Bulletin

Entomological Society of Canada
Société d'entomologie du Canada

Volume 50
Number / numéro 3

September/septembre 2018

Published quarterly by the
Entomological Society of Canada

Publication trimestrielle par la
Société d'entomologie du Canada

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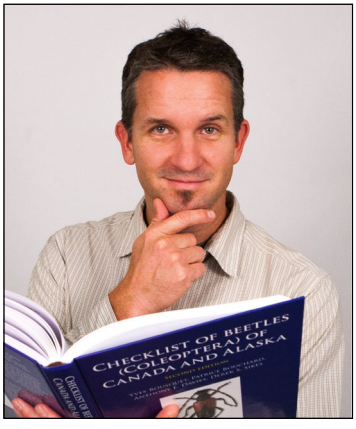
Captions for cover photos can be found on the back cover.
La légende des photos de la couverture se situe sur la couverture arrière.

In 2017, this automated pest monitoring system was used to record the abundance of armyworm moth (*Mythimna unipuncta*; Lepidoptera: Noctuidae). It enables us to catch insects and to take pictures that are automatically sent to the user [St-Mathieude-Beloeil, Québec, Canada].

En 2017, ce système de surveillance automatisé des ravageurs a été utilisé afin d'enregistrer l'abondance de la légionnaire uniponctuée (*Mythimna unipuncta*; Lepidoptera : Noctuidae). Il permet d'attraper des insectes et de prendre des photos qui sont automatiquement envoyées à l'utilisateur. [St-Mathieu-de-Beloeil, Québec, Canada].

[Photo: Julien Saguez]



Strong entomological societies for all Canadians

On the Saturday preceding the joint annual meeting in Winnipeg last October, officers and members of the Board of the Entomological Society of Canada (ESC) participated in an important strategic planning session. The main goal of this all-day event was to identify priorities to ensure the long-term sustainability of our Society. The excellent discussions led to the establishment of new actions in four main categories: governance, membership, financial sustainability and communication. Information about the results of this process will be given during the Annual General Meeting of the ESC on Tuesday, 13 November 2018, in Vancouver; however, a brief summary is given below.

In a world of fast-paced changes, we wanted to make sure that the leadership of the ESC was equipped to govern in the most efficient way possible. For this to happen, the Society needs to be able to respond to challenges quickly and make sure that members of the Board are engaged and fully aware of their responsibilities. Towards this goal, the Society is currently reviewing all of its governance documents (e.g., standing rules, by-laws, and committee guidelines) and putting together measures that ensure better orientation and support for Board members. Great progress is

Des sociétés entomologiques fortes pour tous les Canadiens

Le samedi précédent la réunion annuelle conjointe à Winnipeg en octobre dernier, les dirigeants et les membres du CA de la Société d'entomologie du Canada (SEC) ont participé à une session importante de planification stratégique. Le but principal de cet événement d'une journée était d'identifier les priorités afin d'assurer une durabilité à long terme de notre Société. Ces excellentes discussions ont mené à l'établissement de nouvelles actions dans quatre catégories principales : la gouvernance, les adhésions, la durabilité financière et la communication. L'information sur les résultats de ce processus sera donnée durant l'assemblée générale des membres de la SEC le mardi 13 novembre 2018, à Vancouver. Cependant, un bref résumé est donné ci-dessous.

Dans un monde de changements rapides, nous voulons nous assurer que le leadership de la SEC soit équipé pour gouverner de la façon la plus efficace possible. Pour cela, la Société a besoin de pouvoir répondre rapidement aux défis et de s'assurer que les membres du CA sont engagés et pleinement conscient de leurs responsabilités. Pour atteindre ce but, la Société révise actuellement tous les documents de gouvernance (p. ex., le règlement administratif, les règles permanentes et les lignes directrices des comités) et assemble des mesures pour assurer une meilleure orientation et un meilleur soutien aux membres du CA. De grands progrès se font et des changements nécessaires sont implantés.

Des activités stratégiques concernant les questions d'adhésion ont été mises en place

being made and necessary changes are being implemented.

Strategic activities focussing on membership questions were put in place to explore viable options to better involve current and prospective members in order to maintain, and hopefully increase, membership numbers. Several natural history societies around the world are suffering from decreasing membership numbers and the ESC is not immune to this kind of trend. Other societies on the other hand are able to sustain very healthy numbers of members and we need to learn from them. The ESC is currently reviewing its membership categories, developing better ways to communicate the benefits of being a member, and exploring ways to celebrate insects and their relatives at a national level. We hope that our membership activities will provide reasons for more Canadians to become and remain members of the ESC in the future.

In order for the Society to continue to exist at all, it must be financially sustainable. The ESC Board is frequently involved in discussions revolving around possible increases in revenue and reductions in expenditure. A fine balance must be struck to ensure that high priority roles of the Society (e.g., development of younger entomologists through grants and scholarships and publication of *The Canadian Entomologist*) can be maintained. A review of possible financial scenarios has been led by our past and current Treasurers, and a new national-level sponsorship programme (led by Cynthia Scott-Dupree and Geoff Powell) is showing promising results.

One of the main topics of discussion among our group has been the way the ESC communicates with its stakeholders. Among the new initiatives we have recently started is to better communicate with the seven Canadian regional entomological societies (see links at http://esc-sec.ca/the-society/affiliated-organizations/), which tend to cater to more geographically-restricted audiences. Important discussions between the representatives of

pour explorer des options viables pour mieux impliquer les membres actuels et prospectifs afin de maintenir, et idéalement d'augmenter le nombre de membres. Plusieurs sociétés d'histoire naturelle autour du monde souffrent d'une diminution du nombre de membres et la SEC n'est pas immunisée contre ce genre de tendance. D'autres sociétés, par contre, sont capables de maintenir un nombre très sain de membres et nous devons en tirer des apprentissages. La SEC révise présentement ses catégories de membres, développant de meilleures façons de communiquer les avantages d'être un membre, et explorant des façons de célébrer les insectes et leurs cousins à un niveau national. Nous espérons que les activités de nos membres fourniront des raisons à plus de Canadiens de devenir et rester membres de la SEC dans le futur.

Afin que la Société puisse continuer à exister tout court, elle doit être viable financièrement. Le CA de la SEC est fréquemment impliqué dans des discussions tournant autour des possibles augmentations de revenus et de réductions dans les dépenses. Un équilibre fin doit être atteint afin d'assurer que les rôles à hautes priorités de la Société (p. ex. le développement des jeunes entomologistes via des subventions et des bourses et la publication de *The Canadian Entomologist*) puissent être maintenus. Une révision des scénarios financiers possibles a été menée par nos trésoriers actuels et passés, et un nouveau programme national de partenariat financier (mené par Cynthia Scott-Dupree et Geoff Powell) montre des résultats prometteurs.

Un des sujets principaux de la discussion au sein de notre groupe a été la façon dont la SEC communique avec ses intervenants. Parmi les nouvelles initiatives que nous avons récemment débutées est de mieux communiquer avec les sept sociétés entomologique régionales canadiennes (voir les liens sur http://esc-sec.ca/fr/the-society/affiliated-organizations/), qui tendent à répondre aux besoins d'audiences plus restreintes géographiquement. Des discussions importantes entre les représentants de ces

these affiliated organizations and the ESC have already taken place and more regular meetings have been planned. We have a lot to learn from each other and we all see the value of working together towards similar goals. Our societies have the same objective, that is, to support and develop the Canadian entomological community the best way possible. It is clear that strong entomological communities at local levels strengthen the Canadian entomological community as a whole!

If you have any questions or comments regarding this brief summary of strategic activities, don't hesitate to contact me or anyone in the leadership of the ESC (http://esc-sec.ca/the-society/board-of-directors/). Your input is important to us.

As this is my last my last Up front, I would like to extend my sincere gratitude and appreciation for all of the hard work and dedication provided by the volunteers and staff serving the Society. It has truly been a wonderful experience for me and I am thankful to have gotten to interact with many passionate entomologists throughout my year as President of the Society. It is also quite comforting to know that the Society is currently doing well and is in good hands. For me, this will be a year to remember very fondly.

Sincerely,

Pat Bouchard

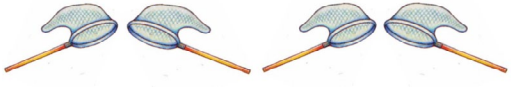
organisations affiliées et la SEC ont déjà pris place et des réunions plus régulières ont été planifiées. Nous avons beaucoup à apprendre les uns des autres et nous voyons tous la valeur de travailler ensemble vers des buts similaires. Nos sociétés ont le même objectif, soit de soutenir et développer la communauté entomologique canadienne de la meilleure façon possible. Il est clair que des communautés entomologiques fortes au niveau local vont renforcer la communauté entomologique canadienne comme un tout!

Si vous avez des questions ou des commentaires concernant ce bref résumé des activités stratégiques, n'hésitez pas à me contacter, moi ou quiconque dans le leadership de la SEC (http://esc-sec.ca/fr/the-society/board-of-directors/). Vos opinions sont importantes pour nous.

Puisqu'il s'agit de mon dernier Avant-propos, j'aimerais exprimer ma sincère gratitude et mon appréciation pour tout le travail ardu et le dévouement des bénévoles et du personnel qui sert la Société. Cela a réellement été une expérience formidable pour moi et je suis reconnaissant d'avoir pu interagir avec autant d'entomologistes passionnés durant mon année comme Président de la Société. Il est également très réconfortant de savoir que la Société se porte bien et est entre bonnes main. Pour moi, il s'agira d'une année dont je me rappellerai avec plaisir.

Sincèrement,

Pat Bouchard



2018 ESA, ESC and ESBC Joint Annual Meeting
Crossing Borders: Entomology in a Changing World
11–14 November | Vancouver, BC, Canada

Réunion annuelle conjointe ESA, SEC et SECB 2018
Au-delà des frontières: l'entomologie dans un monde en changement
11–14 novembre | Vancouver, Colombie-Britannique, Canada

The Entomological Society of British Columbia invites you to attend the 2018 ESA, ESC, and ESBC Joint Annual Meeting!

The 2018 Joint Annual Meeting will take place in beautiful Vancouver, British Columbia, from **11-14 November 2018**. With a theme of **Crossing Borders: Entomology in a Changing World**, 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!

La Société d'entomologie de Colombie-Britannique vous invite à assister à la réunion annuelle conjointe ESA, SEC et SECB 2018!

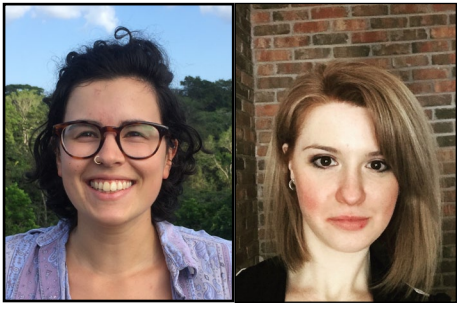
La réunion annuelle conjointe 2018 se tiendra dans la magnifique ville de Vancouver, Colombie-Britannique, **du 11 au 14 novembre 2018**. Avec le thème **Au-delà des frontières : l'entomologie dans un monde en changement**, cette réunion représente une chance unique de partager votre recherche, d'avoir 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/french

Au plaisir de vous voir à Vancouver!

STEP Corner / Le coin de la relève

Anne-Sophie Caron and Rachel Rix



2018 ESA, ESC, and ESBC Joint Annual Meeting

The next JAM is coming up in Vancouver in November 2018! A lot of activities, including debates, Linnaean games and student mixers are taking form. If you want to get involved, you can contact the local student committee through Dan Peach (dap3@sfu.ca) or Joanna Konopka (jkonopk@uwo.ca). You can also contact them to learn more about other student activities such as walking tours and sightseeing to make your stay in Vancouver even more enjoyable!

Additionally, members of SEPAC will be present at the student tables during the whole meeting. Make sure to come and say 'Hi' and learn more about our committee and how we can help you, as undergraduate or graduate students or as early career professionals.

We hope to see you there!

Research Roundup

We continue to publicize graduate student publications to the wider entomological community through our Research Roundup initiative. Check out the ESC blog for most recent featured articles. If you want your recently published article featured (or we missed yours last month!), send us an email at students@esc-sec.ca. For regular updates on new Canadian entomological research, you can join the ESC Students Facebook page or follow us on Twitter @esc_students.

La réunion annuelle de la ESA, SEC et SECB 2018

La prochaine réunion annuelle, qui aura lieu à Vancouver en novembre 2018, s'en vient à grands pas! Une foule d'activités incluant des débats, les jeux linnéens et la soirée étudiante prennent forme. Si vous voulez vous impliquer dans l'organisation, vous pouvez contacter Dan Peach (dap3@sfu.ca) ou Joanna Konopka (jkonopk@uwo.ca) du comité étudiant local. Vous pouvez aussi les contacter pour en apprendre plus sur les autres activités pour les étudiants, incluant des circuits touristiques à pied pour rendre votre séjour à Vancouver encore plus agréable!

De plus, des membres du comité seront présents aux tables étudiantes durant toute la réunion. Venez nous dire bonjour et en apprendre plus sur notre comité et sur les façons dont nous pouvons vous aider, que vous soyez un étudiant au baccalauréat ou aux cycles supérieurs, ou que vous soyez un professionnel en début de carrière.

Nous espérons vous y voir!

Aperçu de la recherche

Nous continuons à faire la publicité des publications des étudiants gradués auprès de la communauté entomologique via notre initiative Aperçu de la recherche. Consultez le blogue de la SEC pour les plus récents articles. Si vous voulez que votre plus récent article soit mis en vedette (ou si nous l'avons manqué le mois dernier !), envoyez-nous un courriel à students@esc-sec.ca. Pour des mises à jour régulières sur la recherche entomologique canadienne, adhérez à la page Facebook des étudiants de la SEC ou suivez-nous sur Twitter à @esc_students.

Getting involved with the ESC

The Student and Early Professional Affairs Committee (SEPAC) is looking for new members (especially early professionals). Volunteering for the SEPAC is a great way to get involved with the society and promote entomology to students 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 annesophie.caron.p@gmail.com or Rachel.Rix@dal.ca.

We look forward to hearing from you,

Anne-Sophie and Rachel.

S'impliquer au sein de la SEC

Le comité des affaires étudiantes et des jeunes professionnels cherche de nouveaux membres (particulièrement des jeunes professionnels). S'impliquer bénévolement pour le comité est une excellente façon de s'impliquer avec la Société et promouvoir l'entomologie auprès des étudiants au Canada. Si vous êtes intéressés à joindre le comité, ou si vous avez des suggestions pour de nouvelles initiatives pour la prochaine année, écrivez-nous à students@esc-sec.ca. Vous pouvez aussi nous contacter personnellement à annesophie.caron.p@gmail.com ou Rachel.Rix@dal.ca.

Au plaisir d'avoir de vos nouvelles,

Anne-Sophie et Rachel.

Thesis Roundup / Foisonnement de thèses

If you or a student you know has recently defended an entomology-related thesis at a Canadian University, and would like notice of this accomplishment published here and on the ESC website, please email students@esc-sec.ca with the relevant information (name, date, degree, thesis title, supervisor[s], and university).

Si vous, ou un étudiant que vous connaissez, avez récemment soutenu votre thèse dans un domaine lié à l'entomologie dans une université canadienne, et que vous voulez publier l'avis de cette réalisation ici et sur le site web de la SEC, merci d'envoyer les informations pertinentes (nom, date, diplôme, titre de la thèse, directeur[s] et université) à students@esc-sec.ca.

In response to a suggestion by the Society's Board of Directors to promote closer ties between the national and regional societies, we are pleased to introduce this new regular feature. Its content will be determined by the regional representatives. The absence of news from a particular region means that nothing has been submitted by the regional representative. If you have newsworthy information from your region that should be highlighted here, contact your regional representative to the ESC (listed on the inside back cover of each issue).

Suite à une suggestion faite par le conseil d'administration de la Société afin de promouvoir des liens plus serrés entre les sociétés nationale et régionales, nous sommes heureux de vous présenter cette nouvelle rubrique régulière. Son contenu sera déterminé par les représentants régionaux. L'absence de nouvelles d'une région particulière signifie que rien n'a été soumis par le représentant régional. Si vous avez des informations d'intérêt de votre région qui devraient être soulignées ici, contactez votre représentant régional à la SEC (la liste se trouve dans la troisième de couverture de chaque numéro).

Alberta

Telsa Willsey

On 13 July 2018, Telsa Willsey from the University of Lethbridge successfully defended her MSc thesis on pea leaf weevil root rot interactions and management. Congratulations Telsa!

Insect Discovery Day

Insect Discovery Day was held on 18 August 2018 at the Coaldale Bird of Prey Centre (http://www.burrowingowl.com/visit/). Co-sponsored by the Entomological Society of Alberta, this annual all-day event introduces children and their parents to the wonderful world of insects. There are displays of pinned local and tropical insects, as well as live insects. Sweep nets are given to children who race about a field, returning with their treasures of butterflies, flies, dragonflies and grasshoppers. Aquariums and shallow pans are populated with the denizens of a nearby pond… the snails are always a big hit (*sigh!*). Beginning in 2011, the event has been very popular with attendees aided by the knowledge and enthusiasm of the volunteers. The event is regularly featured in local media and is a great way to advertise our provincial entomological society. As proof of this, do an internet search for "Insect Discovery Day Coaldale".

Manitoba

Jason Gibbs has a bee named after him

Jason Gibbs, an assistant professor in the Department of Entomology at the University of Manitoba, has had a bee named after him according to a University of Manitoba news release (http://news.umanitoba.ca/finally-a-bee-for-friendly-manitoba/). The bee, a kleptoparasitic (cuckoo bee) species that Jason found in Spruce Woods Provincial Park, has been named *Epeolus gibbsi* by Thomas Onuferko (York University) in the journal *ZooKeys:* https://zookeys.pensoft.net/article/23939/. Species of *Epeolus* typically lay their eggs in the nests of cellophane bees (*Colletes*), though the species parasitised by *E. gibbsi* have yet to be determined.

Grassland Butterfly Conservation Program at Assiniboine Park Zoo and field research by the University of Winnipeg for the recovery of the endangered Poweshiek skipperling.

Laura Burns and Richard Westwood

The endangered Poweshiek skipperling (*Oarisma poweshiek*) was formerly one of the most frequently encountered grassland butterflies in the Midwest, but populations of this small butterfly have collapsed in the last 20 years across its range for largely unknown reasons (although habitat loss, climate change, and pesticide use have been implicated). Recent estimates put the worldwide population of this tall grass prairie specialist at fewer than 500 individuals. Due to extirpation at nearly all sites across its former range, one of the only extant sites is within a 40 km^2 area of the Nature Conservancy of Canada's Tall Grass Prairie Preserve in southern Manitoba. Despite low population counts in recent years, these grasslands in southeastern Manitoba represent one of the species' last strongholds – and the only location in which they still exist in Canada.

S. Semmler

Poweshiek skipperling female.

Assiniboine Park Zoo

A member of the Poweshiek recovery team at Assiniboine Park Zoo measures a Poweshiek skipperling larva.

While previous *O. poweshiek* conservation initiatives have focused on *in-situ* conservation tools such as habitat management, the Assiniboine Park Zoo in Winnipeg, Manitoba is developing an *ex-situ* conservation program for *O. poweshiek* through a 'headstarting' captive rearing program. Headstarting programs aim to give wild animals a 'head start' in life by bringing them into captivity through critical life stages in order to increase survival. For the *O. poweshiek*, gravid females are captured in the Tall Grass Prairie Preserve and brought back to the zoo to oviposit for up to 72 hours before being returned to their capture sites. Their eggs then hatch and the larva are reared throughout the summer on native prairie grasses within protective enclosures at the Zoo. In the fall, the larva go into diapause and are moved indoors to a -4°C incubator. In the spring they are placed on grasses again to grow and pupate, at which point they are released into the wild.

The Zoo's Conservation and Research team hope to increase annual recruitment in the wild by using human care to rear through their vulnerable larval stages prior to wild release; these efforts will continue until the remnant populations have increased to sustainable levels. The summer of

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The original version of this article appeared in the Entomological Society of Manitoba Newsletter ***40****(2), and we thank the Co-editors of the Newsletter for allowing us to reproduce this slightly updated version.*

Laura Burns (lburns@assiniboinepark.ca) is a Conservation Research Specialist, Assiniboine Park Zoo, Winnipeg, and Richard Westwood is a member of the Department of Biology, University of Winnipeg.

M. Hooshmandi

Female resting after laying an egg on Prairie dropseed in the Tall Grass Prairie Preserve, Tolstoi, Manitoba.

J. Henault

First instar larva soon after egg hatch in the Tall Grass Prairie Preserve.

J. Henault

Second instar larva soon after molting in the Tall Grass Prairie Preserve.

2017 was the first time this initiative was attempted, and after a successful first season, this past July marked the first-ever release of captive-reared Poweshiek skipperling into the wild! The second season is off to a strong start with a larger number of larva at the zoo that will be released into suitable habitat at the Tall Grass Prairie Preserve in southern Manitoba next summer.

This program will not only increase wild population levels, but also provide unique research opportunities. *O. poweshiek* larvae are extremely difficult to detect in the wild, and this zoo-based conservation approach provides the ability to study larval stages. Collaborations with the University of Winnipeg are taking advantage of this opportunity with a new graduate student who is looking at factors that affect larval development and survival.

The conservation program also benefits from the high public profile of Assiniboine Park Zoo in the community of Winnipeg and among other accredited zoo facilities across Canada. Visitors to the zoo can learn about *O. poweshiek* and grassland conservation through hands-on volunteer-run interpretive stations. The social media outreach of the zoo currently reaches over 30,000 followers, which has been harnessed to teach people about the importance of insect conservation. This program run by Assiniboine Park Zoo has only been made possible by supportive collaborators in Canada and the US, including the Minnesota Zoo, the University of Winnipeg, the Nature Conservancy of Canada, the Living Prairie Museum, Manitoba Sustainable Development, Environment and Climate Change Canada, and the US Fish and Wildlife Service.

Also at the University of Winnipeg, a research program to better understand the biology and ecology of the Poweshiek skipperling in the wild has been in place in the Westwood research laboratory since 2008. Surprisingly many crucial basic life history components of the Poweshiek skipperling, which are needed to manage remaining Tall Grass Prairie sites better, are poorly known. Katherine Dearborn, Jaimee Dupont-Morozoff, Mahsa Hooshmandi, Justis Henault, Sarah Semmler, and Colin Murray have been studying mating and oviposition behaviour, larval host plant and adult nectaring requirements and the impacts of disturbance such as fire, haying and grazing on larval and adult survival. Recently landscape habitat suitability models have been developed to locate potential new habitats as candidates for future introduction. The program at the University of Winnipeg has been designed to support the future reintroduction of Poweshiek skipperling into areas best suited to ensure the long-term survival of the species.

Ontario

The Entomological Society of Ontario's annual 'Bug Days' will take place in the following locations: AAFC Ottawa Research Centre, Central Experimental Farm, 8 September 2018; and London Children's Museum, 8 September 2018. The first of the year's 'Bug Days' was held at the University of Guelph Arboretum Centre, 26 August 2018.

Quebec

The Société d'entomologie du Québec is working on a new website. As well, the SEQ made representations to the provincial government to name the white admiral (*Limenitis arthemis*) the official provincial insect.

Among popular entomological topics in the Province are: the emerald ash borer (*Agrilus planipennis*) is now in Quebec City, more cases of Lyme disease have been reported in southern Quebec, the northern black widow spider (*Latrodectus variolus*) has been found in the Province, and there have been several sightings of the brown marmorated stink bug (*Halyomorpha halys*) in Montreal. On the brighter side, the industry of breeding insects is blooming!

Saskatchewan

ESS Members have been busy around the province providing entomological knowledge and guidance at various summer activities including a tour of the Nature Conservancy of Canada's new quarter section near Dundurn, various SaskParks Bioblitzes and the Fort Qu'Appelle Butterfly Count. Chrystel Olivier and Jeff Boone have been particularly active, giving entomological talks and leading collection trips at several provincial parks across Saskatchewan over the course of the summer.

Jacques Brodeur Gold Medal Award / Médaille d'or

Dr Jacques Brodeur is the 2018 recipient of the Entomological Society of Canada's Gold Medal. This award recognises outstanding achievement in Canadian entomology and is given annually to an individual judged to have made a superior contribution to entomology in Canada.

Dr Brodeur is an experimental and theoretical ecologist who received his PhD in biology in 1990 from Laval University. Following a postdoc at Wageningen University, The Netherlands, he accepted a professorship position at Laval University. Since 2005, Dr Brodeur has been a full professor at the Université de Montréal and holds a Canada Research Chair in Biological Control. For the past 30 years, he has studied the biology and ecology of natural enemies used for biological control. A long-term goal of his research is to identify the governing ecological principles and mechanisms of multispecies interactions within arthropod communities, and to apply these principles to develop reliable and predictive strategies to best take advantage of biological control agents.

Dr Brodeur has published more than 200 refereed papers, chapters and books on parasitoid and predator ecology, host-parasitoid relationships, the diversity of arthropod communities in natural and managed ecosystems, and biological control. He has served on the editorial board of several journals (*Biological Control*, *Biocontrol*, *Journal of Economic Entomology*, *The Canadian Entomologist*, *PeerJ*), has been active in a number of professional societies (Entomological Society of Canada, Société d'Entomologie du Québec, Entomological Society of America,

Dr Jacques Brodeur est le récipiendaire 2018 de la Médaille d'or de la Société d'entomologie du Canada. Ce prix reconnait les accomplissements exceptionnels en entomologie canadienne et est donné annuellement à un individu considéré comme ayant apporté une contribution supérieure à l'entomologie au Canada.

Dr Brodeur un écologiste expérimental et théorique qui a obtenu son doctorat en biologie de l'Université Laval en 1990. Après un post-doc à l'Université Wageningen, Pays-Bas, il a accepté un poste de professeur à l'Université Laval. Depuis 2005, Dr Brodeur est professeur à l'Université de Montréal et détient la chaire de recherche du Canada en biocontrôle. Durant les 30 dernières années, il a étudié la biologie et l'écologie des ennemis naturels utilisés en lutte biologique. Un objectif à long-terme de ses recherches est d'identifier les principes écologiques et les mécanismes des interactions multi-espèces au sein des communautés d'arthropodes, et d'appliquer ces principes au développement de stratégies fiables et prévisibles pour tirer avantage des agents de lutte biologique.

Dr Brodeur a publié plus de 200 articles, chapitres et livres sur l'écologie des parasitoïdes et des prédateurs, les relations hôte-parasitoïde, la diversité des communautés d'arthropodes dans les écosystème naturels et aménagés, et la lutte biologique. Il a été sur le comité éditorial de plusieurs revues (*Biological Control*, *Biocontrol*, *Journal of Economic Entomology*, *The Canadian Entomologist*, *PeerJ*), a été actif dans plusieurs sociétés professionnelles (Société d'entomologie du

Ecological Society of America, International Organization for Biological Control – IOBC NRS), and has contributed to the organization of national and international scientific meetings or symposia. He has been president of IOBC Global (2008-2012) and Chair of the IOBC Commission on Biological Control and Access and Benefit-Sharing (2008-2016). He is currently director of the Institut de Recherche en Biologie Végétale.

Canada, Société d'entomologie du Québec, Organisation internationale de lutte biologique et intégrée – OILB SRN) et a contribué à l'organisation de réunions scientifiques ou symposiums nationaux et internationaux. Il a été président de IOBC Global (2008-2012) et président de IOBC Commission on Biological Control and Access and Benefit-Sharing (2008-2016). Il est présentement directeur de l'Institut de recherche en biologie végétale.

Rob Johns
C. Gordon Hewitt Award / Prix C. Gordon Hewitt

This award is given annually by the Entomological Society of Canada to an individual judged to have made an outstanding contribution to entomology in Canada, and who received their PhD within the preceding 12 years. The 2018 recipient of this award is Dr Rob Johns.

Dr Johns is a Forest Insect Ecologist with the Canadian Forest Service in Fredericton, New Brunswick. Before joining the federal service, Rob earned his PhD from the University of New Brunswick and enjoyed 2 years as a postdoc in northern Japan. Rob is a skilled project coordinator and cultivates an atmosphere of teamwork and mentorship among his numerous staff and collaborators. In recent years Rob has been a lead on several large collaborative research programs on spruce budworm, including the recently announced $75 million 'Early Intervention Strategy' project aimed at containing the spread of the outbreak through Atlantic Canada.

Three themes have dominated Rob's recent work. First, he seeks to address long-standing questions around why and how

Ce prix est remis annuellement par la Société d'entomologie du Canada à un individu ayant apporté des contributions exceptionnelles à l'entomologie au Canada, et qui a obtenu son doctorat dans les 12 dernières années. Le récipiendaire 2018 de ce prix est Dr Rob Johns.

Dr Johns est un écologiste des insectes forestiers du Service canadien des forêts à Frédéricton, Nouveau-Brunwsick. Rob a obtenu son doctorat de l'Université du Nouveau-Brunswick et a profité d'un post-doc de 2 ans au Japon. Rob est un coordonnateur de projet talentueux et cultive une atmosphère de travail d'équipe et de mentorat parmi ses nombreux collaborateurs et son personnel. Récemment, Rob a mené plusieurs grands programmes collaboratifs de recherche sur la tordeuse des bourgeons de l'épinette, incluant le projet de 75$ millions annoncé sur la « Stratégie d'intervention hâtive » visant à empêcher la dispersion de l'épidémie au Canada atlantique.

Trois thèmes principaux dominent les travaux de Rob. Premièrement, il cherche

spruce budworm outbreaks develop in northeastern North America. Second, Rob works to translate this theoretical knowledge into practical methods for monitoring and managing outbreaks at an operational scale. Third, Rob embraces a role as a 'public educator' on spruce budworm ecology and management (including on controversial issues around insecticides), and has given more than 100 public talks and 75 media interviews in this capacity. As part of their public engagement efforts, Rob's group created a multi-award winning citizen science program (aka Budworm Tracker), which helps to monitor budworm moths in northeastern North America. This collaborative program provides landscape-scale data for studying (among other things) budworm regional dispersal patterns, and serves as an extraordinary vehicle for public engagement and education.

à répondre à des questions concernant le développement des épidémies dans le nord-est de l'Amérique du Nord. Ensuite, Rob travaille à traduire cette connaissance en méthodes pratiques pour surveiller et gérer les épidémies à une échelle opérationnelle. Finalement, Rob embrasse le rôle « d'éducateur public » sur l'écologie et la lutte contre la tordeuse (incluant des questions controversées sur les insecticides) et a donné plus de 100 présentations publiques et 75 entrevues dans les médias à ce titre. Le groupe de Rob a créé un programme de science citoyenne (Pisteurs de tordeuses) ayant reçu plusieurs prix, et qui aide à surveiller les papillons de tordeuses dans le nord-est de l'Amérique du Nord. Ce programme collaboratif fournit des données à l'échelle du paysage pour l'étude des patrons de dispersion régionale de la tordeuse et sert de véhicule remarquable pour l'engagement et l'éducation du public.

Hugh Danks
Honorary Member / Membre honoraire

Honorary Membership is bestowed by vote of the Society membership, to a current or former Active Member of the Entomological Society of Canada who has made an outstanding contribution to the advancement of entomology.

Dr Hugh Danks retired in 2007 after serving for more than 30 years as Head of the Biological Survey of Canada (Canadian Museum of Nature). In that role, he was instrumental in the coordination and facilitation of national research and

Le statut de membre honoraire est décerné par vote des membres de la Société, à un membre actif ou ancien membre actif de la Société d'entomologie du Canada qui a fait une contribution exceptionnelle à l'avancement de l'entomologie.

Dr Hugh Danks, retraité depuis 2007, a servi plus de 30 ans comme agent principal à la Commission biologique du Canada (Musée canadien de la nature). Il a été déterminant dans la coordination et la facilitation d'activités nationales de recherche et de communication

communication activities to highlight Canada's entomological fauna. He also excelled in the coordination and editing of major multi-author synthetic works; e.g., *Canada and Its Insect Fauna* (1979 – 60 contributors, 573 pp.) and *Insects of the Yukon* (1997 – 35 contributors, 1034 pp). His most recent book, "*The Biological Survey of Canada: A Personal History*" (2016, 180 pp) summarizes the history and accomplishments of the BSC achieved during his tenure.

Hugh has authored or co-authored more than 115 refereed scientific publications. Of particular note, with Hugh as sole author, are two widely cited books, *Arctic Arthropods: A Review of Systematics and Ecology...* (1981, 2487 references) and *Insect Dormancy: An Ecological Perspective* (1987, 2754 references). Many of these publications review the physiological ecology of insects, particularly seasonal adaptations of insects and mechanisms of biological clocks. Six of his papers have been cited more than 100 times; his 1978 review "*Modes of seasonal adaptation in the insects: I. Winter survival*" has been cited more than 200 times. Equally noteworthy is Hugh's publication "*The Bug Book and Bottle*", an activity book for entomophilic youngsters. After sales of more than 2 million copies of the first edition, a second edition appeared in 2009.

Hugh has served the Entomological Society of Canada in numerous capacities, including President (1997–98). He also served as Secretary-Treasurer for the Biological Survey Foundation (1990–2007). He was the 1980 recipient of the C. Gordon Hewitt Award, and was awarded a Fellowship of the Society in 1982.

afin de mettre en valeur la faune entomologique du Canada. Il a également excellé dans la coordination et l'édition de travaux majeurs de synthèses à multiples auteurs; p. ex. *Canada and Its Insect Fauna* (1979 – 60 contributeurs, 573 pp.) et *Insects of the Yukon* (1997 – 35 contributeurs, 1034 pp). Son plus récent livre, "*The Biological Survey of Canada: A Personal History*" (2016, 180 pp) résume l'histoire et les accomplissements de la CBC durant son mandat.

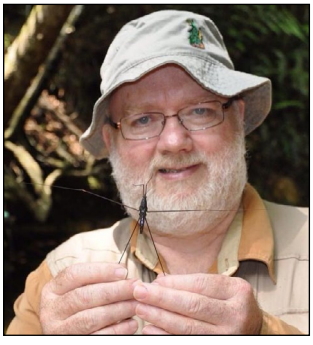
Hugh a écrit ou co-écrit plus de 115 articles scientifiques. Mentionnons particulièrement, avec Hugh comme seul auteur, les deux livres (cités maintes fois) *Arctic Arthropods: A review of systematics and ecology...* (1981, 2487 références) et *Insect Dormancy: An Ecological Perspective* (1987, 2754 références). Plusieurs de ces publications synthétisent l'écologie physiologique des insectes, particulièrement les adaptations saisonnières des insectes et les mécanismes d'horloge biologique. Six de ses articles ont été citées plus de 100 fois : sa synthèse de 1978 « *Modes of seasonal adaptation in the insects: I. Winter survival* » a été cité plus de 200 fois. À mentionner également le livre d'activités pour les jeunes entomophiles « *The Bug Book and Bottle* ». Après plus de 2 millions de copies vendues, une deuxième édition est parue en 2009.

Hugh a fréquemment servi la Société d'entomologie du Canada, incluant comme président (1997-98). Il a également été secrétaire-trésorier pour la Fondation de la Commission biologique (1990-2007). Il a reçu le prix C. Gordon Hewitt en 1980, et est devenu membre associé de la Société en 1982.

Fellows / Membres associés

Entomological Society of Canada Fellowships are bestowed by the Entomological Society of Canada to recognize members of the Society for their major contributions to entomology via research, teaching, application, and (or) administration.

Le statut de membre associé de la Société d'entomologie du Canada est alloué par la Société d'entomologie du Canada pour reconnaître les membres de la Société pour leurs contributions majeures à l'entomologie par la recherche, l'enseignement, les applications et (ou) l'administration.



John Spence

Dr John Spence is Professor Emeritus at the University of Alberta, served for 10 years as Chair of the Department of Renewable Resources, and was the Director of the George Lake Field Station for 31 years. He has published more than 300 scientific journal articles, book chapters, reports and reviews with a focus on the ecology and evolution of gerrid bugs, carabid beetles, and spiders. He oversaw the establishment of the EMEND (Ecosystem Management Emulating Natural Disturbances) forestry experiment. The science behind EMEND has defined current retention harvesting guidelines by the province of Alberta, inspired many related international forestry experiments, and is used internationally to justify implementation of variable retention harvesting.

During his career, John has supervised 32 undergraduate, 47 MSc, 16 PhD students, and 12 post-doctoral fellows. In 2010, he received the Award for Excellence in Mentoring Graduate Students from the Department of Renewable Resources at the University of Alberta. In 2007, he was recognized as Faculty Teacher of the Year. He (co-)organized at least 17 national and international entomologically-oriented symposia and conferences, 10 of them as chairman and 6 in Canada. He has served on the editorial boards of *Ecography* (1999-2018), *Forest and Agriculture Entomology* (1999-2018) and *Canadian Journal of Zoology* (1991-1996). Scientists, both in Canada and internationally, have benefitted from his sharp

Dr John Spence est professeur émérite à l'Université de l'Alberta, a été directeur du département des ressources renouvelables pensant 10 ans et a été le directeur de la station expérimentale de Lake George pendant 31 ans. Il a publié plus de 300 articles scientifiques, chapitres de livres, rapports et synthèses, principalement sur l'écologie et l'évolution des punaises gerridés, des carabidés et des araignées. Il a supervisé l'établissement de l'expérience en foresterie EMEND (Ecosystem Management Emulating Natural Disturbances). La science derrière EMEND a défini les lignes directrices actuelles de coupe avec rétention de l'Alberta, a inspiré plusieurs expériences internationales et est utilisé internationalement pour justifier l'implantation de coupe avec rétention variable.

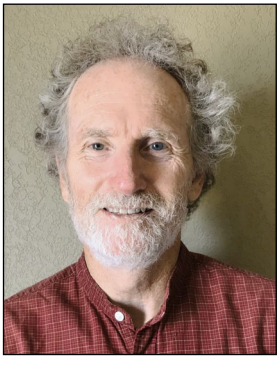
Durant sa carrière, John a supervisé 32 étudiants de premier cycle, 47 maîtrises, 16 doctorats et 12 post-doctorats. En 2010, il a reçu le prix de l'excellence en mentorat d'étudiants de cycles supérieurs du département des ressources renouvelables de l'Université de l'Alberta. En 2007, il a été reconnu professeur de l'année. Il a (co-)organisé au moins 17 symposiums et conférences nationaux et internationaux, dont 10 comme présidents et 6 au Canada. Il a siégé sur le comité éditorial de *Ecography* (1999-2018), *Forest and Agriculture Entomology* (1999-2018) et *Canadian Journal of Zoology* (1991-1996). Des scientifiques au Canada et à l'international ont bénéficié de sa plume

editor's pen, thoughtful evaluation, advice, and decisions about scientific publication.

In 2001, John received the ESC's Gold Medal in recognition of his outstanding contributions to Canadian entomology.

affûtée d'éditeur, de son évaluation réfléchie, de ses conseils et de ses décisions sur des publications scientifiques.

En 2001, John a reçu la médaille d'or de la SEC en reconnaissance de ses contributions exceptionnelles à l'entomologie canadienne



Paul Fields

Dr Paul Fields is a Research Scientist with Agriculture and Agri-Food Canada in Winnipeg, Manitoba. He is internationally recognized for his studies on stored-product pest insects, which have been published in 91 peer-reviewed papers, one of which has been cited almost 400 times. He also has authored or co-authored 12 book chapters and 89 conference proceedings. His applied research has resulted in three patents.

Paul has been a strong supporter of the ESC throughout his career. He was a member of the Executive for 4 years (President 2008/2009), and served for 3 years as Editor of the Society's *Bulletin*. In this latter role, he was instrumental in streamlining the production process to lead the *Bulletin* into the digital age. He has served on several other ESC committees, and also as an associate editor for *The Canadian Entomologist* and the *Journal of Stored Products Research*.

Paul also has been a long-time member of the Entomological Society of America (since 1983) and of the Entomological Society of Manitoba (since 1988; President in 2002 and

Dr Paul Fields est chercheur scientifique à Agriculture et agroalimentaire Canada à Winnipeg, Manitoba. Il est reconnu internationalement pour ses études sur les insectes ravageurs des produits entreposés, qui ont été publiés dans 91 articles scientifiques, dont un ayant été cité presque 400 fois. Il a également écrit ou co-écrit 12 chapitres de livres et 89 comptes rendus de conférences. Ses recherches appliquées ont mené à 3 brevets.

Paul a été un fervent défenseur de la SEC durant sa carrière. Il a été membre du conseil exécutif durant 4 ans (Président en 2008/2009), et a été éditeur du *Bulletin* de la Société pendant trois ans. Dans ce dernier rôle, il a été déterminant pour la rationalisation du processus de production pour mener le Bulletin dans l'ère numérique. Il a siégé sur plusieurs autres comités de la SEC et comme éditeur associé de *The Canadian Entomologist* et *Journal of Stored Products Research*.

Paul est membre de longue date de la Société d'entomologie d'Amérique (depuis 1983) et de la Société d'entomologie du Manitoba (depuis

2015), and was a member of Sigma Xi for 18 years (Secretary 1991-1994). He (co-) organized conferences on Stored Product Protection in Thailand (2014) and Portugal (2010) and joint annual meetings of the ESM in Winnipeg with the ESA (North Central Branch in 2007) and the ESC (2017).

1988; président en 2002 et 2015) et a été membre de Sigma Xi durant 18 ans (secrétaire 1991-1994). Il a (co-)organisé les conférences sur la production des produits entreposés en Thaïlande (2014) et au Portugal (2010) et les réunions annuelles conjointe de la SEM à Winnipeg avec la ESA (North Central Branch en 2007) et la SEC (2017).

Monique Keiran Norman Criddle Award / Prix Norman Criddle

The Norman Criddle Award recognizes the contribution of an outstanding non-professional entomologist to the furtherance of entomology in Canada. The 2018 recipient of the Award is Monique Keiran.

Monique completed a Bachelor of Journalism degree from Carleton University in 1989, and has pursued an interest in science writing and technical editing throughout her career.

She lived in Alberta for a number of years, working primarily with the Royal Tyrrell Museum of Palaeontology in Drumheller, where she authored many articles and books, including the book *Pachyrhinosaurus*: The Mystery of the Horned Dinosaur (Heritage House Publishing, 2006). In addition to her work with the Museum, Monique worked with a broad range of clients, including Calgary's Evergreen Theatre Society, the Calgary Board of Education, Alberta Parks, and Parks Canada.

She became Publications Officer for the Canadian Forest Service, in Victoria, British

Le prix Norman Criddle reconnaît la contribution d'un entomologiste non-professionnel exceptionnel à l'avancement de l'entomologie au Canada. La récipiendaire 2018 du prix est Monique Keiran.

Moniqué a obtenu son diplôme de baccalauréat en journalisme de l'Université Carleton en 1989, et a poursuivi un intérêt en rédaction scientifique et édition technique durant sa carrière.

Elle a vécu en Alberta pour un bon nombre d'années, travaillant principalement avec le Musée royal Tyrrel de paléontologie à Drumheller, où elle a écrit de nombreux articles et livres, incluant le livre « *Pachyrhinosaurus*: The Mystery of the Horned Dinosaur » (Heritage House Publishing, 2006). En plus de son travail avec le musée, Monique a travaillé avec une vaste gamme de clients, incluant la Société du théâtre Evergreen de Calgaray, la commission scolaire de Calgary, Alberta Parks, et Parcs Canada.

Elle est devenu agente des publications pour le Service canadien des forêts à Victoria,

Columbia, in 2003. In this role, she was responsible for promoting the scientific and technical work of the department by authoring and editing numerous technical and general publications, and by assisting scientists via coordination of peer review and editing of scientific manuscripts prior to publication.

In 2012, Monique left the Canadian Forest Service to take on new challenges. She oversaw the Engineers and Geoscientists of British Columbia magazine, *Innovation*, until last year, and continues her work as a freelance consultant and science communicator, writer and technical editor for government agencies, media and NGOs, including the national science blog *Science Borealis*, the Science Media Centre of Canada, the Victoria *Times Colonist*, and trade magazines.

In addition to all of this, in 2012, Monique began assisting the Entomological Society of British Columbia as copy editor for the Society's journal, a role she continues in today.

Specifically, she copy-edits every accepted manuscript that comes through the *Journal of the Entomological Society of BC* (*JESBC*) and works with authors to ensure that their message is clear, concise, and a useful part of the scientific record. Her contributions have been significant, and have ensured that the journal maintains a high degree of professionalism and quality. Her precision, attention to detail, and good understanding of scientific publishing have made her indispensable to the production of *JESBC*. The previous Editor-in-Chief, Dezene Huber, has indicated that her efficient contribution to the quality of this publication has been vital and that he would have had a hard time continuing in the position without her volunteer work.

Monique's contributions have been an incredible benefit to the entomological community in British Columbia and the Entomological Society of British Columbia in particular.

Colombie-Britannique, en 2003. À ce titre, elle était responsable de promouvoir les travaux scientifiques et techniques du ministère en écrivant et en éditant de nombreuses publications techniques et générales, et en aidant les scientifiques par la coordination des évaluations par les pairs et l'édition des manuscrits scientifiques avant la publication.

En 2012, Monique a quitté le Service canadien des forêts pour relever de nouveaux défis. Elle a administré le magazine des ingénieurs et géoscientifiques de Colombie-Britannique, *Innovation*, jusqu'à l'an dernier, et elle continue à travailler de façon indépendante comme consultante, communicatrice, rédactrice et éditrice technique scientifique pour des agences gouvernementales, médias et OBNL, incluant le blogue national de science *Science Borealis*, le centre canadien science et médias, le *Times Colonist* de Victoria, et des magazines spécialisés.

En plus de tout cela, en 2012, Monique a commencé à aider la Société d'entomologie de Colombie-Britannique comme réviseure pour le journal de la Société, un rôle qu'elle remplit encore aujourd'hui.

Plus spécifiquement, elle révise tous les manuscrits acceptés dans le *Journal of the Entomological Society of BC* (*JESBC*) et travaille avec les auteurs pour s'assurer que leur message est clair, concis et une partie utile de l'article scientifique. Ses contributions ont été importantes, et ont permis que le journal garde un niveau élevé de professionnalisme et de qualité. Sa précision, son souci du détail et sa bonne compréhension de la publication scientifique la rendent indispensable à la production de JESBC. Le précédent rédacteur-en-chef, Dezene Huber, a indiqué que sa contribution efficace à la qualité de cette publication a été vitale et qu'il aurait eu beaucoup de mal à continuer dans son poste sans son travail bénévole.

Les contributions de Monique ont été incroyablement bénéfiques à la communauté entomologique de Colombie-Britannique et à la Société d'entomologie de Colombie-Britannique en particulier.

Owen Olfert retires

After 40 years of dedicated service to the people of Canada, Dr Owen Olfert officially retired on 1 June 2018. Owen has led many research projects on insect ecology over the years and his work resulted in ecologically sound insect pest management tools for the Canadian prairies. Owen has been a leader in the development and application of bioclimatic modeling for insect pest risk prediction and he was instrumental in the development and management of the Prairie Pest Monitoring Network. Owen was joined by colleagues (current and past) and friends at the AAFC, Saskatoon Research and Development Centre on 1 June 2018 to mark his retirement.

J. Williams

Melanie Scallion goes caterpillar collecting in Costa Rica

After receiving the ESC Research Travel Scholarship, PhD candidate Melanie Scallion, along with her supervisor Dr Jayne Yack (Carleton University) and former student Alan Fleming, travelled to Guanacaste Province in Costa Rica from 8 June to 16 June 2018. As members of the lab had done 9 years prior, they were visiting the Area de Conservación Guanacaste (ACG) to make use of Dr Daniel Janzen's caterpillar inventory project. The goal of this trip was to test new Bombycoidea caterpillars for defensive sound production, as well as to increase sample sizes of previously tested species and outgroups. The trip marked a final step in testing new species of caterpillars for Melanie's thesis "Why Sound? Diversity and Evolution of Sonic Defences in Caterpillars."

A. Fleming

Melanie setting up a *Xylophanes* sp. caterpillar for a simulated predator attack trial. Estacion Biologica San Gerardo, Costa Rica, 2018.

The three scientists visited five different field stations within the ACG. Each station employs several "parataxonomists" who collect caterpillars from the surrounding forest every day. The ACG proved to be an invaluable resource; caterpillars are brought back to the stations for rearing on site in order to catalogue the lepidopteran biodiversity as well as their parasitoids and hyperparasitoids. Melanie, Jayne and Alan tested 21 bombycoid species (39 individuals), of which at least 14 were species new to the Yack lab Bombycoidea database. Four of these were new records of sound-producing species, and several were repeat species from the 2009 trip allowing the team to confirm the mechanism of sound production. They also added eight new outgroup species to their database. Melanie and colleagues also went hiking with the employees to see what it was like searching for caterpillars — they discovered that it was no easy feat! All in all, the trip was very successful.

Another angle on honey bee virus transmission

Megan J. Colwell

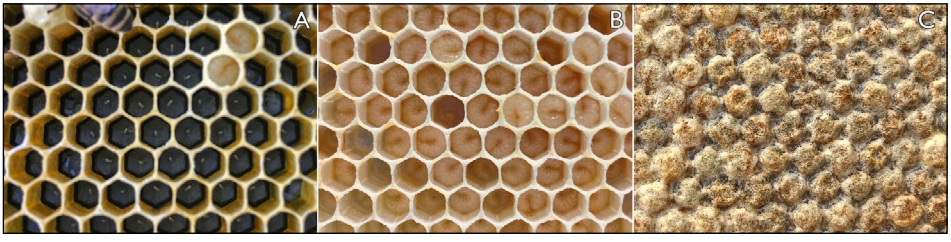
Introduction

On a purely scientific basis, the European honey bee (*Apis mellifera*) is a fascinating study organism in many ways. It can serve as a model to study eusociality, social immunity, complex pathogen webs and insect communication to name only a few broad topics. I would be very happy to work on honey bees from a purely scientific viewpoint, but they are also an integral part of our agricultural system and are, arguably, livestock. Unfortunately, a combination of stressors, such as diseases, parasites, nutrition and pesticides, has meant that honey bees are suffering intensified winter losses in North America and Europe (reviewed in Genersch 2010). You may have seen reports that the number of colonies has increased globally despite these losses (up 45% since the 1960s); however, these figures do not reflect the greater labour and capital costs incurred by beekeepers to replace large numbers of dead colonies. Neither do they take into account the estimated 300% increase in crops that depend on insect pollination in the past 50 years (Aizen & Harder 2009). Of course, this is no way undermines the importance of research on wild and native bees which are also in decline. So often the general public holds the misconception that honey bees are the only bees, and therefore think only of them when they read about diseases, losses, and need of funding. This may explain the occasional unaffectionate use of "honey cow" and "pollen pig" as nicknames for honey bees. I believe beekeepers and producers who rely on honey bee pollination are the ultimate stakeholders in honey bee research. With that in mind, it's almost impossible to talk about honey bee health without also describing how we manage them.

Management

Honey bees are typically kept in modular wooden "Langstroth" boxes containing 9-10 vertically hanging frames of wax. The boxes are modular in the sense that a beekeeper can add other boxes on top of the original, giving the colony more room as the population grows and food is collected and stored. The frames mimic the combs honey bees naturally make in tree cavities using wax. Honey bees secrete beeswax and construct their characteristic hexagonal cells within these frames to store food (pollen that is processed into beebread, nectar that is processed into honey) and raise brood. Queen bees lay diploid eggs on the bottom of cells which develop into workers (females) or lay haploid eggs in larger cells which develop into drones (males), with one individual developing per cell (Fig. 1). Other than during foraging and mating trips (for queens and drones), honey bees spend all their lives within the colony and maintain close contact with its wax surfaces. A result of this lifestyle is that when honey bees get sick, they can contaminate their colony environment. This can be a problem as producers are increasingly forced to make up for high wintering losses by splitting healthy colonies to make more (which also means "splits" will be smaller and less productive than non-split colonies). In addition, it is common practice to re-use boxes and frames from year to year as well as mixing frames among colonies to balance bee populations or food stores. With this in mind, we make a move from managing colonies to science, and will discuss one of the most prevalent kinds of honey bee disease-causing pathogens – viruses.

Megan Colwell (colwellm@myumanitoba.ca) is a PhD candidate at the University of Manitoba. She is co-supervised by Dr Rob Currie (Department of Entomology, University of Manitoba) and Dr Steve Pernal (Beaverlodge, Agriculture and Agri-Food Canada). Her research interests include parasitology, epidemiology, and general honey bee ecology. The work reported here was presented in the Graduate Student Showcase at the 2017 JAM in Winnipeg.



M. Colwell

Fig. 1. Life stages on wax. Honey bee brood spends all of its development time in wax cells. Eggs (A) hatch into larvae that are fed and grow within their cells (B). Larvae moult into pupae which are sealed in their cells, hidden by wax capping (C). Worker honey bees emerge as teneral adults after ~21 d from the time they were laid as eggs, always in direct contact with wax.

Viruses

Honey bee viruses were first detected in 1913 and have been studied increasingly as methods have advanced from serology to the polymerase chain reaction (PCR) and to next generation sequencing (reviewed in Chen & Siede 2007). There are now over 20 identified viruses that infect honey bees, most of which are single stranded RNA viruses. The actual number is difficult to pin down with the rapid discovery of quasispecies and clusters of closely related viruses (McMenamin & Flenniken 2018). The three most commonly detected viruses in Canada are deformed wing virus (DWV), black queen cell virus (BQCV), and Israeli acute paralysis virus (IAPV; Desai et al. 2015). These virus names are often wonderfully descriptive. Symptomatic honey bees with DWV exhibit malformed and shrunken wings, BQCV causes noticeable discolouration in developing queen bees, and, IAPV causes paralysis and shivering in worker bees (Chen & Siede 2007, Chen et al. 2014). These viruses can have a negative impact on colonies even as covert infections, at levels below the threshold of visible symptoms. Although my own work includes these three viruses, my focus here will be on DWV. DWV is strongly correlated with honey bee losses and is transmitted both horizontally and vertically among honey bees (de Miranda & Genersch 2010). One of the most dangerous aspects of it is that it can be vectored by the honey bee ectoparasitic mite, *Varroa destructor* (hereafter, *Varroa* or mites; Fig. 2), and that it also becomes more virulent when vectored by mites (de Miranda & Genersch 2010). DWV also has multiple strains that differ in virulence. The more virulent strain, DWV-B, is correlated with higher mortality than the "original" strain DWV-A (McMahon et al. 2016); there is also a less prevalent DWV-C strain).

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Fig. 2. Varroa on wax. An adult female *Varroa* mite on the wax cappings of developing honey bee pupae. She is likely looking for an adult worker on which to hitch a ride, or else a cell with an uncapped pre-pupa to parasitize.

Contaminated equipment

So, what does all this have to do with bee management? Outside of the necessity to control *Varroa*, there isn't much we can do to prevent the spread of viruses. This begs the question: "Does contaminated wax equipment have an influence on honey bee virus levels?" I came to this work with the assumption that RNA viruses would be unstable, quick to degrade outside the host and therefore unlikely to survive outside honey bees, let alone have an effect on them in the colony environment. Indeed, RNA viruses are susceptible to deactivation and degradation by nucleases, meaning sample collection and storage conditions are of paramount importance (Chen et al. 2007). Despite this, the answer to my original question is "Yes". For example, honey bees reared on gamma-irradiated beeswax frames were shown to have reduced levels of DWV infection (de Guzman et al. 2017; Currie personal communication). In addition, an experiment at the USDA lab in Baton Rouge, Louisiana, showed that DWV titres were also lower in bees reared on gamma-irradiated wax. Collectively, this suggests that something on wax is altered when irradiated, which in turn causes a reduction in virus replication in bees. I contend that this "something" on contaminated wax is inherent levels of contaminating viruses, which have a direct effect on infections in live honey bees.

Waxborne viruses

Up to this point we could only test for the effects of wax on bees indirectly, by rearing brood on comb and testing them for viruses. I wanted to know if it was even possible to detect and quantify viruses on wax (using RT-qPCR). To do this, I adapted a washing method to directly test beeswax for the presence of viruses (Aparicio et al. 1999). I wanted to first look at the worst-case scenario of wax, namely, wax from colonies that died during winter. We purposely keep mites at high levels in some of our colonies at the University, and although I can't be sure why these colonies died, it was highly likely to be linked to mite-virus interactions (more mites = more virus). I sampled wax from winter loss colonies in early spring 2015, and detected and quantified BQCV and IAPV (Colwell et al. 2017a). After optimizing primers, I was also able to detect and quantify DWV from wax. From there, I wanted to know how probable it was for these "waxborne" viruses to be introduced to wax. I performed a cage experiment using a homogeneous population of high-virus workers and another of low-virus workers. Each cage had a vertically suspended sheet of wax foundation that had not been previously exposed to bees. Cages were incubated and provided with sugar water and water *ad libitum*. This meant that worker bees were in contact with wax, but not performing regular duties like caring for brood or storing food. After one week the wax tested positive for viruses, with the high virus bees introducing greater virus titres than the low-virus bees did. This suggests that bees can introduce viruses to wax, and do so in proportion to their inherent levels of infection (Colwell et al. 2017a). The lesson I learned is that viruses can contaminate wax as a direct consequence of their contact with honey bees. Nevertheless, detecting viruses does not necessarily mean that they will be infective. There was a definite possibility that my primers were amplifying portions of the ssRNA with no guarantee that the viruses were, in fact, intact.

I investigated the effects of waxborne viruses with a small-scale experiment using single-frame observation colonies during the summer of 2017. Small colonies of low-virus bees with laying queens were given a frame of beeswax comb that was made by either low- or high-virus bees. A wasp-related massacre meant my small-scale experiment was reduced to an even smaller sample size, but I sampled pupae from the remaining frames. Pupae reared on high-virus wax had higher levels of DWV than those reared on low-virus wax (Colwell et al. 2017b). The queen and workers which reared the brood were all from similar low-virus origins, and as such this difference is likely due to the wax itself (wax comb was constructed by low- or high-virus bees, but removed

before food storage took place and in the absence of queens to prevent brood rearing). The statistical power was too low to allow me to definitively conclude that wax source affected infections in the pupae; however, it did give me hope that I could find a stronger correlation with a beefed-up replication of this experiment.

Controlling waxborne viruses

In tandem with determining if waxborne viruses influence viral infections in honey bees, I've been testing methods to control or reduce them. As mentioned above, one study showed that irradiated wax reduced the levels of DWV in brood (de Guzman et al. 2017), while another demonstrated reduced infectivity of DWV when injected into pupae after gamma irradiation (Simone-Finstrom et al. 2018). Irradiation is already employed by some beekeepers to control the causative agent of American Foulbrood, a spore-forming bacterium (*Paenibacillus larvae*), that can be viable for up to 35 years on wax (Hansen & Brødsgaard 1999). However, effective irradiation is for control of waxborne viruses, it can be expensive to ship beekeeping equipment to facilities, and the effective dose of irradiation for viruses appears to be higher (thus more expensive) than for bacterial pathogens.

As mentioned previously, RNA viruses are inherently unstable. A cost-effective method to control viruses on contaminated equipment may be as simple as storing it for long periods of time and at different temperatures accessible to beekeepers before re-introducing it to live honey bees. In fact, I did a storage time and temperature experiment with wax in summer 2017 and saw a decline in detectable viruses. I stored wax from high-virus colonies for 30 days at -20°C, 5°C, and 20°C. There was no clear relationship between temperature and the number of waxborne viruses, but there was a significant reduction for both BQCV and DWV after 30 days in storage (Colwell et al. 2017b). This is potentially promising, but without testing these degraded virus titres against bees I cannot say if it is biologically relevant. A longer term experiment could better explore differences resulting from storage temperature.

Bringing it together

My current work in summer 2018 explores some of the unanswered questions from above. It is designed to test the infectivity of waxborne viruses and determine if irradiation and storage time can offer a comparable reduction in waxborne viruses, and most importantly their influence on virus levels in bees. The experiment has a total of 60 small "nucleus" colonies, having 5 frames instead of the typical 10 (Fig. 3). Each nucleus colony has a population of low-virus bees with a laying queen. There are two sources of wax frames: colonies with either low- or high-virus

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Fig. 3. Nuc yard panorama. My experimental yard setup for 2018 at the Plant Science Field Station on the University of Manitoba campus. There are 60 cardboard nucleus or "nuc" colonies. Each contains a colony of low virus bees with a laying queen and a randomly and blindly assigned treatment frame. Not pictured: the racoons that are the reason colonies boxes have reinforced and chained lids and are screwed onto makeshift pallets!

bees. There are three treatments for those frames: frames stored for 30 days, frames irradiated with electron beam radiation, or fresh frames taken from source colonies and introduced to the experimental nucleus colonies within the same day. Wax was sampled from each frame before going into the nucleus colonies, and a sample of bees was taken from each nucleus colony for virus levels pre-experiment. The first cohort of brood laid on the experimental frames will be followed. The cohort will be sampled as pupae, then paint-marked upon emergence from their cells, sampled at 12 days post-emergence, and again at 24 days post-emergence. I plan to pair the indirect method of measuring viruses in bees reared on wax, and the direct method of measuring detectable viruses from the wax. The low-virus wax frames without irradiation or storage treatment are representative of natural exposure in a healthy colony. I will compare the virus levels among the three treatments with the baseline of fresh low-virus source wax. It still may be difficult to directly relate waxborne viruses to viruses in the exposed bees. Ideally I would be able to have waxborne viruses that my experimental bees are naïve to. Whereas it is unlikely to have even low-virus bees to be completely free of one of these viruses, it may be possible to use the ratio of DWV-A to DWV-B strains. The more virulent DWV-B strain is likely to be in greater proportion on wax from the high-virus sources. Seeing a higher proportion, or perhaps introduction, of DWV-B in bees exposed to high-virus wax could provide more evidence that these waxborne viruses are actually infective.

I look forward to the completion of my last field experiment and answering more questions related to the epidemiology of RNA viruses within honey bee colonies.

Acknowledgements

I would like to thank my co-supervisors Drs Rob Currie (University of Manitoba) and Steve Pernal (Agriculture and Agri-Food Canada), my thesis committee members, Dr Kateryn Rochon and Dr Steve Whyard, and all of my current and former lab mates. I would like to extend a special "Thank you" for the excellent technical support from the Department of Entomology, especially from Zoe Rempel, Lisa Babey, and Dave Holder. Funding for my research was provided by the University of Manitoba Graduate Fellowship program, the Canadian Bee Research Fund and Agriculture and Agri-Food Canada.

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Wider aspects of a career in entomology. 3. The high Arctic

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 research activities and some information about insects and their environments.

My first winter in Canada as a postdoctoral fellow, outlined in the preceding articles in this series (ESC *Bulletin* **50**: 25, 50), included planning for fieldwork in the high Arctic during the coming summer of 1969. The destination was Polar Bear Pass on Bathurst Island (location shown in Fig. 1), where the National Museum of Natural Sciences operated a research station from 1968 until 1993. Eight people participated, including three graduate students, although not all of them were present for the whole period. There were two entomologists, one mammalogist, and five ornithologists, one of whom studied mammals too.

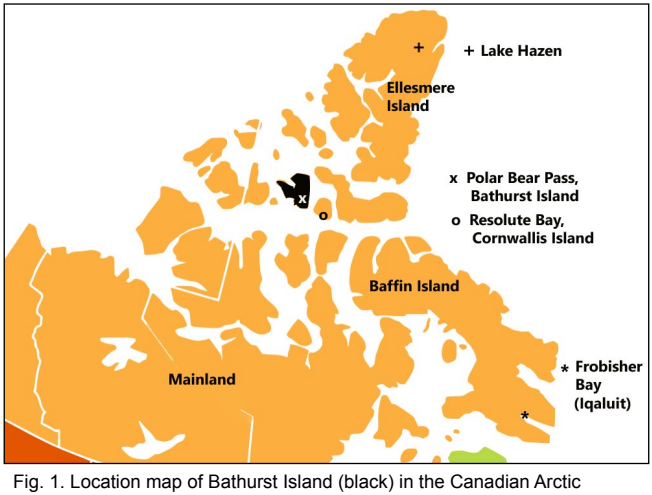

Fig. 1. Location map of Bathurst Island (black) in the Canadian Arctic Archipelago, showing places mentioned in this article.

The second entomologist was my colleague J.R. (Bob) Byers, who like me worked at the Entomology Research Institute in Ottawa. We were visiting the high Arctic to carry out two kinds of research. First, we planned to collect a range of arthropods in various habitats to add to the knowledge of this region, which so far had not been examined for invertebrates. Second, we wanted to study aspects of insect cold hardiness to supplement our research in temperate regions.

The first part of our journey north was a scheduled jet flight from Montreal to Frobisher Bay, now Iqaluit, on Baffin Island. We continued to Resolute Bay, an Inuit settlement, Canadian Forces base, and weather station in the high Arctic. The final flight from Resolute to Bathurst Island used a Twin Otter aircraft organized through the Polar Continental Shelf Project, a program—still in place today—that provides logistic support for field research throughout the Canadian Arctic.

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.

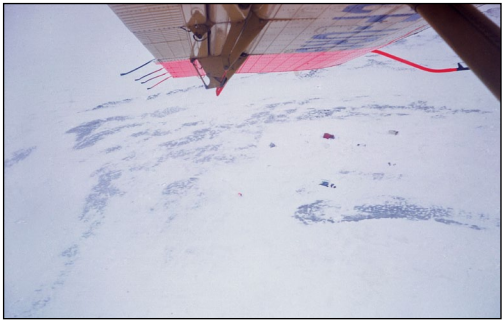
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Fig. 2a. The camp area on arrival, as seen from the air in early June. In the whiteness of the snow, the red Parcoll hut and white mess tent can just be made out below the wingtip.


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Fig. 2b. The same area in summer, six weeks after arrival.

Loaded to capacity with people and their baggage, many weeks of supplies, research gear, and a husky dog, the plane became airborne reluctantly, but then flew steadily to Polar Bear Pass. We crossed a largely snow-covered landscape for about 150 km, a distance considered conveniently short in the Arctic. Eventually, the field station came into view (Fig. 2a). The existing accommodation was intact, comprising one housing unit and a mess tent (Fig 2b).

We landed, unloaded gear and supplies, and immediately started to assemble an additional Parcoll hut, the portable, insulated, and wind-resistant housing unit developed for this sort of use. The manufacturer states that no tools are required for construction, which is reported to take about 3 hours by "unskilled labour"—a qualification that most of us certainly met. It was a typical day in the high Arctic in early June. Winter persisted. The ground was covered with snow, the air temperature was about −8°C, and the wind blew strongly. These June conditions had not been mentioned in the job description of an entomologist when I began my career! However, they reinforced my belief that one should do what is necessary to get the job done, without the expectation that any sort of precious status is conferred by particular qualifications.


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Fig. 3. Two major habitats on Bathurst Island: barrens (on the ridge in the foreground) and wetlands (background).

The terrain looked barren even after most of the snow had melted. However, habitats in the area were surprisingly diverse. For example, dry ridges—like the one on which the camp was located—bore scattered plant cushions, while in the low areas rich sedge meadows were well supplied with water from melting snow held above the permafrost (Fig. 3). In the lee of the ridges, deep snow banks had accumulated during the winter (Fig. 4). They supplied water as the snow melted not only to the wetlands, but also to some rich beds


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Fig. 4. Snow accumulated in the lee of a ridge (23 June). The lake is visible in the background.

of moss (Fig. 5). Associated with these snow-bank habitats too are specialized vascular plants, which can exploit the meltwater despite the reduced period over which the ground is free of snow. A number of creeks cut though the ridges to the lower ground, which also held a lake.

The relative richness of the wetland habitats at Polar Bear Pass and similar sites has led them to be called "arctic oases". Such habitats, scattered within the polar desert, cover only a fraction of the land area in the 1,424,500 square kilometres of the Canadian Arctic Archipelago. All groups of the fauna and flora in these oases are more diverse there than in the surrounding lands.

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Fig. 5. Mosses growing below a snow bank.

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Fig. 6. The sun at midnight on Bathurst Island during June 1969.

Bathurst Island has continuous daylight from the end of April until the middle of August (cf. Fig. 6). As a result, people who arrive from farther south may be misled into working continuously until they become exhausted. Moreover, at first they may find the place cold and strange.

Therefore, eating properly was important to the wellbeing of the group. Every few days, cooking duty fell to the entomologists. I tended to do the cooking, while Bob tended to do the allied jobs. The main course of many meals was canned stew supplemented with canned vegetables. One can-opener was much more effective than the other, leading Bob to declare with some justification that the hardest part of cooking was finding the right can-opener. Years later, I sometimes used a similar canned stew as the base for a quick meal while camping. However, one young lady of the next generation was not used to this family tradition, and exclaimed disapprovingly as a can of stew was opened that it looked like dog food!

We tried hard to increase the variety and interest of the diet by preparing more than stew and vegetables. Once we served a cake, iced with a snow goose motif. A metal box on a Coleman stove served as the oven. When the cake had been eaten, each person received as dessert a small dish of chocolate pudding with the yellow dome of half a canned peach placed on top. One of the ornithologists declared, as he staggered away from the mess tent, that it was the dark brown "egg" that had finished him off.

A great advantage of shared meals and camp chores during fieldwork and other cooperative ventures is the interactions it encourages among the participants. We exchanged ideas and stories, albeit with a very strong emphasis on birds and other vertebrates. The same ornithologist confessed that during another trip, out alone for hours and somewhat weary and disorientated, he had raised his gun towards a distant bird in case it was worth collecting, but soon realized that his target was actually a mosquito at point-blank range. (Actually, after prolonged fieldwork in the northern woods it might even seem to entomologists that the voracious mosquitoes are as big as birds!)

The inevitable result of eating well and having plenty of exercise was regular use of the sanitary facility, which consisted of an empty oil drum topped with an appropriate seat. It was partly enclosed by low shielding to help protect the user from the cold wind, and was placed at an appropriate distance from the mess tent. David Gray, the camp organizer, referred to it as the biffy barrel. In due course, the biffy barrel had to be replaced, and David asked for a volunteer to

help him. Most people were reluctant to assist, because making a mistake while moving the amply filled drum would have led to an even more unpleasant task. I offered to help for the reason noted above, that no-one is precluded from doing what is necessary to get the job done, regardless of their qualifications. Applied more broadly, this approach means that experienced people should help their junior colleagues, and professors should help their students, without any sense of superiority.

Our insect collecting began once the camp was well established. Various techniques became feasible as the season progressed. We searched on the ground, on leaves, and in flowers and vegetation mats, below snow banks, and in other habitats. Numerous pan traps were installed in different places. We watched for insect activity. In due course, sweep nets could be used in the sedge meadows, where the vegetation was just tall enough to bother. Substrate samples were taken from aquatic habitats, and a few emergence traps and stream nets were deployed. We also made sure to examine isolated sources of nutrients, such as the area used for garbage from the camp kitchen, muskox dung, and the remnants of old kills made by wolves.

We explored for a considerable distance around camp in an attempt to collect as many species as possible. I had completed my doctorate in England the year before, and during that project walked many kilometres daily in the summer to check experimental sites. Therefore, I had acquired a relatively high step to avoid tripping on grass clumps and other uneven terrain. This walking style led to some amusement from one of the ornithologists, who contrasted my "stair-climbing" gait with the minimal energy actually required to shuffle across the barrens.

My long walks on Bathurst Island sometimes passed through the nesting territories of birds. Perfectly camouflaged rock ptarmigans would burst from their nests to escape at the last minute, frightening the living daylights out of me. Jaegers (skuas) were more aggressive. Pomarine jaegers would fly hard directly at the threat (Fig. 7) but veer off at the last minute with their wing tips almost touching the head of the intruder. Long-tailed jaegers would hover just overhead, screeching. Snowy owls are especially aggressive near the nest, but fortunately the nests are conspicuous and widely dispersed, so that a visitor could avoid the powerful talons that might otherwise tear into his head.


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Fig. 7. A pomarine jaeger protecting its territory by flying rapidly towards the intruder.

Before leaving Ottawa we had been briefed by entomologists from the Canadian National Collection. Many of them had collected insects at Lake Hazen, another arctic oasis considerably farther north in the eastern Arctic (compare Fig. 1). They told us to watch for bumble bees, butterflies, and mosquitoes active above the ground; for aphids, thrips, coccids, and sawflies on the plants; for woolly bear and other moth caterpillars on the ridges; for water beetles and caddisfly larvae in the ponds; for many kinds of flies including more conspicuous species such as syrphids; and for various other arthropods. The whole area, and especially the wetlands, should be rich with insects, which supply food to the many birds that migrate there in summer to nest. Even the chicks of some otherwise herbivorous bird species rely on insect food.

Our general collecting began on the ridge barrens, in places where snow had been swept off by the wind, before the snow cover melted to expose habitats in more sheltered places and then in the valleys. For many days initially, therefore, we looked especially under frost-shattered rock fragments of various sizes and in "hot spots" of vegetation, notably mats of purple saxifrage (Fig. 8). We looked diligently for hours. Turning over countless plates of rock on the ridges yielded a few drab geometrid caterpillars and a few adult ichneumonid parasitoids, together with spiders and

some other very small arthropods. Shorebirds and other arriving migrants foraged under stones on these ridges before their main food in the valleys became accessible, and one of the ornithologists had collected a few specimens of these birds. Their stomachs contained several of the same arthropods we had encountered, suggesting that the birds were better at finding them than we were.


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Fig. 8. A mat of arctic saxifrage on a ridge barren. Note also the rock fragments, for example in the right foreground.

However, even after snowmelt we saw few of the species expected to be active. Small flies predominated. We found many chironomid midges, and then still more. Some larger flies appeared later in the season, especially in the wetlands, but they were far outnumbered by chironomids. We searched harder and began to worry, thinking that we were no good at collecting. Even the pan traps caught mostly small or very small arthropods. Although there were sciarids and other species too, the diversity was very limited: no butterflies, no bumble bees, not even mosquitoes. There were no aphids, coccids or thrips. We failed to find any other kinds of caterpillars. Ponds and streams yielded only chironomids. Our only large catch, in fact, was a lemming. Lemmings were particularly abundant that year, and this one had fallen into a pan trap. It was sitting in the corner chattering at me.

After one typical long day of collecting, Bob returned to the hut, where I was sorting my own substantial haul of tiny chironomids. I asked him if he had found anything, meaning anything new. “No”, he replied, “just another ten thousand” of the little black midges.

In due course, mortified by the unexpected lack of diversity in our collections, we brought the material back to the Canadian National Collection for identification. It seemed that we had achieved very little despite the great effort and expense.

Nevertheless, our collections were shown eventually to be highly representative, and therefore of great interest. They revealed that faunal diversity in that region is strikingly limited by the extensive summer cloud cover, caused by cold seas that surround the small islands in the area and supply moisture to the air as the sea ice melts. Moreover, the year we were there proved to have been even more cloudy than usual. Most arctic arthropods do best in the sunniest regions, because they rely on sunshine to warm the plant cushions, ponds, and other microhabitats in which they develop. The sun-warmed ground surface also contributes to higher air temperatures, which favour adult activity.

Lake Hazen is on a much larger island to the northeast and so is far less cloudy. Also, that location is adjacent to mountains from which air drops into the valleys, warming as it does so because of the increase in atmospheric pressure (the same phenomenon responsible for the Chinook in Alberta). Therefore, its fauna is much richer than that of Bathurst Island, where arthropods are markedly disadvantaged by the frequent cloud and the flatter terrain. For the same reason, plants too are less diverse in this zone of smaller islands, which has been termed the “northwestern gap” because so many species that are typical of the high Arctic elsewhere do not live there.

At last, we could relax—we were not such ineffective collectors of insects after all! The next article in this series outlines some of our studies on the cold hardiness of insects, the onset of the high-Arctic summer, and our homeward journey.

Access to Genetic Resources and Benefit-Sharing Affects Entomology in Canada

Peter G. Mason, Andrew M. Bennett, and Brad Fraleigh

The Convention on Biological Diversity (CBD) acknowledges that countries have sovereign rights over their genetic resources. In 2014, the Nagoya Protocol on Access to Genetic Resources and the Fair and Equitable Sharing of Benefits Arising from their Utilization to the Convention on Biological Diversity (Nagoya Protocol) came into force and provides a legal framework for the implementation of a process by which access to genetic resources, and fair and equitable sharing of benefits from their utilization between donors and recipients, can take place (Convention on Biological Diversity 2018a). Implementation of the Nagoya Protocol has implications for entomology in Canada. Access to genetic resources, living or dead, must comply with the legal requirements of the countries where they are sourced including, where applicable, sharing the benefits that arise from their utilization.

To inform entomologists in Canada, we provide background on the access and benefit sharing issue, the potential impacts on biodiversity research and biological control, and the status of Canada's activities. Actions taken to facilitate continued biodiversity research and biological control activities are summarized.

The Convention on Biological Diversity

The Convention on Biological Diversity (CBD) was an outcome of the 1992 "Earth Summit" conference in Rio de Janeiro, Brazil. The CBD is a legally binding international treaty to which 196 countries are party (Convention on Biological Diversity 2018b). The three main CBD objectives are:

- the conservation of biological diversity;
- the sustainable use of its components;
- the fair and equitable sharing of benefits arising out of the utilization of genetic resources.

The CBD can be seen as one of the most significant treaties in the history of humanity as concerns the diversity of life on Earth (Prathapan and Rajan 2011). As is common in framework agreements, specific methods for implementation and enforcement were not outlined in detail. Thus, participating countries had to determine how to comply with the agreement, either through decisions taken by the CBD's Conference of the Parties, or at national level.

The Nagoya Protocol

The third CBD objective, on access to genetic resources and benefit-sharing (ABS), is actioned through the Nagoya Protocol (NP), named after the location in Japan where the 10th Conference of Parties to the CBD met and finalized the agreement that is also intended to contribute to the conservation and sustainable use of biodiversity. The NP is an agreement between its parties as to how access to genetic resources and sharing the benefits of their utilization will be handled

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and includes all of biodiversity (Convention on Biological Diversity 2018c), except human genetic material. Each country that has ratified, acceded to, accepted, or approved the NP has the responsibility to prepare its own legislation or regulatory requirements, administrative measures and/or policies to implement the Protocol. An important feature of the NP is that the genetic resources and traditional knowledge of Indigenous Peoples and local communities associated with these resources are taken into account. There are several implications for Canadian entomology.

Article 6 'Access to Genetic Resources' states that access to genetic resources for their utilization shall be subject to the prior informed consent (PIC) of the providing Party (country of origin, or other Party that has acquired the genetic resources in accordance with the CBD) unless otherwise determined by that Party. "Utilization of genetic resources" in the NP means to conduct research and development on the genetic and/or biochemical composition of genetic resources, including through the application of biotechnology. Information is provided in Article 6 as to what must be included in legislative, administrative or policy measures, including that requirements for acquiring PIC must: provide for legal certainty, be clear and transparent, inform on how to apply for PIC (including involvement of Indigenous and local communities where relevant), provide for non-arbitrary, clear and written decisions by a competent national authority, provide for a permit or equivalent of the decision to grant PIC and of the establishment of mutually agreed terms (MAT), and establish clear rules and procedures for establishing MAT. Identification of "equivalents" to permits is a matter of national implementation, and can be quite broad, including, for example, material transfer agreements and purchase orders.

Article 8 'Special Considerations' of the NP states: *"In the development and implementation of its access and benefit-sharing legislation or regulatory requirements, each Party shall:*

(a) Create conditions to promote and encourage research which contributes to the conservation and sustainable use of biological diversity, particularly in developing countries, including through simplified measures on access for non-commercial research purposes, taking into account the need to address a change of intent for such research;

(b) Pay due regard to cases of present or imminent emergencies that threaten or damage human, animal or plant health, as determined nationally or internationally. Parties may take into consideration the need for expeditious access to genetic resources and expeditious fair and equitable sharing of benefits arising out of the use of such genetic resources, including access to affordable treatments by those in need, especially in developing countries;

(c) Consider the importance of genetic resources for food and agriculture and their special role for food security."

Article 13 states that each Party is required to designate a national focal point on ABS whose role is to make information available for applicants seeking access to genetic resources, and shall designate one or more competent national authorities who would "… be responsible for granting access or, as applicable, issuing written evidence that access requirements have been met and be responsible for advising on applicable procedures and requirements for obtaining prior informed consent and entering into mutually agreed terms". At the international level, the NP (Article 14) establishes an "Access and Benefit-Sharing Clearing-House" via the CBD, that will provide information relevant to the implementation of the Protocol (https://www.cbd.int/chm/).

Many countries have developed national ABS legislation, before and since the entry into force of the NP, that has had consequences for biodiversity research (Prathapan et al. 2018, Bockmann et al. 2018) and biological control (Cock 2010). In Canada, entomology is integral to both of these areas of research. Access to genetic resources from other parts of the world is critical to understanding our biodiversity, identifying threats to agriculture, forests and the environment, and developing solutions to mitigate those threats.

Impacts on Biodiversity Research

Global trade is a major pathway for the introduction of invasive alien species (IAS) from trading partners and understanding the biodiversity of these countries (and Canada) is essential to protecting our food supply, native species and the environment. The potential negative effects of the NP on biodiversity research could be immense (Bockmann et al. 2018). With respect to the scope of these effects for Canadian biodiversity researchers, as stated above, the NP applies to all genetic resources, either living or dead. This means that all biodiversity research involving arthropod specimens or materials derived from these specimens (e.g., DNA extracts) could be affected by one or more provisions of the Nagoya Protocol or its implementation in Canada and its trading partners. Following this broad scope of genetic resources, the question of whether particular research will be affected by the NP depends on many factors, including: 1) origin or source of the genetic resources; 2) location of the research; 3) date of acquisition of the genetic resources; and 4) potential for commercial applications.

1) *Origin or source of the genetic resources*

As outlined below (Canada's ABS Initiative), currently Canada is not a Party to the Nagoya Protocol. This means that as of July 2018, biodiversity research within Canada on specimens collected within Canada's borders is not subject to the provisions of the Protocol. This does not eliminate the need to obtain permits or permission from governments, Indigenous Peoples or private land owners to collect specimens or perform research on their lands. In Canada, access to genetic resources has long been governed by applicable laws such as property law and contract law. Under property law, dimensions of real property, chattels and intellectual property may be relevant. It is against property law to trespass to gain access to genetic resources, or to violate intellectual property such as patents. Entities such as private companies or Indigenous Peoples and local communities can be owners of genetic resources and associated traditional knowledge, so obtaining either without their consent could be classified as theft. Many genetic resources are exchanged in Canada by way of contracts, including loan agreements issued by genetic resources collections.

Biodiversity research within Canada using genetic resources that originate outside of Canada requires the users to follow the ABS laws, regulations and administrative measures of the countries providing the genetic material. The list of countries that are Parties to the NP (Nagoya Protocol 2018) can be found at https://www.cbd.int/abs/nagoya-protocol/signatories/default.shtml. By opening the hyperlink for each country, information about ABS can be found, including a link to the country's ABS National Focal Point. From this contact, information on what PIC and MAT are required for each country can be obtained (in theory, if the National Focal Point is active and responds to enquiries). Note that, like Canada, the United States is not a Party to the Nagoya Protocol, but the European Union, China and Japan are.

2) *Location of the research*

For Canadians doing biodiversity research outside of Canada (or collaborating with non-Canadian researchers), the laws and regulations of the country(ies) in which the research is being conducted must be followed. Access and benefit-sharing regulations are often encountered when genetic resources move across national borders. Therefore, if research involves the movement of specimens across borders, one needs to be aware of the ABS regulations and administrative measures of the country providing the specimens and the country receiving the specimens (recipient). Movement of specimens to or from particular countries can result in fees to the provider or recipient to comply with ABS regulations, and/or return shipping costs (if fees are not paid). Of course, collection of specimens without required permits can result in fines and/or revocation of future access to genetic resources in that country. There have also been concerns that shipment of genetic resources to nations with strict ABS regulations and administrative measures may result in the specimens not being returned (Prathapan et al. 2018).

3) Date of acquisition of genetic resources

The Government of Canada stated publicly during the negotiation of the NP that its provisions cannot be applied retroactively to genetic resources collected prior to accession to the Protocol. This means that research using specimens collected before 12 October 2014 (when the Protocol entered into force) should not be affected by the provisions of the NP. This cut-off date may actually be more recent, depending on the individual country and its date of accession to the Protocol (see link above for the signatories of the Nagoya Protocol). Of course, this does not necessarily mean that another country will share Canada's interpretation of the date of application of the Protocol, and some Parties may attempt to implement legislation that includes retroactivity.

4) Potential for commercial applications

Generally, biodiversity research is non-commercial, 'public-good' research and is therefore unlikely to lead to commercial applications. However, recipients should be careful in signing ABS exchange agreements for non-commercial use only. If research evolves from non-commercial to commercial (e.g., commercialization of new pollinator species or some broader monetary benefit), then the recipient may be obliged to re-negotiate MAT to take into account potential future commercial gains. Re-negotiation at this point in the process would likely not put the recipient in a good negotiating position.

Impacts on Biological Control

The implementation of ABS policies may have significant impacts on biological control. Regulatory ABS procedures may have the potential to impede surveys for potential biological control agents, prevent sending specimens for expert identification, and create barriers for the export of agents (Cock 2010). As with other non-commercial research, such as taxonomy, ecology and general biodiversity (see above and Feit et al. 2005), biological control is caught between the intent to share the benefits of the utilization of genetic resources fairly and the need to understand and preserve biodiversity. The result is that PIC and MAT, possibly with monetary or non-monetary benefit-sharing mechanisms, may need to be developed for each biological control initiative with each country that is a source of potential agents (Cock et al. 2010). Cock et al. (2009, 2010) and Haas et al. (2010) cite examples where ABS legislation already in place in some nations has hindered biological research far more than it has protected its biodiversity. The success of biological control has provided global benefits. ABS legislation, administrative measures or policy that does not take such 'public good' considerations into account will have a significant detrimental impact on the global community in terms of: 1) utilization and exchange of biological control genetic resources; 2) perception that all biological control genetic resources are used for commercial enterprise; and 3) response time for implementing biological control. Furthermore, countries where biocontrol agents are sourced can also be the area of origin of IAS that are the targets for biological control in invaded regions, suggesting that the provider country may have a moral obligation to be a good global citizen.

1) Utilization and exchange of biological control genetic resources

In Canada, more than 400 invertebrate species have been released for biological control against weeds and arthropods (Mason and Brodeur 2013). Many of our biological control target species originate from Europe and, up to now, exploration for and access to biological control agents has been facilitated through the principle of free use and exchange of genetic resources. However, future access to natural enemies for new IAS targets could be restricted or prevented where they originate from countries that have enacted ABS legislation that does not adequately consider the 'public good' aspect that biological control provides.

2) Perception that all biological control genetic resources are used for commercial enterprise

Most biological control projects are non-commercial as they result in the introduction of an

agent to permanently suppress an IAS (importation biological control). The benefits provided are to the global community, improving security of the food supply, reducing pesticide use, and preserving native biodiversity. In particular, poorer countries have shared the benefits when other nations have invested significant resources to discover and develop biological control agents. For example, the international assistance agencies of Austria, Belgium, Canada, Denmark, Germany, Italy, the Netherlands, Norway, and Switzerland, the African Development Bank, the European Economic Community, the International Fund for Agricultural Development, and the United Nations Development Program supported all phases of the biological control programme that introduced the parasitoid *Anagyrus lopezi* (DeSantis) (Hymenoptera: Encyrtidae) for control of the cassava mealybug, *Phenacoccus manihoti* Matile-Ferrero (Hemiptera: Pseudococcidae) in 22 African countries (Neuenschwander 2001; Cock et al. 2009).

Development of agents for the commercial biological control industry is an option for a very few biological control genetic resources. In these cases the recipient (usually a private company) may find it simpler to develop MAT that includes benefit sharing at the beginning of a project. However, parties negotiating MAT should be mindful that profit margins for this industry are small. Non-monetary benefits may be a more appropriate consideration.

3) Response time for implementing biological control

If biological control is considered as non-commercial research, simplified measures for access and benefit sharing could facilitate biological control research and the use of biological control to address emergencies and the needs of food and agriculture should also be facilitated (Cock 2011). Therefore, depending on the legislation and regulations, administrative measures and policies put in place by each country could either impede or facilitate biological control. If biological control is not accepted as non-commercial research, some countries may make it unnecessarily difficult or even impossible to access biological control genetic resources. At the very least, additional administrative procedures will slow efforts, already dealing with tight regulatory procedures and limited funding, to find biological control solutions to IAS problems.

Canada's ABS Initiative

As a signatory to the CBD, Canada and Canadians are obliged to address the objective that benefits arising from the utilization of genetic resources are shared fairly and equitably. In so doing, Canadians will need to comply with the legislation, administrative measures and policies of other countries where applicable. Currently, in Canada, access to genetic resources and associated traditional knowledge is largely addressed through existing laws (e.g., property and contract law) and existing practices.

Environment and Climate Change Canada has been designated as the National Focal Point for ABS in Canada. A Federal/Provincial/Territorial Working Group on Access and Benefit-sharing (FPT WG-ABS) sought input from Indigenous Peoples and other key stakeholders on the further development of ABS policy in Canada. In 2009 they released a discussion paper, *Access to Genetic Resources and Sharing the Benefits from Their Use in Canada: Opportunities for a New Policy Direction,* that presented three possible approaches (Biodiv.ca 2018). A "Nationally consistent approach" would see Federal, Provincial and Territorial governments develop further ABS policy based on common principles and core elements but would allow each jurisdiction to address its unique circumstances. An "Independent approach for each jurisdiction" would allow each government to independently develop their own ABS policy or to maintain the status quo (including not developing further policy). A "Single national approach" would task the federal government to develop a single national ABS policy. Linked to all approaches is how ABS policy would be implemented and this would be done either through building on existing laws and practices, by developing new voluntary and non-regulatory measures by creating new regulatory

measures, or through new ABS-specific legislation and regulations. An important issue raised in the discussion paper is whether traditional knowledge associated with genetic resources should be part of ABS policy in Canada.

If traditional knowledge were included in ABS policy, it would make it simpler to join the Nagoya Protocol. However, significant resources may be required to develop a transparent and equitable mechanism, whereas exclusion would simplify developing and implementing policy governing only genetic resources (Biodiv.ca 2018). It has been argued that the inclusion of the interests of Indigenous Canadians in ABS policy is imperative to support their cultures and to address the decline of biodiversity (McDermott and Wilson, 2010).

The issue of ABS policy for Canada is complex and Canada has not ratified the Nagoya Protocol. A clear path is needed, one that recognizes that biodiversity research and biological control utilize biodiversity for the public good. Policy makers have been made aware of this, thus ABS policy development in Canada should be informed.

Actions we can take

The Canadian entomological community can take action that will ensure that biodiversity research and development of biological control agents will continue with minimal disruption. In 2009, the Entomological Society of Canada developed a *Policy Statement on Biodiversity Access and Benefit Sharing* outlining their support for the principles of ABS and encouraged governments to ensure that entomological research is not compromised by implementation of ABS policy (Entomological Society of Canada 2009). Entomologists should provide input on the public good that research contributes to Canadians and provide input to forums such as the FPT WG-ABS to ensure that Canada plays a lead role in developing procedures that govern issues such as PIC, MAT and permissions for access to and export of organisms for biodiversity and biocontrol research that are straight-forward, easily implemented, and serve Canadians best.

Other actions should include developing standards and best practices for biological control activities. One such effort was made by the AAFC Biological Control Working Group which set out the practices of Biological Control Scientists in Canada in two draft documents, "Canadian Biological Control Agent and Pollinator Genetic Resources: AAFC Policy for provision of naturally-occurring beneficial genetic resources to other jurisdictions" and a standard letter to be included when shipments of biological control agents of Canadian origin are made (Mason et al. 2017).

International initiatives, such as the Swiss Academy of Sciences (2006) "Access and Benefit Sharing Good Practice for Academic Research on Genetic Resources" provide advice on developing national guidelines for biological control practice.

The International Organisation for Biological Control (IOBC) Global Commission on Biological Control and Access and Benefit Sharing strongly recommended that biological control agents should be considered as a special case with respect to access and benefit sharing under the CBD (Cock *et al.*, 2010). To advance this idea, IOBC prepared a best practices guide to assist the biological control community to demonstrate due diligence in complying with ABS requirements (Mason *et al.*, 2018).

Conclusion

Informed ABS policy will be key to ensure that collection and exchange of genetic resources for biodiversity research and biological control can continue. It must also be accepted that to succeed, biodiversity and biological control research in the future will be required to follow the regulations of each country in which a project is implemented.

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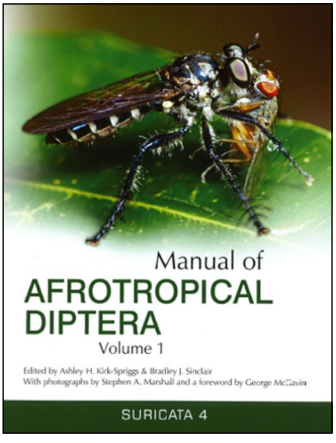
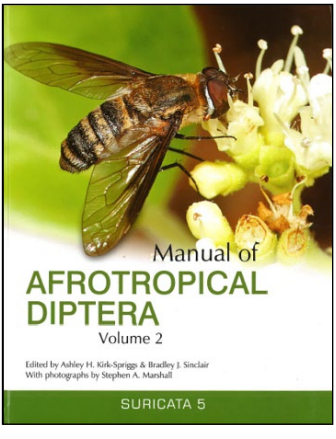
Manual of Afrotropical Diptera, Volume 1. Introductory chapter and keys to Diptera families. Kirk-Spriggs, Ashley and Sinclair, Bradley, editors. 2017. South African National Biodiversity Institute (SANBI), Pretoria, South Africa. 425 pp. ISBN 978-1-928224-11-2. Hardcover. CAN$35.
Manual of Afrotropical Diptera, Volume 2. Nematocerous Diptera and lower Brachycera. Kirk-Spriggs, Ashley and Sinclair, Bradley, editors. 2017. South African National Biodiversity Institute (SANBI), Pretoria, South Africa. 936 pp. ISBN 978-1-928224-12-9. Hardcover. CAN$50.





An idea was hatched in the 1970s amongst the Dipterists at the Canadian National Collection: Produce comprehensive guides to Diptera, family by family, including the most up to date morphological terminology, phylogenetic hypotheses, and identification keys. High quality illustrations must be included. This idea has been carried forward in many forms by many authors and editors. *The Manual of Nearctic Diptera* was published in three volumes (1981, 1987, 1989). *Contributions to a Manual of Palaearctic Diptera* was published in four volumes (1997, 1998, 2000 [Volumes 1 & 4]). *Manual of Central American Diptera* was published in two volumes (2009, 2010). The latest iteration tackles the Afrotropical region with two volumes available now and two more to follow in the next 2 years.

The most recent version of this global, dipterological effort has produced the most comprehensive, accessible, and informative volumes to date. The first volume of the *Manual of Afrotropical Diptera* (MAD) provides all of the foundational, background chapters. Over the course of 11 chapters, the history of African Dipterology, Diptera collection techniques, current standards of morphological terminology, fly natural history and ecology, and medical, veterinary, agricultural, forensic, and phytosanitary impacts of flies are laid out by world experts. Of particular value is a historical and biogeographical examination of the African continent. Modern translations of various colonial names are essential to those trying to make sense of historical literature and labels. A listing of current insect collections and biodiversity efforts across the region gives the book a forward-looking perspective. Here are opportunities to work with local governments, agencies, and institutions to continue efforts to track and investigate Afrotropical Diptera.

The final two chapters of Volume 1 set the stage for what constitutes the rest of the series, including all of Volume 2. A key to adult Diptera families is provided in more photographic detail than has ever been done before. Spanning nearly 100 pages, with colour photographs at almost every couplet, the dichotomous key makes it very easy for anyone to put a family name on any fly they should encounter in the Afrotropical region. This modern take on identification tools is obviously influenced by online, picture-based keys. The larval key that concludes Volume 1 takes a more conventional approach to the dichotomous key, but is still richly illustrated.

The second volume of the MAD is presented in a format that will comprise the final three volumes of the Manual. Starting with Tipulidae/Limoniidae and continuing through

Dolichopodidae, 43 families of "Nematocera" and "lower Brachycera" are treated. The life history, ecology, morphology, classification, and proposed phylogeny of each family are provided in detail. Expert authors have been sought for each family, resulting in a total of 46 contributing authors for Volume 2 alone. Each family chapter contains at least a dichotomous key to genus for adults, while some also include a key for immature stages. An addition to the standard "Manual" format that was added in the *Manual of Central American Diptera*, and continued in MAD, is a summary of the diversity and available literature for each genus included in the key. In almost every chapter, it is noted that current numbers of described species, and often described genera, are far below what will actually be found to exist with future research. All keys are aided by abundant line drawings and colour photographs. This use of illustration is greatly appreciated and was made possible by new photography as well as publishing agreements with previous Manuals. Seeing the beautiful Ralph Idema line drawings from the Nearctic Manual still being used in keys today is a testament to their original quality.

The first two volumes of the *Manual of Afrotropical Diptera* are a testament to current, hard-working Dipterists, authors, illustrators, and editors. It is also a powerful testament to the enduring quality of that original idea of the CNC Diptera Unit. Forty years after proposing to generate a single series of books that will make it possible to identify ALL Diptera in a region, the movement has spread to tropical Africa. Using the two volumes here, a genus identification, and quite possibly a species identification (depending on the state of current revisionary classification for said group), is attainable for ALL of the currently described species of Afrotropical Diptera (from Tipulidae to Dolichopodidae). This is an amazing feat yet to be equaled in any other group of insects. Further to its present value, the publication of this series will also spark new research in Afrotropical Dipterology. With existing keys in hand, future workers can begin to describe the as yet undescribed species of the region. They can investigate the agricultural, veterinary, and human health impacts of African flies. They can explore evolutionary histories and ecological relationships using the vast diversity in the region. With a very reasonable sticker price and a beautiful layout, owning a hard copy of these volumes is required for all interested entomologists. The level of detail in the background information and the user-friendly keys make the pool of who should be interested in a book on African flies wider than would be predicted.

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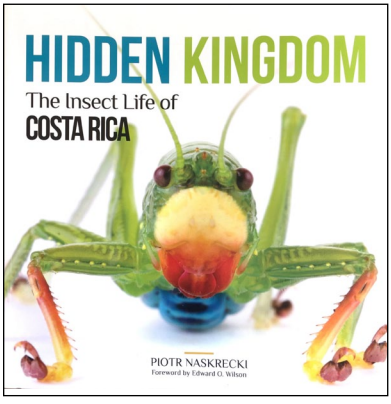
Hidden Kingdom: The Insect Life of Costa Rica. Piotr Naskrecki. 2017, Comstock Publishing Associates, a division of Cornell University Press, Ithaca, USA. *vii* + 208 pp. ISBN 978-0-9894408-6-8. Softcover. Can$41.63.



This book describes fascinating life histories of selected insect species across a broad range of taxa. Text in this book typically composes only ⅓ to ½ of each page, with one or a few large illustrating images occupying the rest of the space. The author is obviously a talented photographer, as the book displays numerous high-quality close-ups of live insects and other land invertebrates in their natural habitat. These images, combined with the large format of the book (25.4 cm x 25.4 cm), reveal a stunning array of insect morphology and diversity. The vivid pictures and descriptions almost make the reader feel as though they are in the rainforest of Costa Rica. When I finally read the biography of the author on the last page, it came as a surprise to find out that the author is not in fact a native or a resident of Costa Rica. His broad expertise of the local entomofauna and anecdotal experiences certainly made me think otherwise.

The author mentions that the target audience for this book is young readers. Although I agree that the design of the book is best suited for a young audience, I believe that audiences of all ages, and particularly naturalists, would enjoy reading it. However, a seasoned entomologist might find little new information. The book covers a broad range of taxa and lifestyles, and the trade-off of this design is that most taxa and lifestyles are mentioned very briefly. Many major taxa, including some orders, are covered in only two or three sentences. For example, hymenopterous parasitoids, which undoubtedly constitute one of the main groups of local insects and one that contains a great deal of fascinating life histories, are mentioned in only three short sentences. On the other hand, leaf katydids are displayed on nine pages. In general, an emphasis is placed on large, colorful, or peculiar looking species. This design fits perfectly with the intent of the book: to showcase insect diversity and beauty in a way that is easy to understand by a young audience. Brief descriptions and large beautiful images ensure that young readers who may have limited or non-existent knowledge of entomology do not get bored with the content but rather enjoy the images and learn much about the fascinating lives and diversity of insects without being overwhelmed.

There are nine chapters as well as a Foreword by Edward O. Wilson (Emeritus Professor, Harvard University), Acknowledgements, Introduction, Photo Credits, Index, and the last page is About the Author. The Introduction goes over the basic life history, life cycle, and evolution of insects, which will provide neophytes with basic entomological knowledge as well as "fun facts" that should pique the interest of the reader.

Chapter 1, "What Is This?", is an overview of the class Insecta and its relatives. It starts with general facts about the class, then delves into 27 insect orders (the 3 remaining orders do not occur in Costa Rica) plus 13 other arthropod taxa. Each group is briefly discussed in one or a few paragraphs, including specificities and interesting facts about the group.

In Chapter 2, "Is It Dangerous?", the reader learns about venomous species and parasites. The author has also included some information on how to protect yourself against attacks from these species.

Chapter 3 is entitled: "Horns, Spines, and Claws". It explains the purpose of these apparatus; for example, the author explains that a large horn on the head of rhinoceros and conehead katydids (*Copiphora* spp.) provides them with protection against bats.

Chapter 4, “Masters of Deception”, offers a close look at certain species that have mastered the art of camouflage, including leaf katydids, phasmids, praying mantises, treehoppers, moths, and others. The author explains that many species are so well camouflaged that when you walk for the first time in the forest during the day you may be surprised by the apparent lack of animal life, when in fact there are many insects surrounding you.

Chapter 5, “Warning Signs”, presents an array of species that use aposematism, Müllerian mimicry, and Batesian mimicry to warn predators that they may be chemically protected.

Chapter 6, “Sounds of the Forest”, has an interesting design. It describes the sounds that can be heard in the forest at different times of the day, starting at 7:00 am with the call of cicadas and ending at 10 pm with the sounds produced by certain moths to repel bats.

Chapter 7, “Living Together”, goes over fascinating life histories of social species.

The final chapter, Chapter 8, “Moths and Butterflies”, is dedicated to lepidopterans. Here again, stunning pictures are displayed, including close-ups of insect wings, a bat chasing a moth, and a montage of quick time-lapse images of moths flying in the night sky.

In only 208 pages, and considering the relatively low amount of text per page, the author does an excellent job covering a variety of topics and taxa. This book gives the reader a good overview not only of insects from Costa Rica, but of the class Insecta as a whole and thus provides a clear and interesting introduction to entomology.

Vincent Hervet
University of Toronto/Agriculture and Agri-Food Canada, Lethbridge, Alberta

Harlequin beetle (*Acrocinus longimanus*; Coleoptera: Cerambycidae), Drake Bay, Costa Rica

Books available for review / Livres disponibles pour critique

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

If you wish to review one of these books, please send an email to the Chair of the Publications Committee (Maya Evenden, mevenden@ualberta.ca).

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

Preference will be given to ESC members.

Guidelines

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

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

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

Si vous souhaitez critiquer un de ces livres, veuillez envoyer un message au président du comité des publications (Maya Evenden, mevenden@ualberta.ca).

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

La préférence est donnée aux membres de la SEC.

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 / Livres disponibles pour critique

Copsey, J.A. 2018. Species Conservation: Lessons from Islands (Ecology, Biodiversity and Conservation). ISBN-13: 978-0521899390

Curtain, C.G. and T.F.H. Allen 2018. Complex Ecology: Foundational Perspectives on Dynamic Approaches to Ecology and Conservation. ISBN: 9781108235754

Saguez, J. 2017. Guide d'identification des vers fil-de-fer dans les grandes cultures au Québec. Centre de recherche sur les grains. ISBN: 978-2-9813604-5-8 [e-book]

Dale, M.R.T. 2017. Applying graph theory in ecological research. Cambridge University Press. ISBN: 9781316105450

Danks, H.V. 2017. The Biological Survey of Canada: A Personal History. Biological Survey of Canada. ISBN: 978-0-9689321-9-3 [e-book]

Allison, J.D. and R.T. Cardé [Eds.]. 2016. Pheromone communication in moths: Evolution, behavior and application. University of California Press. ISBN: 978-0-520-27856-1.

Appel, E. & S.N. Gorb. 2015. Comparative Functional Morphology of Vein Joints in Odonata. Zoologica Vol. 159; ISBN-978-3-510-55046-3.

Pohl, G.R. et al. 2018. Annotated checklist of the moths and butterflies (Lepidoptera) of Canada and Alaska. Pensoft *Series Faunistica* No 118. ISBN 978-954-642-909-4 [e-book]

68th Annual Meeting of Members and Board of Directors Meetings

The Annual Business Meeting of Members of the Entomological Society of Canada will be held at the Vancouver Convention Centre, 1055 Canada Place, Vancouver, British Columbia, on Tuesday, 13 November 2018, from 2:30 pm to 3:30 pm, in Meeting Room 211*. The Board of Directors Meeting will be held at the Pan Pacific Hotel, 300-999 Canada Place, Vancouver, British Columbia, on Sunday, 11 November 2018, from 8:00 am to 3:00 pm, in the Coal Harbour Suite*. The incoming Board of Directors will meet immediately following the Annual Business Meeting of Members, also in Meeting Room 211* at the Vancouver Convention Centre, on Tuesday, 13 November 2018, from 3:30 pm to 4:00 pm. Matters for consideration at any of the above meetings should be sent to Vincent Hervet, Secretary of the Entomological Society of Canada (see inside back cover for contact details).

***Please note the new room numbers**

68e assemblée annuelle et réunions du conseil d'administration

L'assemblée annuelle des membres de la Société d'entomologie du Canada se tiendra au Vancouver Convention Centre, 1055 Canada Place, Vancouver, Colombie-Britannique, le mardi 13 novembre 2018 de 14h30 à 15h30 dans la salle Meeting Room 211*. La réunion du conseil d'administration se tiendra au Pan Pacific Hotel, 300-999 Canada Place, Vancouver, Colombie-Britannique, le dimanche 11 novembre 2018 de 8h00 à 15h00 dans la salle Coal Harbour Suite*. Le nouveau conseil d'administration se réunira immédiatement après l'assemblée annuelle des membres le mardi 13 novembre 2018 de 3h30 à 4h00 dans la salle Meeting Room 211* au Vancouver Convention Centre. Les sujets à aborder pour n'importe laquelle de ces réunions doivent être envoyés à Vincent Hervet, secrétaire de la Société d'entomologie du Canada (voir le troisième de couverture pour les coordonnées détaillées).

*** Veuillez noter les changements de salles**

Annual Financial Statements

Following completion of the review engagement of the accounts of the Entomological Society of Canada and its Scholarship Fund for the financial year ended 30 June 2018, both sets of financial statements will be posted on the ESC website, and an email sent to members indicating their location.

États financiers annuels

Suite à la mission d'examen des comptes de la Société d'entomologie du Canada et de son fonds de bourses pour l'année financière s'étant terminée le 30 juin 2018, les deux états financiers seront affichés sur le site Internet de la SEC et un courriel sera envoyé aux membres afin de leur indiquer son emplacement.

Call for Nominees: ESC Achievement Awards
Appel à candidature: Prix d'excellence de la SEC

Do you know a well-respected entomologist who deserves recognition because of their outstanding contributions to their science in Canada? Is this person a leader in their field due to successes in publishing, patenting, editorial work and/or grant acquisition, in the teaching and mentoring of students, or through active volunteer involvement in the ESC and other societies/organizations? If yes, consider nominating them for one of our Society's Achievement Awards. Do not hesitate to contact the Chair of the Achievement Awards Committee, Gail Anderson (ganderso@sfu.ca), if you have any questions about eligibility or the nomination process.

Connaissez-vous un entomologiste respecté qui mérite une reconnaissance pour ses contributions remarquables à sa science au Canada? Cette personne est-elle leader dans son champ d'étude par ses succès en publication, brevets, travail éditorial et/ou obtention de subventions, enseignement, mentorat d'étudiants, ou par son implication bénévole auprès de la SEC et d'autres sociétés/organisations? Si oui, veuillez considérer de nominer cette personne pour un des prix d'excellence de notre Société. N'hésitez pas à contacter le président du comité des prix d'excellence, Gail Anderson (ganderso@sfu.ca) si vous avez des questions sur l'éligibilité ou le processus de nomination.

Gold Medal and C. Gordon Hewitt Award

Both awards are for outstanding entomological contributions in Canada by an individual, but the nominees for the C. Gordon Hewitt Award must have successfully defended their doctoral thesis in the 12 years ending on December 31 of the year in which the Award is received. Parental, compassionate or medical leave is not counted as part of the 12-year period; however, such periods must be identified in the letter from the nominator.

Nominations can only be made by members of the ESC, and signed by the nominator and by at least one seconder (also to be a member of the ESC). Verified communication from a recognized email address will be accepted in lieu of a signature. Nominators should include the following information for both awards: 1. The name and address of the nominee(s); 2. A statement of relevant achievements (3–5 pages) which may include, but is not limited to, the following: outline of research areas, particularly major contributions; number of articles in refereed journals, books, book

Médaille d'or et prix C. Gordon Hewitt

Les deux prix sont pour des contributions entomologiques exceptionnelles au Canada par un individu, mais les candidats pour le prix C. Gordon Hewitt doivent avoir soutenu avec succès leur thèse de doctorat dans les 12 dernières années au 31 décembre de l'année de remise du prix. Les congés parentaux, de soignant ou de maladie ne comptent pas dans la période de 12 ans : ces périodes doivent cependant être identifiées dans la lettre de présentation.

Les candidatures doivent être soumises par des membres de la SEC, et doivent être signées par la personne qui soumet la candidature et par au moins une personne qui l'appuie (également membre de la SEC). Une communication vérifiée par une adresse courriel reconnue sera acceptée comme signature. Les candidatures doivent inclure les informations suivantes pour les deux prix : 1. Le nom et l'adresse du candidat; 2. Un énoncé des accomplissements pertinents (3-5 pages) qui peuvent inclure, mais ne se limitent pas à : le domaine de recherche et particulièrement les contributions majeures;

chapters, patents; editorial activities; teaching history, numbers of graduate students, teaching awards; value of grants; involvement in ESC; active involvement and/or memberships in other Societies; entomological extension/ community involvement; organizing of symposia or meetings; 3. A current curriculum vitae; and 4. The name of the nominator and at least one seconder. The documentation should stress the particular achievement or achievements to be considered and not merely the general competences of the nominee. Other seconders may merely state their support, without documentation, in a letter of endorsement of the nomination. The Committee will not prepare the documentation nor conduct research connected with it. Please send nominations by e-mail to the Chair of the Achievement Awards Committee, Gail Anderson (ganderso@sfu.ca), no later than **31 December 2018**.

le nombre d'articles dans des revues avec évaluation par les pairs, livres, chapitres de livres, brevets; activités éditoriales; historique d'enseignement, nombre d'étudiants gradués, prix d'enseignement; valeur des subventions; implication au sein de la SEC; implication active et/ou adhésion à d'autres Sociétés; implication dans la communauté entomologique et vulgarisation; organisation de symposiums ou de réunions; 3. Un curriculum vitae à jour; et 4. Le nom de la personne qui soumet la nomination et au moins une personne qui l'appuie. La documentation devrait mettre en évidence le ou les accomplissements particuliers à considérer, et pas seulement les compétences générales du nominé. D'autres personnes peuvent aussi manifester leur appui, sans documentation, dans une lettre de soutien de la nomination. Le comité ne préparera aucune documentation et ne fera aucune recherche en lien avec la nomination. Merci d'envoyer vos nominations par courriel au président du comité des prix d'excellence, Gail Anderson (ganderso@sfu.ca), au plus tard le **31 décembre 2018**.

Honorary Members of the Entomological Society of Canada

An Honorary Member is deemed to have made an outstanding contribution to the advancement of entomology, and may be an Active Member or former Active Member of the Society at the time of nomination.

Collectively, Honorary Members are not to comprise more than 10 members or 1% of the active membership of the Society. Nominations should be supported by at least five members of the Society, and are to be sent by e-mail to the Chair of the Achievement Awards Committee, Gail Anderson (ganderso@sfu.ca) no later than **31 December 2018**.

Membres honoraires de la Société d'entomologie du Canada

Un membre honoraire est considéré comme ayant apporté des contributions remarquables à l'avancement de l'entomologie et peut être un membre actif ou un ancien membre de la Société au moment de la nomination.

Collectivement, les membres honoraires ne peuvent pas totaliser plus de 10 membres ou 1% des membres actifs de la Société. Les nomination doivent être appuyées par au moins cinq membres de la Société, et doivent être envoyées par courriel au président du comité des prix d'excellence, Gail Anderson (ganderso@sfu.ca), au plus tard le **31 décembre 2018**.

Fellows of the Entomological Society of Canada

Fellows are deemed to have made a major contribution to entomology, and are to be Active Members of the Society at the time of nomination. Their contribution may be in any area (e.g., research, teaching, application or administration), and may be judged on the basis of contribution to and stimulation of the work of others, as well as by direct personal effort.

Collectively, Fellows may not comprise more than 10% of the active membership of the Society. Nominations should be supported by at least four members of the Society, and are to be sent by e-mail to the Chair of the Achievement Awards Committee, Gail Anderson (ganderso@sfu.ca), no later than **31 December 2018**.

Fiduciaires de la Société d'entomologie du Canada

Les fiduciaires sont considérés comment ayant apporté une contribution majeure à l'entomologie et doivent être des membres actifs de la Société au moment de la nomination. Leur contribution peut se situer dans n'importe quel domaine (p.ex. recherche, enseignement, application ou administration), et ils seront jugés selon leur contribution et la stimulation du travail des autres, ainsi que par leurs efforts personnels.

Collectivement, les fiduciaires ne peuvent pas totaliser plus de 10% des membres actifs de la Société. Les nominations doivent être appuyées par au moins quatre membres de la Société, et doivent être envoyées par courriel au président du comité des prix d'excellence, Gail Anderson (ganderso@sfu.ca), au plus tard le **31 décembre 2018**.

Wanted: Applicants for the Bert & John Carr Award

The Bert and John Carr Award was created in 2010 (see ESC *Bulletin*, June 2010 [p.102] or September 2010 [p. 170]) to support research activities by individuals who study insect faunistics, or the natural history and taxonomy of Canada's insect fauna. Preference is given to applications by amateurs, but those by students and others will be considered. Applications should consist of: 1.The name and address of the applicant; 2. A statement of the research activity to be undertaken, including a cost estimate of up to $500; and 3. A current curriculum vitae. Applications are to be sent by e-mail to the Chair of the Achievement Awards Committee, Gail Anderson (ganderso@sfu.ca) no later than **31 December 2018**.

Recherchés : Candidats pour le prix Bert & John Carr

Le prix Bert et John Carr a été créé en 2010 (voir le bulletin de la SEC, juin 2010 [p.102] ou septembre 2010 [p.170]) afin de soutenir des activités de recherche par des individus qui étudient la faunistique des insectes ou l'histoire naturelle et la taxonomie de la faune entomologique du Canada. La préférence sera donnée aux candidatures provenant d'amateurs, mais les candidatures d'étudiants ou d'autres individus seront considérées. Les candidatures devront inclure : 1. Le nom et l'adresse du candidat; 2. Un énoncé sur les activités de recherche qui seront entreprises par le candidat, incluant le coût estimé jusqu'à 500$; et 3. Un curriculum vitae à jour. Les candidatures doivent être envoyées par courriel au président du comité des prix d'excellence, Gail Anderson (ganderso@sfu.ca), au plus tard le **31 décembre 2018**.

Highlights from the Board of Directors Meeting of 22 June 2018

The Board of Directors met by conference call on 22 June 2018. Present were Pat Bouchard (President), Kevin Floate (First Vice-President), Gail Anderson (Second Vice-President), Neil Holliday (Past President), Bill Riel (Regional Director ESBC), Haley Catton (Regional Director ESAb), Boyd Mori (Regional Director ESS), Sophie Cardinal (Regional Director ESO), Étienne Normandin (Regional Director SEQ), Suzanne Blatt (Regional Director AES), Véronique Martel, Laura Timms, Deepa Pureswaran (Directors-at-Large), Joel Kits (Treasurer), Vincent Hervet (Secretary), and Geoff Powell (Executive Director: Strauss event and association management).

Draft budget 2018-2019

Joel Kits presented the draft ESC budget for 2018–2019. The budget was discussed and approved with a minor revision. Joel also presented a new use for the ESC Endowment Fund [CP Alexander Fund]. The Fund was established in 1983 to help the Society to cover the cost of producing *The Canadian Entomologist*. To help insure its growth and sustainability, this fund has been invested since receipt of the original bequest. This fund historically was used to pay for page charges for people publishing reviews under the CP Alexander series. There are no more page charges for publications in *The Canadian Entomologist* so new uses for the funds were investigated. It is proposed that the fund shall now be used to help cover the Assistant Editor's salary, but no more than $4000 should be withdrawn from the fund in a single fiscal year.

Social media

Angela Gradish was appointed as new Social Media Administrator to replace Sean McCann. Morgan Jackson is still the other Social Media Administrator.

Insect Common Names Committee

The Board approved revised guidelines for the Insect Common Names Committee. Notably with the addition of the sentence: "Lists shall be restricted to taxa for which there are clear benefits to having names that are accessible to the general public: examples are economically relevant taxa, threatened species, and taxa, such as butterflies and dragonflies, that are easily distinguishable without specialized knowledge or equipment" in order to prevent committee members from spending too much time on long lists of species and to better define the role of this committee and differentiate it from the common name list that is being built by "The General Status of Wild Species in Canada".

Plagiarism in *The Canadian Entomologist*

Dezene Huber noticed a few incidences of plagiarism in articles submitted to *The Canadian Entomologist* since he took over the position of Editor-in-Chief in October 2017. The Editorial Board of *The Canadian Entomologist* does not have a plagiarism detection system, which makes it difficult to notice plagiarism in a fair, consistent manner. The Board accepted on a motion, "in principle", to: 1) integrate plagiarism detection systems into the ScholarOne workflow, 2) pre-scan for plagiarism all papers submitted to *The Canadian Entomologist* prior to moving forward in the review process, 3) notify authors ahead of time in the instructions for submission that their manuscript will be scanned, and 4) if possible, to notify authors of results and permit them (with discretion) to modify their manuscripts and resubmit, particularly if the issue is more likely to be due to language than to malice. The Board remarked that plagiarism detection systems are not without flaws and that further steps should be taken to detect plagiarism. Licensing costs, software use and limits, and logistics issues will need to be clarified before final approval from the Board.

Bylaw amendment

Bylaw 34 (Rules Managing the Corporation's Affairs) was amended to read: "The Board may prescribe, amend or repeal rules and regulations, not inconsistent with these By-Laws, relating to the management and supervision of the affairs of the Corporation as Standing Rules of the Corporation." Instead of: "The Board may prescribe, amend or repeal rules and regulations, not inconsistent with these By-Laws, relating to the management and supervision of the affairs of the Corporation as Standing Rules of the Corporation. Such rules and regulations shall be submitted for confirmation at the next annual members' meeting and unless approved by a simple majority vote, shall cease to be valid." It is uncommon for societies to require votes from their members to approve changes to Standing Rules. Removing this process will allow the Board to more efficiently govern the society. This amendment, which is an amendment to the Bylaws of the Society, will need to be approved by the members at the next Annual General Meeting in order to take effect.

Public Education Committee

The Public Education Committee would like to put together a Career Booklet describing what careers are available to those with training in entomology. The Committee is looking for volunteers to suggest a list of categories of careers; e.g., forestry, agriculture, academia etc., and to write a paragraph or two about each area, links to websites where they can find more details, etc. If anyone has any suggestion or would like to contribute to this booklet, please contact Gail Anderson (ganderso@sfu.ca).

Science Policy Committee

The Science Policy Committee is always looking for ideas or subjects that would be of interest to the membership. If anyone has any ideas or suggestions, please contact Amanda Roe (amanda.roe@canada.ca).

Joint Annual Meeting 2020

Haley Catton informed everyone that the 2020 meeting will take place on 18-21 October, 2020 at the Carriage House Inn, Calgary, Alberta.

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/.

Announcements / Annonces

Announcement / Annonce

The 2017 Pest Management Research Report
The 2017 Pest Management Research Report is now available at http://phytopath.ca/publication/pmrr/.

L'édition 2017 de la Rapport de recherches sur la lutte dirigée
L'édition 2017 de la Rapport de recherches sur la lutte dirigée est maintenant disponible à http://phytopath.ca/publication/pmrr/.

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

Contents of regional society journals

This new regular feature, initiated at the request of the Board of Directors, will highlight research published in the five regional society journals that include peer-reviewed papers. It should be noted that some regional society journals are not published on a regular basis and may not always include peer-reviewed articles.

Contenu des revues des sociétés régionales

Cette nouvelle rubrique régulière, initiée à la demande du conseil d'administration, mettra en lumière la recherche publiée dans les cinq revues des sociétés régionales qui incluent des articles révisés par les pairs. Veuillez noter que certaines revues des sociétés régionales ne sont pas publiées sur une base régulière et peuvent ne pas toujours inclure des articles évalués par les pairs.

Journal of the Entomological Society of British Columbia, **114** (2017)

Articles

Jensen L.B.M., Lowery D.T., and DeLury N.C.. Grape leaf rust mite, *Calepitrimerus vitis* (Acari: Eriophyidae), a new pest of grapes in British Columbia, 3-14.

Sealy S.G. Insect taxa named for the Rev. John H. Keen, early naturalist on the Queen Charlotte Islands and at Metlakatla, British Columbia, 15-21.

Maclauchlan L.E., and Brooks J.E. Western balsam bark beetle, Dryocoetes confusus Swaine (Coleoptera: Curculionidae: Scolytinae), in situ development and seasonal flight periodicity in southern British Columbia, 22-37.

Gibson J.F. An updated and annotated checklist of the thick-headed flies (Diptera: Conopidae) of British Columbia, the Yukon, and Alaska, 38-55.

Naumann K., Moniz de Sá M., Lewis E., and Noronha R. Supercolonies of the invasive ant, *Myrmica rubra* (Hymenoptera: Formicidae) in British Columbia, Canada, 56-64.

Scientific Notes

Peach D.A.H. First record of *Aedes (Ochlerotatus) spencerii* (Theobald) (Diptera: Culicidae) in the Yukon, 65-67.

Bleiker K.P., and Meyers K.J. Cold requirements to facilitate mass emergence of spruce beetle (Coleoptera: Curculionidae) adults in the laboratory, 68-72.

Poirier, L.M. Production of epicormic buds by Douglas-fir in central British Columbia, Canada, following defoliation by western spruce budworm (Lepidoptera: Tortricidae), 73-76.

Natural History & Observations

Cannings R.A., and Pym R.V. *Archilestes californicus* McLachlan (Odonata: Zygoptera: Lestidae): a damselfly new to Canada. 77-82.

Abram P.K., Hueppelsheuser T., Acheampong S., Clarke P., Douglas H., Gariepy T.D. Evidence of established brown marmorated stink bug populations in British Columbia, Canada, 83-86.

Sheffield C.S., and Heron J. An unusual specimen of the subgenus *Lasioglossum* Curtis from British Columbia, Canada (Hymenoptera, Halictidae), 87-92.

MacDonald J.L., Maw E., and Clarke P. First identifications of aphid and diamondback moth populations on wasabi in British Columbia, 93-96

Proceedings
Heron J., Sheffield C.S. Proceedings of the "Pollination: Science and Stewardship" Symposium, 97-100.

Annual Meeting Abstracts
Presentation abstracts of the Entomological Society of British Columbia Annual General Meeting (2017), 101-104.

Symposium Abstracts
Symposium abstracts of the Entomological Society of British Columbia Annual General Meeting 2017: "Biological Control — A Safe Approach to Pest Management", 105-107.

Volume 114 (2017) of the Journal of the Entomological Society of British Columbia may be viewed at: https://journal.entsocbc.ca/index.php/journal/issue/view/Volume%20115%20%282017%29/showToc

Journal of the Entomological Society of Ontario, 149
(published 21 March 2018)

Gibson S.D., Bennett K., Brook R.W., Langer S.V., MacPhail V.J., and Beresford D.V. New records and range extensions of bumble bees (*Bombus* spp.) in a previously undersampled region of North America's boreal forest. 1–14.

Smith M.A. First report of the Palearctic sawfly *Pristiphora subbifida* Thomson 1871 (Hymenoptera: Tenthredinidae) in Canada. 15–19.

JESO may be viewed at https://journal.lib.uoguelph.ca/index.php/eso/index

Journal of the Acadian Entomological Society, 14
(published on various dates)

Landry B. and Schmidt B.C. *Arctia plantaginis* (Lepidoptera: Erebidae: Arctiinae) in Newfoundland, a disjunct population 1800 km east of its previously known range in North America. **14**:1-3, February 2018.

Noronha C. and Bahar M.H. First records of three parasitic wasps of diamondback moth (Lepidoptera: Plutellidae) in Prince Edward Island. **14**, 4-7, February 2018.

McAlpine D.F., Migneault R. and Webster R.P. *Coleomegilla maculata lengi* Timberlake, 1943 (Coleoptera: Coccinellidae), a native North American lady beetle new to Maritime Canada **14**:8-10, February 2018.

Joseph D.A., Cutler G.C. and Blatt S.E. Differentiating between click beetle and carrot weevil damage in Nova Scotia **14**:11-16, April 2018.

Lewis J.H. and McAlpine D.F. *Scudderia fasciata* and *Scudderia septentrionalis* (Orthoptera: Tettigoniidae) from the Maritime Provinces of Canada, with additional notes on the Tettigoniidae of New Brunswick **14**:17-21, April 2018.

Parsons C.K. and Sinclair B.J. *Rhagoletis pomonella* (Diptera: Tephritidae), a new record for the island of Newfoundland **14**: 22-24, June 2018.

JAES may be viewed at https://www.acadianes.ca/journal.php

THE CANADIAN PHYTOPATHOLOGICAL SOCIETY

LA SOCIÉTÉ CANADIENNE DE PHYTOPATHOLOGIE

CPS.SCP News

Vol 62 (2) June 2018

https://phytopath.ca/wp-content/uploads/2018/06/CPS-SCP-News-62-2-June-2018.pdf

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https://biologicalsurvey.ca/newsletter/bsc-summer-2018.pdf

Meeting announcements / Réunions futures

66th Annual Meeting of the Entomological Society of Alberta
Edmonton, 27-29 September 2018
http://www.entsocalberta.ca/annmeet2018.htm

Entomological Society of Manitoba Annual Meeting: Invasive species: Impacts on forestry to managed pollinators (Keynote speaker: Daniel Simberloff, University of Tennessee)
Winnipeg, 19-20 October 2018.

Entomological Society of Ontario 155th Annual Conference
Irondale, Ontario, 19-21 October 2018
https://www.entsocont.ca/eso_agm_2018.html

Joint Meeting of the Entomological Society of Canada, the Entomological Society of British Columbia and the Entomological Society of America
Vancouver, 11-14 November 2018
https://www.entsoc.org/events/annual-meeting
https://www.entsoc.org/events/annual-meeting/french

Réunion 2018 de la Société d'entomologie du Québec: L'entomologie à l'ère des nouvelles technologies
Québec, 29 et 30 novembre 2018
http://seq.qc.ca/activites/reunions/seq2018/index.asp

13th International Congress of Orthopterology
Agadir, Morocco, 24-28 March 2019
http://www.ico2019morocco.com/

Joint Meeting of the Entomological Society of Canada, the Acadian Entomological Society and the Canadian Society for Ecology and Evolution
Fredericton, 18-21 August 2019
For more information: Twitter @CSEE_ESC2019; email csee.esc.2019@gmail.com

26th International Congress of Entomology (Entomology for our planet)
Helsinki, Finland, 19-24 July 2020
http://www.ice2020helsinki.fi/

Joint Annual Meeting of the Entomological Society of Canada and the Entomological Society of Alberta
Calgary, 18-21 October 2020

Readers are invited to send the 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.

Published by the
Entomological Society of Canada
386 Broadway, Suite 503
Winnipeg, Manitoba R3C 3R6
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ISSN: 0071-0741

Submission deadline for the next issue: 31 October 2018

Bulletin de la Société d'entomologie du Canada

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.

Publié par la
Société d'entomologie du Canada
386 Broadway, Suite 503
Winnipeg, Manitoba R3C 3R6
E-mail: info@esc-sec.ca
www.esc-sec.ca/

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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ISSN: 0071-0741

Date de tombée pour le prochain numéro: 31 octobre 2018

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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.*

The last word / Le dernier mot

Cedric Gillott, Editor / Rédacteur

Entomologists of …….

Close to 30 years ago, the late Paul Riegert, with financial support and encouragement from the Entomological Society of Canada and the four western regional societies, began publication of a series of booklets that provided short biographies of entomologists in the four western provinces, plus lists of entomology students who had received a graduate degree at one of the universities in these provinces. In chronological order of publication, these booklets were: Entomologists of Manitoba (1989), Entomologists of Alberta (1989), Entomologists of Saskatchewan (1990), and Entomologists of British Columbia (1991) (see http://esc-sec.ca/the-society/history-and-heritage/). (Paul had actually undertaken a pilot project some 8 years earlier when the Entomological Society of Saskatchewan supported publication of the initial Entomologists of Saskatchewan.)

Almost three decades later, a small team of members of the Entomological Society of Saskatchewan (Meghan Vankosky, Martin Erlandson and myself) decided that it's time for an update. The details of people listed in the original Entomologists of Saskatchewan are being refreshed, 'new' entomologists or those missed in the original edition are being added, as are post-1990 entomology graduate students. The task is proving to be both interesting and challenging, not least obtaining information for the original group who may

Les entomologistes de …….

Il y a presque 30 ans, le défunt Paul Riegert, avec un soutien financier et des encouragements de la Société d'entomologie du Canada et des quatre sociétés régionales de l'ouest, a commencé la publication d'une série de livrets qui fournissent de courtes biographies des entomologistes des quatre provinces de l'ouest, en plus d'une liste des étudiants en entomologie qui ont reçu leur diplôme d'études supérieures dans l'une des universités dans ces provinces. En ordre chronologique de publication, ces livrets sont : Entomologists of Manitoba (1989), Entomologists of Alberta (1989), Entomologists of Saskatchewan (1990), et Entomologists of British Columbia (1991) (voir http://esc-sec.ca/fr/the-society/history-and-heritage/). (Paul avait en fait entrepris un projet pilote environ 8 ans auparavant quand la Société d'entomologie de Saskatchewan avait soutenu la publication de la liste initiale Entomologists of Saskatchewan.)

Presque trois décennies plus tard, une petite équipe de membres de la Société d'entomologie de Saskatchewan (Meghan Vankosky, Martin Erlandson et moi-même) ont décidé qu'il était temps pour une mise à jour. Les détails des gens listés dans la version originale de Entomologists of Saskatchewan ont été rafraîchis, les « nouveaux » entomologistes, ou ceux qui avaient été omis dans l'édition originale ont été ajoutés, ainsi que les étudiants en entomologie post-1990. La tâche s'est avérée aussi intéressante qu'importante, notamment de devoir obtenir

have moved away or are deceased! However, when completed the new version will be in electronic format and easily kept current – a living document.

So, the 'gauntlet has been thrown down'. Shall we see the other three western regional societies rise to the occasion and begin an update of Paul's booklet for their province?

de l'information de groupes originaux qui peuvent avoir déménagé ou être décédés! Cependant, lorsqu'elle sera complétée, la nouvelle version sera en format électronique et facile à garder à jour – un document vivant.

Ainsi, le gant a été jeté. Verrons-nous les trois autres sociétés régionales de l'ouest saisir l'occasion de débuter une mise à jour du livret de Paul pour leur province?

D. Giberson

An ambitious blue dasher (*Pachydiplax longipennis*; Odonata: Libellulidae) apparently sneaking up on a small frog. Smuggler Cove, BC

Entomological Society of Canada, 2017-2018
Société d'entomologie du Canada, 2017-2018

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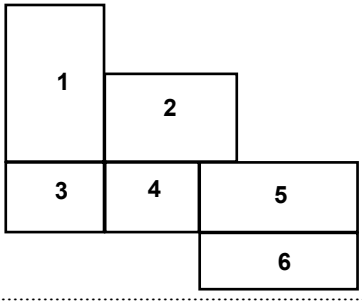

Front cover/Plate supérieur:

1 *Glyptapanteles militaris* (Hymenoptera: Braconidae). In 2017, many armyworm moth (*Mythimna unipuncta*; Lepidoptera: Noctuidae) larvae were parasitised by *Glyptapanteles militaris*. Cocoons were collected in wheat fields and reared until adult emergence. This photograph shows the head of an adult of the beneficial insect [Shawville, Québec, Canada]

Glyptapanteles militaris (Hymenoptera : Braconidae). En 2017, de nombreuses chenilles de la légionnaire uniponctuée (*Mythimna unipuncta*; Lepidoptera : Noctuidae) ont été parasitées par le parasitoïde *Glyptapanteles militaris*. Les cocons ont été récoltés dans des champs de blé à Shawville et ont été élevés jusqu'à l'émergence des adultes. Cette photo montre la tête d'un adulte de cet insecte bénéfique [Shawville, Québec, Canada]
[Photo: Julien Saguez]

2 Eight-spotted skimmer (*Libellula forensis*; Odonata: Libellulidae), perching on a twig near the outflow to a large marsh pond [Sergeant Bay Provincial Park, British Columbia, Canada]
La libellule *Libellula forensis* (Odonata : Libellulidae) posée sur une brindille près de l'écoulement d'un grand étang marécageux [Parc provincial Sergeant Bay dans le sud-ouest de la Colombie-Britannique, Canada]
[Photo: Donna Giberson]

3 A *Hybomitra* (Diptera: Tabanidae) [Kokanee Glacier Provincial Park, British Columbia, Canada]
Une *Hybomitra* (Diptera : Tabanidae) [Parc provincial de Kokanee Glacier en Colombie-Britannique, Canada]
[Photo: Ward Strong]

4. A foraging *Villa* (Diptera: Bombyliidae) [Kelly Lake, British Columbia, Canada]
Un *Villa* (Diptera : Bombyliidae) qui butine [Kelly Lake, Colombie-Britannique, Canada]
[Photo: Bernard Roitberg]

5. Flower longhorn, *Cortodera subpilosa* (Coleoptera: Cerambycidae), 21 June 2016 [Wagonwheel Road, Kootenay Boundary, British Columbia, Canada]
Le longicorne *Cortodera subpilosa* (Coleoptera : Cerambycidae), 21 juin, 2016 [Wagonwheel Road, Kootenay Boundary, Colombie-Britannique, Canada]
[Photo: Adam Blake]

6. When camouflage fails—a nymph of the stink bug *Palomena prasina* (Hemiptera: Pentatomidae) [Delémont, Switzerland]
Quand le camouflage échoue—une nymphe de la punaise verte, *Palomena prasina* (Hemiptera : Pentatomidae) [Délémont, Suisse]
[Photo: Tim Haye]

Back cover/Plate inférieur:

A live female Asian longhorned beetle (*Anoplophora glabripennis*; Coleoptera: Cerambycidae) [Insect Production and Quarantine Laboratory in the Great Lakes Forestry Centre, Sault Ste. Marie, Ontario, Canada]
Une femelle longicorne asiatique vivante (*Anoplophora glabripennis*; Coleoptera : Cerambycidae) provenant [Laboratoire de production d'insectes et de quarantaine au Centre de foresterie des Grands Lacs à Sault-Sainte-Marie en Ontario, Canada]
[Photo: Amanda Roe]

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Date of issue: September 2018 /
septembre 2018

ISSN: 0071-0741