envoyées en pièce jointe d'un courriel dont l'objet doit commencer par « Concours de photographie de la SEC ». Envoyez le courriel à : photocontest@esc-sec.ca.

Request for candy-striped spider specimens or photographs

My current postdoctoral research is focused on the foraging ecology of the candy-striped spiders (*Enoplognatha ovata* and its close relative, the nearly identical *Enoplognatha latimana*).

These spiders were introduced to North America some time before the 1950s and are now present in all 10 provinces. Despite being widespread and often extremely locally abundant in habitats across North America, little is known about their behaviour or foraging ecology. In previous work in collaboration with Sean McCann, we commonly encountered *E. ovata* hunting on flowering plants and found that they have a broad diet dominated by pollinating insects. I am now investigating their foraging behaviour and impact on native arthropod communities, especially pollinators. I have two requests for data that would be very helpful for this project:

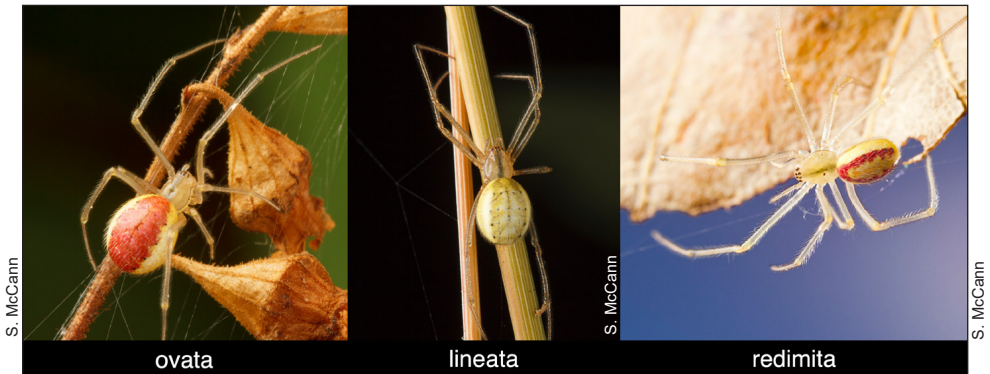


Figure 1. Both candy-striped spider species have three morphs (*ovata* is the least common).

1. Do you have specimens/records of *Enoplognatha ovata* (Clerck) or *E. latimana* Hippa & Oksala (Araneae: Theridiidae) in your personal or institutional collection?

If yes, and if I haven't already been in touch with you, please [email](#) me! I hope to collect as many records as possible so that we can document the historical and current distribution and phenology of these introduced spiders in Canada and the USA.

2. Have you seen candy-striped spiders at your field site, in your garden, or around your workplace?

Candy-striped spiders are common and often quite abundant across urban, agricultural, and natural areas and most conspicuous as adults between June and August. They are striking in their morphology (Fig. 1) and often easy to spot beneath flowers or on grasses because they are feeding on prey much larger than themselves (Fig. 2). If you have taken photos of these spiders in the past, I would appreciate it if you would either (a) post them on iNaturalist (where they will automatically be added to the [Spider Hunters](#)



Figure 2: *Enoplognatha ovata* feeding on *Ammophila*.

project), or (b) send me the photograph(s). If you encounter them this spring or summer, please consider taking some photos of them, and/or enlisting your students and colleagues to do so! Photos that include details of the plant the spider is on and/or the insect it is feeding upon (where relevant) are especially useful!

Catherine Scott
Lyman Entomological Museum, McGill University
Email: catherine.elizabeth.scott@gmail.com

Advertising in the *Bulletin* / Publicité dans le Bulletin

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

For 2022, 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 (cedric.gillott@usask.ca).

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

Pour 2022, 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* (cedric.gillott@usask.ca).





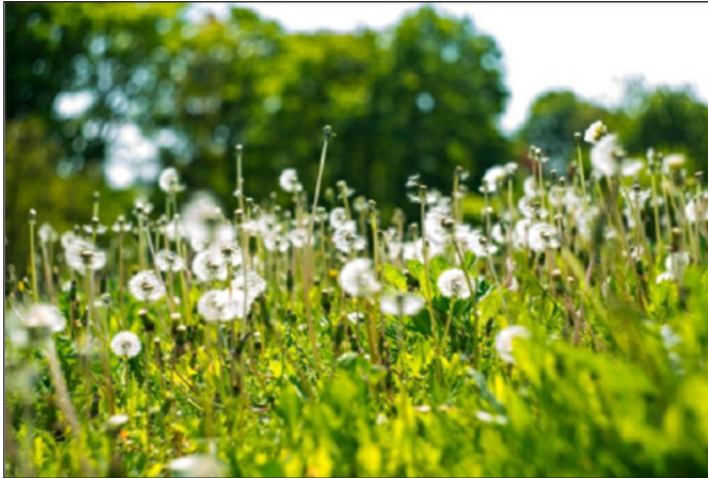
Canadian Weed Science Society
Soci t  canadienne de malherbologie

CWSS-SCM Newsletter

The Society has recently 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:

March <https://seureservercdn.net/192.169.220.85/c8x.545.myftpupload.com/wp-content/uploads/2022/03/3march-2022-newsletter.pdf>

May <https://seureservercdn.net/192.169.220.85/c8x.545.myftpupload.com/wp-content/uploads/2022/05/5may-2022-newsletter.pdf>





THE CANADIAN PHYTOPATHOLOGICAL SOCIETY
LA SOCIÉTÉ CANADIENNE DE PHYTOPATHOLOGIE

CPS-SCP News

VOL. 66, NO. 1 (March 2022)

<https://phytopath.ca/wp-content/uploads/2022/04/CPS-SCP-News-66-1-March2022.pdf>

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Meeting announcements / Réunions futures

Note: 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.

26th International Congress of Entomology (Entomology for our planet)

Helsinki, Finland, 17-22 July 2022

<https://ice2020helsinki.fi/>

XVI International Conference on Ephemeroptera and XXI International Symposium on Plecoptera

Virtual meeting: 26-29 July 2022

<http://plecoptera.speciesfile.org/HomePage/Plecoptera/HomePage.aspx>

Ecology of Aphidophaga 15

Catalonia, Spain, 19–23 September 2022

<https://aphidophaga15.udl.cat/>

Joint Annual Meeting of the Entomological Society of Canada, Entomological Society of America, and the Entomological Society of British Columbia

Vancouver, 13–16 November 2022

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

Entomological Society of America International Branch, 2023 Virtual Symposium

24–26 April 2023

(no website to date)

Joint Annual Meeting of the Entomological Society of Canada and the Entomological Society of Saskatchewan

Saskatoon, 15–18 October 2023

(no website to date)

XII European Congress of Entomology

Crete, Greece, 16–20 October 2023

www.ece2023.com

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

National Harbor, Maryland, 5–8 November 2023

(no website to date)

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: Cedric Gillott
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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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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Rédacteur: Cedric Gillott
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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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.

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Droits d'auteur 2022 Société d'entomologie du Canada

Date de tombée pour le prochain numéro: 31 juillet 2022

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



All good things must come to an end

Little did I think, following a conversation in late 2009 with former graduate student and ESC President Kevin Floate, that I would still be the *Bulletin* Editor over 12 years later! Kevin persuaded me that, being such a pedant (just kidding, Kevin), I was highly suited for the position! I use the word 'position' deliberately as being the Editor isn't really a 'job', but a very satisfying all-round experience. It begins with the gentle art of persuasion (convincing potential contributors to submit material), moving through the editing process (where my pedantry comes to the fore!), to seeing the final product appear on the Society's website.

Of course, the preceding would not be possible without the aid of the Assistant Editor, responsible for the *Bulletin's* attractive layout, and here I have been blessed with several talented individuals: Fred Beaulieu who showed me the ropes in my first year, Julia Mlynarek who worked with me for the next 3 years, and of course Donna Giberson now in her ninth year in the position. Add to this list Neil Holliday who for some time now has acted as proof-reader in the final stage of *Bulletin* production (and catches all my deliberate mistakes!). Véro Martel has provided many French translations with speed and a smile on her face (sometimes I have wondered if the latter was the result of the convoluted text that some English-speaking entomologists write!). And last but not least, I thank the numerous contributors whose material has made the newsletter

Toutes les bonnes choses ont une fin

J'étais loin de me douter, à la suite d'une conversation fin 2009 avec Kevin Floate, ancien étudiant des cycles supérieurs et président de la SEC, que je serais encore rédacteur du *Bulletin* plus de 12 ans plus tard! Kevin m'a persuadé qu'étant un tel pédant (je plaisante, Kevin), je convenais parfaitement à ce poste! J'utilise délibérément le mot « poste » car être rédacteur en chef n'est pas vraiment un « emploi », mais une expérience très satisfaisante à tous points de vue. Cela commence par l'art délicat de la persuasion (convaincre les contributeurs potentiels de soumettre du matériel), passe par le processus d'édition (où mon pédantisme est à l'honneur!), jusqu'à voir le produit final apparaître sur le site web de la Société.

Bien sûr, ce qui précède ne serait pas possible sans l'aide du rédacteur adjoint, responsable de la mise en page attrayante du *Bulletin*, et j'ai eu la chance de pouvoir compter sur plusieurs personnes talentueuses : Fred Beaulieu qui m'a montré les ficelles du métier dès ma première année, Julia Mlynarek qui a travaillé avec moi pendant les trois années suivantes, et bien sûr Donna Giberson qui en est à sa neuvième année à ce poste. Ajoutez à cette liste Neil Holliday qui, depuis quelques temps déjà, fait office de correcteur d'épreuves dans la phase finale de la production du *Bulletin* (et attrape toutes mes erreurs délibérées!). Véro Martel a fourni de nombreuses traductions françaises avec rapidité et le sourire aux lèvres (je me suis parfois demandé si ce dernier n'était pas le résultat du texte alambiqué que certains entomologistes anglophones écrivent!). Enfin, je remercie les nombreux collaborateurs dont le matériel a fait de l'infolettre un élément

such an interesting and informative part of the Society's raison d'être in Canadian entomology.

So, with this issue, my 50th as Editor, we come to the end of an era. Here's hoping that my successor, Bernie Roitberg (Simon Fraser University), will experience the same degree of satisfaction as I did.

intéressant et informatif de la raison d'être de la Société en entomologie canadienne.

Ainsi, avec ce numéro, mon 50^e en tant que rédacteur en chef, nous arrivons à la fin d'une époque. J'espère que mon successeur, Bernie Roitberg (Université Simon Fraser), éprouvera le même degré de satisfaction que moi.



D. Giberson

Post-retirement possibilities!

Entomological Society of Canada, 2021-2022

Société d'entomologie du Canada, 2021-2022

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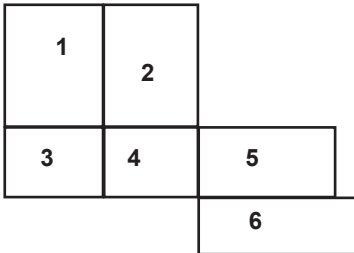
Canadian Journal of Arthropod Identification

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Front cover/Page couverture:

1. The face of a male leafcutter bee (*Megachile* sp.), resting on a yarrow inflorescence on a cold day in spring.
 Le visage d'un mâle d'une abeille découpeuse (*Megachile* sp.) se reposant sur une inflorescence de millefeuille lors d'une froide journée de printemps.
 Photo: Bob Lalonde
2. Mountain ash sawfly (*Pristiphora geniculata*) larvae feeding gregariously on host foliage (Vancouver, British Columbia).
 Larves de la tenthrède du sorbier (*Pristiphora geniculata*) se nourrissant en groupe sur du feuillage de leur plante hôte (Vancouver, Colombie-Britannique).
 Photo: Debra Wertman
3. Hickory tussock moth (*Lophocampa caryae*) in Centreville, Ontario.
 Halysidote du caryer (*Lophocampa caryae*) à Centreville, Ontario.
 Photo: Andrea Brauner
4. White tiger moth (*Spilosoma congrua*, family Erebidæ). I found this beautiful tiger moth on the glass window at the Carins building at Brock University Ontario Canada.
Spilosoma congrua, de la famille des Erebidæ. J'ai trouvé ce magnifique papillon sur une fenêtre du bâtiment Carins de l'Université de Brock en Ontario, Canada.
 Photo: Lauren Nesbitt
5. The strawberry blossom weevil or *Anthonomus rubi* crawling over its namesake host, a strawberry flower (Agassiz, Canada). This invasive pest, originally from Europe, is now spread across the Fraser Valley of British Columbia, Canada.
 L'anthonome du fraisier, ou *Anthonomus rubi*, rampant sur son hôte, une fleur de fraisier (Agassiz, Canada). Ce ravageur envahissant, originaire d'Europe, est maintenant répandu dans la vallée du Fraser en Colombie-Britannique, au Canada.
 Photo: Warren Wong
6. Marsh beetle (Coleoptera: Scirtidae: *Prionocyphon limbatus* LeConte); South Skunk River, Iowa.
 Scirtidé (Coleoptera: Scirtidae: *Prionocyphon limbatus* LeConte); South Skunk River, Iowa.
 Photo: Gregory Courtney

Back cover/Quatrième de couverture:

- An inquisitive red-legged grasshopper (*Melanoplus femurrubrum*) in tall grass (Aldergrove, British Columbia).
 Un criquet à pattes rouges (*Melanoplus femurrubrum*) se montre curieux dans les hautes herbes (Aldergrove, Colombie-Britannique).
 Photo: Debra Wertman