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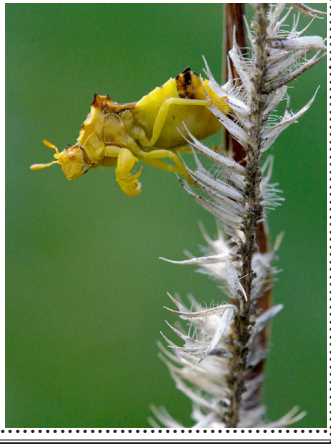

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Captions for cover photos can be found on the back cover.
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Halyomorpha halys (Hemiptera: Pentatomidae) is an emerging pest of fruit across North America. This is an individual from London (Ontario, Canada), where the overwintering biology is being studied.

Halyomorpha halys (Hemiptera : Pentatomidae) est un nouveau ravageur des fruits en Amérique du Nord. Ici un individu de London (Ontario, Canada), où la biologie hivernale est étudiée.

[Photo: Brent Sinclair]

The ESC and our regional societies – Stronger together

We are a national community of entomologists, providing support to each other and to each of our affiliated regional societies. This is the concept captured with our new "Societies" emblem. The emblem reminds us that we are stronger together, but also has a more utilitarian purpose. ESC webmaster, Jordan Bannerman, has embedded a hidden link with each logo. Click on the logo and it opens the associated societal website. The emblem with functional links is now posted on the ESC website (https://esc-sec.ca/affiliated-societies/) and is in the process of being incorporated into the websites of each regional society.

The Societies emblem is just one of several initiatives that have kept various ESC committees active this past year. Through the diligent efforts of the Membership Committee, the Board recently approved an *Entomology Enthusiast* membership category. Entomology Enthusiasts have online access to

La SEC et nos sociétés régionales – Plus fortes ensemble

Nous formons une communauté nationale d'entomologistes, fournissant du soutien les uns aux autres, ainsi qu'à chacune de nos sociétés régionales affiliées. Il s'agit du concept illustré dans le nouvel emblème de nos sociétés. Cet emblème nous rappelle que nous sommes plus forts ensemble, mais il a également un but plus utilitaire. Le webmestre de la SEC, Jordan Bannerman, a inséré un lien caché dans chacun des logos. Cliquez sur le logo et le site web de la société associée s'ouvrira. L'emblème avec les liens fonctionnels est maintenant affiché sur le site web de la SEC (https://esc-sec.ca/fr/affiliated-societies/) et est en cours d'être incorporé dans le site web de chacune des sociétés régionales.

L'emblème des sociétés n'est qu'une des initiatives sur lesquelles les différents comités de la SEC ont travaillé cette dernière année. Par le travail diligent du comité des adhésions, le CA a récemment approuvé une nouvelle catégorie de membres, les *Enthousiastes de l'entomologie*. Les enthousiastes de l'entomologie ont un accès en ligne à *The Canadian Entomologist* et aux Mémoires de la SEC pour environ 50% du coût d'un membre régulier, plus de tous les autres avantages de l'adhésion. Cette nouvelle catégorie de membres constitue une option intéressante pour les gens engagés dans la poursuite de l'entomologie comme passe-temps, et qui désirent accéder aux archives numériques des publications de la SEC. Cette option n'est pas

The Canadian Entomologist and *Memoirs of the ESC* for about 50% of the cost of a Regular membership plus all of the other benefits of membership. This new membership category provides an attractive option for individuals engaged in entomological pursuits as a pastime and who wish to access the ESC's extensive digital archives of publications. This option is not available, however, to individuals who derive a significant amount of their income from entomological activities. Entomology instructors, researchers, extension personnel and students will still need to pay for their dues as Regular, Early Professional or Student members. The Enthusiast membership category comes into effect for 2020, so start spreading the word now to your fellow entomophiles.

The Public Education Committee has been busy with a new initiative to recognize 8 June as **NA**tional **I**nsect **A**ppreciation **D**ay (NAIAD). The 8th day of the 6th month symbolizes 6-legged insects and their 8-legged cousins (mites, spiders). The acronym 'NAIAD' is the term given to aquatic nymphs of several different insect orders. Early June is a time when many public schools invite local speakers into classrooms to chat about insects, and teachers take students on field trips to learn about nature. To facilitate these types of outreach events, the ESC has compiled a directory of resources on their "Education and Outreach" webpage. We also provide, upon request, an annual public education grant of up to $200 to each of our regional societies. NAIAD events can be held on 8 June, or on any other date that best suits the organizers. Kudos to Gail Anderson, past-Chair of this committee and incoming ESC President, for shepherding this initiative from conception through eclosion.

The "Cool/Cruel Insects" is another initiative of the Public Education Committee. Conceptualized by John Acorn, this initiative provides information on specific insects in a blog format with photographs and text intended to appeal to a broad audience. The first (and so far only) submission received in support of this initiative is one provided by John for the mourning cloak butterfly. Despite several efforts, additional submissions have

disponible, cependant, aux gens qui soutirent un revenu significatif d'activités entomologiques. Les chargés de cours, chercheurs, personnel de transfert de connaissances et vulgarisation et les étudiants doivent continuer de payer leurs cotisations comme membres réguliers, jeunes professionnels ou étudiants. La catégorie de membres enthousiastes de l'entomologie entrera en vigueur en 2020, alors commencez à passer le mot à vos collègues entomophiles.

Le comité d'éducation publique a été occupé avec une nouvelle initiative qui reconnaît le 8 juin comme la journée nationale des insectes (JNI ou NAIAD en anglais, pour **NA**tional **I**nsect **A**ppreciation **D**ay). Le 8e jour du 6e mois symbolise les insectes à 6 pattes et leurs cousins à 8 pattes (acariens, araignées). L'acronyme 'NAIAD' est, en anglais, le terme donné aux nymphes aquatiques de plusieurs ordres d'insectes. Le début juin est une période où plusieurs écoles publiques invitent des présentateurs locaux dans leurs classes pour parler des insectes, et les enseignants amènent leurs élèves dans des sorties de terrain pour en apprendre plus sur la nature. Afin de faciliter ce type d'évènement de vulgarisation, la SEC a compilé un répertoire de ressources sur sa page web « Éducation et programmes d'animation ». Nous fournissons également, sur demande, une subvention annuelle d'éducation publique allant jusqu'à 200$ pour chacune de nos sociétés régionales. Ces évènements de la JNI peuvent se tenir le 8 juin, ou à toute autre date qui convient aux organisateurs. Chapeau à Gail Anderson, ancienne présidente de ce comité et présidente à venir de la SEC pour avoir mené cette initiative de la conception à son éclosion.

« Cool/Cruel Insects »[1] est une autre initiative du comité d'éducation publique. Conceptualisée par John Acorn, cette initiative fournit des informations sur des insectes spécifiques dans un format de blogue avec des photographies et du texte qui visent un vaste auditoire. La première (et jusqu'à maintenant la seule) soumission reçue pour cette initiative est celle fournie par John pour le morio. Malgré de nombreux efforts, des soumissions additionnelles sont toujours requises. Pour aider à lancer cette initiative, je mets chaque société régionale au défi d'envoyer

[1]Le nom en français suivra bientôt!

yet to materialize. To help 'kick start' this initiative, I challenge each regional society to send current Committee Chair Étienne Normandin a submission for the insect featured in their societal logo. Why does the logo of the Entomological Society of British Columbia include an insect called a scorpionfly that is neither a scorpion nor a fly? How did a grylloblattid end up on the logo of the Entomological Society of Canada and how many other species share its placement in the Order Notoptera? Does the lepidopteran in the logo of the Société d'entomologie du Québec depict a particular species or Lepidoptera in general? What is the fly in the logo of the Acadian Entomological Society? Enquiring minds want to know! If you wish to provide submissions for these or any other species of insect or spider or mite, please contact Étienne (etienne.normandin@gmail.com). Cedric Gillott, Editor of the ESC Bulletin, is also happy to receive submissions. If you have an idea for a special article, send him an email (cedric.gillott@usask.ca). This quarterly newsletter is free online and continues to grow in size and readership with each issue.

A reminder that JAM 2019 (18–21 August) is fast approaching. ESC members will by now have received several emails informing them of various deadlines and directing them to the meeting website (http://csee-esc2019.ca/). Note that 5 June is the early-bird deadline for registration and for oral submissions; 7 August is the deadline for poster submissions. Co-hosted with the Acadian Entomological Society and the Canadian Society of Ecology and Evolution in beautiful Fredericton, this year's JAM promises to be particular noteworthy. And for those of you that like to plan your travel schedules well in advance, JAM 2020 will be in Calgary, 18–21 October.

JAM 2019 also marks the end of my tenure as ESC President. It seems like it just started. I entered the role last November in Vancouver at JAM 2018. Although my 9-month term may be among the shortest of any President, it has been long enough to confirm what I've known for years. We are a strong and vibrant society and have much of which to be proud. We provide a supportive environment for

au président actuel du comité, Étienne Normandin, une soumission pour l'insecte représenté dans le logo de leur société. Pourquoi le logo de la Société d'entomologie de Colombie-Britannique inclut-il un insecte qui, bien qu'il ne soit ni un scorpion, ni une mouche, porte parfois le nom de mouche scorpion? Comment un grylloblatte a-t-il abouti dans le logo de la Société d'entomologie du Canada, et combien d'autres espèces partagent sa place dans l'ordre des Notoptères? Le lépidoptère du logo de la Société d'entomologie du Québec représente-t-il une espèce en particulier ou les lépidoptères en général? Quelle est la mouche dans le logo de la Société acadienne d'entomologie? Les curieux veulent savoir! Si vous désirez soumettre des textes pour ces insectes, ou toute autre espèce d'insecte, d'araignée ou d'acarien, merci de contacter Étienne (etienne.normandin@gmail.com). Cedric Gillot, éditeur du Bulletin de la SEC, est également heureux de recevoir des soumissions. Si vous avez une idée pour un article spécial, envoyez-lui un courriel (cedric.gillott@usask.ca). Ce bulletin trimestriel est gratuit en ligne et continue de croître en taille et en lectorat à chaque numéro.

Un rappel que la réunion annuelle conjointe 2019 (18-21 août) approche à grands pas. Les membres de la SEC ont maintenant reçu de nombreux courriels les informant de différentes dates limites et les dirigeant vers le site web de la réunion (http://www.csee-esc2019.ca/index-fr.html). Veuillez noter que le 5 juin est la date limite pour l'inscription hâtive et pour les soumissions de présentations orales; les soumissions pour les affiches peuvent se faire jusqu'au 7 août. Co-organisée par la Société acadienne d'entomologie et la Société canadienne d'écologie et d'évolution dans la belle ville de Fredericton, la réunion de cette année promet d'être particulièrement intéressante. Et pour ceux d'entre vous qui aiment planifier leur voyage bien en avance, la réunion annuelle conjointe 2020 se tiendra à Calgary, du 18-21 octobre.

La réunion 2019 marque aussi la fin de mon mandat de président de la SEC. J'ai l'impression qu'il vient de commencer. J'ai débuté mon mandat en novembre dernier à Vancouver à la réunion annuelle 2018. Bien que mon mandat de 9 mois soit peut-être parmi les plus courts de tous les présidents, il a été suffisamment long pour que

our student members to help them achieve their career aspirations. Our joint annual meetings are a national stage shared with our affiliated regional societies to showcase and honour the many accomplishments of our members, whether they be amateurs, students or professionals. *The Canadian Entomologist*, now in continuous publication for 151 years, is a respected and international venue for the publication of high quality research. For 50 years, the *Bulletin of the Entomological Society of Canada* has communicated news and recorded the activities of our society for future generations. Our annual photo contest is a forum for the photographers among us to feature their work. And through the use of the ESC Blog, Twitter and Facebook, we have embraced social media to better connect with our members and a broader world.

There are many definitions of community, but they all convey a sense of interaction. Our national entomological community is no different. The interactions we have with each other, our regional societies, and within the Entomological Society of Canada define our community and make us all stronger. If you wish to strengthen your interactions in our community, consider the suggestions offered above. Attend a regional or national meeting, post to the ESC blog, enter the ESC photo contest, write something for the *Bulletin*, or submit your next paper to *The Canadian Entomologist* or to one of five journals published by our affiliated regional societies (ESBC, ESM, ESO, SEQ, AES). Join one of the many ESC committees or work to recruit new members. And if you want to help but don't know how, send an email with the message "How can I help?" to ESCPresident@esc-sec.ca – it'll be warmly received.

My interactions with the ESC began in 1985 when I joined as a very shy MSc student. My experiences since have been rich and rewarding. Serving as your President has been a privilege.

je confirme ce que je savais depuis des années. Nous sommes une société forte et vibrante et nous avons de quoi être fiers. Nous fournissons un environnement de soutien à nos membres étudiants pour les aider à atteindre leurs aspirations de carrière. Nos réunions annuelles conjointes sont une scène nationale partagée par nos société régionales affiliées afin de mettre en valeur et d'honorer les nombreux accomplissements de nos membres, qu'ils soient amateurs, étudiants ou professionnels. *The Canadian Entomologist*, publié en continu depuis maintenant 151 ans, est une plateforme internationale respectée pour la publication de recherche de haute qualité. Depuis 50 ans, le Bulletin de la Société d'entomologie du Canada communique des nouvelles et enregistre les activités de notre société pour les générations futures. Notre concours annuel de photos est un forum pour mettre en vedette les travaux des photographes parmi nous. Et par l'utilisation du blogue de la SEC, de Twitter et de Facebook, nous avons embrassé les médias sociaux pour être mieux connectés avec nos membres et le reste du monde.

Il y a plusieurs définitions de communauté, mais elles convergent toutes vers l'interaction. Notre communauté entomologique nationale n'est pas différente. Les interactions que nous avons entre nous, avec nos sociétés régionales, et au sein de la Société d'entomologie du Canada définissent notre communauté et nous rendent plus forts. Si vous souhaitez fortifier vos interactions dans notre communauté, considérez les suggestions offertes ci-dessus. Assistez à une réunion annuelle régionale ou nationale, publiez un billet dans le blogue de la SEC, participez au concours de photos de la SEC, écrivez quelque chose pour le *Bulletin*, ou soumettez votre prochain article dans *The Canadian Entomologist* ou une des cinq revues publiées par nos sociétés régionales affiliées (SECB, SEM, SEO, SEQ, SAE). Joignez un de nos nombreux comités de la SEC, ou travaillez à recruter de nouveaux membres. Et si vous voulez aider, mais ne savez pas comment faire, envoyez un courriel avec le message « Comment puis-je aider? » à ESCPresident@esc-sec.ca – il sera chaleureusement reçu.

Mes interactions avec la SEC ont débuté en 1985 quand j'y ai adhéré en tant qu'étudiant de maîtrise très timide. Mes expériences depuis ce temps ont été riches et enrichissantes. Servir comme votre

Announcing the 2019 JAM

18–21 August
Fredericton, NB

In August 2019, the **Entomological Society of Canada** will meet jointly with the **Acadian Entomological Society** and the **Canadian Society for Ecology and Evolution**. Join us on the banks of the beautiful St. John River as we bring these three sister societies together for their first-ever joint meeting! **Registration is open! (Early-bird and oral presentation deadlines are 5 June 2019, with posters accepted until 7 August.)**

- Link ecological principles and theory to applied entomology
- Learn new tools and approaches relevant to your work
- Celebrate how insects fit into broader ecological studies
- Meet new colleagues and gain new perspectives

Follow the meeting on Twitter (*@CSEE_Meetings*) or find more details on the web: www.csee-esc2019.ca

Annonce pour la réunion annuelle conjointe 2019

18-21 août
Fredericton, NB

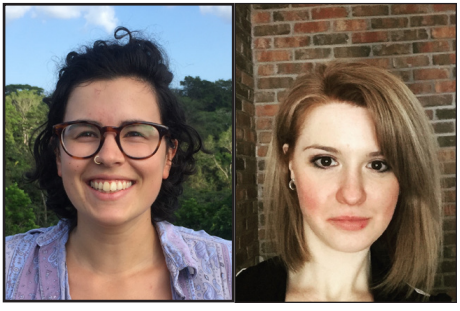
En août 2019, la **Société d'entomologie du Canada** se réunira conjointement avec la **Société d'entomologie acadienne** et la **Société canadienne d'écologie et d'évolution**. Joignez-vous à nous sur les rives du magnifique fleuve Saint-Jean alors que nous réunirons pour la première fois ces trois sociétés sœurs!
Inscrivez-vous maintenant! (La date limite pour les inscriptions hâtives et la soumission d présentations est le 5 juin 2019, les affiches seront acceptées jusqu'au 7 août.)

- Liez les principes écologiques et la théorie à l'entomologie appliquée
- Découvrez de nouveaux outils et de nouvelles approches pertinents à vos travaux
- Célébrez la façon dont les insectes cadrent dans les études écologiques plus vastes
- Rencontrez de nouveau collègues et acquérez de nouvelles perspectives

Suivez la réunion sur Twitter (*@CSEE_Meetings*) ou trouvez plus d'informations sur le site web : http://www.csee-esc2019.ca/index-fr.html.

STEP Corner / Le coin de la relève

Anne-Sophie Caron and Rachel Rix



2019 Eco-Evo-Ento meeting

The next JAM will take place in Fredericton, New Brunswick from 18 to 21 August and will include the Canadian Society for Ecology & Evolution, the Entomological Society of Canada, and the Acadian Entomological Society. Consider attending some of the workshops offered this year! You can see the information on the workshop tab.

Don't hesitate to contact us to get involved! For more information, go to http://csee-esc2019.ca/index.html

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.

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

La réunion Éco-Évo-Ento 2019

La prochaine réunion annuelle, qui aura lieu à Fredericton, Nouveau-Brunswick du 18 au 21 août, est organisée par la Société canadienne d'écologie et d'évolution, la Société d'entomologie du Canada, et la Société d'entomologie acadienne. Considérez participer à un des nombreux ateliers offerts cette année! Vous pouvez trouver plus d'informations dans l'onglet « Ateliers » .

Si vous souhaitez vous impliquez, contactez-nous! Pour plus d'informations, rendez-vous à l'adresse suivante http://www.csee-esc2019.ca/index-fr.html

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.

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

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.

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.

Cibler un projet de recherche : un choix stratégique

À mes yeux, la profession de chercheur s'avère la plus belle d'entre toutes. En particulier parce qu'elle repousse les accablements de l'ennui que menace une routine quotidienne. On ne peut espérer un jour parachever l'exploration et la découverte de notre univers scientifique, et ce peu importe le sujet d'étude. Pouvez-vous envisager un collègue taxonomiste qui peu à peu, voire soudainement, se lasse d'échantillonner, de décrire, de préserver et de classifier son groupe taxonomique fétiche? Les insectes parasitoïdes me fascinent tout autant, sinon plus, qu'il y a une trentaine d'années alors que j'amorçais mes études graduées en entomologie. La curiosité du chercheur l'accompagne jusque dans sa tombe et plusieurs lui doivent leur équilibre psychique et leur bonheur professionnel.

Quiconque choisit la profession de chercheur envisage le succès, peu importe son ampleur. Il doit dès lors développer et cultiver diverses exigences et qualités. La première, universelle, concerne le travail acharné auquel on ne peut échapper si l'on veut atteindre un but. Le chercheur doit aussi continuellement acquérir et maitriser des connaissances. Il doit en parallèle développer des aptitudes techniques et de communicateur lui permettant de réaliser des travaux de recherches et par la suite de les mettre en valeur. Mais les chercheurs qui se démarquent font preuve d'une grande créativité. En sortant des sentiers battus, un prérequis à la découverte, ils font progresser leur discipline et ouvrent de nouvelles voies à explorer.

Des chercheurs de divers horizons s'intéressent depuis des lunes au phénomène de la créativité et à sa manifestation dans le domaine des sciences. Une question récurrente et fascinante concerne les conditions qui nous permettent de libérer notre créativité. Prenons le cas de Charles Darwin, la quintessence du biologiste créatif. Indépendant de fortune, il n'avait pas d'emploi. Il n'a à aucun moment enseigné, supervisé un étudiant gradué ou rédigé une demande de subvention. Il a présenté moins d'une dizaine de conférences durant sa carrière. Dans les faits, Darwin a consacré sa vie à réfléchir chez lui et à son rythme. Motivé, discipliné et persévérant, à tous les jours il entreprenait une longue marche en solitaire dans son domaine, toujours la même durée et le même trajet, afin de se plonger dans un état favorable à la pensée créative. Nul n'est Darwin et, malheureusement, la cadence frénétique qui caractérise désormais nos vies professionnelles fait en sorte que notre quotidien de chercheur minimise à la fois le temps que nous consacrons à la réflexion et les opportunités de se plonger dans un environnement favorable à la créativité. Nous sommes au quotidien occupé, débordé et voguons d'une échéance à l'autre. Les réunions se succèdent et que dire de ces bombardements incessants de messages de toutes sortes. À cet égard, je suis parfois nostalgique de mon statut d'étudiant au doctorat ou de post-doctorat. De ces premières étapes de formation où nous étions libres penseurs et chercheurs. Comme chercheur établi, l'année sabbatique constitue un privilège nous permettant de retrouver certaines conditions libératrices de créativité. Si ces questions de créativité en science vous interpellent, et que vous recherchez un auteur qui s'exprime admirablement bien et de façon concise, je vous conseille les écrits de Craig Loehle, un écologiste américain (voir références ci-dessous).

Jacques Brodeur (jacques.brodeur@umontreal.ca), Professor of Biology, Canada Research Chair in biological control, University of Montreal, received the Gold Medal at the 2018 JAM in Vancouver.

Parmi toutes les approches ou les conditions évoquées par les penseurs pour accroitre notre niveau de créativité en science, j'aimerais discuter plus spécifiquement celle qui concerne le choix même d'un problème à explorer. Selon Loehle (1990), un élément qui distingue grandement ces chercheurs qui marquent leur époque et leur domaine réside dans le fait qu'ils ont la perspicacité de choisir des questions à la fois originales et résolubles. Et cette capacité contribue à promouvoir la créativité en science. L'argumentaire de Loehle a d'abord été inspiré des écrits de Sir Peter Medawar, un immunologiste ayant reçu le prix Nobel de médecine pour ses travaux sur la transplantation d'organes. Medawar s'intéressait également à la philosophie des sciences et plus spécifiquement aux déterminants de la carrière scientifique. Dans son livre publié en 1984 et intitulé '*Pluto's Republic – The Art of the Soluble*', Medawar suggère bien simplement que les problèmes qui sont trop faciles à résoudre mènent rarement à des résultats originaux. Quant aux problèmes qui sont trop ambitieux, leur résolution échoue fréquemment à cause d'une trop grande complexité. Ils peuvent aussi être rejetés ou ignorés par la communauté scientifique dans son ensemble, en particulier parce que nous naviguons dans un environnement scientifique régi par un ensemble de paradigmes difficiles à renverser. Selon Thomas Kuhn, philosophe des sciences, un paradigme représente des « découvertes scientifiques universellement reconnues qui, pour un temps, fournissent à une communauté de chercheurs des problèmes types et des solutions » (Kuhn 1970). Se libérer des paradigmes scientifiques représente un défi énorme, seuls les libres penseurs peuvent y arriver.

Loehle (1990) a suggéré une relation entre le degré de difficulté et le bénéfice associé à la résolution d'un problème scientifique. Il a ainsi identifié un espace sous une courbe parabolique qu'il a nommé la 'zone Medawar', tel qu'illustré à la figure 1A. Cette zone génère un maximum de gains en terme de reconnaissance scientifique tout en étant associé à un degré modéré de difficulté à solutionner un problème. La zone Medawar devrait donc être privilégiée par tous les chercheurs. Les questions qui sont très simples à résoudre devraient être évitées puisqu'elles engendrent peu de bénéfices (à l'extrême gauche de la courbe). De même, les problèmes trop

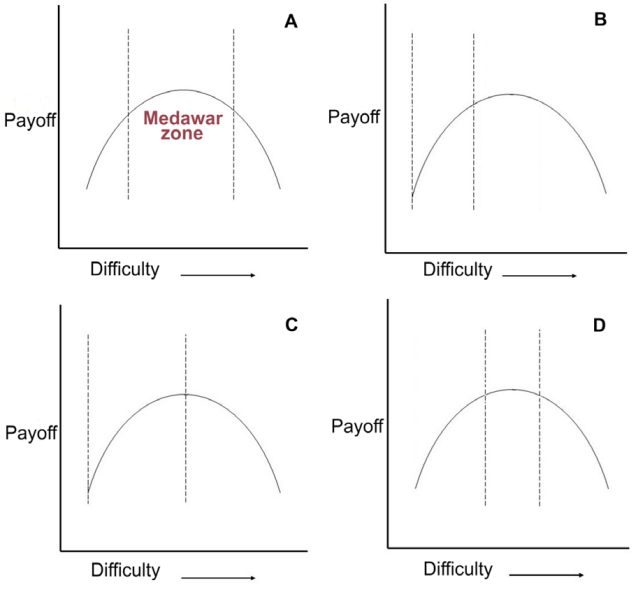


Figure 1. Relation entre le degré de difficulté et les gains associés à la résolution d'un problème scientifique. La zone de Medawar correspond à l'aire sous la courbe qui présente un gain élevé tout en ayant un degré de difficulté modéré. A) modèle général décrit par Loehle (1990). B), C), D) représentations de la zone de Medawar pour, respectivement, les étudiants à la maitrise, les étudiants au doctorat et les chercheurs de haut niveau.

difficiles à résoudre devraient être rejetés a priori puisque la probabilité de succès est très faible (à l'extrême droite de la courbe). La zone Medawar s'avère de plus une question de timing, soit de poser les bonnes questions au bon moment; c'est-à-dire lorsque les connaissances ou les approches expérimentales permettent la résolution de problèmes. Le fruit doit être mûr avant d'être cueilli puis dégusté. Par exemple, la conjecture de Poincaré, énoncée en 1904 par le mathématicien français Henri Poincaré, est demeurée irrésolue pendant un siècle. L'avancement des mathématiques durant cette période et bien entendu le génie de Grigori Perelman lui ont permis en 2003 de résoudre ce problème fondamental de l'algèbre. De même, le développement fulgurant des techniques de séquençage des génomes et la bio-informatique ont révolutionné notre compréhension de l'histoire évolutive d'un organisme. Le développement des connaissances atténue inexorablement le niveau de difficulté de tout problème. Il importe donc pour tout chercheur de cibler, en son temps, la zone de Medawar qui correspond à son domaine de recherche. Pour ce faire nous devons reconnaitre les débats et enjeux actuels, identifier les failles de nos connaissances et déterminer si ces dernières peuvent être comblées sans que le niveau de difficulté soit extrême.

Je m'intéresse au concept de la zone de Medawar depuis que j'ai le plaisir de superviser les travaux de recherche d'étudiants gradués. J'estime que l'aire sous la courbe à privilégier varie selon les compétences et l'expérience en recherche de chacun. Lors de l'élaboration d'un projet, le niveau de difficulté, et conséquemment le bénéfice anticipé, ne doivent pas être les mêmes pour un stagiaire au baccalauréat que pour un chercheur établi. Bien que cela soit intuitif, le concept de la zone de Medawar nous permet de visualiser le tout et de sélectionner les problèmes les plus pertinents à explorer.

Les stagiaires de premier cycle et les étudiants à la maitrise ont très peu d'expérience en recherche et, sauf exception, ne possèdent pas les connaissances et les habiletés techniques requises pour entreprendre de difficiles projets. De plus, la durée des stages et des programmes de maitrise est relativement courte, de quelques mois à deux ans. Cela exige de cibler un projet dont la faisabilité et la finalité comporte peu de risques mais qui procurera une reconnaissance certaine à celui qui le réalise (figure 1B). C'est pourquoi les superviseurs de stagiaires de premier cycle et d'étudiants à la maitrise les orientent vers des modèles biologiques déjà bien connus et des sujets spécifiques et ponctuels qui s'emboitent au sein de programmes de recherche déjà en cours au laboratoire.

La situation diffère grandement chez l'étudiant au doctorat. De part la nature même du PhD, l'étudiant doit contribuer de façon significative à l'avancement des connaissances dans son domaine de recherche. La qualité d'une thèse se mesure avant tout sur la base de l'originalité des découvertes. Le candidat doit dès lors cibler une zone de Medawar plus étendue et qui englobe les aires sous la courbe les plus 'payantes' (figure 1C). Cela implique dès lors de s'aventurer vers des niveaux de difficulté plus élevés quant à la réalisation du projet de recherche. Sans toutefois que le projet soit d'une ampleur et d'une complexité telles que sa réalisation soit compromise dans la période de temps impartie à un programme de doctorat. Des éléments de stratégie s'imposent à l'étudiant au doctorat dès le développement de son projet de thèse. Il doit éviter de mettre tous ses œufs dans un même panier et privilégier uniquement des contenus et des expériences à hauts risques. Typiquement, une thèse de doctorat se compose de chapitres (articles scientifiques) dont les bénéfices et les niveaux de difficulté s'échelonnent à différentes positions de l'aire sous la courbe de la figure 1C. Tout comme l'investisseur à la bourse, l'étudiant au doctorat devrait diversifier son portefeuille de recherche et y inclure des sujets relativement faciles, mais pas trop (!), et d'autres nettement plus audacieux.

La majorité des chercheurs établis, qu'ils oeuvrent dans une université, un laboratoire gouvernemental ou une entreprise privée, adopte la zone de Medawar décrite à l'origine

par Loehle (1990), soit celle de la figure 1A. L'aire sous la courbe est vaste et se prête à des carrières en recherche qui s'étalent sur quelques décennies et se caractérisent par une succession d'honnêtes contributions à la science et de quelques coups de génie! Des considérations de compétence, d'enthousiasme au travail, de quota de performance et de fonds de recherche disponibles modulent cette relation entre le degré de difficulté et le bénéfice associé à la résolution d'un problème scientifique. La contrainte de temps s'impose nettement moins pour le chercheur établi que pour les étudiants gradués. C'est pourquoi le risque de s'aventurer vers la droite de la courbe, au-delà de l'optimum, devient moindre pour les chercheurs de carrière.

Le quatrième scénario illustré à la figure 1D concerne les chercheurs de haut niveau; ceux qui possèdent toutes les aptitudes pour réussir une brillante carrière en science. Ils se permettent de cibler essentiellement des projets de recherche qui maximisent les bénéfices. Ces chercheurs délaissent à la fois les questions les plus faciles et celles qui peuvent difficilement être résolues compte tenu de l'état des connaissances ou de verrous technologiques ou expérimentaux. Les chercheurs de haut niveau connaissent, voire anticipent, de par leur expérience, les sujets les plus brulants de leur domaine et initient leurs projets de recherche en conséquence. Ils atteignent fréquemment la section la plus 'payante' de la zone de Medawar en étant informé des enjeux scientifiques de l'heure et des plus récents développements méthodologiques. Naviguer au cœur de la zone de Medawar nécessite de se poser les bonnes questions, au bon moment.

Cela étant dit, le facteur principal d'animation et d'entrainement en science demeure l'intérêt. Au delà d'un positionnement cartésien dans la zone de Medawar, l'exaltation que l'on témoigne pour une thématique de recherche détermine bien souvent le succès d'un projet et le bonheur de le réaliser. Que l'on soit en début de carrière, en phase d'apprentissage des nombreux rouages de la science, ou en pleine maitrise de sa profession de chercheur, le choix d'un sujet d'étude demeure l'une des plus importantes étapes du processus scientifique. Le concept de la zone de Medawar s'avère un outil à considérer lors du choix d'une thématique de recherche à explorer ou non. Sous divers aspects, la recherche scientifique est de plus en plus déposséder de sa grandeur morale. À tort ou à raison, la reconnaissance et l'avancement du chercheur reposent désormais en grande partie sur des paramètres quantitatifs (p. ex., nombre de publications, notoriété des revues scientifiques, facteur H, niveau de financement de la recherche, taille des équipes), ce qui incite celui-ci à être stratégique dans la sélection des études à entreprendre. Le sujet d'étude doit être original et pouvoir se résoudre d'une manière efficace et avantageuse. Dans ce contexte, il importe d'identifier sa zone de Medawar ou de seconder un étudiant gradué à cibler la sienne. Ce type de gestion du risque (!) s'impose désormais comme une réalité de la profession de chercheur.

Je profite de l'opportunité de cet article pour remercier à nouveau, et très sincèrement, la Société d'entomologie du Canada qui m'a décerné la Médaille d'or. C'est un honneur que j'apprécie énormément. Je remercie également ceux qui ont eu la gentillesse de soumettre ma candidature.

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Entomological Society of British Columbia

The next Annual General Meeting of the Entomological Society of British Columbia will be held at the Pacific Forestry Centre, Victoria BC, on 4–5 October 2019. More information will be available at http://entsocbc.ca/meetings/ in the coming weeks.

B. Van Hezewijk.

*Lorquin's Admiral (*Limenitis lorquini*) (Boisduval, 1852) is a common and charismatic species typical of southern British Columbia. This individual was photographed in Victoria as it moved from leaf to leaf, apparently searching for the perfect spot to lay an egg. After a few minutes it was observed carefully moving backwards along a poplar leaf and laying a single egg at the pointed leaf apex.*

Entomological Society of Alberta

The Entomological Societies of Alberta and Saskatchewan hold a joint meeting approximately every 10 years, and 2019 is one such year. The joint meeting will be 3–5 October 2019 at Elkwater Lodge in the beautiful Cypress Hills Interprovincial Park.

Entomological Society of Saskatchewan

The ESS held its annual spring meeting on 12 April 2019. The meeting was highlighted with a presentation by Stuart Smyth on "Insights into the relationships between GM crops and the environment." Dr Smyth holds an Industry Funded Chair in Agri-Food Innovation in the Department of Agricultural and Resource Economics, University of Saskatchewan.

ESS Members have been busy around the province providing entomological knowledge and guidance at various activities including an event at the Western Development Museum in North Battleford and Gardenscape and Ag in the City in Saskatoon.

As noted above, the ESS will host a joint regional meeting with the Entomological Society of Alberta in Elkwater, Alberta (Cypress Hills Interprovincial Park) on 3–5 October 2019.

Entomological Society of Manitoba

A partnership between the Department of Entomology (University of Manitoba), the City of Winnipeg, and the Living Prairie Museum has led to the creation of "Bee Better Manitoba", a new conservation website launched on Earth Day: www.beebettermb.ca. The goal is inspire and empower Manitobans to protect, conserve and create pollinator-friendly habitat at home and in their communities. They also encourage people to share their habitat and pollinator encounters with the hashtag *#beebetterchallenge* on Instagram.

Entomological Society of Ontario

The next AGM and conference for the ESO will again be held at the Bark Lake Conference Centre near Irondale (Haliburton County), 1–3 November 2019. The theme will be: *By observation and experiment: teaching and learning about insect biodiversity*.

The Entomological Society of Ontario's flagship publication, *Journal of the Entomological Society of Ontario* (commonly known as JESO) is now in its 150th year of publication. It was first published in 1870 as the *First Annual Report on the Noxious Insects of the Province of Ontario, Prepared for the Agricultural and Arts, and Fruit Growers' Associations of Ontario, on behalf of the Entomological Society of Canada.* In 2002 the journal was given its present name.

From the beginning the journal had an agricultural focus due to the financial support of the Ontario Council of Agriculture (Timms 2009). The first paper in the report was "Insects Affecting the Apple" (C. J. S. Bethune), followed by a report on "The Grape" (W. Saunders), and "The Plum" (E. B. Reed). This emphasis on agricultural insects continued for 90 years until 1959, when studies from all aspects of entomological research both in and out of Ontario were welcomed. The name of the journal was changed to *Proceedings of the Entomological Society of Ontario* to reflect this development (Timms 2009).

Although no longer the main focus, publishing research on agricultural pests is still an important part of the work of the journal, such as two recent papers on fruit pests, one on apple pests (Trimble 2012), and one on commercial orchards (Renkema et al. 2013). The current issue, Volume 150, has two articles with a northern biogeographic focus, one on burying beetles (Ringrose et al. 2019) and one on Syrphidae (Vezsenyi et al. 2019), evidence of the renewed interest in insect biodiversity.

All papers that have been published in the journal are freely available either at the Society website (https://journal.lib.uoguelph.ca/index.php/eso/index), or for early volumes, at the Biodiversity Heritage Library https://www.biodiversitylibrary.org/creator/2359#/titles).

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Société d'entomologie du Québec

The Montreal Insectarium of Montreal is currently closed for renovations. The grand reopening is planned for June 2021.

The SEQ Annual Meeting is set for 28–29 November 2019, in Drummondville, Quebec, with the theme "Entotechnologies and entomophagy".

Acadian Entomological Society

In May 2019, Dr Jessica Vickruck will be joining Agriculture and Agri-Food Canada's Fredericton Research and Development Centre to lead the Entomology Science Program. Her research will involve insects relevant to integrated cropping systems, as well as other areas.

In staff changes within the New Brunswick Department of Energy and Resource Development, Drew Carleton has moved to the position of Manager, Forest Health, and Eric Knopf is now the Entomologist on staff.

A new field guide is in press and due to be published in May 2019: Tom Chapman, Peggy Dixon, Carolyn Parsons and Hugh Whitney have co-authored *Stouts, Millers and Forky-tails: Insects of Newfoundland and Labrador*. Boulder Books, Portugal Cove, Newfoundland. 358pp. Watch for a review in a future issue of the *Bulletin*!

Wider aspects of a career in entomology. 6. North Carolina

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.

Employment opportunities were limited by a decline in the Canadian economy as my postdoctoral fellowship in Ottawa came to an end. After a few temporary research jobs, I applied in 1972 for a 2-year position at North Carolina State University in Raleigh, to help run a new MSc program on insect pest management, organized by R.L. (Bob) Rabb. My chief responsibility would be to coordinate and teach ecological aspects of the program (and I knew that my lectures could include the challenges of managing pests across enormous areas, as illustrated by Canadian research on the dynamics of spruce budworm populations). Some local research would be possible too.

My interview in Raleigh took place in early April. The temperature was about 80°F [27°C], and redbuds (Figure 1a) and dogwoods were in bloom. Back in Ottawa, traces of winter snow persisted (Figure 1b)…I accepted the job.

Figure 1a. Roadside in the southern United States in early April, showing shrubs in leaf and redbud trees in flower.

Figure 1b. Roadside in Ontario at a similar time of year, showing still-dormant shrubs and trees as well as residual snow.

Obtaining the necessary visa proved difficult. United States authorities declared that the waiting list for immigrants of my nationality was so long that I was not eligible to come for 6 years. They could not be made to understand that I wanted only a temporary visitor's work visa for a 2-year appointment. Finally persuaded to grant my visa after intervention by the university, the authorities asked "why don't you want to immigrate to the USA?"

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.

My wife Thelma and I made a short visit to North Carolina to search for accommodation. We drove along the scenic Blue Ridge Parkway (Figure 2), part of the Appalachian mountain range. The route and timing of that journey proved to have been chosen with extraordinary luck. All the campsites were empty (except for us) after days of heavy rain caused by Hurricane Agnes. The massive amounts of water drained into the valleys below, contributing to serious flooding and road closures. Without today's electronic devices and otherwise preoccupied, we skipped along the mountains largely unaware of these events. We were greeted with surprise in Raleigh because we had made it through.

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Figure 2. View from the Blue Ridge Parkway, 24 June 1972. The blue haze has been attributed to release by the trees of isoprene, the subject of some entomological investigations.

That visit yielded not only accommodation but also other information. For example, no one recognized Canadian currency, which was eyed distrustfully (and not accepted) as though it had come from the game of Monopoly.

A small truck was booked for the move itself, but on the scheduled day the rental company insisted that we use a much larger truck registered in the United States. The vehicle was 40 feet [more than 12 metres] long, far too big for our household goods, and posing some danger to fire hydrants and other objects when turning corners. At the border, the customs officer opened the giant truck with great suspicion; but then saw the remarkably shallow layer of possessions it contained. He smirked slightly, and sent us on our way.

In Raleigh, class materials used American spelling, such as behavior (not behaviour) and color (not colour). For years afterwards, I had to exercise extraordinary diligence to avoid spelling errors. One exercise was designed to illustrate the contrast between S-shaped population growth (as populations reach equilibrium because surplus individuals migrate away) and J-shaped growth (as populations crash after the carrying capacity has been exceeded). Winged aphids could leave from some small tobacco plants as crowding increased, but cages prevented departures from other plants. A test run showed the expected patterns perfectly. However, the course itself took place in hotter weather, and the tobacco plants grew so rapidly that they outpaced the reproductive capacity of the aphids. As aphid numbers increased, counts were modified from the whole plant, to a sample, to a subsample, and finally to a subsubsample. With every aphid population and tobacco plant still growing exponentially, the experiment had to be abandoned. Rather sheepishly, I supplied students with data from the test run instead.

The course included guest lectures by invited speakers: P.S. (Phil) Corbet and W.G. (Bill) Wellington came from Canada. One guest, a senior entomologist from Florida, had packed essential heart medications in his checked baggage, which was then misplaced by the airline. I was very worried about him given the absence of these essentials, the stress thereby created, and the demands of the lecture itself. Fortunately, frequent assertive contacts with the airline prompted a delivery to our building just before the lecture began. On my future travels, I applied that lesson to carry all essentials — as well as to be assertive on critical matters!

Preparing for the start of classes was not without disruption. Our accommodation had been built recently and we were among the first tenants. Therefore, several defects had not yet come to light. A sewer misalignment caused a flood of dirty water from other residences to rise out of our toilet, carrying coloured tissue and other unwanted products, and introducing a vile smell that persisted

Kevin Bercaw (CC BY-SA-3.0)

Figure 3. Young tobacco plants in flower in a crop field in North Carolina.

for many days until the fitted carpet was replaced. The air-conditioning unit failed repeatedly too, and a serviceman came many times. More than once he had been called out just as he sat down at his home to eat a watermelon, as a way to cool down in the stifling heat.

Watermelons grown in North Carolina were readily available. Other crops included peanuts, corn, soybeans, and cotton. A substantial crop was tobacco (Figure 3): 678 million kg were harvested in the 2 years I was in North Carolina. Tobacco fields are ploughed in fall to limit the winter survival of several major agricultural pests, but a field neglected after harvest might generate thousands of tobacco hornworms that had overwintered in the soil, causing widespread damage to seedling tobacco in the spring. Therefore, authorities would intervene in fields not ploughed by a certain date, and then bill owners for the work.

Caterpillars of the tobacco budworm (Figure 4) and the corn earworm were common on tobacco and other crops. In the fall, some of them bore large numbers of white macrotype eggs deposited by tachinid flies. The tachinids were potential control agents, but had been neglected because their build up coincided with the start of university classes, and identifications were challenging. I decided to study them.

Whitney Cranshaw (CC BY-3.0-US)

Figure 4. Larva of the tobacco budworm, a common host of the tachinid parasitoids that were studied. Length about 3 cm. (Whitney Cranshaw, Colorado State University / © Bugwood.org.)

A rearing facility on campus maintained large numbers of these moths on artificial diet, and an experimental farm some distance away supplied fields of tobacco managed in such a way that they would support caterpillar populations throughout the season (by allowing plants to flower after topping them at a different time for each field). Such infrastructures are important for many kinds of research. Here they provided a reliable research site, a supply of host larvae for experiments, and a means to rear larvae after collection.

I spent many hours sampling larvae in these and other fields, collecting them into individual diet cups to prevent large larvae from cannibalizing others. It was a pleasant chore to take samples from tall tobacco plants with flowers occasionally visited by hummingbirds. Nevertheless, attention had to be paid not only to ensure careful sampling and recording, but also because a large larva can deliver a painful bite near the fingernail, a shock that might cause a valuable sample to be inadvertently flung away!

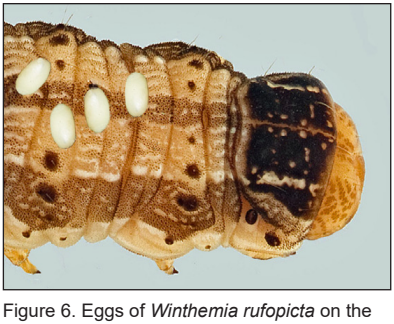
Host caterpillars were sampled throughout the season. A taxonomic study of tachinid eggs demonstrated that nearly all of the eggs attached to these hosts belonged to a single tachinid species. When many hosts bore eggs, large numbers were reared at different temperatures. Daily

microscopic examinations monitored the development and mortality of hosts and parasitoids, after the size and instar of each caterpillar and the position of each tachinid egg had been recorded. The university offset all of this work the following weekend by shutting down the electrical supply without notice (apparently for maintenance), disabling the temperature-controlled cabinets for more than 2 days, and making any future data on development useless. Some insects had completed a few stages of development at the highest temperature, but not in cooler conditions. I went back into the field for another time-consuming collection of larvae, and set up replacement experiments. Two weekends later, the university shut down the power yet again without notice. Still more cultures were set up, although by then few larvae were available in the field. Reviewers of the manuscript from this work must have thought poorly of the resulting erratic and somewhat limited sample sizes, and I was tempted to provide an explanation (including pointed commentary!), but decided that it would not be appropriate for publication. Such human disruptions of research are not uncommon, and the insects too may be unpredictable, reinforcing the lesson that wise researchers do not guarantee results in advance.

Adult tachinids (Figure 5) were fully active only in bright sunshine. An unusually long, but totally artificial, longevity could be documented for females kept in dull light. Substantial numbers of the eggs they deposit are unsuccessful. Eggs that do not hatch before a caterpillar moults are shed, removing most eggs except on the long-lasting final instar. As the eggs hatch and maggots begin to penetrate the host cuticle, caterpillars turn their heads and bite, destroying many parasitoids. The same response may defend against other attackers, including collectors (see above).

Insektarium.net

Figure 5. Adult tachinid of the genus *Winthemia*, similar to the species studied. Length about 0.8 cm.



H. Danks

Figure 6. Eggs of *Winthemia rufopicta* on the anterior segments of a fully grown larva of the corn earworm. Egg length about 0.9 mm.

Many eggs are deposited where the caterpillar cannot reach them, the top of the body behind the head (Figure 6). My observations of ovipositing females suggested that this placement is keyed by caterpillar movement, and a smaller peak at the back shows where flies have targeted the wrong end. A fly deposits several eggs on a large host, and flies do not appear to discriminate against previously parasitized hosts. Therefore, many eggs can be found on a single caterpillar.

A Malaise trap (Figure 7) monitored the seasonal activity of adult flies and potential hosts. Few hosts of this polyphagous species were accessible in the spring, but suitable hosts built up through the season. However, the spectacular loads of tachinid eggs in the fall occurred only where emergence of another generation of flies in the same field was accompanied by a decline in accessible caterpillars as many entered the ground to pupate, and in fact the tachinid was not especially abundant. Evidently, as for many other potential biological control agents, parasitoid abundance is governed by host populations, not the other way round. Moreover, these temporal and spatial interactions mean that the relative numbers of hosts and parasitoids in a given field can change rapidly. Therefore, spot records of percentage

Figure 7. The Malaise trap referred to here, near a crop field (not yet planted) in North Carolina early in 1973.

parasitism, the statistic customarily compiled by agricultural agents, are potentially meaningless.

These and other detailed findings confirmed a general lesson from my previous research projects: wide-ranging analysis of the life cycles of individual species gives valuable information not discovered by less thorough approaches.

Although research avenues were familiar to me, environmental and cultural settings were not. The weather in Raleigh includes summer storms, torrential downpours, and extreme heat and humidity, responsible for the failed class experiment with aphids on tobacco. I might have achieved much less without the almost universal air-conditioning (and the serviceman who worked on ours). Comparable heat and humidity occur in the Florida Everglades, where we camped one year. Illustrations of early explorers there show them dressed from head to toe in heavy fabric despite the conditions, and we soon understood why as the resident mosquitoes gave us their undivided attention.

A tornado once passed through the experimental site. Small wire-mesh emergence cages, set up to reveal when tachinid adults would emerge from overwintered caterpillars, were torn out of the ground and carried off. I found only a few of the missing cages — up to half a kilometre away. Scattered replicates remained intact. These peculiar numbers echoed the developmental data ruined by power interruptions, and reviewers of a subsequent manuscript must have been similarly unimpressed.

The same tornado mangled the Malaise trap, creating a gap in data. The collecting head on that trap was a killing bottle. If there is no killing agent, captured insects, especially blundering beetles, move around destroying taxonomic characters as they scrape off the wing-scales of moths and break off the setae of tachinids. Those taxa are difficult to identify too if they have been immersed, so that ethanol is not a suitable killing agent. Care was needed to recover the remains of the killing bottle, pulverized beneath the wreckage of the Malaise trap, because it had been charged with cyanide.

Although summers were almost subtropical, some winter days were cold enough for snow. However, heavy snowfalls were infrequent, so that there was no local equipment to clear the roads. If more than a small amount of snow fell, some owners might simply abandon their cars on the travelled part of the roadway, returning to retrieve them when the snow had melted. After one light snowfall, we were trapped behind a vehicle stuck on a slight incline. We tried to help the

driver multiple times by pushing her large American car, but she offset our efforts by constantly turning the steering wheel and spinning the tires despite advice to the contrary. Eventually, with a young child getting cold in our own car, she was told abruptly to get out and let me drive! Stunned by the order, she complied, allowing the vehicle to be eased up the slope and on to a level section, from which she was able — apparently still stunned — to drive away.

This approach to interpersonal relationships was not the normal one in North Carolina. The mode of speech was unfamiliar to me too. For example, some people might respond to my attempt to set up a meeting with a slow and elaborate, but inconclusive, reply: "Well... now... Hugh. ... Let us consult... our schedules, ... to see... whether or not... we can find… a time… that we could arrange…". I resisted the temptation to finish those colleagues' sentences — most of the time.

Another newly arrived visitor to North Carolina left a shop and heard "Y'all come back and see us, y'hear", the typical local farewell. The staff were confused when the visitor, unfamiliar with that expression, walked back in and said "Yes?"

Soon after my own arrival in Raleigh, an African-American lady approached me from the nearby aisle of a department store. "'Scuse me, sah", she said, "c'ny' tah-attaah". Luckily, before the number of requests to repeat what she had said could become embarrassing, her young son walked up carrying a necktie, and I realized that she must have wanted to see if it suited him and had asked me "Can you tie a tie?" Apart from the language barrier, she had chosen the correct customer to ask: my school uniform in England had included a tie — all day, every day. Certainly I could tie a tie!

I enjoyed my time in North Carolina, but was happy to return to Canada in 1974. Strict United States tax requirements had to be met before temporary residents were allowed to depart. Canadian immigration requirements were complicated too, because we arrived with two children born in the United States. Those matters contributed to considerable delays, and we entered Canada only minutes before our American visas expired (when we would have become "illegal aliens").

Crossing the border reminded me of the very different Canadian climate that I knew so well from earlier research, especially in the winter. Indeed, the subject of snow had come up during one coffee break in Raleigh, when I mentioned that snowplows in Ontario are identified by flashing blue warning lights (Figure 8). In a state where police cars have conspicuous blue roof lights (Figure 9), this information led to the drawled response from a departmental technician: "Well, … if a flashing blue light is chasing you round here, … it ain't a snowplow".

Jeroen Kransen (CC BY-SA-2.5)

Figure 8. Ontario snowplow, showing the blue warning light.

Alberto Rodriguez (CC BY-SA-3.0)

Figure 9. North Carolina police car, showing the blue roof lights.

Continued pursuit of Alfred Kinsey's first love: Status of the North American gall wasps and their parasitoids 100 years later

Y. Miles Zhang

Chances are that many people have heard of the name Alfred Kinsey for his ground-breaking, albeit controversial, research on human sexuality. A lesser known, but equally interesting (at least to me) fact is that he started his career as an entomologist, specializing in gall wasps (Hymenoptera: Cynipidae). Kinsey was extremely productive as a gall collector, having amassed more than 7.5 million specimens of gall wasps and their parasitoids from the USA and Mexico, which are currently housed at the American Museum of Natural History (Egan et al. 2018a). Long before the advent of cladistic methods, Kinsey built the first phylogeny of Cynipidae based on three morphological and seven biological features using this collection (Kinsey 1920).

Gall wasps are tiny, solitary wasps that inject their eggs into plant tissues, a process which induces tumor-like growths known as "galls" in order to provide food and protection for their larvae (Figure 1). When the eggs and a cocktail of secretions from the venom gland are inserted into the tissues of the host plant, they trigger a rapidly proliferating reaction in the plant's meristematic cells, creating this new gall around the wasp eggs. Recent transcriptomic work has shown that wasps can significantly alter the expression of nearly a third of the plant genome between the inner gall tissue and the plant tissue from which it was derived, effectively creating a novel organ on the host plant rather than simply modifying the plant tissue (Egan et al. 2018a). Although most gall wasps do not pose significant threat to tree health, certain species such as the Asian chestnut gall wasp (*Dryocosmus kuriphilus*) and the newly described *Zapatella davisae* can cause extensive damage to host plants, and are considered serious horticultural pests (Buffington et al. 2016).

Y.M. Zhang

Figure 1. Rose galls induced by *Diplolepis polita* on wild rose.

Most (~70%) gall wasp diversity lies within the tribe Cynipini, with over 34 genera and 1000 species worldwide associated with Fagaceae such as oak (*Quercus*) and walnut (*Castanea*) (Ronquist et al. 2015). These oak galls not only caught the eye of Kinsey, but inspired the creation of iron gall ink, which is made from the gallotannic acid extracted from oak galls. In their own small way, cynipid oak galls made their mark in the line drawings by Da Vinci, Van Gogh, Rembrandt, and even in the writing of many historical documents such as the U.S. Declaration

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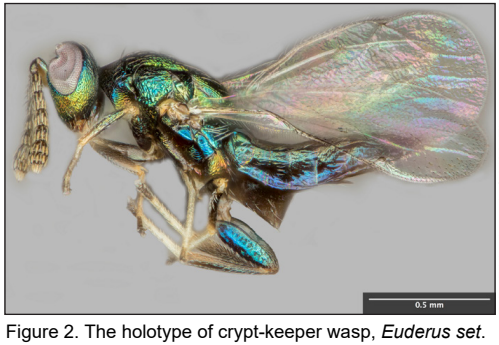
of Independence (Egan et al. 2018a). While the European species of oak gall wasps are very well studied, the North American fauna remains largely untouched since Kinsey's day. To further complicate matters, many species of oak gall wasps alternate their reproductive mode, which consists of a sexual and asexual generation cycle in a single year. Unsurprisingly, this alternation of generations has created taxonomic confusion in the past, as the adults of the two generations show different morphology, and often form distinct galls on different hosts.

The staggering morphological variation among cynipid galls is often species-specific, with varying size and coloration, often adorned with sticky or hairy surfaces, spikes, and toxic tissue layers. These variations are thought to have evolved in response to natural enemies, as the galls are susceptible to attack by other organisms that feed on either the tissues of the gall (inquilines), or on the larvae of the gall-inducer (parasitoids). Interestingly, many of the inquilines are cynipids that have lost the ability to make their own galls, and instead "cheat" by laying eggs into galls made by other gall wasps. This secondary loss of the ability to induce galls on their own was traditionally thought to have evolved only once, but the most recent phylogenetic study suggests this switch to inquilinism has evolved multiple times within Cynipidae (Ronquist et al. 2015). However, despite the latter being the most comprehensive phylogenetic study of Cynipidae to date, using 5 genes and over 100 taxa, the relationships among major tribes and the origins of inquilines remain unresolved.

Like their hosts, these gall associates are also poorly studied, but what little we know about their fascinating interactions is akin to science fiction. For example, the recently described crypt-keeper wasp (*Euderus set*, Figure 2), is aptly named after the Egyptian god Set, who trapped his brother Osiris in a crypt before killing him and cutting him up into little pieces. This parasitic wasp lays eggs into a developing gall. Its larva burrows into the host larva, then in an unknown way induces it to metamorphose. The adult thus formed chews its way to the gall surface months earlier than normal. However, the burrow opening is too narrow for emergence of the host, which dies with its head stuck in the opening. The crypt-keeper larva overwinters within the gall, slowly eating the host. It emerges next spring by chewing through the host's head, thus escaping the gall that it cannot tunnel through itself due to its weak mandibles (Weinersmith et al. 2017). Insects aren't the only organisms that take advantage of galls; the parasitic love vine (*Cassytha filiformis*) has been recorded attacking multiple galls using modified root structures called haustoria (Egan et al. 2018b).



R.D. Ridenbaugh & Y.M. Zhang.

Figure 2. The holotype of crypt-keeper wasp, *Euderus set*.

Y.M. Zhang

Figure 3. Adult *Eurytoma longavena* chewing its way out of the gall tissue.

My foray into the world of cynipid galls started during my master's degree program at Laurentian University, working on the parasitoids associated with Canadian rose galls (*Diplolepis*) with Dr Joe Shorthouse. Joe dedicated his academic career to the ecology and evolution of rose gall wasps, which is the second most diverse group of gall wasps after the Cynipini. My research focus was a revision of the Eurytomidae (Figure 3), one of

seven families of microhymenopterans that are associated with rose galls. Previous taxonomic work on the eurytomids associated with rose galls was largely focused on the USA species, and the identification keys were often inadequate to identify these morphologically-similar species. Collaborating with Dr Michael Gates at the National Museum of Natural History in Washington D.C., we were able revise the eurytomids using a combination of mitochondrial gene *COI* (aka DNA barcode) along with morphological characters visible using scanning electron microscopy. As a result of this study, some species originally given distinct names were recognized as being the same species, while a new species *Eurytoma shorthousei* was described, and named in honor of Joe (Zhang et al. 2014; Zhang et al. 2017). The work also resulted in a new identification key for both sexes of eurytomids, as previous studies have only provided keys for females. We also used a similar approach to build the first global phylogeny of the rose gall wasps *Diplolepis* spp. and their inquilines *Periclistus* spp. using DNA barcodes (Zhang et al. unpublished data). We determined the rose gall wasps likely originated from Central Asia, and subsequently invaded North America along with their host through the Bering Land Bridge (Zhang et al. unpublished data). However, extensive sampling of the Asian fauna is needed to confirm this hypothesis, as there are many undescribed species of *Diplolepis* and its enigmatic sister genus *Liebelia*, which are endemic to Asia. This future study will likely be a race against time, as wild roses are rapidly disappearing due to habitat loss and pest species such as rose stem girdler (*Agrilus cuprescens*: Buprestidae) which is having devastating effects on wild roses in Canadian prairies (Shorthouse and Larson 2010).

While DNA barcoding has certainly been the predominant tool used by taxonomists to aid in the identification of species in the past decade, the dawn of massive parallel sequencing has enabled users to generate genomic-level data with thousands of genes at an affordable rate. An additional benefit of many of these new methods is that they can also target older specimens with more degraded and fragmented DNA, including pinned specimens from over 100 years ago (Blaimer et al. 2016). It is an exciting time to reexamine the specimens and theories put forth by Kinsey (and subsequent workers), as many of the currently established genera are not closely related based on recent molecular studies. One common theme throughout studies on cynipids and their natural enemies is that we know very little about these tiny wasps, and there are likely many new species waiting to be discovered. Currently, there are 62 known species of Cynipidae in Canada, a number which will likely double given the number of genetically distinct clusters based on DNA barcode data (Bennett et al. 2019). Many of the natural enemies of these unnamed gall wasps will also likely be new, thus increasing the number of species and shedding light on the complex interactions between host plant, gall inducers, and their associates which Kinsey began to study almost a century ago. Only by continuing Kinsey's work of exhaustively collecting, rearing, and identifying gall wasps, can we establish frameworks for understanding the foundational evolutionary ecology questions such as drivers of speciation. This will not only help us identify endangered species, but also potential parasitoids that can be used for biocontrol of current or future gall wasp pests, as global trade, habitat loss, and climate change dramatically alter their ranges.

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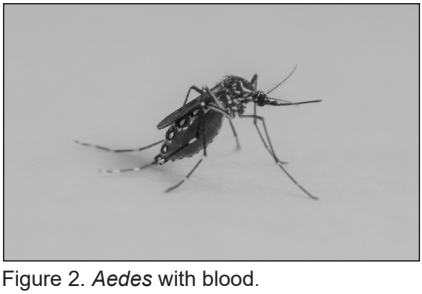
Multi-modal floral-foraging ecology of mosquitoes

Dan Peach

Sean McCann

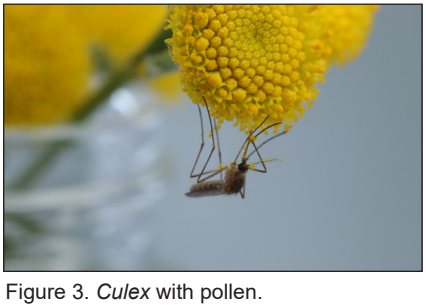
Figure 1. Biting *Aedes*.

Mosquitoes (Culicidae), buzzing, in hordes, biting incessantly, a nuisance like no other – not to mention the devastating impacts of disease caused by the pathogens they vector. We often view mosquitoes as blood-suckers that serve no other function than to make our lives miserable (Figure 1). The perception of mosquitoes as ecologically dispensable is often espoused in both the scientific and public literature. However, mosquitoes are essential players in the tapestry of life. Studying them will enable us to understand their community and ecosystem functions, and to eventually curb their vectorial capacity.



Adam Blake

Figure 2. *Aedes* with blood.



Mike Hrabar

Figure 3. *Culex* with pollen.

Pollination is a commonly overlooked ecological function of mosquitoes. Female mosquitoes are well known to consume vertebrate blood for egg development (Figure 2), but male and female mosquitoes also consume plant sugar, primarily floral nectar, often pollinating inflorescences in the process (Figure 3). This pollination function was observed as far back as the 19th century when a plant was aptly named mosquito flower, *Lopezia racemosa* (Müller 1873). There are also reports of specialist plants such as the small northern bog orchid, *Habenaria obtusata*, and the catchfly, *Silene otites*, that are pollinated exclusively by mosquitoes and small lepidopterans (Dexter 1913; Brantjes and Leemans 1976). Moreover, some arctic plants in their quest for pollination, such as the white mountain-avens, *Dryas integrifolia*, make use of vast hordes of nectar-hungry mosquitoes (Kevan 1972). Recently, our own research revealed that some generalist flowers, such as the common tansy, *Tanacetum vulgare*, are pollinated by mosquitoes

Dan Peach (dan_peach@sfu.ca) is fascinated by how insects perceive and interact with the world around them and he loves the challenge of harnessing such information to create applied solutions for integrated pest management. In addition to his thesis research on the sensory ecology of mosquitoes, Dan participates in numerous bioblitzes and aids in curating the mosquito collections of museums as part of his goal to update our knowledge of the mosquito fauna of Western Canada. Dan was a participant in the Graduate Student Showcase at the 2018 JAM in Vancouver. He defended his PhD thesis at the end of April 2019 and is seeking a postdoctoral position.

(along with many other insects) (Peach and Gries 2016). We anticipate that this may be true for many other members of the Asteraceae with a similar floral morphology.

Multi-modal cues (including odourants and CO_2) guide mosquitoes to vertebrate hosts but only floral odourants were thought - until recently - to attract mosquitoes to inflorescences (Foster 1995; Nyasembe and Torto 2014). We used the yellow fever mosquito, *Aedes aegypti*, the northern house mosquito, *Culex pipiens*, and the mosquito-pollinated common tansy, *Tanacetum vulgare*, and common hawkweed, *Hieracium lachenalii,* as model organisms to study floral foraging of mosquitoes. At first, we identified the odourants that attract mosquitoes to tansy inflorescences (Peach et al. 2019). A 20-component synthetic blend of inflorescence odourants was attractive to both female *Ae. aegypti* and *Cx. pipiens*. Intriguingly, many of these odourants also emanate from the microbiome of humans, and an odour blend comprising only components shared between human and inflorescences was attractive to mosquitoes. This prompted us to hypothesize that other ostensibly vertebrate host cues may also be part of the inflorescence gestalt.

Vertebrate-derived CO_2 and dark colours play important roles in the attraction of host-foraging mosquitoes (Sippell and Brown 1953; Gillies 1980) and plant-derived CO_2 affects foraging behaviour of both haematophagous and phytophagous insects. The sand fly, *Phlebotomus papatasi*, for example, uses differential CO_2 emissions from sugar-rich and sugar-poor plant tissue to locate the former (Schlein and Jacobson 2008), and the tobacco hornworm, *Manduca sexta*, uses nocturnal CO_2 emissions from nectaries of the sacred Datura, *Datura wrightii* (Goyret et al. 2008)animal pollinators are attracted to flowers by sensory stimuli in the form of pigments, volatiles, and cuticular substances (hairs, waxes, to obtain nectar meals. During diurnal photosynthesis, plants are net CO_2 sinks but at dusk cease photosynthesis and become net producers of CO_2. The volume of net CO_2 produced by plants is within the range that is detectable by vertebrate host-seeking mosquitoes. After we demonstrated CO_2 emission from tansies at dusk, we added a flow of CO_2-enriched air to a synthetic floral odourant blend, and thereby enhanced the blend's attractiveness (Peach et al. 2019). By occluding, or not occluding, inflorescences with cheesecloth, we also tested the effect of visual floral cues and found that visual and olfactory cues in combination are more attractive to mosquitoes than olfactory cues alone (Peach et al. 2019). Inspired by these results, we further examined characteristics of visual floral cues. Because mosquitoes could sense UV wavelengths in our electroretinogram recordings, we studied visual floral cues not only in the human-visible but also in the UV-range. For these studies, we focussed on inflorescences of common hawkweed, *Hieracium lachenalii,* which exhibit patterns of UV-absorption and UV-reflection. Behavioural bioassays revealed that UV inflorescence cues enhance the attractiveness of inflorescence odour. In the presence of natural floral odour, female *Cx. pipiens* were attracted to floral patterns of UV-absorption and UV-reflection but preferred uniformly UV-dark inflorescences (Peach et al. unpublished). Moreover, *Cx. pipiens* females preferred UV-dark and black inflorescence models to UV-dark and yellow inflorescence models (Peach et al. unpublished). Our data combined demonstrate that nectar-foraging mosquitoes not only respond to floral odor but also to CO_2 and (dark) visual cues, as do vertebrate host-foraging host mosquitoes.

Haematophagy in mosquitoes is thought to have evolved from either entomophagy or phytophagy of mosquito ancestors (Mattingly 1965; Lehane 2005). Our data reveal convergent floral and vertebrate foraging cues (odourants, CO_2, dark visual cues) and thus support a phytophagous origin of mosquito haematophagy.

Multimodal integration of CO_2, odourants and visual cues drives mosquito attraction to humans and, according to our study, also drives mosquito attraction to inflorescences. Like many other pollinators, nectar-foraging mosquitoes exploit multi-modal floral cues to locate inflorescences The potential of synthetic floral odourants as mosquito lures is well-known (Foster 2008;

Nyasembe and Torto 2014). However, interactions among floral odourants, CO_2 and visual cues have not yet been fully explored for optimal lure and trap design.

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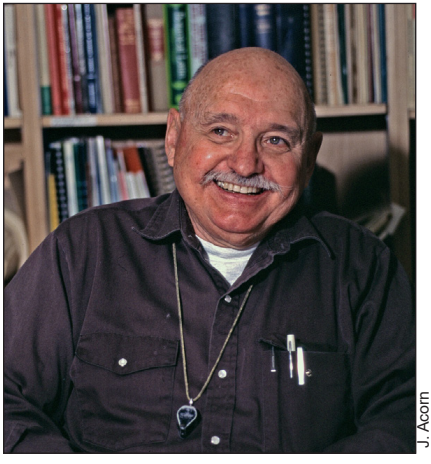
George Eugene Ball (25 September 1926 – 12 January 2019)


J. Acorn

George Ball at his desk at the University of Alberta in 1998.

The winter of 2019 will be remembered as a cold one in western Canada, made to seem a little colder on 12 January with the sudden passing of Professor George Eugene Ball, a leading Canadian entomologist for more than a half century. He boarded the train to the great beetle collection in the sky and its adjacent carabid country while out on his daily walk in Edmonton. Starting in 1954, George enjoyed a long and happy professional life based at the University of Alberta, during which he sponsored 40 graduate students and a number of Postdoctoral Fellows. He made large and lasting contributions to entomology in Canada and to the international scientific effort to organize and understand the evolution and ecology of carabid beetles. Although he was principally known as an academic systematist with research focused on classification, phylogeny and zoogeography, to those who knew him well George was a thoughtful, well-informed and interested partner in discussion of anything biological, all matters of general scientific principle, social issues and of life in general. His profound influence on others sprang from the exceptional reach of his interests, his principled depth of character, his generosity, his enthusiasm for his chosen life's work and his approach to life in general.

George was born on 25 September 1926 in Detroit, Michigan, the only child of Eugene and Mary Ball. His mother died tragically of kidney disease when George was 11 and his father, who worked in a lumber yard, passed on in 1951. Thus, George was without the influence of a primary birth family for much of his life. Formal schooling and the Boy Scouts were central aspects of his life while growing up in Detroit. He finished his public education at St. Theresa Primary School and the Catholic Central High School where he described the teacher-priests as being 'as tough as nails'. Nonetheless, he was well educated and credited reading a chapter in Darwin's *Origin of Species* in a high school English course as the main factor that tilted him toward an evolutionary perspective. George applied this perspective usefully in his subsequent career, and was perhaps among the early devotees of phylogenetic perspectives in systematic entomology as a result. Involvement in the Boy Scouts fostered and supported his growing interest in natural history, and the insect collection that he built in pursuit of the merit badge in 'Insect Life' paved the way for his life as an entomologist. As he finished high school, this interest prompted him to write to J. Chester Bradley, a hymenopterist and one of the authors of the pamphlet for the merit badge, to enquire about pursuing entomology as a career. Subsequently, George ended up in Ithaca, New York, living in Bradley's home as a first year student at Cornell University.

The United States entered World War II during his first year of study at Cornell. George felt the duty to respond to the call but needed his father's permission to enlist before the age of 18. Having agreed that he would complete his first year before his father would sign, George enlisted in the Marine Corps in September 1944, just before his 18th birthday, and after basic training became a rifleman assigned to the First Marine Division. After being organized on Guam, his company was injected as replacement soldiers into the raging Battle of Okinawa, the bloodiest conflict of the Pacific Theatre. There he experienced first-hand combat duties. In one engagement,

his life was saved by his helmet; and he was later awarded a Purple Heart for the head wound he sustained (self-described as recognition of his 'failure to keep head down' (Rice 2017)). After the fall of Okinawa, George's Division was posted to Tientsin, China, where they disarmed and removed Japanese forces from North China. George's platoon served as MPs in Tientsin working mainly to keep their fellow marines in line, something highly consistent with his sense of fair-play and adherence to principle. In addition to the Purple Heart, George also received a Presidential Unit Citation for the Okinawan Campaign, the Asiatic-Pacific Theater Medal, and the Victory Medal for his contributions to the allied efforts in the Pacific.

After mustering out of the Marines in 1946, George returned to Cornell to complete his undergraduate degree (AB) with support under the G.I. Bill. During this period, George met Ralph Chermock, a charismatic young doctoral student working on Lepidoptera at Cornell, who went on to accept an appointment in entomology at the University of Alabama. In 1948, George and fellow Cornell student and coleopterist, Barry Valentine, followed Chermock to Tuscaloosa to pursue Master's degrees. George's degree was officially conferred in 1950. His time in Tuscaloosa featured happy field outings collecting and identifying insects with Chermock and his fellow 'Chermockians', a group that included both Barry Valentine and Edward O. Wilson. Chermock was enthusiastic about entomology and spent much time in activities focused on insects with his students, a pattern of interaction that George eventually adopted as a signature feature for his own pedagogic relationships.

After completing the work for his MS at Alabama, George returned in 1949 to the entomological Mecca of Cornell as a doctoral student, first under the supervision of the lepidopterist, W.T.M. Forbes, and the hymenopterist, V.S.L. Pate. However, early during pursuit of his degree Forbes retired and Pate left Cornell, requiring a switch of supervisors to another lepidopterist J.G. Franclemont, for whom George often expressed lasting appreciation, and another hymenopterist, H.E. Evans. George had previously become fast friends with Evans during his post-war undergraduate years at Cornell, and in fact, the two of them had co-invested in a car and made an extended collecting trip to the American southwest the summer before George moved to Alabama. By this time, it should be noted that George was already a dedicated and determined coleopterist, especially interested in the Carabidae because according to him, 'they were easy to find, the first group in the key' and he had become 'completely wrapped up in trying to put the right names on ones that (he) had collected'. George's well-known general expertise and broad interest in entomology, reflected in his willingness to sponsor students working on a variety of taxa, no doubt reflects these experiences of his early life of working closely with enthusiastic entomologists of many specializations.

At Cornell, George met and fell in love with Kay Fetherston, a doctoral student from London, Ontario, who was pursuing ornithology at Cornell. They were married on 6 September 1949. Kay was a remarkable woman and an excellent life-long companion for George. They frequently participated in entomological meetings together and Kay became a formidable insect collector in her own right. Her strong interest in biological sciences supported George's entomological work, prompted bird-watching as an avocation among many of his students and made discussions with students and visitors something of a family affair. Furthermore, Kay was central in making the Ball home a welcoming hub for many biologists from near and far, contributing much to a sense of vibrant intellectual community in Edmonton. Kay completed her doctoral thesis about pheasants at Cornell in 1949, and then gave birth to two sons, Eric and Stephen, while George worked on his own doctoral thesis entitled "A taxonomic study of the North American Licinini with notes on the Old World species of the genus *Diplocheila* Brulle (Coleoptera: Carabidae)", and successfully defended it in 1954. The thesis described new species, then seen as the primary aspect of taxonomic work, but most notably advanced phylogenetic hypotheses based largely

on formal comparative investigation of morphological character systems. Although George was a consummate 'bagger and tagger' of specimens, he insisted that professional systematic work should contain more, and in his earliest work sought to establish connections between classification and evolution as revealed by his early approach to formal character analysis.

As George finished his dissertation, Kay yearned increasingly to return to Canada. Upon writing to one of her former professors at the University of Western Ontario, she learned about a position in entomology at the University of Alberta and encouraged George to apply. He did so and was offered the position, and thus, soon after his thesis had been accepted, the Ball family moved to Edmonton. George took up an academic position in the Department of Entomology in 1954, from which he faithfully served the University of Alberta well, contributing significantly to the local intellectual milieu for the next 65 years.

George relished field work and was an excellent field biologist. He collected widely in Canada and Alaska, travelling extensively in 1956, 1958 and 1962 with the eminent Swedish Coleopterist and dear friend, Carl Lindroth, and engaging in the foundational field work for Lindroth's highly influential treatise entitled '*The Ground-beetles of Canada and Alaska*'. Fieldwork and beetle collecting also took him on travels to South America, the West Indies and New Guinea, and on 19 extended trips to the American Southwest and throughout Mexico. Over a 40-year period, George amassed an invaluable and extensive collection of Mexican carabids. Although his original dream of treating the entire Mexican fauna remained incomplete, his own work and that which he encouraged from others has made extensive use of this collection, and as a result there is a basis for study and understanding of the Mexican carabid fauna. The trips to Mexico included many of George's students and colleagues, helping them learn the tricks and trade of field biology focused on ground beetles in the context of happy and unforgettable experiences well-steeped in the exuberant diversity of Mexican culture.

J. Spence

George Ball in the field collecting arboreal carabids on the Cofre de Perote, Veracruz, Mexico, in 1999.

George advanced our knowledge of the taxonomy, phylogeny, and biogeography of carabids through tremendous productivity and through rigorous, detailed, in-depth analyses. In a career that lasted over 65 years, George explored the diversity of many different lineages of carabids, documenting his results in over 4700 published pages. He turned taxa that were previously poorly understood and chaotically organized into clades with well-crafted maps, thereby opening those groups up to future research. In the process, George also explored their evolutionary and natural history to bring them fully into the view of modern biology. Most notably, he often tackled some of the more difficult groups with confusing patterns of variation and unclear species boundaries; we suspect he did this out of a sense of both adventure and duty, as these were challenging groups in which few dared to tread, but George knew they needed study.

In research George was an innovator, developing new methods and embracing new ideas if his keen intellect judged them worthy. His doctoral dissertation on licinine carabids, published in

1959, was a synthesis without equal at the time because of the breadth of characters he studied (including his novel examination of mouthparts and female ovipositors), and the thoroughness of this examination (including detailed morphometric measurements and comparisons, which was pathbreaking then). His careful reconstruction of the phylogeny of licinines used methods he developed that foreshadowed cladistics, parsimony-based methods, and the arrival of Willi Hennig's *Phylogenetic Systematics* (1966) into the English-speaking world. George received his copy of Hennig's work in May 1967, and quickly embraced some of its core arguments, becoming one of the earliest proponents of cladistics in North America (Hull, 1988). George's 1960 chapter on Carabidae in Ross Arnett's *Beetles of the United States* (Ball 1960) had tremendous impact on studies of carabid beetles, forming the groundwork for much of the research done in North America since 1960. He set a standard for systematic work throughout his career, and continually tried to improve all aspects of his work, including visualizations of character state distributions and other results. As one example among many, Ball and Shpeley's (1983) revision of the eucheiloid Pericalina is among the most detailed morphological studies ever done in carabid systematics, with novel graphics designed to convey more clearly the patterns observed. It should be noted that George's fruitful collaboration and excellent personal working relationship with Danny Shpeley, whom he had hired in 1974 as Assistant Curator and technician in charge of the E. H. Strickland Entomological Museum, led to exemplary systematic treatments of more than 20 carabid groups, and is surely an effective model for such partnerships in the academy.

Many of George's significant contributions to entomology are found in papers that do not include him as an author, as George was tireless in helping others complete their works through thoughtful and detailed reviewing, careful editing, or even extensive rewriting, without expectations of compensation. In fact, when pressed to be a co-author in recognition of extensive effort, his usual response was that an acknowledgement would be sufficient as he 'really hadn't done much'. His research contributions are also to be found in the collections of the world, for George felt it was his duty to identify the many thousands of specimens that were sent to him from museums around the world, and in that way small portions of the tremendous knowledge he had of beetles has been captured on insect pins far and wide.

Working as a university-based academic, George also had teaching responsibilities and he welcomed and excelled at these. In his early days at the University of Alberta, he taught undergraduate courses in General Entomology, Toxicology, and Insect Morphology and Physiology, but later in his career focused on his speciality offering in Insect Systematics. This course was a much appreciated among senior undergraduates and graduate students across campus, especially because of its focus on phylogenetic thinking. Nonetheless, there can be no doubt that George did his most outstanding work with graduate students, having guided a total of 40 successfully over the course during his career. George was an empathetic mentor for his students, generally preferring the self-description of 'sponsor' to 'supervisor', consistent with his treatment of students as junior colleagues and his commitment to the idea that graduate students were not to be 'the hands of the master'. A significant part of his work with students was accomplished in one-on-one interactions focused on encouragement and open communication, often in the context of bi-weekly meetings. Especially during his time as Chair of the Entomology Department, he confided that these meeting often provided a most interesting high point of his week, something much enjoyed as an opportunity to contemplate real entomology and a break from administrative drudgery. George also prompted and organized evening discussion sessions with his students and other evolutionary minded colleagues on campus. These were generally focused on recent books about contentious new issues in systematics and evolutionary biology and will be long remembered by all students who participated as valuable components of their development. Most importantly, George fostered for those around him an appealing sense of the

academic lifestyle as being devoted to intellectual activity that was well connected to conceptual issues of the day. His acumen as a mentor for developing systematists and the characteristics that prompted the unusual affection for George among his students were summarized by Hull (1988, pp. 370-371).

George's service and organizational contributions to his various communities were legion. His character was that of a natural leader, and people were happy to walk with him in directions that he defined through collective dialogue that he encouraged and helped bring to focus. He served in a defining role as Chair of the Department of Entomology for a decade (1974-1984). During this time he took on much of the administrative load himself, seeing his goal as 'freeing his colleagues to devote their time and energy to tasks in teaching and research', which he regarded as the central purpose of the university. George had an enviable ability to combine his genuine personal egalitarianism with a sense of organizational structure in running the Department. Everyone deserved and received his personal respect and warm friendship, but at the same time, smooth working relationships were promoted by his expectations of clear commitment of all staff and students to being effective in well-defined roles. Largely for this reason, we think, the Department ran smoothly, prospered and enjoyed international presence and impact that far exceeded its size under his leadership. He was also Curator of the Strickland Museum (1960-1992) and the active Editor of the Department's international journal *Quaestiones Entomologicae* from 1974 through its closure in 1990 (as a result of drastic university-wide budget cuts). As those who knew his pen will understand, he was a demanding and attentive editor, but oversaw publication of many influential papers in *Quaestiones*, especially in the field of systematics. George was also an active member of five entomological societies and a number of additional professional organizations. He served as President of the Entomological Society of Alberta (1957-58), the Coleopterists Society (1972-73) and the Entomological Society of Canada (1981-82). He was a founding member of the Biological Survey of Canada and guided its early work as Chair of the Scientific Committee (1983-96). He was a member of the NSERC Grant Selection Committee in Population Biology, serving as its Chair during 1987-88, and the Canadian representative to the Council for International Congresses of Entomology (1980-1996). As testament to the wide understanding of his wisdom as an academic, George also served as an invited external reviewer of many departments, institutions and programs.

Although George retired officially in 1992 at a time when mandatory retirement was still in force at the University of Alberta, his life changed very little as a result. It was a time of budgetary crisis at the University and, it was not possible to fill a position in systematic entomology immediately. Thus, George simply covered the gap until a tenure-track professorial position became available and was filled. He was in the Department working full days whenever he was in Edmonton until he and Kay moved into a retirement community at Canterbury Manor in Edmonton. Kay passed away in August 2014, and although George's time in the office was reduced after that, he still maintained a remarkable presence on campus interacting closely with students and colleagues. At the Manor, George became re-acquainted with Carol Paetz, whom he had met years before in the context of serving as a member of her late husband's supervisory committee. Carol brought renewed joy and richness to George's life. They were married at the Faculty Club in June 2017 and enthusiastically enjoyed life together with many family members and friends until the end.

It would be difficult to overstate the breadth of George's influence on the development of entomology in Canada, and on the study of ground-beetles internationally. His own work was creative, voluminous and of high quality. He authored or co-authored more than 130 publications and 5 edited books. In addition to these impressive contributions, George contributed enormously to the development of a cadre of excellent students who became international leaders in their

own right. His mark on Canadian entomology has been enormous and his international status as an insect systematist brought much attention to Canadian efforts. This ensured that his students, colleagues and associates had opportunities borne as fruit of such academic networks. George worked with the best and brought them into connection with others in his orbit. Largely through the force of his personality, strong connections were developed between the productive and innovative European school of carabid ecology and the North American school of carabid systematics that blossomed under George's influence. George was well recognized for his efforts through the award of the Entomological Society of Canada's Gold Medal in 1980, and election as an Honorary Member of the Coleopterists Society (2003) and the Entomological Societies of Canada (1994), Alberta (2000) and America (2005). His carabidological and departmental colleagues, with whom he enjoyed especially warm and friendly connections, honoured him with a retirement symposium in a Festschrift published as a special issue of *The Canadian Entomologist* in 1994, and with two 80th birthday symposia (Pittsburgh, Pennsylvania, and Blagoevgrad, Bulgaria) and a gala 90th birthday celebration and carabidological symposium in Athens, Georgia.

In conclusion, George was a wonderful human being, generous and empathetic in his personal interactions with others, and a unifying big-picture force in the holistic study of carabid beetles. He was both a steely-eyed scientist who challenged his own beliefs and inferences head-on against Nature, always looking face-on into reality. Yet this professional rigour coexisted with and was tempered by an all-encompassing compassion and consideration for other people. He was a much loved professor and will be missed and most fondly remembered both for his science and for his warm interactions with others. In short, George Ball was a most uncommon man, a steadfast friend to many, an excellent entomologist and an inspiration to all who were fortunate to know him.

George is survived by his second wife Carol and her large family, and by his children Eric (Beverley) and Stephen, grandchildren Stephanie Heming (Arthur) and Simon, and his great grandchildren Clara, Miles and Brandt. George's extended family also includes many nieces and nephews as well as their children and grandchildren.

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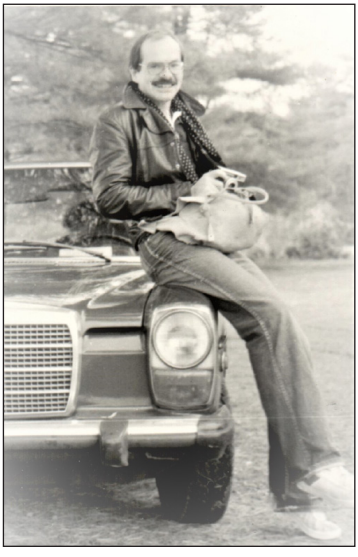
James (Jim) Eugene Corrigan
(21 December 1952–26 January 2019)


R. Bennett

Jim Corrigan, October 1983, collecting leaf-miners near Norton, Jackson County, North Carolina

Jim's earliest years were spent with his parents and younger brother in the Gatineau River valley, on the Quebec side of the Ottawa River, just north of Ottawa. This at least partially idyllic rural life drew to a close in the mid-1960s: before Jim became a teenager, his father Frank was dead and his mother Marjorie (née Clark) moved south with her two sons to the big city. While Jim was in high school at Ottawa's Glebe Collegiate his mother died, too. For 2 years Jim and his brother Ken were on their own in Ottawa South where Jim managed their day-to-day lives with the help of some charitable neighbours. Subsequently, a brief spell in the care of an uncle back in the Gatineau did not sit well with Jim and, as soon as he turned 16, he returned to Ottawa to live on his own and finish high school at Glebe Collegiate. Independence and self-motivation from an early age…

At the start of his Glebe years Jim was shy and reserved, seemingly an unlikely candidate for significant academic and athletic achievement. But beneath his quiet demeanour and teenage gangly body lurked a great analytical mind, a strong desire to achieve, and a highly competitive but compassionate and humanist philosophy of life. To say nothing about a wicked sense of humour and unselfconscious individualism. These characteristics were all obvious by the time he graduated from Glebe Collegiate: his academic success allowed him easy acceptance into the University of Guelph in 1972 and by then he was already well-known in Ontario as a determined bicycle racer and an excellent curler. Jim was highly competitive in the saddle and on the ice but kind-hearted and empathetic to his rivals, friend and foe alike, at the end of the race or match.

From 1972 through 1980, Jim lived in Ottawa and Guelph, alternating between earning a living in Ottawa and working on his Honours BSc in Environmental Biology at the University of Guelph. During this period he fed his passion for bicycling by opening (with backing from a couple of "silent partners", one a biking enthusiast on the entomology faculty at the University of Guelph) a bike shop, Southpaw Cycles, on Bank Street in Ottawa, and racing bicycles in various events around eastern Ontario. (Check out this 1976 Glebe community newspaper for a Southpaw Cycles article, advertisement, and photos: http://www.glebereport.ca/wp-content/uploads/1976/12/Glebe_Report_1976_06_05_v04_n06.pdf.) He also became a formidable curler, playing on various competitive teams in Guelph and Ottawa (including Ottawa's notorious "coma crew"), advancing to the Ontario men's provincial super league championship several times, and winning it in 1975.

While pursuing his undergraduate degree at the University of Guelph, Jim discovered entomology, the second great passion in his life after competitive sports. In the 1970s, in addition to its robust reputation for economic entomology, the Department of Environmental Biology was at the apex of a golden era for the study of classical natural history. Central to this was a group of faculty members, a majority of whom were wrapping up productive teaching and research careers begun at the end of WW II, who believed that all entomology students should have a

comprehensive understanding of insect taxonomy, comparative morphology, physiology, ecology, and behaviour. Under their guidance Jim pursued entomological knowledge with the same zeal that drove his interest in competitive sports. Like many entomology students at Guelph at the time, Jim developed a keen interest in the taxonomy and biology of a particular group of insects. In his case it was leaf-miners, especially gracillariid "leaf blotch miners." This was closely coupled with a strong interest in biological control and resulted in Jim becoming an important researcher and lab technician in the Department of Environmental Biology's biocontrol lab before he had obtained his BSc in 1980.

After graduation, Jim continued to work at the Guelph lab through the mid-1980s until he moved to New Jersey to pursue graduate research in biocontrol at Rutgers University. He earned his MSc there in 1988, studying the biology of a eulophid egg parasitoid. In that short time span, he also made a very successful inroad into American competitive curling, playing with a men's team that went to the United States national championship and, losing in the final match, narrowly missed the prestige of representing the US at the world championship.

Following his successful incursion into the US, Jim moved to Quebec City to start a PhD program at Université Laval. There he quickly learned to speak colloquial French with a delightfully distinctive accent. For a variety of good reasons, however, he aborted the pursuit of his PhD early on and returned to Guelph in 1990 to take on the teaching and operational biocontrol research responsibilities that would define the mid portion of his career and take him well into the first decade of the new millennium.

Jim's efforts at the Guelph biocontrol lab in the 1990s initially focused on collaborative development of a *Trichogramma* egg parasitoid for management of *Choristoneura* budworms. This work, however, was soon eclipsed by his involvement early in the decade with the Ontario Ministry of Natural Resources' effort to control purple loosestrife (*Lythrum salicaria*) in provincial wetlands using *Galerucella* (now = *Neogalerucella*) beetles. The loosestrife control program was established at the Guelph lab in 1992 and by the next year Jim and his colleagues were actively rearing and releasing beetles at loosestrife sites across southern Ontario. By the time active implementation of the program was terminated in 1997, hundreds of thousands of beetles had been released at more than 200 sites across southern and eastern Ontario and west to Georgian Bay. By then, the beetles had formed an advancing front, moving steadily northwards and westwards into new loosestrife territory, aided by the translocation efforts of a number of volunteer organizations. Jim continued to monitor the spread and establishment of beetle populations, as well as the reduction of purple loosestrife populations to very low levels, across Ontario until 2005. From its inception, this venture was largely Jim's "baby" and is one of the best examples of a successful classic biological control program: well-planned, organized, implemented, monitored, and documented.

Starting in 1997 Jim also took on undergraduate and graduate teaching duties in the Department of Environmental Biology at Guelph and found time to earn a BEd degree from the University of Western Ontario. His lectures in entomology and applied environmental studies were well-attended and consistently earned him high instructor approval ratings. And, although he wasn't piling on the miles in a bicycle saddle all that much anymore, Jim was still very active in competitive curling, culminating in his team winning the 2005 senior men's (Jim was by then over 50 and officially an old geezer) Ontario provincial championship. During this era Jim's curling colleagues gave him the affectionate sobriquet "The Bugman" because of his passion for entomology. Additionally, his reputation was cemented as probably the most originally dressed curler ever and for being able to change his intensely competitive on-ice demeanour quickly to one of affability, comradeship, and great good humour at the end of a match (see "Remembering Jim Corrigan, The Bugman" https://www.facebook.com/groups/2296530867260759/).

The 1990s also saw the birth of Jim's last great passion in life: fly-fishing for Atlantic salmon. From relatively humble beginnings angling for brown trout in streams flowing into Lake Huron, Jim pursued fly-fishing with the same passionate intensity that characterized his approach to all things in life that mattered to him. He applied his entomological knowledge, critical eye, and attention to detail to the arcane art of fly-tying and soon became a master of that skill. With his athletic style, feel for technique, and playing the "long game" developed in his years of competitive sports, it didn't take him long to meet the challenge of fishing for Atlantic salmon in the tricky rivers of the Gaspésie and New Brunswick. This was the defining passion of the last 20 years of Jim's life.

A. Larsen

Jim Corrigan, July 2015, catch-and-release harassing an Atlantic Salmon in Ladder Pool, Dartmouth River, Gaspésie, Québec.

In 2006 Jim's life changed again when he was head-hunted by the British Columbia Ministry of Forests to provide extension expertise in cone and seed insect and disease management to the province's extensive network of conifer seed orchards and seed production facilities. Jim closed out his entomological career with this endeavour, based out of Vernon, British Columbia, retiring in early 2018. His days of highly competitive curling were over by the time he moved to British Columbia but Jim remained happy playing the game on a more relaxed level with new friends and colleagues in his Vernon community. His devotion to hard-core fly-fishing however, remained unchanged and, in most of his years in British Columbia, Jim usually managed to spend a few weeks on the rivers of New Brunswick and the Gaspésie matching wits with Atlantic salmon. Through this period in Jim's life, his deep understanding of insect biology, insect/plant interactions, and experimental design and analysis coupled with his engaging personality and increasingly original life style and taste in clothing earned him the lasting respect and affection of his adopted British Columbia community of clients, peers, and friends.

All good things come to an end and for Jim this process commenced in earnest in late 2016. In 2009, the passing of his sole sibling (whom Jim had watched over since the demise of their parents) deeply affected Jim and left him with no close relatives. Jim started thinking seriously about how to spend the rest of his life. The answer came simply and quickly (and was no surprise to his friends): fly-fishing for Atlantic salmon! By 2015 Jim had purchased a home on the banks of the Miramichi River in Blackville, New Brunswick. With a well-known salmon pool literally in his backyard this was a dream come true for Jim and he made plans to retire and move there in 2018. His 2016 Gaspésie summer fishing trip was marred by the first indication his health was failing. Tests in British Columbia in September 2016 were followed in November by radical surgery related to advanced cancer in some major organs. Further significant surgery followed in February but, after more tests in July 2017, Jim was his usual cheerfully optimistic self and proceeding with the retirement plan. He even found the energy for fishing trips to the Restigouche and Miramichi Rivers in August and September.

Curling, however, was another matter. Jim continued to enjoy the sport until the surgeries killed his ability to throw a curling rock. The eternal optimist (taking his "Always Look on the Bright Side of Life" philosophy from Monty Python's The Life of Brian), Jim noted at the time "It's

tough to complain ... I got 49 great years out of my sport, and retired with my knees and hips intact."

By early 2018 implementation of Jim's retirement plan was well underway and he was disposing of his material wealth not deemed essential to his future life as a gentleman fisher. His extensive entomology library and collection of British Columbia insects were donated to the Entomological Society of British Columbia and the Royal British Columbia Museum, respectively. His important collection of leaf-miners was packed for donation to the Canadian National Collection. Likewise, his world-class collection of fishing literature (much of it antiquarian, historical, practical, or of technical importance, some of it quite arcane or simply out-and-out weird) was ear-marked for donation to the Atlantic Salmon Museum in Doaktown New Brunswick. In mid-May a few close friends helped Jim pack what remained of his hoard into a U-Haul truck and, towing his Honda Element behind, Jim cut his ties with British Columbia and headed the truck east towards his new home. There were tears when he left…

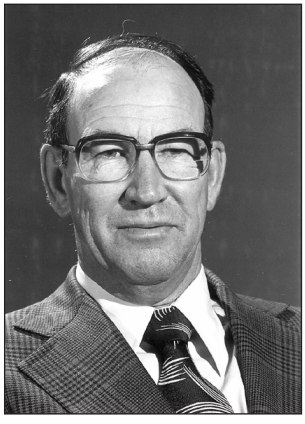
A wonderful trip, mostly on secondary roads, across spring-time Canada ensued; Jim had not before experienced this great Canadian rite-of-passage. Life returning to the land after a lengthy winter, beautiful weather with long sunny days, explosions of wildflowers and insects, flocks of migrating birds, and the real joy of stopping to visit with old friends to reminisce and drop-off mementos of a life well-lived. Jim and his hoard arrived in Blackville, New Brunswick in late May and from then until the end of the fishing season in October, Jim achieved all the primary goals he had set for the last part of his life: he spent a final full season fly-fishing for Atlantic salmon on east coast rivers (70 days on the water!), became a licensed professional New Brunswick fishing guide, turned his home into a fishing lodge, and hosted/guided groups of his closest friends "from away" on fly-fishing adventures on the Miramichi. Things were going well and, looking to the future, Jim optimistically booked July 2019 dates for fishing on the Gaspésie.

In December, however, Jim remarked to his friends that he had "not been feeling 100%" and was "putting his affairs in order." Despite realizing cancer was going to be with him until the end (and the end was approaching faster than he had expected), in characteristic fashion he stated "I'm not terribly bummed out by these developments." He deteriorated rapidly in the New Year, and his last couple of weeks were difficult. He was, however, able to remain in his Blackville home until less than a day before he died. On 25 January, two of his closest friends helped transfer him into palliative care in Fredericton and, less than 12 hours later in the wee small hours of 26 January 2019, he passed with one of them watching over him.

Jim loved curling, bugs, fly-fishing, great blues and jazz, the pursuit of knowledge, a good debate, baseball and the Blue Jays, sleeping in the bathtub (having some kind of internal temperature control that woke him up to add hot water as needed), and (most importantly) his friends. Although he was a life-long bachelor, comfortable in solitude, Jim loved people and never lacked for female companions (at least two of whom broke his heart). His life alone was by choice. Jim had no traditional family to mourn his passing; his many friends were his family and have shouldered that role.

Jim lived life his way, with unique panache. He was a fierce competitor with strong convictions and would not be swayed if those convictions didn't fit with politically correct ideas of the time. As one close friend remarked at his passing "He was always a pleasure to be around and spoke the truth." It is a measure of his strength of character that Jim, without parental or other family guidance, completed high school, had a productive academic and athletic life, developed a successful career in applied entomology, and inspired not only younger students and athletes but his peers as well.

Robb Bennett (Victoria, BC), Bruce Gill (Woodlawn, ON), Brent Kirkham (Perth, ON), Kevin Marsh (Toronto, ON), Lynne Dee Sproule (Ottawa, ON), Paul Welsh (Ottawa, ON).



Charles Harvey Craig (1924–2019)

Charles Harvey Craig (Harvey) was born in Foam Lake, Saskatchewan, on 4 June 1924. He is fondly remembered for his many contributions to forage crop entomology during his almost 40-year research career.

Following his service with the Canadian Navy in World War II, he obtained his BA from the University of Saskatchewan in 1949, and promptly joined the Dominion Entomological Laboratory in Saskatoon. His research role from 1949 to 1956 related to the agro-ecology of legume crop pollinators. This included the systematics of bumble bees and leaf-cutter bees, housing and propagating bee colonies, bee nesting and foraging behavior, and documenting bee pollination efficiency.

His role as a forage crop entomologist was greatly expanded in 1957 to include the biology, ecology and management of insect pests of forage and grass crops in western Canada. The major pests of concern were the alfalfa plant bug, sweet clover weevil and lygus bug. Following up on life history and population ecology studies, Harvey took an integrated approach to the management of this pest complex. He quantified pest population damage potential, screened insecticides, and developed biological control options, all the while minimizing their potential negative impact on the beneficial insects (most notably pollinators).

In addition to his investigative research expertise, Harvey was also a major contributor to forage crop extension, providing timely integrated insect management advice to growers and the seed crop industry. He was honored by the Saskatchewan Alfalfa Seed Producers Association prior to his retirement in 1987.

During his career, Harvey contributed significantly to our provincial and national entomological societies. He was President (1960) and Secretary/Treasurer (1958-1959) of the Entomological Society of Saskatchewan, and an Assistant Editor of The Canadian Entomologist from 1986 until his retirement.

His friends also remember Harvey's fondness for prairie sports. He hung up his insect sweep net for a curling broom every fall, and then switched over to golf clubs every spring. He served a term as President of the Saskatchewan Curling Association, and was a long-standing member of the Saskatoon Golf and Country Club.

Charles Harvey Craig passed away on 25 March 2019 at his home in Saskatoon.

Owen Olfert
AAFC Saskatoon Research Centre

Peter Belton passed away the morning of 1 April 2019 at the age of 88. Peter led a full life, and touched the lives of many. He moved with Bryan Beirne's lab to Simon Fraser University in 1967, and became one of the founding faculty members of the Master of Pest Management Program, where he stayed until his retirement in 1994.

Peter Belton (1930–2019)

I met Peter at my MSc defence. In the audience, filled largely with people I knew, sat an elderly gentleman genuinely interested in my research. After meeting Peter, I knew he had to be on my PhD committee; I am forever grateful that he accepted. In the over 12 years that I knew Peter, we spoke a lot about research, of course, but also about his life, the family he loved so very much, his graduate students, and everything from murder mysteries, to how the Vancouver Canucks were doing. On a drive down to a conference in the United States in 2008, Peter let me record his story. Selections of that, with information he provided since, follow.

Peter was born, an only child, in Driffield, a small Yorkshire town, on 6 September 1930. His dad, who worked for the civil service, was a keen gardener and beekeeper. On weekends, the family would pack up an old Morris Ten, and go to tend their bees on the Yorkshire moors. These weekends sparked Peter's interest in all things entomological.

When his dad was promoted, the family moved to London, during the Blitz. Always one to find a silver lining, when recounting this move, Peter commented that it meant the family was able to get a fantastic deal on a house, and that going to the basement during the raids was rather exciting. The gardening and beekeeping continued, and to those hobbies, Peter added trainspotting, stamp collecting, and rearing of any Lepidoptera larvae he could find. It was during this time that Peter knew he would become an entomologist.

Peter's national service was deferred for a year after his dad's untimely death in 1948, and his mum's poor health. He took the opportunity to work for the Ministry of Food at Sheffield Market, in the meat and egg sector. He enjoyed candling the eggs as a form of quality control.

After working for the Ministry, Peter did his 2 years of national service in the RAF. He specialized in wireless radio-work, which fueled his interest in electronics. He was put in charge of a transmitter station in Norfolk, and worked his way up to Corporal. Peter's experience playing rugby during his school days gave him an 'in' with the officers, and landed him a spot on their rugby team. The 2 years passed quickly.

Peter entered the Applied Entomology Program at Imperial College, London. A strong student, Peter's success in his physical chemistry course saw the Chemistry Department try to convince him to change his program. Luckily for us, Peter stayed with entomology. He went back briefly for some work in civil service, but finished his degree, doing an honours project in his last year. Under the supervision of Peter Haskell, Peter's research on tiger moth tympanal organs yielded recordings from moth tympanal nerves. His first journal article, detailing these groundbreaking recordings, was published in Nature.

During this final year, Peter won a grant to attend a prestigious conference in Oxford. There, he met Elizabeth, a young entomologist studying the taxonomy of weevils. When Peter started his PhD in Glasgow, he was surprised to find her in the zoology department; Elspeth, as most

of us know her, was doing her degree there. Peter quickly realized he would have to brush up his Scottish country dancing skills, as Elspeth was a keen dancer. Dressed in a kilt given to him by a fellow graduate student, Peter impressed Elspeth, and the two of them became part of the university's dance team. They married in February, 1957.

Peter's supervisor, neurophysiologist Graham Hoyle, convinced Peter to work on the nerves and muscles of the Lepidoptera leg. Peter had originally gone to Glasgow to study moth tympanal organs, but Hoyle worried that an American lab was further ahead in the research. When it came time to defend, although Hoyle felt Peter's research was complete, external examiner John Pringle thought more work was needed. Most of this work was completed under neurologist Harry Grundfest's supervision, because Peter and Elspeth moved to New York for Peter to work with Grundfest at Columbia University. His thesis was completed in 1960.

Peter loved his brief time in New York. The Grundfest lab spent the summers at Woods Hole, studying the nervous system of lobster walking legs; the meaty claws were always spared, but never wasted! Elspeth worked for Asher Treat as a lab instructor for his general biology course, and Peter and Elspeth would visit Treat's summer cottage on the occasional weekend. Unfortunately for Peter, moths were not available for purchase, so he spent his time working on mealworm muscles, because the larvae were readily available from local pet stores. He also did some work on the slow muscles of frogs, which were somewhat similar to insect muscles. His breakthrough research was showing that action potentials in the mealworm muscles could be produced with potassium.

Thanks to Asher Treat meeting George Wishart at an international conference, Wishart learned of Peter, and convinced Bryan Beirne to interview him for a job in Belleville. When Peter and Elspeth went to Ontario that June for the interview, they were caught off guard by a late snowfall. Despite that cold introduction to Ontario, they moved to Belleville. Peter taught electrophysiology as an adjunct at Queen's University, and was a research scientist and group leader at the Agriculture Canada Research station. They welcomed a daughter and son while in Belleville, then had another son after they moved to Vancouver.

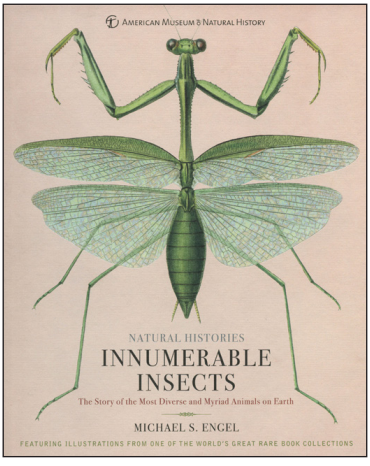
In terms of research, Peter is best known for his work on mosquitoes, and his 1983 book on the mosquitoes of British Columbia. However, Peter remained fascinated by all things bioacoustic, and participated in many projects, right until his death. He treated everyone as equal, was a patient teacher, encouraged original research, and never spoke poorly of others. This brief piece only touches on a few aspects of Peter's life, and cannot do justice to the amazing person he was.

Before Peter died, I was fortunate enough to visit and say my goodbyes. During that last visit, Peter said he felt very lucky to have lived such an incredible life; and, in the fashion suiting a gentleman, he asked that I let people know he was doing well. He didn't want anyone to worry, or to cause a bother.

The world is a little dimmer for the loss of such a brilliant person. Father to three children he adored, grandfather to seven, and academic father to years of students, both undergraduate and graduate, Peter will live on in the fond memories each of us has of him.

Mel Hart
Regina, Saskatchewan

***Innumerable Insects: the story of the most diverse and myriad animals on Earth*. Engel, M.S. 2018. Sterling Publishing, New York. xviii + 214 pp. ISBN 978-1-4579-2323-7. Can $37.95. Hardback.**



This book was received as recent birthday gift from 'the missus', perhaps as a gentle hint that someone nearing the end of his eighth decade should have a refresher course in entomology. Its author, Michael S. Engel, is internationally renowned for his studies and writings on insect evolution, including *Evolution of the Insects* (as co-author). Engel is University Distinguished Professor of Ecology and Evolutionary Biology and Senior Curator of Entomology at the University of Kansas in Lawrence. He also holds a Research Affiliate position at the American Museum of Natural History in New York.

Aimed at lovers of natural history, the book presents a fascinating account of insects' evolution, and their diversity of form and habits. The Introduction (Inordinate Insects) summarizes their multiplicity, how they are perceived by humans, and how these 'pervasive little things that run our world' (p. xvi) have been a favorite subject of authors of early scientific treatises. The first chapter introduces readers to the science of entomology and is followed by four chapters covering insect diversity and evolution, and five chapters that examine some of the most interesting aspects of insects' lives. The volume also includes Acknowledgments, Suggested Reading, Works Featured, Picture Credits, and Index.

Chapter 1 (Entomology: The Science of Insects) briefly considers the relationship of insects to other arthropods, the features that define an insect, and the enormous challenge of describing and classifying the millions of representatives of the group.

Grappling with Diversity (Chapter 2) begins by reminding readers of how we classify insects today, based on the system introduced by Linnaeus, but then takes readers back in time to earlier attempts to organize insects into related groups. Chapter 3 (Earliest of the Six-legged) deals with the evolution and major groups of wingless insects; Chapter 4 (Insects Take to the Skies) considers the evolution of insect flight (some 170 million years before the earliest flying vertebrates) and the hemimetabolous orders; and Chapter 5 (Complete Metamorphosis) covers the holometabolous orders whose members have evolved a pupal stage, enabling the juvenile and adult stages to exist in widely different habitats and use very different resources. This chapter, incidentally, includes a delightful account of how Jan Swammerdam and, independently but almost simultaneously, Maria Merian in the late 1600s showed that larvae, pupae and adults were not totally different animals but different life stages of the same species. (At the same time, this discovery put paid to the long-standing idea that insects were formed spontaneously, for example from rotting carcasses!)

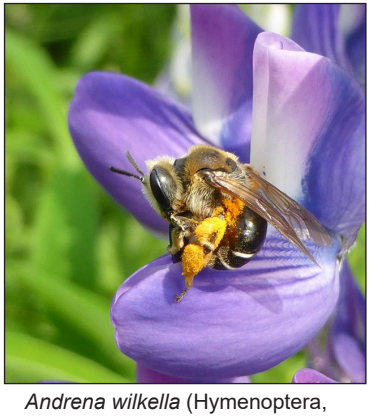
Chapter 6 (Pests, Parasites, and Plagues), as the title indicates, deals with the minute fraction of the world's insect species that can affect human health, directly or indirectly. The chapter includes several examples of how insects (and the diseases they transmit) have changed the direction of civilization. Chapter 7 (It Takes a Village) considers the various forms of sociality in insects, from simple aggregations to eusociality (overlapping generations of reproductive females in a shared nest and collaborative brood care). The chapter also includes information on squatters (inquilines) in social insect nests and farmers, the fungus-growing termites and ants. In Chapter 8 (The Language of Insects), Engel takes readers through the world of insect communication —

the means by which, and why, they contact each other. The chapter ends with a consideration of language, the ultimate form of communication, specifically, the honey bee waggle dance (of which each of the seven honey bee species has its own version). Chapter 9 (Hiding in Plain Sight) examines camouflage in its various forms, from the colour of an individual simply resembling that of the environment to mimesis where the form of the insect has evolved to resemble closely a plant part or another animal ('form' in this case not being necessarily the insect's body but some other part, for example, the eggs of stick insects). Engel's final chapter (The World Abloom) deals with insect-flowering plant relationships and especially pollination. Though, unsurprisingly, Engel notes the critical importance to humans of honey bees as pollinators, he is at pains to emphasise that they are but 1 of over 4000 bee species in North America (and are not even native); further, many other insects are vital pollinators — butterflies most obviously, but including flies, beetles and thrips — for some flowers.

The well-written text notwithstanding, there were two features of the book that significantly enhanced its overall appeal, even to a professional entomologist. First, the book is generously illustrated by images taken largely from the American Museum of Natural History Rare Book Collection, with the earliest going back over three centuries. Engel has used these to great effect, not least to affirm that 'old' does not mean 'no longer useful'. The second feature is the inclusion of biographic information of early entomologists, arranged in a series of catchily titled text boxes. For example, in Chapter 2 under 'The Pope's Dragon Slayer', Engel talks about Ulisse Aldrovandi who published the first book devoted to insects, especially their classification, in 1602. In Chapter 3, Engel discusses the contributions of the first 'Lord of the Flightless', Sir John Lubbock, a banker and politician professionally but far more interested in archeology and entomology. And in Chapter 6, in the text box headed 'Of Lice and Men', the life and work of Henry Denny, a British entomologist widely accepted as a leading authority on parasitic insects, is described.

With his articulate writing and, as noted above, the inclusion of features rarely seen in other insect natural history books, Engel has produced a volume that will be enjoyed by all those who are fascinated by the myriad of six-legged creatures that surround us and affect our everyday lives.

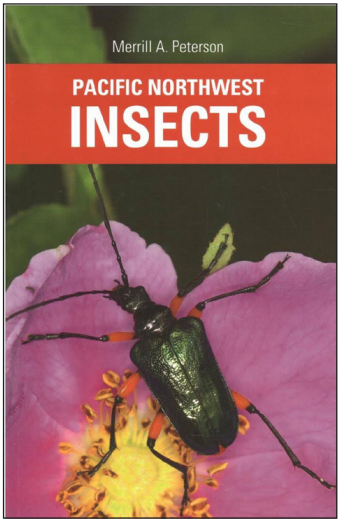
Cedric Gillott
University of Saskatchewan



C. Sheffield

Andrena wilkella (Hymenoptera, Andrenidae) on Lupin, PEI

Pacific Northwest Insects. Peterson, M.A. 2018. Seattle Audubon Society, Seattle, WA. 520 pp. ISBN 978-0-914516-18-7. CAN$37.95, paperback.



Trying to cover a group as large and diverse as the insects for as diverse a region as the Pacific Northwest is a monumental task, and Merrill Peterson should be commended for both the attempt and the final product. This 520-page book is a lovely compendium of generally high-quality photos and biological information about more than 1200 species found in the region (even as it makes the expected caveats about the many species in the region that are not included). The focus is on the "most common, most interesting, and most spectacular species" in the region, based on the author's 30+ years of teaching experience and answering insect questions from the public. And despite its title and the sole focus on insects in the introductory sections, the book also includes spiders, ticks, and other terrestrial arthropods.

I struggled a bit with the target audience for the book, which seemed too elementary for the trained entomologist but too reliant on entomological terminology for the non-specialist. I also worried about non-specialists assuming that they could use the book as a photo guide to species, attaching species names to insects they match to the photos. Careful reference to the accompanying text would mitigate that concern, but I'm not convinced that all readers would wade through the text on arthropod morphology and learn the names of the structures, life cycle types, and so on to be able to assess the distinguishing characters listed.

The bulk of the book is taken up with species accounts for the >1225 taxa covered in the book, but the author also manages to pack a lot of information into the Preface (pp. vi–vii) and the first 26 pages. An **Introduction** (pp. 1–3) includes a map of the area covered, and sections on the **Importance of Insects** (pp. 3–6) and **Insect Conservation** (pp. 6–8) provide background on the important role of insect in ecology and the economy, as well as threats to insect populations. A section on **Finding Insects in the Pacific Northwest** (pp. 9–12) goes into the range of ecoregions and habitat types found in the region, with examples of specialized habitats and seasonal patterns. At this point, the author's suggestions that readers begin searching in rotting wood, dung, dead animal carcasses etc. might conflict with the book's stated focus just on the most commonly seen insects.

The section on **Insect Identification** (pp. 12–19) gives the main features used in identification, including a well-labelled diagram. Here, the specialized morphological terminology used in the species accounts is introduced, though some (e.g., coxa, trochanter, femur, tibia, tarsus) are not shown on the basic morphology diagram, so could be a bit confusing for users of the guide. One point somewhat hidden in this section is that magnification is needed to confirm many of the species pictured in the book (using at least a 10x hand lens, but realistically a microscope, for many features). This is likely to be missed by people just looking through the photos to identify their insects. The Insect Identification section also covers life cycles, behaviour, variation, and mimicry, and is very well done, providing great background for understanding insects.

The guide is set up taxonomically, so the last introductory section, **How to use this guide** (pp. 20–26), starts with an explanation of taxonomic hierarchies and how the names work. The focus in this section continues to be entirely on insects, despite the significant section on non-insects in the book.

The **Species Accounts** section (pp. 27–489) includes sections on each major taxonomic group (Class, Sub-Class, or Order for the non-insects, and Order for the Insects). Each section begins with an essay describing typical body plan (with body plan illustrations for major orders), diet, development pattern, and mode of reproduction (in that order). This is followed by the estimated number of species in that order in the world, in North America, and in the Pacific Northwest. Where applicable, there are notes on other major groups with which it may be confused, and tips to tell them apart. For the insect orders, accounts are arranged by family (including only the most common or charismatic families), with photos and a list of distinguishing features for the family and notes on similar families and how to tell them apart. Family-specific information on diet and life history features appear here, as well as statistics on the approximate species diversity for the family (e.g., >900 North American species of cerambycid beetle, and about 225 in the region). The book ends with a three-page Glossary, a list of Threatened and Endangered Insects in the Pacific Northwest, three pages of Resources and References, and the Index.

There were a lot of things I really liked about this book, but other aspects left me confused, such as the focus on insects in all the introductory material (leading me to believe initially that there would be no information on non-insect arthropods in the book), and who the book was really aimed at. The lack of keys and reliance on photographs to identify common "focal" species (in concert with some details on similar species) suggests a target audience of untrained observers with an interest in insects. However, the requirement to understand life cycle and morphological terminology, and the need for magnification to assess many characters to confirm species identifications, would suggest a focus on people with some entomological background.

Consider an example from the Ephemeroptera (mayflies), the group I know best (but note that the information is similar for all the families in all the insect orders included). The text for the family Ameletidae (comb-mouthed minnow mayflies, p. 69), refers to important taxonomic characteristics, many of which need a microscope or very good hand lens to see (such as wing venation and the shape of the tarsal claws) on a captured specimen. Tips to distinguish Ameletidae from two other similar families (which aren't pictured) also use wing venation and characters on the tarsi and tibiae. Although 23 species occur in the region, only one is pictured and discussed: *Ameletus oregonensis* McD., a species with strikingly patterned wings. It is compared to one similar species (*A. subnotatus* Eaton), then the remaining 21 species are just grouped together as having clear or tinted wings. Of the 187 regional mayfly species (in 12 families), photos and details are given for six (each from a different family). In contrast, 32 of 117 of the more charismatic dragonflies are pictured (described as the most commonly seen ones). And not unexpectedly, the larger groups also include multiple examples for each family and include many more families (e.g., the Orthoptera section shows 47 of the 300 regional species, and includes multiple representatives from 5 of the 8 families listed).

With these caveats, I'm enjoying the book. The photos, while small, are well reproduced and stunning, showing the living arthropods in their habitats. The accompanying text is clear on what species could be confused with the one in the photo, as well as the total number of species expected. I loved the vignettes that were included, such as one on fly-tying (p. 68), Grasshopper, Cricket and Katydid songs (p. 108), and "Scourge from Yesteryear" (Coulee Cricket) (p. 114). I'm pleased to have the book on my shelf, and I'll be recommending it to others, albeit with a few reservations about certain target audiences.

Donna Giberson
Sechelt, British Columbia

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.

Currently available for review / Disponibles pour critique

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 [hardback].

Curtain, C.G. & T.F.H. Allen [Eds.]. 2018. Complex Ecology: Foundational Perspectives on Dynamic Approaches to Ecology and Conservation. Cambridge University Press. ISBN: 9781108235754 [paperback].

Dale, M.R.T. 2017. Applying Graph Theory in Ecological Research. Cambridge University Press. ISBN: 9781316105450 [paperback].

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

Forman, R.T.T. 2019. Towns, Ecology and the Land. ISBN 978-1-316-64860-5 [paperback].

Kaufman, A.B., M.J. Bashaw and T.L. Maple [Eds.]. 2019. Scientific Foundations of Zoos and Aquariums: Their Role in Conservation and Research. ISBN 978-1-316-64865-0 [paperback].

Leidner, A.K. and G.M. Buchanan [Eds]. 2018. Satellite Remote Sensing for Conservation Action: Case Studies from Aquatic and Terrestrial Ecosystems. ISBN 978-1-10845670-8 [paperback].

Pettorelli, N., S.M. Durant and J.T. du Toit [Eds.]. Rewilding. ISBN 978-1-108-46012-5 [paperback].

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].

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].

69th Annual Meeting of Members and Board of Directors Meetings (JAM 2019)

The Annual Meeting of Members of the Entomological Society of Canada will be held at the Fredericton Convention Centre, 670 Queen Street, Fredericton, New Brunswick, on Tuesday, 20 August 2019, from 1:30 pm to 2:30 pm, in Barker's Point A. The Board of Directors Meeting will be held on Sunday, 18 August 2019, from 8:00 am to 3:30 pm, in Marysville A, Fredericton Convention Centre, 670 Queen Street, Fredericton, New Brunswick. The incoming Board of Directors will meet immediately following the Annual Meeting of Members, also in Barker's Point A at the Fredericton Convention Centre, on Tuesday, 20 August 2019, from 2:30 pm to 3:00 pm. Matters for consideration at any of the above meetings should be sent to Neil Holliday, Secretary of the Entomological Society of Canada (see inside back cover for contact details).

69e assemblée annuelle des membres et réunions du conseil d'administration (RAC 2019)

L'assemblée annuelle des membres de la Société d'entomologie du Canada se tiendra au Palais des congrès de Fredericton, au 670 Queen Street, Fredericton, Nouveau-Brunswick, le mardi 20 août 2019, de 13h30 à 14h30, dans la salle Barker's Point A. La réunion du conseil d'administration se tiendra le dimanche 18 août 2019, de 8h00 à 15h30, dans la salle Marysville A, Palais des congrès de Fredericton, 670 Queen street, Fredericton, Nouveau-Brunswick. Le nouveau conseil d'administration se réunira immédiatement après l'assemblée annuelle des membres, également dans la salle Barker's Point A, au Centre des congrès de Fredericton, le mardi 20 août 2019, de 14h30 à 15h. Tout sujet à considérer pour une de ces réunions doit être envoyé à Neil Holliday, secrétaire de la Société d'entomologie du Canada (voir la troisième de couverture pour les informations de contact).

Executive Meeting - Call for Agenda Items

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

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

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

Notice of a Special Meeting of Members

The financial year of the Entomological Society of Canada runs from 1 July to 30 June. Following year-end, financial data must be collated by our accountant and sent to the auditors for examination. Following that examination, the resulting financial statements must be posted for members to view for no less than 21 days and not more than 60 days before a members' meeting at which they are considered for approval. In 2019, the Annual Meeting of Members is scheduled for Tuesday 20 August; this is not sufficient time since the end of the financial year for all the legally-required steps to occur. Accordingly, the Board of Directors of ESC has decided to hold a Special Meeting of Members for the purpose of considering the Society's financial statements for 2018–2019. This meeting will take the form of a moderated teleconference and is scheduled for **12:00 noon (Central Daylight Time) on Tuesday, 22 October 2019**. Financial statements will be posted in the members' area of the ESC website within the legally required interval before the meeting. Further details will be communicated to all ESC members by E-mail.

Avis d'assemblée spéciale des membres

L'année financière de la Société d'entomologie du Canada est du 1 juillet au 30 juin. Après la fin de l'année, les données financières doivent être colligées par notre comptable et envoyées aux auditeurs pour examen. Après cet examen, les états financiers qui en résultent doivent être affichés pour consultation par les membres pendant au moins 21 jours et au plus 60 jours avant l'assemblée annuelle des membres durant laquelle ils sont considérés pour approbation. En 2019, l'assemblée annuelle des membres est prévue le mardi 20 août : cela n'est pas assez loin de la fin de l'année financière pour que toutes les étapes légales puissent avoir lieu. Par conséquent, le conseil d'administration de la SEC a décidé de tenir une assemblée spéciale des membres dans le but de considérer les états financiers de la Société pour 2018-2019. Cette réunion prendra la forme d'une téléconférence modérée et est prévue pour le **mardi 22 octobre 2019 à 12h (heure avancée du centre)**. Les états financiers seront affichés dans la section des membres du site web de la SEC à l'intérieur des délais requis légalement avant l'assemblée. Plus de détails seront communiqués à tous les membres par courriel.

Members' Discounts

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

Remise pour les membres

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

Announcement of Changes in the ESC Standing Rules

At its meeting on 29 April 2019, the Board of Directors of ESC approved two additions to the Standing Rules. The effect of the addition to Standing Rule I Membership is to create a seventh membership category, "Entomology Enthusiast", to allow amateur entomologists to gain the benefits of ESC membership at a reduced membership rate. The addition to Standing Rule XX Use of Languages is to provide clarity regarding the language requirements for Committee Guidelines. Previously, Standing Rule XX required that both By-laws and Standing Rules be available in English and in French, but made no mention of Committee Guidelines.

Addition to Standing Rule I Membership:

Entomology Enthusiast

An individual accepted as a member by the Corporation who is in compliance with By-Law 12 through payment of Entomology Enthusiast Member annual dues, and is defined as a person who is engaged in entomological pursuits as an amateur (e.g., collects and/or studies insects as a pastime), and NOT as someone that derives a significant amount of their income from entomological activity, such as entomologist instructors/researchers (university or college), government researchers and extension personnel or students enrolled in a graduate program in entomology, who are already covered by Regular, Early Professional, and Student Memberships in the ESC.

i) Entomology Enthusiast Members receive an approximate 50% discount from the Regular Members rate on membership dues, when including online access to The Canadian Entomologist.

ii) Entomology Enthusiast Members shall receive The Canadian Entomologist, Memoirs and the Bulletin of the Corporation as online access.

Addition to Standing Rule XX Use of Languages:

5) Complete Committee Guidelines shall be available in English. Upon request of a committee chair, the guidelines for that committee will be translated into French.

Annonce de modifications aux règles permanentes de la SEC

À sa réunion du 29 avril 2019, le conseil d'administration de la SEC a approuvé deux ajouts aux règles permanentes. L'effet de l'ajout à la règle permanente I Membres est de créer une septième catégorie de membres, « Enthousiastes de l'entomologie », pour permettre aux entomologistes amateurs d'obtenir les avantages de l'adhésion à la SEC à des frais d'adhésion réduits. L'ajout à la règle permanente XX Utilisation des langues est de fournir des éclaircissements concernant les exigences linguistiques pour les lignes directrices des comités. Précédemment, la règle permanente XX exigeait que le règlement administratif et les règles permanentes soient disponibles en anglais et en français, mais ne faisait pas mention des lignes directrices des comités.

Ajout à la règle permanente I Membres

Enthousiaste de l'entomologie

Un individu accepté comme membre de l'Organisation conformément au règlement intérieur 12 par le paiement de la cotisation annuelle des membres enthousiastes de l'entomologie, qui se définit comme une personne qui est impliquée dans la poursuite de l'entomologie au niveau amateur (p. ex. collectionne et/ou étudie les insectes comme passe-temps), et qui n'est PAS quelqu'un qui reçoit un montant important de revenus d'une activité entomologique, tels que les chargés de cours/chercheurs (université ou cégep), chercheurs du gouvernement et personnel de vulgarisation ou étudiants inscrits dans un programme d'études supérieures en entomologie, qui sont déjà couverts par les catégories de membres réguliers, jeunes professionnels et étudiants de la SEC.

i) Les membres enthousiastes de l'entomologie reçoivent un rabais d'environ 50% sur le coût de la cotisation annuelle des membres réguliers, lorsque cela inclut l'accès électronique à The Canadian Entomologist.

ii) Les membres enthousiastes de l'entomologie ont accès en ligne à The Canadian Entomologist, les Mémoires et le Bulletin de l'Organisation.

Ajout à la règle permanente XX Utilisation des langues

5) Les lignes directrices des comités sont disponibles en anglais. Sur demande du président du comité, les lignes directrices de ce comité seront traduites en français.

Highlights of the Recent Board of Directors Meeting

The Board of Directors met by teleconference on 29 April 2019. The Board approved two changes to the ESC's Standing Rules. One of these was to add the new "Entomology Enthusiast" membership category, which is intended to provide amateur entomologists with the benefits of ESC membership at reduced cost. The second was an addition to the standing rule on use of languages, which previously required ESC's Bylaws and Standing Rules be available in both official languages, but was silent on the language requirements for Committee Guidelines. Details of these changes are provided elsewhere in this issue of the *Bulletin*. The Board also approved changes to Committee Guidelines to increase the value and number of Bert and John Carr Awards available annually, and to broaden the scope of eligibility for funding by Public Encouragement Grants to include support of educational activities of amateur entomologist within a regional society's region.

The Board gave final approval to several proposals that had previously been approved in principal. A final decision was made to cease publication of French manuscripts in *The Canadian Entomologist*; author-provided French abstracts of English-language papers will be published, and all communications with authors — including the journal's website and instructions to authors — will continue to be in both official languages. Final approval was given to the ESC Meeting Code of Conduct, which will first be implemented at the 2020 Joint Annual Meeting with the Entomological Society of Alberta. The Board noted that it had already approved the jointly-developed meeting code of conduct to be used at the 2019 Joint Annual Meeting in Fredericton. The Board gave final approval of the proposal to meet jointly with the Entomological Society of America and the Entomological Society of British Columbia at the Vancouver Convention Centre in 2022. In reaching this decision, the Board reviewed a report of the financial and other outcomes of the 2018 joint meeting of the same societies at the same venue, and the results of surveys of ESC members and of meeting registrants. It was noted that the survey results were overwhelmingly positive, and that the meeting was extremely well attended and generated considerable income for both Canadian societies. The Board discussed implications of frequent joint meetings with the Entomological Society of America, including the disruption of the 7-year cycle of meetings with regional societies, and the financial inequities that can result because only three regional societies have venues suitable for these large and large-revenue-generating meetings. Measures to ameliorate the negative implications will be considered at future Board meetings.

The Board received reports from the Public Education Committee on development of a brochure describing careers available to those who study entomology, and on plans for publicizing the **NA**tional **I**nsect **A**ppreciation **D**ay (NAIAD). This is the first year of NAIAD and it (8 June) falls on a Saturday; the date should be regarded as a focal day for early June activities that develop public awareness of insects, and should not inhibit activities at other times of the year. A NAIAD poster has been prepared and press releases are under development.

The Board received updates on the state of development of the next three Joint Annual Meetings. Many aspects of plans for the 2019 Joint Annual Meeting have been communicated to the Board by Julia Mlynarek, ESC's representative on the local organizing committee. It is planned that the 2019 Graduate Student Showcase will be live-streamed; this is a pilot project to explore the feasibility of live-streaming. If the pilot project is a success, the Board will need to assess implications for registrant attendance of more general live-streaming. Because the Fredericton meeting is in August, the audited financial statements for the ESC's financial year ending on 30 June 2019 will not be available in time for the Annual Member's Meeting.

Consequently, the Board agreed on a date for a special member's meeting to consider the financial statements (see notice elsewhere in this issue).

The Board approved recommendations from the Achievement Awards Committee to confer the 2019 ESC Gold Medal for Outstanding Achievement on Peter Mason (Agriculture and Agri-Food Canada, Ottawa), the 2019 C. Gordon Hewitt Award on Zoë Lindo (Western University), and an ESC Fellowship on Gerhard Gries (Simon Fraser University). Citations for these awardees will appear in the September issue of the *Bulletin.*

The Board approved a recommendation to renew ESC's agreement with Strauss event and association management to provide management services to the Society. In response to the considerable increase in numbers of applications for Student Awards, the workload of assembly of applications and associated letters of reference will henceforth be transferred from the chair of the Student Awards Committee to Strauss. The Board approved a modification to the Society's Investment Policy to allow a modest increase in the proportion of assets held in equities, while recognizing the need to be conserve assets. The Board considered two proposals related to International Congresses of Entomology (ICE). It was decided not to proceed with a proposal from the Vancouver Convention Centre for ESC to bid for Vancouver to be the venue of ICE in 2028. There was much discussion of a request for a donation from the ICE Council. The Board agreed to support ICE in two ways: by donating $2,500 in response to the Council's request, and by providing an equal amount to support student travel to attend ICE in Helsinki in July 2020.

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

The following have been nominated and agreed to stand for election in 2019 for the indicated positions. Members will receive more details on this year's process by email. In accordance with our By-laws under the Canada Not-for-profit Corporations Act, a plebiscite/vote first will be held to 'select candidates' for a slate of Directors. The slate will then be presented for formal election at the Annual Members' Meeting in Fredericton in August.

The current ballot will select candidates for a Director-at-Large and a Societal Director (Second Vice-President). The plebiscite will be conducted electronically, with the webpage for balloting active from **1 June to 15 July 2019**. PLEASE REMEMBER TO VOTE!

To vote, use the following link: https://docs.google.com/forms/d/e/1FAIpQLSd1l5hQIrBeQe1okqe8bziLABScm_AWtCyR1_6GlFAkhRms-A/viewform?usp=sf_link

Les personnes suivantes ont été nominées et ont accepté de se présenter pour les élections de 2019 pour les postes indiqués. Les membres recevront plus de détails sur le processus de cette année par courriel. Conformément à notre règlement intérieur en vertu de la loi canadienne sur les organisations à but non lucratif, un plébiscite/vote sera d'abord tenu afin de « sélectionner les candidats » pour une liste de directeurs. La liste sera ensuite présentée pour une élection formelle à la réunion annuelle des membres à Fredericton en août.

Ce vote sélectionnera les candidats pour les postes de conseillers et de directeur sociétal (second vice-président). Le plébiscite sera conduit électroniquement, et la page web pour voter sera active du **1 juin au 15 juillet 2019**. N'OUBLIEZ PAS DE VOTER!

Pour voter, utilisez le lien suivant : https://docs.google.com/forms/d/e/1FAIpQLSd1l5hQIrBeQe1okqe8bziLABScm_AWtCyR1_6GlFAkhRms-A/viewform?usp=sf_link

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

Kirk Hillier
(Acadia University)

Felix Sperling
(University of Alberta)

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

Christopher Ernst
(University of British Columbia /
Simon Fraser University)

Christine Noronha
(AAFC, Charlottetown)

ESC Scholarship Fund

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

Le Fonds de bourses d'études de la SEC

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

2018 Donors – Donateurs et donatrices pour 2018

Albert, P.J.
Almdal, Crystal
Arnason, John
Behan-Pelletier, Valerie
Biological Survey of Canada
Borden, John
Brodo, Irwin & Fenia
Cameron, E. Allan
Cloutier, Conrad
Dale, John W.E.
De Clerck-Floate, Rosemarie
Devine, Alexandra
Doucet, Daniel
Fields, Paul
Galloway, Mary M.
Gibson, Gary
Gill, Bruce D.
Gillespie, David R.
Henne, Don
Higgins, Rob
Holliday, Neil
Horton, David
Hueppelsheuser, Tracy
Johnson, Dan
Klimaszewski, Jan
Lynch, Ann
MacQuarrie, Chris
Manning, Paul
Marshall, Valin
Peschken, Diether
Philogene, B.J.R.
Poland, Therese
Roitberg, Bernard
Safranyik, Laszlo
Sawinski, T.A.
Shorthouse, Joseph
Soroka, Juliana J.
Sweeney, Jon
Vanderwel, Desiree
Walter, Doreen

… and those who preferred to remain anonymous.
… et ceux et celles qui ont préféré rester anonyme.

Fifteenth Annual Photo Contest

The 15th Annual Photo Contest to select images for the 2020 covers of *The Canadian Entomologist* and the *Bulletin of the Entomological Society of Canada* is underway. The cover images are intended to represent the breadth of entomology covered by the Society's publications. Insects and non-insects in forestry, urban or agriculture; landscapes, field, laboratory or close-ups; or activities associated with physiology, behaviour, taxonomy or IPM are all desirable. A couple of 'Featured Insects' (for the spine and under the title) are also needed. If selected, your photo will grace the cover of both publications for the entire year. In addition, winning photos and a selection of all submitted photos will be shown on the ESC website.

Contest rules:

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

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

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

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

The copyright of the photo remains with the entrant, but royalty-free use must be granted to the ESC for inclusion on the cover of one volume (6 issues) of *The Canadian Entomologist*, one volume (4 issues) of the *Bulletin*, and on the ESC website.

The judging committee will be chosen by the Chair of the Publications Committee of the ESC and will include a member of the Web Content Committee.

The Photo Contest winners will be announced on the ESC website, and may be announced at the Annual Meeting of the ESC or in the *Bulletin*. There is no cash award for the winners, but photographers will be acknowledged in each issue in which the photos are printed.

Submission deadline is 31 August 2019. Entries should be submitted as an attachment to an email message; the subject line should start with "ESC Photo Contest Submission". Send the email message to: photocontest@esc-sec.ca.

Quinzième concours annuel de photographie

Le quinzième concours annuel de photographie visant à sélectionner des images pour les couvertures de *The Canadian Entomologist* et du *Bulletin de la Société* d'entomologie du Canada pour 2020 est en cours. Les images sur la couverture doivent représenter l'étendue entomologique couverte par les publications de la Société. Des photos représentant des insectes ou autres arthropodes forestiers, urbains ou agricoles, des paysages, du travail de terrain ou de laboratoire, des gros plans, ainsi que montrant des activités associées à la physiologie, au comportement, à la taxonomie ou à la lutte intégrée seraient souhaitées. Deux « insectes vedettes » (pour le dos et sous le titre) sont également recherchés. Si elle est sélectionnée, votre photo ornera la couverture des deux publications pour l'année entière. De plus, vos photos gagnantes et une sélection de photos soumises seront montrées sur le site Internet de la SEC.

Règlements du concours :

Les photos d'insectes et autres arthropodes à n'importe quel stade, effectuant n'importe quelle activité et dans n'importe quel habitat sont acceptées. Afin de représenter les sujets de la recherche entomologique, nous encourageons également les photos de parcelles de terrain, expériences de laboratoire, impacts des insectes, activités de recherche, équipement d'échantillonnage, etc. Les photos doivent, cependant, avoir un intérêt entomologique clair.

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

Chaque participant peut soumettre jusqu'à cinq photographies. Une légende doit être fournie pour chaque photo soumise : les photos sans légendes ne seront pas acceptées. La légende doit inclure la localisation, l'identification du sujet le plus précisément possible, la description de l'activité si le sujet n'est pas un insecte, et toute information intéressante ou pertinente. Les légendes doivent avoir une longueur maximale de 40 mots.

Les participants doivent être membres en bonne et due forme de la Société d'entomologie du Canada. Les photos doivent avoir été prises par le participant, et le participant doit en posséder les droits d'auteur.

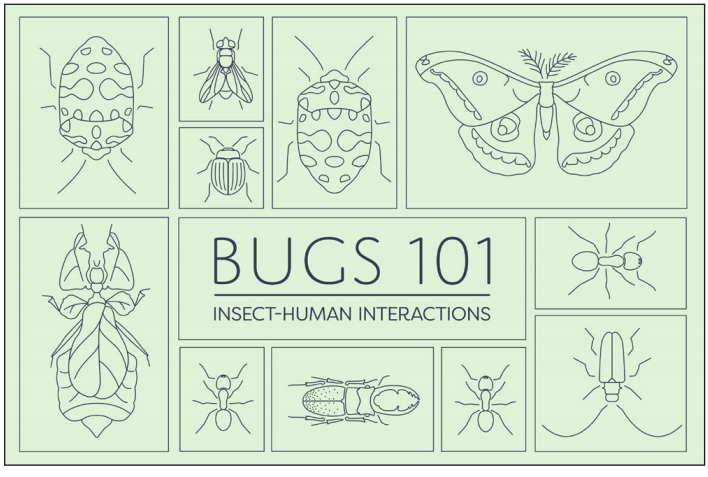
Le participant conserve les droits d'auteur de la photo, mais l'utilisation libre de droits doit être accordée à la SEC afin de l'inclure sur la couverture d'un volume (6 numéros) de *The Canadian Entomologist*, un volume (4 numéros) du *Bulletin*, et sur le site Internet de la SEC.

Le comité d'évaluation sera choisi par le président du comité des publications de la SEC et inclura un membre du comité du contenu du site Internet.

Les gagnants du concours de photographie seront annoncés sur le site Internet de la SEC et pourront être annoncés à la réunion annuelle de la SEC ou dans le *Bulletin*. Il n'y a pas de prix en argent pour les gagnants, mais les photographes seront remerciés dans chaque numéro où les photos seront imprimées.

La date limite de soumission est le 31 août 2019. Les soumissions doivent être faites en pièces jointes d'un courrier électronique. L'objet du message doit débuter par « Soumission pour le concours de photographie de la SEC ». Envoyez vos courriels à : photocontest@esc-sec.ca.

Help us find the “bugs” in Bugs 101.



Dear fellow Canadian entomologists,

Over the past several years, entomologists in the Faculty of Science at the University of Alberta have developed a Massive Open Online Course (MOOC) called *Bugs 101: Insect-Human Interactions*. Our hard work has paid off, and the course will launch on coursera.org this summer. Coursera is a platform that hosts online courses produced by a number of different universities around the world. Anyone can register and take *Bugs 101* for free to learn about basic insect biology and the many ways that insects impact human society. This course will also be offered as a for-credit course at the University of Alberta starting this fall.

We encourage experts in the field like you to take the course online this summer and provide us with feedback to work out the “bugs” in *Bugs 101*. Please contact us (email below) with any errors you find in the course, and we can make changes over the summer before students take the course for credit in the fall.

Any feedback you can provide is appreciated!

Yours Sincerely,

Maya Evenden, course lead
mevenden@ualberta.ca

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

Contents of regional society journals

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

Contenu des revues des sociétés régionales

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

Journal of the Entomological Society of British Columbia

(JESBC can also be viewed at https://journal.entsocbc.ca/index.php/journal)

Volume 115 (2018)

Articles

Scientific Notes

Natural History & Observations

Journal of the Entomological Society of Ontario

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

Volume 149 (published on various dates)

Scientific Notes

First report of the Palearctic sawfly *Pristiphora subbifida* Thomson 1871 (Hymenoptera: Tenthredinidae) in Canada M. Alex Smith, 15-19 PDF

Observations on Blackhorned Tree Cricket, *Oecanthus nigricornis*, floral tissue herbivory and pollen transfer of New England Aster, *Symphyotrichum novae-angliae* Heather Anne Cray, 21-26 PDF

Pyrrhocoris apterus L. (Hemiptera: Pyrrhocoridae), a newly introduced family, genus, and species to Ontario and Canada Paula J. Oviedo Rojas, Morgan D. Jackson, 27-32 PDF

Articles

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

A new species of *Palaeoneura* Waterhouse (Hymenoptera: Mymaridae) from California, USA Serguei Triapitsyn, 33-47 PDF

Volume 150 (published on various dates)

Articles

Burying beetles of the genus *Nicrophorus* Fabricius (Coleoptera: Silphidae) from northern Ontario and Akimiski Island, Nunavut John L. Ringrose, Sarah V. Langer, Kaitlyn J. Fleming, Trevor O. Burt, Donald R. Bourne, Robin Brand, David V. Beresford, 1–10 PDF

Sampling Syrphidae using Malaise and Nzi traps on Akimiski Island, Nunavut. Kathryn Anne Vezsenyi, Jeffrey Skevington, Kevin Moran, Andrew Young, Michelle Locke, James Schaefer, David Beresford, 11–26 PDF

Journal of the Acadian Entomological Society

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

Vol. 14 (published on various dates)

The first recorded occurrences of Platydracus immaculatus (Mannerheim) and Ocypus nitens (Schrank), (Coleoptera: Staphylinidae), in New Brunswick, Canada. E. Knopf and W. Gilmore, 25–27, December 2018. Full Text

THE CANADIAN PHYTOPATHOLOGICAL SOCIETY

LA SOCIÉTÉ CANADIENNE DE PHYTOPATHOLOGIE

CPS-SCP News

VOL. 63, NO. 1 (March 2019)

https://phytopath.ca/wp-content/uploads/2019/04/CPS-SCP-News-63-1-March2019.pdf

International Congress on Invertebrate Pathology and Microbial Control & 52nd Annual Meeting of the Society for Invertebrate Pathology & 17th Meeting of the IOBC-WPRS Working Group (Microbial and Nematode Control of Invertebrate Pests)
Valencia, Spain, 29 July–1 August 2019
https://congresos.adeituv.es/SIP-IOBC-2019/ficha.en.html

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
http://csee-esc2019.ca

Royal Entomological Society, Ento 19 (Vectors of Diseases)
London, UK, 20–22 August 2019
https://www.royensoc.co.uk/event/ento-19

46th Apimondia International Apicultural Congress
Montreal, 8–12 September 2019
https://www.apimondia2019.com/

7th International Entomopathogens and Microbial Control Congress
Kayseri (Turkey), 11–13 September 2019
http://emc2019.erciyes.edu.tr/

14th International Symposium: Ecology of Aphidophaga (IOBC-Global Working Group meeting)
Montreal, 16–20 September 2019
http://www.aphidophaga14.uqam.ca

Entomological Society of America Annual Meeting (Advocate Entomology)
St Louis, 17–20 November 2019
https://www.entsoc.org/events/annual-meeting

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

10th International IPM Symposium: Implementing IPM across Borders and Disciplines
Denver, 15-18 March 2021
https://ipmsymposium.org/2021/index.html

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.

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www.esc-sec.ca/

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

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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.

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www.esc-sec.ca/

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ISSN: 0071-0741

Date de tombée pour le prochain numéro: 31 juillet 2019

Officers of affiliated Societies, 2018-2019
Dirigeants des Sociétés associées, 2018-2019

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http://entsocbc.ca

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Past President — Bette Beswick
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Webmaster — Micky Ahn
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Agriculture and Agri-Food Canada / Agriculture et Agroalimentaire Canada
5403 - 1 Ave S. Lethbridge, Alberta T1J 4B1
Tel: (403) 317-2247
E-mail: esalberta@gmail.com
http://www.entsocalberta.ca

Entomological Society of Saskatchewan

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Vice-President — Sean Prager
Past President — Danielle Stephens
Treasurer — Tyler Wist
Newsletter Editor — Nicole Pillipow
Secretary — Iain Phillips
Saskatchewan Watershed Authority
101-108 Research Drive, Saskatoon, SK, S7N 3R3
Tel: (306) 933-7474
Email: iain.phillips@swa.ca
http://www.entsocsask.ca

Entomological Society of Manitoba

President — Erica Smith
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Treasurer — Kathy Cano
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Living Prairie Museum
2795 Ness Ave, Winnipeg MB R3J 3S4
E-mail: entsocmanitobasecretary@gmail.com
http://home.cc.umanitoba.ca/esm/

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President — David Beresford
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Vista Centre
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E-mail: entsocont.membership@gmail.com
http://www.entsocont.ca

Société d'entomologie du Québec

Président — Raymond-Marie Duchesne
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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

Echoing 'The Pres'!

In his Up Front message, our President has been at pains to emphasise the desirability of strengthening/improving links between the regional societies and the national body. This is a view that I fully support — and, I suspect, by virtue of their dual membership in both the local and national groups, so do most *Bulletin* readers.

Important elements in making this linkage work are the regional directors. Formerly known as regional representatives, the primary (in practice, the 'sole') duty of these individuals was to report on happenings at the national level to their regional society, and vice-versa. While this was commendable, it was a 'blinkered' way of doing things; that is, members of a local society would not hear of the activities of other regional groups.

Recently, there has been a strong push to improve inter-societal communication, to enable the regional societies to learn more about each other's activities. The *Bulletin* is central to dissemination of this information, which principally takes the form of publication of the contents of the journals of the five regional societies that have them, interesting local entomological news, and where known dates of a regional society's annual meeting. After some initial teething troubles, the regional directors have bought in wholeheartedly to the new venture, and good examples can be seen in this issue (pages 87-88 and 131-132). I thank the regional directors for their co-operation — and keep up the good work!

Je me fais l'écho au Président!

Dans son Avant-propos, notre Président a mis l'emphase sur les avantages de renforcer/améliorer les liens entre les sociétés régionales et l'organisation nationale. C'est un point de vue que je partage entièrement – et je suspecte que la plupart des lecteurs du *Bulletin* aussi, de par leur double adhésion à leur société locale et à la société nationale.

Les éléments cruciaux pour faire fonctionner ce lien sont les directeurs régionaux. Anciennement connus comme les représentants régionaux, leur principale tâche (en fait, leur unique tâche) était de rapporter au niveau national les événements de leur société régionale, et vice-versa. Bien que cela soit digne de mention, cela était très limité : les membres d'une société locale n'entendaient pas parler des activités des autres groupes régionaux.

Récemment, il y a eu de fortes pressions pour améliorer la communication inter-sociétale, pour permettre aux sociétés régionales d'en apprendre davantage sur les activités des autres. Le *Bulletin* est central dans la dissémination de cette information, qui prend principalement la forme de la publication du contenu des journaux des cinq sociétés régionales qui en ont, de nouvelles entomologiques locales intéressantes, et des dates des réunions des sociétés régionales lorsqu'elles sont connues. Après quelques problèmes initiaux, les directeurs régionaux ont pleinement embarqué dans l'aventure, et de bons exemples se trouvent dans ce numéro (pages 87-88 and 131-132). Je remercie les directeurs régionaux pour leur coopération – et continuez votre bon travail!

Entomological Society of Canada, 2018-2019
Société d'entomologie du Canada, 2018-2019

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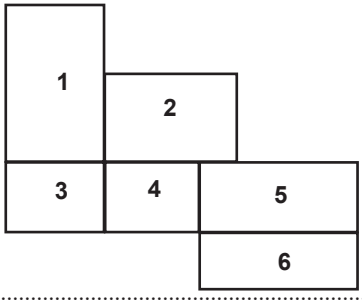

Front cover/Plate supérieur:

1. Female ambush bug (Hemiptera: Reduviidae: Phymata) (Centreville, Ontario, Canada).
Punaise femelle (Hemiptera : Reduviidae : Phymata) (Centreville, Ontario, Canada).
[Photo: Andrea Brauner]

2. *Philanthus multimaculatus* (Hymenoptera: Crabronidae) resting on a *Solidago* inflorescence in the fall (Kelowna, British Columbia, Canada).
Philanthus multimaculatus (Hymenoptera : Crabronidae) se prélassant sur une inflorescence de *Solidago* à l'automne (Kelowna, Colombie-Britannique, Canada).
[Photo: Robert LaLonde]

3. *Buprestis aurulenta* (Coleoptera: Buprestidae) relaxing on an aged deck on Hornby Island (British Columbia, Canada).
Buprestis aurulenta (Coleoptera : Buprestidea) se prélassant sur un patio vieillissant sur l'île Hornby (Colombie-Britannique, Canada).
[Photo: Debra Wertman]

4. Tabanidae (Diptera) collecting device: no alpine entomological survey is complete without it (Lillooet, British Columbia, Canada).
Un outil de récolte de tabanidés (Diptera) : aucun inventaire entomologique alpin n'est complet sans lui (Lillooet, Colombie-Britannique, Canada).
[Photo: Ward Strong]

5. Portrait of a tiger beetle, *Cicindela campestris* (Coleoptera: Carabidae) (Delémont, Switzerland).
Portrait d'une cicindèle champêtre, *Cicindela campestris* (Coleoptera : Carabidae) (Delémont, Suisse).
[Photo: Tim Haye]

6. The western bean cutworm, *Striacosta albicosta* (Lepidoptera: Noctuidae), is becoming a major concern for producers in Ontario and Québec. Colourful egg masse on corn leaf collected in Saint-Anicet (Québec, Canada).
Le ver-gris occidental des haricots, *Striacosta albicosta* (Lepidoptera : Noctuidae), devient une préoccupation importante pour les producteurs de l'Ontario et du Québec. Des masses d'oeufs colorés sur une feuille de mais récoltée à Saint-Anicet (Québec, Canada).
Cambridge Core [Photo: Julien Saguez]

Back cover/Plate inférieur:

Stiretrus anchorago (Hemiptera: Pentatomidae) from Okaloacoochee Slough State Forest (Hardy County, Florida, United States of America).
Stiretrus anchorago (Hemiptera : Pentatomidae) de la forêt d'état d'Okaloacoochee Slough (Hardy County, Floride, États-Unis).
[Photo: Matthias Buck]

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