

Bulletin

Entomological Society of Canada
Société d'entomologie du Canada

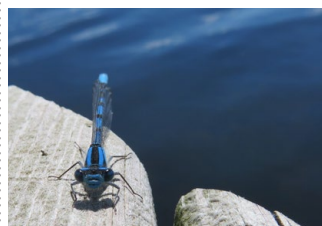
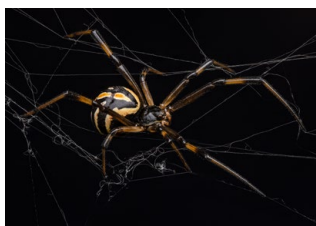
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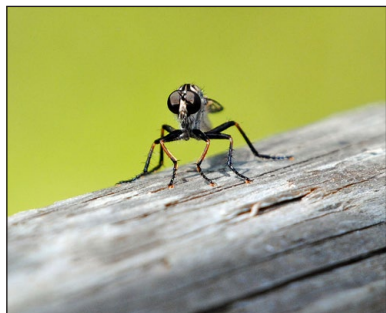


List of Contents / Table des matières

Volume 53(1), March / mars 2021

Up front / Avant-propos	1
Joint Annual Meeting 2021 / Réunion annuelle conjointe 2021	4
STEP Corner / Le coin de la relève	6
Thesis Roundup / Foisonnement de thèses	10
News from the Regions / Nouvelles des régions	11
People in the news / Gens qui font les manchettes (Charles Vincent)	12
Special Features / Articles spéciaux	
Wider aspects of a career in entomology. 13. Graduate studies in England, continued (Hugh V. Danks)	13
Modern internet helps amateur biologist solve complexities associated with cynipid galls (Joe D. Shorthouse)	20
Canada's Coolest/Cruellest Bugs / Ces bestioles les plus cools/cruelles du Canada	
A bit of Cool and a bit of Cruel – The apple maggot, <i>Rhagoletis pomonella</i> , the logo insect that now represents the entirety of its regional society (Carolyn Parsons)	33
In memory / En souvenir de	
Olga Kukal (Virginia K. Walker)	36
Paul Denness Syme (Stephen Dominy)	38
Books available for review / Livres disponibles pour critique	42
Members' discounts / Remise pour les membres	43
Society business / Affaires de la Société	
JAM 2021 and ESC Business Meetings	44
Highlights of the recent Board of Directors meeting	45
Executive Meeting - Call for Agenda Items / Réunion du conseil exécutif – Points à l'ordre du jour	46
Announcement of Changes in the ESC Standing Rules / Changements dans les Règles permanentes de la SEC:	47
Seventeenth Annual Photo Contest / Dix-septième concours annuel de photographie	50
List of Contents: Regional Journals / Table des matières : Revues des sociétés régionales	
Journal of the Entomological Society of British Columbia Volume 117 (2020)	52
Proceedings of the Entomological Society of Manitoba Volume 75 (2019)	53
Journal of the Acadian Entomological Society Volume 16 (November 2020)	53
Announcements / Annonces	
Biological Control Programmes in Canada – call for chapter proposals (Véronique Martel)	54
Bugdex: when insect guides meet digital design / Bugdex: lorsque les guides d'insectes rencontrent le design numérique (Charles-Étienne Ferland)	54
“Les Cahiers Léon-Provancher” (The Léon-Provancher Notebooks), entitled “Tableaux d'Histoire naturelle de la Province de Québec”(Portraits of Natural History in the Province of Quebec)	57
Contents of newsletters / Contenu des bulletins	
Canadian Weed Science Society / Société canadienne de malherbologie	60
Canadian Phytopathological Society / Société Canadienne De Phytopathologie	61
Newsletter of the Biological Survey of Canada / Commission biologique du Canada	62
Meeting announcements / Réunions futures	63
Officers of affiliated societies / Dirigeants des sociétés associées	65
The last word / Le dernier mot	66
Governing board / Conseil d'administration	inside back cover

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



Robber fly in the Subfamily Asilinae (Diptera: Asilidae),
photo taken at Trout Creek Point [Summerland, British
Columbia, Canada]
Une mouche à toison de la sous-famille Asilinae
(Diptera : Asilidae) photographiée à Trout Creek Point
[Summerland, Colombie-Britannique, Canada]
[Photo: Robyn DeYoung]



Light at the End of the Tunnel

By the time you read this we will be approaching a full year since pandemic restrictions came into being, changing so much of our personal, professional and social lives. The effects have been profound for many of us, and that includes the way we conduct business in the Entomological Society of Canada.

Fortunately, the Board, Officers, Committee Chairs and Strauss representatives have shown incredible dedication, creativity and imagination as we've pivoted to working productively under these difficult circumstances. We are also fortunate that vaccination programs continue to roll out in all the provinces, and it is just a matter of time before we get back to something approaching normal.

While this wasn't an easy decision, we intend to hold an in-person Joint Annual Meeting this November with the Entomological Society of Ontario in Niagara Falls. Given the contractual obligations with the hosting venue, attempting to go completely virtual could incur some serious financial penalties. Further, the complexity and expense of hosting a hybrid meeting just isn't feasible at this time for a number of reasons.

We recognize that it may be difficult for all our members to attend this meeting, so we are separating the AGM from the scientific program, and will carry out the annual business of the ESC in a virtual

La lumière au bout du tunnel

Au moment où vous lirez ces lignes, nous serons à presque une année complète depuis la mise en place des restrictions liées à la pandémie, changeant ainsi une grande partie de notre vie personnelle, professionnelle et sociale. Les effets ont été profonds pour beaucoup d'entre nous, et cela inclut la façon dont nous menons nos activités au sein de la Société d'entomologie du Canada.

Heureusement, le conseil d'administration, les dirigeants, les présidents des comités et les représentants de Strauss ont fait preuve d'un dévouement, d'une créativité et d'une imagination incroyables alors que nous nous efforçons de travailler de manière productive dans ces circonstances difficiles. Nous sommes également chanceux puisque les programmes de vaccination continuent à se déployer dans toutes les provinces, et ce n'est qu'une question de temps avant que nous ne revenions à quelque chose qui se rapproche de la normale.

Bien que cette décision n'ait pas été facile à prendre, nous avons l'intention d'organiser une réunion annuelle conjointe en personne en novembre prochain avec la Société d'entomologie d'Ontario à Niagara Falls. Compte tenu des obligations contractuelles avec le site d'accueil, toute décision d'une réunion complètement virtuelle pourrait entraîner de sérieuses pénalités financières. En outre, la complexité et le coût de l'organisation d'une réunion hybride ne sont tout simplement pas envisageables pour l'instant, et ce pour plusieurs raisons.

Nous sommes conscients qu'il peut être difficile pour tous nos membres d'assister à cette réunion, c'est pourquoi nous séparons l'AGA du programme scientifique et nous mènerons

format to allow all members to participate. More information, times and dates will be forthcoming. Despite the uncertainty, I am very excited to be finally looking forward to the possibility of attending a real, in-person meeting! Full details regarding the meeting and scientific program can be found at the meeting web site: <https://www.entsocont.ca/esceso-2021-jam-english.html>. While my attendance at this meeting is far from assured, I am hopeful that I will get a chance to once again see you in person, attend some presentations and symposia in the flesh, and especially, share a pint with you!

While this is an even longer way off, we are once again planning on holding a joint meeting with the Entomological Society of America and the Entomological Society of British Columbia in Vancouver in 2022. We have signed a Memorandum of Understanding with the ESA and ESBC, and will soon begin the process of organizing the many details that a meeting of this size entails. The last joint meeting with these societies in 2018 was an incredible success, and I am very excited to see how 2022 will unfold.

It's also not too early to start thinking about the upcoming National Insect Appreciation Day (NAIAD)! On 8 June, we want to celebrate all things insect, and I encourage you to think of creative ways to safely celebrate our love of arthropods. The ESC Public Education Committee has a great web page and poster describing NAIAD and providing information on how to participate in one event that all can partake in: the insect picture challenge: <https://esc-sec.ca/entomology-resources/education-and-outreach/>

The Public Education Committee continues to offer Public Encouragement Grants to regional societies despite the challenges presented by the pandemic. Clearly, in-person events cannot take place, but the committee recognizes the difficulties regional societies are facing, and is being very

les affaires de la SEC dans un format virtuel pour permettre à tous les membres de participer. De plus amples informations, ainsi que les heures et les dates, seront communiquées prochainement. Malgré l'incertitude, je suis très enthousiaste à l'idée de pouvoir enfin assister à une véritable réunion en personne! Tous les détails concernant la réunion et le programme scientifique sont disponibles sur le site web de la réunion : <https://www.entsocont.ca/esceso-2021-rac-franccedilais.html>. Bien que ma participation à cette réunion soit loin d'être assurée, j'espère avoir l'occasion de vous revoir en personne, d'assister à quelques présentations et symposiums en chair et en os, et surtout, de partager une pinte avec vous !

Bien que ce délai soit encore plus long, nous prévoyons une fois de plus de tenir une réunion conjointe avec la Société d'entomologie américaine et la Société d'entomologie de Colombie-Britannique à Vancouver en 2022. Nous avons signé un accord avec l'ESA et la SECB, et nous allons bientôt commencer à régler les nombreux détails qu'une réunion de cette ampleur implique. La dernière réunion conjointe avec ces sociétés en 2018 a été un succès incroyable, et j'ai bien hâte de voir comment se déroulera l'année 2022.

Il n'est pas non plus trop tôt pour commencer à penser à la prochaine journée nationale des insectes! Le 8 juin, nous célébrons tout ce qui touche aux insectes, et je vous encourage à trouver des moyens créatifs de célébrer votre passion pour les arthropodes en toute sécurité. Le comité d'éducation de la SEC possède une excellente page web et une affiche décrivant la journée nationale des insectes et fournissant des informations sur la façon de participer à un événement auquel tous peuvent prendre part : le défi photo d'insectes : <https://esc-sec.ca/fr/entomology-resources/education-and-outreach/>

Le comité de l'éducation continue d'offrir des subventions d'encouragement public aux sociétés régionales malgré les défis posés par la pandémie. Les événements en personne ne peuvent évidemment pas avoir lieu, mais le

flexible with regards to funding requests. So, I encourage regional societies who have not applied for a grant to think creatively about ways they may engage in public outreach and submit a request! Regional societies are eligible for grants up to \$500 per year; for details on applying, contact the Chair of the Public Education Committee, Étienne Normandin (etienne.normandin at gmail.com).

Finally, I wish all of you good health, the ability to connect with loved ones and the means to find peace of mind in the midst of this chaos we find ourselves in. We are finally approaching a season of hope, and I hope very much to be able see all of you before long.

comité reconnaît les difficultés auxquelles les sociétés régionales sont confrontées et fait preuve d'une grande souplesse en ce qui concerne les demandes de financement. J'encourage donc les sociétés régionales qui n'ont pas demandé de subvention à réfléchir de manière créative aux moyens de s'engager dans la sensibilisation du public et à soumettre une demande ! Les sociétés régionales sont admissibles à des subventions pouvant atteindre 500 \$ par année. Pour obtenir des détails sur la façon de présenter une demande, communiquez avec le président du comité de l'éducation, Étienne Normandin (etienne.normandin at gmail.com).

Enfin, je vous souhaite à tous une bonne santé, la possibilité de communiquer avec vos proches et les moyens de trouver la tranquillité d'esprit au milieu de ce chaos dans lequel nous nous trouvons. Nous approchons enfin d'une saison d'espoir, et j'espère vivement pouvoir tous vous voir d'ici peu.



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ESC/ESO 2021 JAM



ESC-ESO
2021

Sunday, 14 November to Wednesday, 17 November 2021
Marriott Fallsview Hotel, Niagara Falls, Ontario

JAM theme and vision

Strength in Diversity. The insects are among the most diverse group of organisms on the planet, and entomologists are applying an increasingly diverse toolkit to advance knowledge on a diversity of topics in the field. We are keenly aware of the declines in the diversity of insects that threaten vital ecosystem functions, human health, and our economy. We are also becoming increasingly aware of systemic barriers that preclude many from studying and practicing entomology, threats that likely impact the productivity and ingenuity of entomological research in Canada. Our goal for the 2021 JAM – Strength in Diversity - is to showcase state of the art entomological research on a diversity of taxa, ecosystems and disciplines, and to collectively discuss solutions to enhancing equity and diversity in Entomology.

Speakers

Heritage Lecture: Dr Lisa Myers, York University

Keynote: Dr Amanda Mochring, Western University

Keynote: Dr Jayne Yack, Carleton University

Keynote: Dr Claire Kremen, University of British Columbia

<https://www.entsocont.ca/esceso-2021-jam-english.html>

ESC/ESO 2021 RAC



ESC-ESO
2021



Du dimanche 14 novembre au mercredi 17 novembre 2021
Hôtel Marriott Fallsview, Niagara Falls, Ontario

Thème et vision de la réunion annuelle

La force est dans la diversité. Les insectes font partie du groupe d'organismes le plus diversifié de la planète, et les entomologistes utilisent une panoplie d'outils de plus en plus variés pour faire progresser les connaissances sur une multitude de sujets dans ce domaine. Nous sommes très conscients du déclin de la diversité des insectes qui menace les fonctions vitales des écosystèmes, la santé humaine et notre économie. Nous sommes également de plus en plus conscients des obstacles systémiques qui empêchent de nombreuses personnes d'étudier et de pratiquer l'entomologie, des menaces qui ont certainement un impact sur la productivité et l'ingéniosité de la recherche entomologique au Canada. Notre objectif pour la réunion annuelle conjointe 2021 - La force est dans la diversité - est de présenter l'état de la recherche entomologique de pointe sur une diversité de taxons, d'écosystèmes et de disciplines, et de discuter collectivement des solutions pour améliorer l'équité et la diversité en entomologie.

Conférencières

Allocution du patrimoine : Dre Lisa Myers, Université York

Conférencière d'honneur : Dre Amanda Moehring, Université Western

Conférencière d'honneur : Dre Jayne Yack, Université Carleton

Conférencière d'honneur : Dre Claire Kremen, Université de Colombie-Britannique

<https://www.entsocont.ca/esceso-2021-rac-franccedilais.html>



Changes coming to SEPAC!

This has been in the works for quite a while and we can now announce it: the current co-chairs of SEPAC are passing on the torch!

A word from Anne-Sophie

I have been involved with SEPAC since 2015 and have been co-chair since 2016. In the last 5 years, the ESC has given me lots of opportunities to create connections and to contribute to the dissemination of entomological work by students and early professionals. In the years I have been involved, we have continued the tradition of silent auctions and Graduate Student Showcases and have been able to bring even more attention to the amazing research done by the members of our community. We have also revised and expanded a tool I am very proud of, the Directory of Entomology. I think this is an incredible resource for students, one that allows them to connect with entomologists all over Canada and helps them foster their interest in entomology. Students and early career researchers are essential for progress and change within the Society and this is, in my opinion, for the best! This past year has seen the development of new initiatives by the ESC notably the formation of the Equity, Diversity, and Inclusion (EDI) Committee and the addition of an EDI Director to the Board, with early career members being the driving force behind their implementation. I am eager to see what Rowan and Matt will do in the

Des changements à venir dans le comité

Cela fait déjà un certain temps que ce projet est en cours et nous pouvons maintenant l'annoncer : les co-présidentes actuelles du comité des affaires étudiantes et des jeunes professionnels passent le flambeau!

Le mot d'Anne-Sophie

Je suis impliquée dans le comité depuis 2015, et j'en suis la coprésidente depuis 2016. Au cours des 5 dernières années, la SEC m'a donné de nombreuses occasions de créer des liens et de contribuer à la diffusion des travaux entomologiques des étudiants et des jeunes professionnels. Au cours des années où j'ai été impliquée, nous avons poursuivi la tradition des enchères silencieuses et des vitrines aux étudiants des cycles supérieurs et nous avons été en mesure de faire connaître encore davantage les recherches étonnantes réalisées par les membres de notre communauté. Nous avons également révisé et développé un outil dont je suis très fière, le répertoire des formations en entomologie. Il s'agit d'une ressource incroyable pour les étudiants, leur permettant d'entrer en contact avec des entomologistes de tout le Canada et les aidant à développer leur intérêt pour l'entomologie. Les étudiants et les chercheurs en début de carrière sont essentiels au progrès et aux changements au sein de la Société et c'est, à mon avis, pour le mieux! Au cours de la dernière année, la SEC a mis en place de nouvelles initiatives, notamment la création du comité sur l'équité, la diversité et l'inclusion (ÉDI) et l'ajout d'un administrateur de l'ÉDI au conseil d'administration, les membres en début de carrière étant le moteur de leur mise en œuvre. Je suis impatiente de voir ce que Rowan et Matt vont faire dans les prochaines années et de voir le comité continuer à prospérer en termes d'inclusion, d'éducation et de soutien.

coming years and to see SEPAC continue flourishing in terms of inclusion, education and support.

A word from Rachel

It has been one of the greatest joys of my PhD years to serve the ESC. My family imparted to me that one has a duty to serve their community. Graduate work has expanded my community to include the academic world. Through service to the ESC, I have been able to build connections with students and working professionals of all ages, disciplines, and backgrounds, all of whom share a common bond, an interest in and appreciation for insects. As student representatives, our role is to support students by highlighting their research and providing them with the means and connections to advance their research and careers. Through the Graduate Student Showcase, annual silent auction, and Directory of Entomology we have been able to accomplish this. Moreover, students and early professionals have been instrumental in pushing the Society forward to being a more open and inclusive environment for incoming student members. I know this will be a priority for Matt and Rowan, and eagerly await the new initiatives they will foster.

We are now very pleased to present the two new SEPAC co-chairs and to give you an opportunity to get to know them!

Matt Muzzatti is a PhD student at Carleton University, co-advised by Heath MacMillan and Sue Bertram, and is studying how to maximize the production of farmed crickets. He also works with Entomo Farms, a Canadian cricket farming company that is directly involved with his research, to tackle issues at the farm. Matt has a BSc in Biodiversity at the University of Guelph where he fell in love with entomology after Steve Marshall's Insect Diversity and Gard Otis' Insect Behaviour classes, and their field entomology course in Missouri. He then completed his MSc at the University

Le mot de Rachel

Servir la SEC a été l'une des plus grandes joies de mes années de doctorat. Ma famille m'a appris que l'on a le devoir de servir sa communauté. Le programme d'études supérieures a élargi ma communauté pour inclure le monde universitaire. En servant la SEC, j'ai pu établir des liens avec des étudiants et des professionnels de tous âges, de toutes disciplines et de tous horizons, qui partagent tous un lien commun, un intérêt et une appréciation pour les insectes. En tant que représentantes des étudiants, notre rôle est de soutenir les étudiants en mettant en valeur leurs recherches et en leur fournissant les moyens et les contacts nécessaires pour faire progresser leurs recherches et leurs carrières. Grâce à la vitrine aux étudiants des cycles supérieurs, aux enchères silencieuses et au répertoire des formations en entomologie, nous avons pu accomplir cela. De plus, les étudiants et les jeunes professionnels ont joué un rôle déterminant dans l'évolution de la Société vers un environnement plus ouvert et plus inclusif pour les nouveaux membres étudiants. Je sais que ce sera une priorité pour Matt et Rowan, et j'attends avec impatience les nouvelles initiatives qu'ils encourageront.

Nous sommes maintenant très heureuses de vous présenter les deux nouveaux coprésidents du comité des affaires étudiantes et des jeunes professionnels et de vous donner l'occasion de les connaître!

Matt Muzzatti est étudiant au doctorat à l'Université de Carleton, sous la direction de Heath MacMillan et Sue Bertram, et étudie comment maximiser la production de grillons d'élevage. Il travaille également avec Entomo Farms, une société canadienne d'élevage de grillons directement impliquée dans ses recherches, afin de résoudre les difficultés rencontrées à la ferme. Matt possède un baccalauréat en biodiversité de l'Université de Guelph, où il est tombé amoureux de l'entomologie grâce aux cours de Steve Marshall sur la diversité des insectes, de Gard Otis sur le comportement des insectes et de leur cours d'entomologie sur le terrain dans le Missouri. Il a ensuite effectué sa maîtrise à l'Université de

of Guelph with Rebecca Hallett, where he entered the field of integrated pest management and studied the density-dependent impacts of swede midge on canola. There, he developed a strong interest in insects as food and feed and was determined to pursue this after his MSc. He hopes to continue being able to connect science to industry as he does in his PhD. He believes that insects as food and feed are a burgeoning market in Canada, especially with strong leaders like Entomo Farms paving the way, and is excited to be part of this movement. In the future, he hopes to lead an insect as food and feed research lab, and to teach entomology courses at the university level.

Matt has been involved with SEPAC for the past 2 years, helping with the Research Roundups, and in doing so has learned about the different entomology research groups across Canada. Through that, he has been able to remain connected with the really cool insect research coming from all corners of our country. Since he enjoys teaching and getting others excited about insects, the ESC keeps him inspired to continue to learn as much as he can and communicate it to others. We are very excited to have Matt take over the role of co-chair,

Rowan French is a PhD student at the University of Toronto supervised by Locke Rowe in the Department of Ecology and Evolutionary Biology. She has been fascinated by insect diversity since elementary school, and her enthusiasm for entomology grew during her undergraduate research on the evolution and systematics of beetles and moths at the University of Alberta. Rowan's current work focuses on the evolutionary drivers and constraints of phenotypic diversity in longhorned beetles (Coleoptera: Cerambycidae), with emphasis on sexually dimorphic morphological traits and pheromones.

Rowan became an ESC member in the final year of her undergraduate studies (2019) and is excited to invite new members and varied perspectives into the Society that welcomed

Guelph avec Rebecca Hallett, où il s'est orienté vers la lutte intégrée contre les ravageurs et a étudié les effets dépendants de la densité de la cécidomyie du chou-fleur dans le canola. Il y a développé un intérêt marqué pour les insectes en tant qu'aliments pour les humains et les animaux et était déterminé à poursuivre dans cette voie après sa maîtrise. Il espère pouvoir continuer à faire le lien entre la science et l'industrie comme il le fait dans son doctorat. Il estime que les insectes utilisés dans l'alimentation humaine et animale constituent un marché en plein essor au Canada, en particulier grâce à des leaders forts comme Entomo Farms, et il est enthousiaste à l'idée de faire partie de ce mouvement. Il espère diriger un laboratoire de recherche sur les insectes destinés à l'alimentation humaine et animale, et donner des cours d'entomologie au niveau universitaire.

Matt est impliqué dans le comité des affaires étudiantes et des jeunes professionnels depuis 2 ans, contribuant aux aperçus de la recherche, et ce faisant, il a appris à connaître les différents groupes de recherche en entomologie à travers le Canada. Grâce à cela, il a pu rester en contact avec la recherche vraiment cool sur les insectes provenant de tous les coins de notre pays. Comme il aime enseigner et susciter l'intérêt des autres pour les insectes, la SEC lui permet de continuer à apprendre autant qu'il le peut et à le communiquer aux autres. Nous sommes très enthousiastes à l'idée de voir Matt prendre le rôle de coprésident du comité.

Rowan French est étudiante au doctorat à l'Université de Toronto sous la direction de Locke Rowe, au département d'écologie et de biologie évolutive. Elle est fascinée par la diversité des insectes depuis l'école primaire, et son enthousiasme pour l'entomologie s'est développé au cours de ses recherches de premier cycle sur l'évolution et la systématique des coléoptères et des papillons à l'Université de l'Alberta. Les travaux actuels de Rowan se concentrent sur les moteurs de l'évolution et les contraintes de la diversité phénotypique des longicornes (Coleoptera : Cerambycidae), avec une attention particulière pour le dimorphisme sexuel des traits morphologiques et des phéromones.

her as a budding entomologist. As co-chair of SEPAC, her top priority is to foster a welcoming and inclusive environment for Canada's diverse community of entomologists-in-training. She also aims to strengthen ties among early career entomologists by offering opportunities for professional development, mentorship, and socialization between and during annual meetings. She looks forward to working with Matt, other members of SEPAC, and entomologists across Canada to promote the study of arthropods and support students and early professionals in our field.

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 suggestions for new initiatives in the coming year, email us at students@esc-sec.ca.

We look forward to hearing from you,

Anne-Sophie and Rachel (for the last time!)
and Matt and Rowan (for the first time!)

Rowan est devenue membre de la SEC lors de sa dernière année d'études de premier cycle (2019) et est ravie d'inviter de nouveaux membres et des perspectives variées dans la Société qui l'a accueillie en tant qu'entomologiste en devenir. En tant que co-présidente du comité des affaires étudiantes et des jeunes professionnels, sa priorité est de favoriser un environnement accueillant et inclusif pour la communauté diversifiée des entomologistes en formation au Canada. Elle vise également à renforcer les liens entre les entomologistes en début de carrière en leur offrant des possibilités de développement professionnel, de mentorat et de socialisation entre et pendant les réunions annuelles. Elle est impatiente de travailler avec Matt, les autres membres de ce comité et les entomologistes de tout le Canada pour promouvoir l'étude des arthropodes et soutenir les étudiants et les jeunes professionnels dans notre domaine.

Aperçu de la recherche

Nous continuons à faire la publicité des publications des étudiants des cycles supérieurs 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 initiatives pour la prochaine année, écrivez-nous à students@esc-sec.ca.

Au plaisir de vous entendre et de vous lire,
Anne-Sophie et Rachel (pour la dernière fois!), et
Matt et Rowan (pour la première fois!)

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).

SEPAC wants to congratulate the following students for successfully defending their thesis! If you want to learn more about their research, you can contact them directly or send us a message to be put in contact.

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.

Le comité veut féliciter les étudiants et étudiantes suivantes pour la défense de leurs mémoires et thèses! Si vous voulez en savoir plus sur leur recherche, vous pouvez entrer en contact avec eux directement ou nous envoyer un message pour vous mettre en contact.

Julie Augustin. 2020, PhD. Université de Montréal. Caractérisation et modélisation des comportements d'une guêpe parasitoïde en fonction de la température: conséquences populationnelles et lutte biologique. Co-supervised by Jacques Brodeur (Université de Montréal), Gaétan Bourgeois (AAFC, St-Jean-sur-Richelieu) and Guy Boivin (AAFC, St-Jean-sur-Richelieu).

Janet Sperling. 2021, PhD. University of Alberta. Assessment and diversity of tick bacterial microbiomes. Supervised by Kathy Magor (University of Alberta). <http://tickmicrobiome.org/>





Entomological Society of Manitoba

The Entomological Society of Manitoba has recently posted a statement to its website on its commitment to equity, diversity, and inclusion:

“The Entomological Society of Manitoba unreservedly condemns all forms of racism and discrimination against people from minority and underrepresented groups. We value our Black, Indigenous, and People of Colour (BIPOC) members and support the Entomological Society of Canada Equity, Diversity and Inclusion policies and measures <https://esc-sec.ca/the-society/statement-of-diversity-and-inclusion/>. We recognize that a more diverse membership would strengthen the ESM. We are committed to identifying and removing barriers for BIPOC, LGBTQ+, disabled, and female members to encourage their involvement and full participation in the ESM.”

The 76th Annual Meeting of the Entomological Society of Manitoba was held virtually using Zoom on 4 December 2020. The meeting included a symposium for students and postdocs with eleven contributed presentations. Presentations covered a wide range of topics in systematics, ecology and behaviour. Abstracts will be published in a future issue of the *Proceedings of the Entomological Society of Manitoba*.



Entomological Society of British Columbia

It has been a relatively quiet few months for the ESBC but progress has been made on an interesting community outreach program first mentioned in the September *Bulletin*. In December, the ESBC Executive approved the purchase of 500 copies of “*The Bug Girl*” by Sophia Spencer and Margaret McNamara.

For those of you who haven’t heard of this book, it is the true story of how 7-year-old Sophia was bullied at school for liking bugs and how hundreds of female scientists flooded her with support, and encouraged her to continue studying the bugs she loved. The copies purchased by the ESBC will be distributed to elementary school teachers throughout the province, and in collaboration with the British Columbia Agriculture in the Classroom Foundation, a set of lesson plans and hands-on activities are being developed that will teach students how to recognize the common structures and characteristics of insects, explore the many adaptations of insects, and appreciate insect diversity.

Another interesting project with an outreach component is being run by Dr Rob McGregor of the Douglas College Institute of Urban Ecology. Rob provided the following description of his most recent citizen science program.

New adventive carabid beetle in Western Canada

**Rob McGregor, Institute of Urban Ecology, Douglas College,
New Westminster, BC**

Ecology Students at Douglas College recovered specimens of *Nebria brevicollis* (Fabricius) (Coleoptera: Carabidae) in pitfall traps near our Coquitlam, BC campus in the fall of 2018. As this species had not previously been recorded in western Canada, we engaged in further trapping for this species in 2019 and recovered *N. brevicollis* from four parks in the City of Coquitlam. Since then, single specimens were identified collected near UBC in 2015, and in farmland in Delta, BC in 2019. This new adventive beetle species has apparently migrated north from populations in Oregon where the species was



H. Goulet

accidentally introduced before 2007 (LaBonte 2011).

In the fall of 2020, we established Beetle Watch ([IUE Beetle Watch 2020 | Facebook](#)), a citizen science program where members deployed pitfall traps to try to detect *N. brevicollis*. We identified beetles from photographic records submitted by public volunteers and now have records of this species from Vancouver Island through Metro Vancouver and on to Chilliwack. This species is evidently well established in southwestern British Columbia and we will continue to monitor its spread and establishment. First records and identification criteria for *N. brevicollis* are now available in a new paper in *The Canadian Entomologist* ([First western Canadian records of *Nebria brevicollis* \(Coleoptera: Carabidae\) and establishment of populations in Coquitlam, British Columbia, Canada | The Canadian Entomologist | Cambridge Core](#)). The Institute of Urban Ecology at Douglas College would be very interested to hear of any records of this species at any locations in BC or beyond (iue@douglascollege.ca).

Reference

LaBonte, J.R. 2011. *Nebria brevicollis* (Fabricius, 1792) in North America, benign or malign? (Coleoptera, Carabidae, Nebriini). *ZooKeys*, **147**: 497–543.

People in the news / Gens qui font les manchettes

Charles Vincent (Saint-Jean-sur-Richelieu Research and Development Centre, Agriculture and Agri-Food Canada) will receive a Lifetime Achievement Award of Excellence during the 10th International IPM Symposium to be held in Denver, Colorado. Due to the COVID-19 pandemic, the 10th International IPM Symposium has been postponed to 28 February – 3 March 2022. In part Charles' citation for the award reads "[he] is an international leader in agricultural entomology and has led innovation in research and development of alternative insect management methods to conventional insecticides. He has an illustrious career spanning over 30 years to his credit and the goal of his program is to address threats posed by arthropods to some horticultural crops by developing non-insecticidal methods with the aim to improve the sustainability of plant protection programs".

For more information, visit: <https://ipmsymposium.org/2021/awards.html>

Wider aspects of a career in entomology. 13. Graduate studies in England, continued Hugh V. Danks

This series of articles outlines some ancillary aspects of my entomological career, for the potential amusement of readers. It reports the sometimes unexpected challenges of working in new places and in the real world, an approach that serves also to expose some conclusions about research activities and some information about insects and their environments. This article treats the rest of my time as a graduate student in entomology.



My research on solitary wasps and bees nesting in bramble stems (see *ESC Bulletin* 52: 196) continued at the Silwood Park Field Station of Imperial College, near Ascot, Berkshire.

Nests outside the field station were sampled too. In addition, hundreds of trap-nest bundles were placed in various locations in southeast England (e.g., Figures 1, 2). However, those sites were accessible to the public and nearly all of the bundles were vandalized, suggesting that such time-consuming projects are not worthwhile except in protected locations¹.

The outside work was made feasible by replacing my motorcycle with a secondhand Mini van. That



Figure 1. Chobham Common (the largest national nature reserve in southeast England: 656 hectares), where trap nests were placed.

Panoramio (CC BY-SA 3.0)



Figure 2. View from the North Downs near Albury (at Newlands Corner, a nature reserve of more than 100 hectares), where trap nests were placed.

Andy Scott (CC BY-SA 4.0)

¹Therefore, the key discovery from these travels was not about insects. It was that the best places to eat were cafes frequented by lorry drivers [truck drivers], because businesses on common transport routes would fail unless they provided wholesome and inexpensive meals. This expectation was met less often in North America!

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.

vehicle (Figure 3) was indeed “mini”: it had small wheels and a small engine, and would have been unsuitable for most North American conditions—but it was ideal for English country roads, and there was space in the cargo area for armloads of brambles.

The van was used only once in an appreciable amount of snow (insufficient practice for later winters in Canada). The snowfall was followed by a warm spell, which softened the snow and made it more slippery. Assuming incorrectly that the warmth had made driving easier, one English student crashed into the field-station gate ... but nevertheless reacted calmly.

Some other residents at Silwood were less serene, given the range of personalities and cultural norms: people came from several regions of the United Kingdom, and from many different countries. Despite this diversity—and even because of it—they contributed to entomology in various ways, and subsequently promoted the study of insects across the world. Nevertheless, their differences led to occasional disagreements, and a few especially volatile individuals were involved in loud and spectacular incidents in the student lounge.

A student from Australia had a robust physique and a robust vocabulary. In the evenings, he and I would often play snooker at the field station, when his performance was reflected by how frequently he employed certain forthright expressions unsuitable for use in the *Bulletin*. It is said that proficiency in indoor games is the sign of a misspent youth, but those games taught me a valuable lesson: confidence is as necessary as technical ability. When confident, I expected to make every shot, and usually did; when I was unsettled, even easy shots would fail. Such a lesson applies to almost every activity. Confidence, like execution, is enhanced by study, preparation, effort, concentration, and practice.

One set of English students adopted an exaggerated simple or rustic demeanour, as if to contrast with the affected manner common at the Ascot races. A couple of them gained employment in Australia. A few years later, they already carried themselves in an even more relaxed manner, and spoke with pronounced Australian accents.

At the opposite extreme was an English student from the undergraduate cohort after mine. He was strikingly pompous, a trait maintained after he secured a university appointment overseas. The position led eventually to a professorship, and at a conference soon afterwards, talking with a group of past students from Silwood, he proclaimed: “I have a Chair!” A former classmate, familiar with his posturing, deflated it with the response: “...but I have a settee!” [sofa]

My research at the field station continued with an attempt to measure aculeate populations. One wasp species (Figure 4) and one bee species (Figure 5) were studied in most detail.



Figure 4. The crabronid wasp *Pempredon lethifer* (or a similar species). Female length about 0.65 cm.



Figure 3. Vehicle used in the 1960s for the fieldwork noted here (Morris Mini Minor van), parked on a suburban street.



Figure 5. The colletid bee *Hylaeus brevicornis*. Female length about 0.5 cm.

H. Danks



Figure 6. Marked female of *Pemphredon lethifer* at the entrance to a nest. Wasps released in different areas of the field station were given different colours of mark.

large samples were harvested with secateurs by cutting swathes 1.5 m wide through representative stands. Leather gauntlets held the thorns at bay ... most of the time! In about half the samples, both living and dead stems were cut into 30-cm lengths to measure the diameter of the pith. The laboratory benches were soon overloaded, but at least there was plenty of material for additional trap-nest bundles.

The numbers of broken ends, nests, and successful cells could be related to the volume of bramble, giving population estimates, albeit with a high standard deviation. However, the less variable estimates from mark-recapture were in the same range, which lent credence to both estimates. Across the whole area, there were no more than a few hundred females of each of the two target species, despite the abundance of bramble and the fact that they were the most frequent and widely distributed species there. The populations of other species were limited too (as indicated by the bramble sampling only), although some were more aggregated or favoured shadier sites.

The bushes contained few broken, dead stems of large diameter, which are favoured by these species. Therefore—in view of the very low developmental mortality (see *ESC Bulletin* 52: 200)—populations appear to be constrained chiefly by the availability of suitable nesting sites. Indeed, species that nest in existing cavities commonly occupied channels excavated by other species, and some were even seen to usurp active nests while the owner was away.

Females emerging from nests collected locally were marked and released, and considered “recaptured” if any of them constructed nests in trap-nest bundles. Each day throughout the season, a long hike around the field station checked all of my 500 bundles. New nests were observed in suitable weather until the female was seen (cf. Figure 6). A population estimate could be derived from the ratio of marked to unmarked females.

My daily route took me past a small farm patrolled by a collie dog. It was not a threat. Many rabbits infected with myxomatosis virus were so sick that they might stop even when the dog was chasing them ... but then the dog would always stop too and wait for them to restart.

A second independent method of assessing aculeate populations focussed on bramble, by far the dominant habitat for nests. Bramble grew well on about 60 hectares of the field station, where there were more than 6 200 cubic metres of bushes.

The periphery of every bush had been searched for broken ends (which make the pith accessible) and nests, but to quantify their occurrence within entire stands I had to attack the virtually impenetrable bushes (Figure 7). Dozens of



H. Danks

Figure 7. Stand of brambles, and (inset) close-up of the thorns.

Assessing such low populations took much work but yielded relatively few publishable results. However, because work on nest contents was sure to yield data, this relatively risky attempt to advance knowledge seemed a useful way to develop the project. I sometimes questioned the wisdom of that decision whilst fighting more than 170 cubic metres of thorny bushes, measuring the pith diameters of more than 6 kilometres of stems, or completing the daily inspections of my trap-nest bundles when it was particularly hot or rainy!

Computer analysis of data is now taken for granted. One of the earliest computers had been installed at Silwood, but was much less powerful and efficient than modern computers despite its great size. A course for students taught simple programming with the now obsolete language FORTRAN, but a burdensome stack of punch cards had to be fed into the computer to run even the most elementary program.

Consequently, most of my data were analysed instead with a mechanical calculator (Figure 8). Its most conspicuous feature was the noise produced during division: the handle had to be cranked noisily multiple times until a bell rang, followed by a crank in the other direction². Electronic pocket calculators became cheaper and more widely available towards the end of my degree, and I saved up to

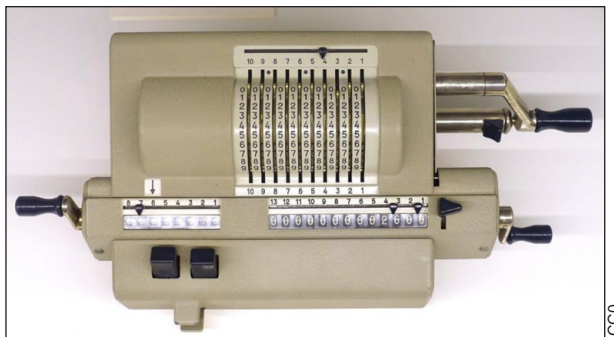


Figure 8. Example of a mechanical calculator.

buy a sophisticated model designed for scientific calculations. It cost about £150 (worth several thousand in today's Canadian dollars), but was no more capable than the mass-produced scientific calculators now sold online and elsewhere for less than \$20.

My graduate work exposed me to a number of professional entomologists with distinctive personalities. For example, a symposium of the Royal Entomological Society of London (subsequently published) was organized in 1967 by an Imperial College professor. He asked me to write down the questions and answers that followed each paper, to help him edit the proceedings. A senior professor from the hallowed halls of the University of Oxford approached me after his presentation, and told me to change his reply to one of the questions. I noted that my charge was merely to report accurately what was said, and he would have to address his request to the symposium organizer—a response that, given his unquestioned domain over students in his own department, was not received with equanimity!

²Numbers were set in the register of the calculating machine by moving levers directly or through a keyboard. Forward rotation of the crank added the set number to an accumulator; backward rotation subtracted it. For division, the dividend was entered into the accumulator—if necessary by adding it from the setting field—and then the divisor was set. Division is equivalent to repeated subtraction: the answer (quotient) is how many times the divisor can be subtracted from the dividend. Therefore, backward rotations were made until a bell rang, showing that the number in the accumulator had become negative; a single forward rotation restored any remainder, while a rotation counter showed the answer. The number of rotations required was reduced because subtractions could be done separately, in decreasing sequence, for higher places in the quotient: each rotation would then subtract 100 or 10 times the divisor, for example, or add it back after the bell-ring prompt. [For multiplication, the set figure (the multiplicand) was added repeatedly to the accumulator. This was done the number of times specified by the multiplier, and verified by the rotation counter. Higher places in the multiplier could be accumulated separately too.]

One faculty member at the field station was a creative theoretician, but somewhat impractical. For example, he reached carelessly into a tree hole in the tropics and was injured by its occupant; and he limited the supply of oil to his old car in the hope it would use less. When he explained his theoretical conclusion that one should drive across intersections as fast as possible to be at the place of maximum danger for the minimum possible time, students suspected that he was not joking.

Another faculty member had designed a machine to monitor the activity of ants in a network of tubes. Whenever an ant passed a photoelectric sensor, it caused a pen to strike a paper chart. An audible alert could be added as each ant passed, and there was also a multiplier that served to visualize low levels of activity by creating 10 records for every passing ant. I was once nearby when ant activity increased. The audible signal and the multiplier were both engaged, and my first instinct was to take cover at the sound of machine-gun fire.

The faculty member requested resources to expand this network, and gave a long and detailed demonstration to O.W. Richards, who was head of the department (and my supervisor). O.W. listened silently until the end. "That's all very well," he said, "but I hope you remember you've got an ant in there somewhere." He did approve the request.

The fact that all of my reared specimens were mounted (e.g., Figure 9) allowed me to receive significant support from O.W. towards the end of my work. An unexpected taxonomic problem arose for *Spilomena* (Figure 10), a genus of tiny wasps that stock their nests with thrips.

Only one species had been reported from the British Isles, but a key to the European species (in German) seemed to show that much of my reared material was a different species. I asked O.W. for confirmation, and he identified a few specimens to the previously unrecorded species. "Bring me all of your material,"

he said. Although he was leaving soon for an extended trip overseas, he examined every one of my 200 specimens, finding those two species as well as a third species from a single nest. He also looked at material in the British Museum (Natural History) and discovered a fourth species from Britain. That effort prevented misinformation in my thesis.

My general findings about the bramble-stem fauna were consolidated in a key to aculeate nests and the nearly 50 species that developed there. Diverse and overlapping characters gave the key an unusual structure:

galleries might be linear or branched; cells varied in size and shape, and might be separated by pith, mud, sand, resin, leaf fragments, or salivary secretions; there were many different kinds of prey (aphids, spiders, flies, psocids, psyllids, thrips, or caterpillars); each nest might contain cells with one or some combination of prey, developmental stages of aculeates, and their natural enemies (e.g., Figures 11,12); more than one species of cell-maker might be present when a partly completed nest had been usurped or superseded; some of the parasitoids were associated with

Josef Dvorak (www.biolib.cz) BWARS



Figure 10. Crabronid of the genus *Spilomena*, which stocks larval thrips in pith-partitioned nests. Length about 3.5 mm. Image from Bees, Wasps & Ants Recording Society 2020; bwars.com/wasp/crabronidae/inae/spilomena-trogloclodes.



Figure 9. Stem-nesting aculeates from the research collection made during these studies: the crabronids *Pemphredon shuckardi* (L, length about 0.7 cm), which like *P. lethifer* stocks aphids in pith-partitioned tunnels; and *Trypoxylon figulus* (R, length about 1.2 cm), which stocks spiders in mud-partitioned cells in existing cavities.

H. Devitt, modified

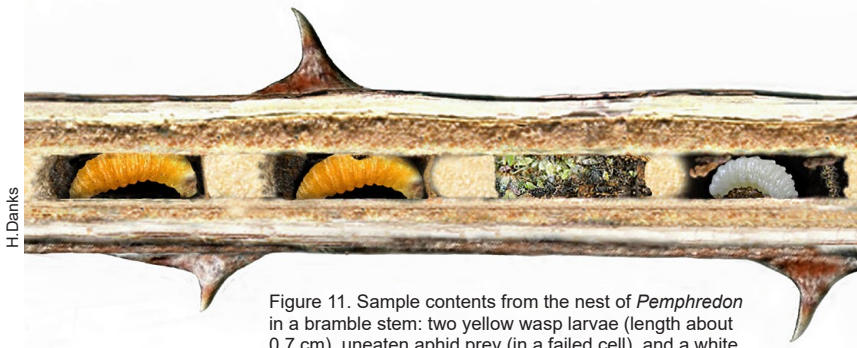


Figure 11. Sample contents from the nest of *Pemphredon* in a bramble stem: two yellow wasp larvae (length about 0.7 cm), uneaten aphid prey (in a failed cell), and a white chrysid larva.

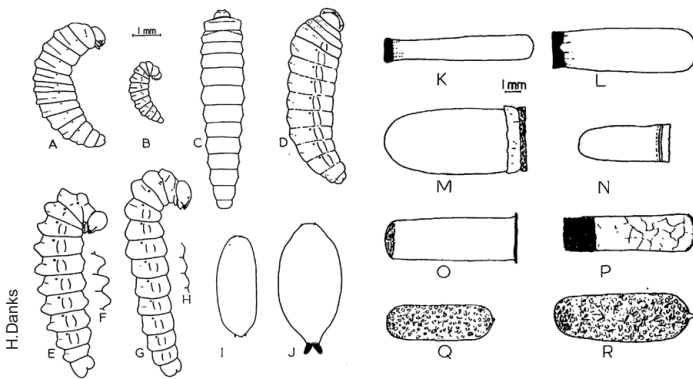


Figure 12. Sketches of some larvae and puparia (L), and cocoons (R) of crabronid wasps, megachilid bees, ichneumonids, chrysidids, and tachinids found in bramble stems.

several different hosts; and other insects were sometimes found, such as the puparia of a tachinid parasitoid that had come from earwigs sheltering in the nest channel.

My final request to O.W. was to review the draft of my thesis. The required format was more detailed than many modern theses, which contain papers suitable for publication (a valuable option that was not permitted at the time). Comments on the thesis did not relate to standards for publication, but only to the validity of the content.

Therefore, considerable additional work was required for subsequent publication. Only four papers were developed from my PhD, although the longest was 73 published pages. In contrast, one student from Silwood described many tiny aspects of his work in separate papers, a procedure that has become more frequent. Delivering results in “least publishable units” (LPUs) maximizes the number of publications, a statistic likely to impress administrators.

Another calculating approach, intended to favour promotions and grant applications, has developed more recently. A paper is submitted to the journal with the highest “impact factor” (provided the work might possibly be accepted there), whether or not it would be the most appropriate outlet; if rejected the paper is submitted to the journal with the next highest rank; and so on.

Such strategies might be acceptable if they have equivalent value for science, but not if they cause results to be published in too fragmentary a form or in the wrong place. My later attempt

to synthesize the literature on insect dormancy was hindered by the need to integrate results published in multiple LPU papers by an author who should have done this himself in a much smaller number of publications.

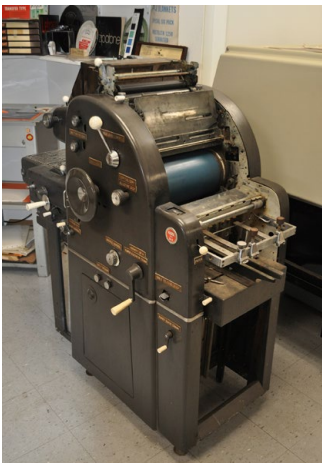
Most of my contemporaries at the field station worked hard, having entered graduate school only by clearing the many hurdles of the British educational system. However, one PhD student had a limited focus on his studies of spiders. He often took a guitar into the field, whereupon his sampling might become erratic. When one laboratory trial was neglected for too long, he simply relabelled it as a “starvation experiment”.

The student, hoping to obtain useful content for his thesis, requested a detailed analysis of his seasonal sampling records from a staff member whose particular expertise was interpreting the effects of weather in biological data. As soon as the assessment was complete, the student rushed over to find out the results.

The analyst was a Scot, a man not known for elaborate commentaries, and he provided a complete summary of the results in a single sentence. “Your data show,” he said, “that it got warmer in the summer, and then cooled back down again.” The student eventually completed his thesis, but did not pursue an academic career.

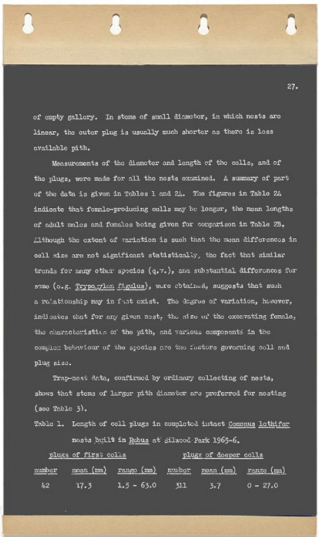
When my own thesis was complete, multiple copies were made with a mimeograph (Figure 13)³. Duplicating the pages one by one was a time-consuming chore. Moreover, preparing the mimeograph stencils (cf. Figure 14), including many detailed tables, was a challenging task—and the thesis acknowledged not only my supervisor and the taxonomists who had helped me with identification of prey species, but also the expert typist who transcribed the manuscript on to more than 350 stencils!⁴

Figure 14. Example of a mimeograph stencil. The holes near the top fit over pins on the drum, precisely positioning the stencil, which is then clamped at both ends.



Printhusiast (CC BY 4.0)

Figure 13. Example of a mimeograph (stencil duplicator). The model shown here is more sophisticated than the one used by the author.



H.Danks

³The mimeograph used a special wax-covered stencil, in which impressions were made by a typewriter with its ink ribbon disengaged. The ink-filled drum of the mimeograph had an absorbent ink pad on its surface, and the typed stencil was fastened around it. Each rotation of the drum against a pressure roller carried a sheet of paper through the machine and squeezed ink on to it through the impressions in the stencil. Running the machine (and pouring in the ink) required care to reduce the amount of extraneous ink transferred to the paper or the operator. Mimeographs became obsolete as soon as photocopiers were widely available.

⁴Most figures (including line drawings) were added to the thesis after the text had been duplicated, by interpolating pages with photographic copies. Captions were duplicated separately and affixed to those copies.

The thesis cited 263 references, the search for which had begun with titles provided by O.W. Richards. More than half were in languages other than English, consistent with my belief that effective scientific research requires thorough knowledge of the global literature⁵.

Employment opportunities for entomologists were limited nationally, but there were more options overseas. My preference for Canada developed from many elements, including the size and natural diversity of the country. When O.W. heard of my interest, he suggested that I write to a former student of Imperial College then in Canada, Antony Downes. That contact elicited a later meeting in London, which led to my postdoctoral fellowship in Ottawa.

The formal oral examination remained. Unexpectedly, only my supervisor and the external examiner were there, sitting casually backwards on a pair of dining chairs. Nevertheless, I had prepared diligently, and braced myself for a penetrating question as the external examiner began his interrogation. "I hear you are leaving for Canada next week," he said. Fortunately, the doctorate was granted, allowing me to travel to Ottawa for the studies of insect cold hardiness outlined at the start of this series (*ESC Bulletin* 50: 25).

⁵Knowledge of the scientific literature outside the language of the author often is incomplete in current publications, even though computer-assisted searches are now available.

Modern internet helps amateur biologist solve complexities associated with cynipid galls

Joe D. Shorthouse

Perhaps many biologists and other scientists of my generation, having been educated and practiced science largely during the late 20th century, have noted the acceleration of studies and communication in the practice of science today. I had not given this much thought until 4 March 2019, when I received an email from a complete stranger in Seattle, Washington, who claimed he was undertaking research on cynipid galls on feral roses and wanted to start an annual "rose gall wasp festival".

There are not many researchers in the world studying cynipid galls, and I had never heard of a "rose gall wasp festival," so this immediately caught my attention. I was surprised to find that the writer was an amateur who was not educated in biology, and yet was discussing plans to investigate factors responsible for gall induction, a complex subject that has fascinated scientists for several centuries.

The story became even more intriguing when the writer revealed he was a practicing litigation lawyer in Seattle who had built his own laboratory to study molecular, morphological and physiological aspects of gall biology. How he did this gave me a new appreciation for how intellectually-motivated amateurs can quickly assemble, thanks to the internet, the literature

Joe Shorthouse (roses@cyberbeach.net) is a contributor familiar to Bulletin readers. An emeritus professor at Laurentian University, he remains active in bringing an appreciation of insects and natural history to the general public.

needed to understand and meaningfully help solve complex biological issues.

The email was from lawyer Leonard D. Flanagan (Figure 1) and was the beginning of one of the most fascinating experiences of my career, one that I wish to share with readers of the *Bulletin*. Thanks to a flurry of emails containing ideas, hypotheses, photographs, and literature that has continued unabated since our meeting in 2019, we have become close friends.

I start this story of camaraderie and scientific discovery by sharing part of Leonard's 4 March 2019 email to me, which he has agreed to include here:

This is one of those unexpected (and hopefully interesting) communiques from a stranger that the internet has enabled.

*I am writing to ask whether I could persuade you to travel to an event that I am planning to hold on June 22 at my personal lab in Washington state, and to give an hour or so presentation to about 30 very nice friends and family of mine touching on gall wasps generally, *Diplolepis rosae* in particular, and whatever you can share about the current state of research into the potential use of galling insects for control of invasive plants. Allow me to explain.*

There has been, as you know, interesting recent proteomic research into the nature of differentiated expression of gall tissue compared to normal rose tissue, but nobody seems to be trying hard to identify or isolate the involved substance(s) or other factors responsible for gall induction and growth. Judging from the literature, unless I have missed something, the basic work of isolating gall induction factor(s) has been, with just a few exceptions, largely stalled for many decades.

When that became clear, I decided it would be interesting to see what I can figure out myself. To be clear, I am not trained in the sciences, and this effort is motivated by nothing but amateur curiosity. I fully understand that the problem is likely to be far too complex for me, and that I am very unlikely to make any significant headway on the problem at all. However, it is also true that I have learned a great deal on my own, am quite smart, self-motivated to learn, and most importantly that I have a real knack for successfully performing complex tasks based on book-learning, practice, advice from experts, and careful forethought. So I am giving it a try. I have now converted the former commercial print shop attached to my office into a reasonably complete research lab. (The availability of surplus equipment in this area from the UW genetics labs, Zymogenetics and others, along with online sales, makes preparing a high-functioning lab of this sort amazingly cheap, if you have patience.)

*One hypothesis I am exploring is whether *Wolbachia* carried by *Diplolepis rosae* is instrumental in induction and growth of rose galls, in addition to being responsible for the insect's parthenogenic reproduction pattern. If, say, the rose is normally able to kill off a *Wolbachia* infection, but is constantly being injected with new *Wolbachia* by the larva, and if, say, the *Wolbachia* picked up some key strand of the rose genome along the way (as *Wolbachia* is apparently wont to do), then perhaps *Wolbachia* from the wasp is responsible for altered expression in the plant by some kind of steady-state horizontal gene transfer or other mechanism of interference with regulation of rose expression fueled by the supply of *Wolbachia* from the insect.*

There would appear to be lots of ways to try to explore the basics of that possibility, even without the skills needed to try to characterize any potentially involved factors at a molecular level. (I am, however, teaching myself HPLC and electrophoresis techniques, so perhaps in a year or two I will be in a position to do more on that.)

An experimental design I am going to try to implement early on involves raising young larvae, if possible, on an artificial diet. To that purpose (and others), I want to harvest several hundred live young larvae this coming June and attempt to establish a portion of them on

artificial diet formulae and variants derived from the literature, and also to characterize the nutritional content of inner gall tissue that will be harvested along with the larvae to inform alterations of the diet formulae.

My wife and I will be harvesting a few hundred young galls at a site in Eastern Washington about 5 hours from my lab on Friday, June 21 and returning with them that evening. I want to try to dissect all or enough of the galls at my lab in one effort on June 22. That means many hands... But getting a lot of people (or indeed anyone) to come dissect galls just for the sake of helping me on this hare-brained project seemed to be asking too much of my friends and family.

I therefore decided to make a big midsummer party out of it. I am inviting friends, family, colleagues etc. to come dissect rose galls as both the price of admission, and the subject of the midsummer festivities. My hope is to have gall dissections start after your talk from about 11AM to noon, though I am flexible on that. The expected audience will not consist of biologists or scientists, though most have advanced degrees of one sort or another. Accordingly, a general explanation of the gall wasp life cycle, its peculiarities, where the research is at, and whatever else you think would be both interesting and accessible to educated lay people, would all be appropriate for your talk.

The plan is for about 30 guests to dissect galls and process larvae and gall tissue from about noon to 6pm on June 22. I will then provide dinner and for entertainment, I have hired the Aaron Walker's Gypsy Jazz band from Denver, Colorado, to play under a large tent.

Once I spoke on the telephone with Leonard, I booked flights from Sudbury to Seattle with visions of immersing myself in gall science for 4 days in a strikingly different way. Of course, I was curious as to how an 'amateur' could have such a deep understanding of current gall biology and was planning studies that could lead to discoveries new to science.

Leonard picked me up at the Seattle airport, the afternoon of 19 June 2019, and after lunch, showed me his 'laboratory' that he has named Gwixlab. He purchased the property in 2017 with its 70-year-old brick building outside the town of Renton (of Boeing aircraft fame) so he could convert about half into a law office, a kitchen, sitting area, and a bedroom, all handy after spending long hours handling legal issues. He painted the building green and red – the colours of rose leaf galls (Figure 2).



Figure 1. Leonard Flanagan in his private laboratory.



Figure 2. Leonard Flanagan's building holding his law office and gall laboratory. Note that it is painted in the colours of the mossy or bedeguar gall of *Diplolepis rosae*.

J. Shorthouse



Figure 3. Gall of *Diplolepis rosae* on a leaf bud of sweet briar rose *Rosa rubiginosa* found near Dayton, Washington.



Figure 4. Dissected gall of *Diplolepis rosae* showing larvae feeding within their chambers.

J. Shorthouse

Soon after Leonard purchased the building, he found a tall rose bush covered with mossy galls near the back door. A search of the internet identified the gall (Figure 3) as induced by the cynipid wasp *Diplolepis rosae*. He became fascinated by the story of how this gall wasp was accidentally introduced from Europe, along with its hosts, the dog rose (*Rosa canina*) and sweet briar rose (*Rosa rubiginosa*) by early homesteaders and how both the roses and gall wasps have persisted to this day across northern United States and southern Canada (Shorthouse 2001). He opened several galls to see how each inducer larva was deeply embedded inside its own chamber (Figure 4) and how the larvae had somehow caused the host leaves, stipules, and early buds on the stems, to surround the gall wasp chambers with masses of branching hair.

It became obvious to me that Leonard is a voracious reader with an uncanny ability to absorb and use vast amounts of technical literature in a wide variety of fields. Once he had a grasp of current knowledge of gall biology, he developed a plan to study how cynipid larvae control gall growth. He decided what he would do with the second half of his building – he would turn it into a research laboratory so he could walk next door after work in the evenings and study galls.

Galls of *Diplolepis rosae* near Dayton, Washington

Having identified from a U.S. Department of Agriculture technical note available online that the remote southeast corner of Washington State, around the town of Dayton, is an area replete with invasive roses, Leonard made the 5-hour drive east from Renton into dry ranchland of the Columbia Plateau. Most of these shrubs he examined were heavily galled by *D. rosae*.

Leonard picked me up early the next morning for a gall-collecting trip to Dayton. The highway east passes over the Cascade Mountains with dormant volcanoes, such as Mount Rainier, visible to the south. On the lower east side of the range, we found thick patches of the wild rose *Rosa nutkana*, along the highway.

I was unprepared for the extent to which the weedy feral roses had overgrown the rangeland around Dayton (Figure 5) and were clearly impacting cattle ranching. No galls of other *Diplolepis* species were found on the feral roses. However, galls of *D. bicolor* (we have yet to

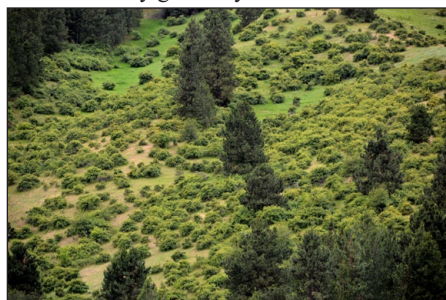


Figure 5. Hillside near Dayton, Washington with dense patches of feral sweet briar roses galled by *Diplolepis rosae*. Each patch (light green shrubs) is 2-4 m in diameter and 1-2 m in height.

J. Shorthouse

J. Shorthouse



J. Shorthouse

J. Shorthouse



Figures 6 (upper left), 7 (upper right) and 8 (left). Guests of the 'rose gall wasp festival' in Leonard Flanagan's laboratory dissecting galls of *Diplolepis rosae* to remove the larvae for experiments on gall induction.

examine the adult inducers to confirm the species) were common on short wild roses that were either *Rosa nutkana* or *Rosa woodsii* growing at higher elevation on hillsides.

We spent the night in Dayton after collecting hundreds of galls kept fresh in coolers, and then drove back to Renton the next day, June 21. We took the galls to Leonard's laboratory for storage in incubators fashioned from pop dispensers.

The 'rose gall wasp festival' began the next morning (June 22) when about 30 guests began arriving around 10:30 and socialized in Leonard's large sitting area. I gave my presentation on rose galls and then we broke for lunch. At about 1:30, Leonard gathered everyone in his 130 m² laboratory to explain how he wanted them to dissect the Dayton galls. To my amazement, there were work stations (Figures 6, 7 and 8) for all guests who spent the next four hours dissecting galls to remove the cynipid larvae and weighing gall tissues. Leonard provided a banquet and then after socializing until about 7:00 pm, the Aaron Walker's Gypsy Jazz band appeared (Figure 9) and entertained us for the next 2 hours.

As if the whole day wasn't surreal enough (I could never get friends and children to sit for hours dissecting rose galls!), Leonard had previously suggested to the band members that they engage in discussions about insect galls. I was floored when the band leader approached Leonard and me to ask about the difference between sawfly and cynipid galls.



J. Shorthouse

Figure 9. Jazz band providing entertainment for guests after they had spent several hours dissecting galls.

Leonard Flanagan's Research Laboratory

By searching and making purchases from on-line sources such as eBay and a government surplus auction site, and by purchasing surplus equipment at local universities, Leonard was able to assemble what he needed to study rose galls with an intent to find molecular signals passed to rose tissues from the larvae.

Leonard explained that while some men are considered successful at middle age and buy a sports car or a sailboat, he instead put together a second-hand laboratory. Some of his major pieces of equipment include a late vintage Nikon Diaphot inverted compound microscope with epifluorescence capabilities. He upgraded this microscope with parts from others including darkfield condensers along with high numerical aperture objectives to supplement the usual long working distanced objectives, attached a cooled CMOS camera, and an electronic flash adapter for the time-lapse work.

He also has an ancient Reichert Zetopan microscope fitted with both the original objectives and several sets of Lomo objectives (Soviet era optics); this, he explained, was among the best engineered microscopes ever made. He uses the Zetopan for episcopic viewing, transmitted UV, phase contrast, normal light, differential interference contrast, and polarized light microscopy. He has several dissecting scopes including an inexpensive AmScope zoom model on a boom and a Lomo MBR-1 polarizing stereo microscope he bought from an eBay seller in Belarus. He takes photographs and video of wasp behaviour with a repurposed Leisegang colposcope (I never thought of getting one of these!) with an attached digital camera.

The lab's embedding and sectioning equipment includes a refurbished vacuum oven attached to a NASA-surplus vacuum pump found on eBay, a classic AO 820 microtome, a Reichert sliding microtome (eBay), an ancient cryostat microtome from the University of Washington, a Leica/Reichert glass knife ultratome, and associated knife maker (again from the University of Washington), an old-school freezing microtome, and a Leica 1500 series vibratome with peltier stage, also obtained as university surplus.

He has a standard surplus but functioning PCR thermal cycler (eBay), a new electrophoresis chamber (Amazon) attached to a surplus power supply (eBay), a gel imager (eBay), a benchtop Jouan microcentrifuge (eBay), and a Jouan refrigerated ultracentrifuge (University of Washington). He uses a functioning Amersham HPLC setup that he assembled from parts and a Perkins-Elmer photospectrometer (University of Washington surplus).

One of Leonard's hobbies is repairing optical, electro-mechanical and electronic instruments that he purchases cheaply and returns them to working condition. He owns two vehicles for field trips. The one we took on our field trip to Dayton is a surplus government half-ton truck with a flashing yellow light on the roof. I was impressed that farmers and ranchers stayed clear when we stopped on side roads to examine rose bushes (Figure 10).

Contributions to gall biology

Leonard has made some remarkable observations and discoveries over the past 2 years in at least three areas of gall biology including structures within gall cells and nearby leaf cells, distribution of *Wolbachia* bacteria in tissues of the larvae and galls, and the development of an artificial diet that sustains inducer larvae. He was able to make rapid progress in these areas because of the internet,



Figure 10. Surplus government truck purchased by Leonard Flanagan (standing beside truck) for field trips to collect rose galls.

J. Shorthouse

this marvelous resource of modern scientific investigation where, for the first time in history, amateurs or citizen scientists can locate and read current and past scientific publications just as easily and quickly as do scientists.

Leonard has read literature on galls and plant physiology prodigiously and often finds references new to me. His emails, which I receive almost daily, have been so full of comments and questions about gall initiation, development, and physiology, along with physiology of plants, that I have had to re-read the material myself to respond. Most of his observations have been made on galls of *D. rosae*; however, I also fixed and sent him galls of *D. nebulosa* found on *Rosa blanda*, from Manitoulin Island, Ontario, for comparisons.

Structurally complex cynipid galls have evolved to provide the larvae protection from the elements deep within plant tissues and to provide high quality nutrients in special cells lining the larval chambers (Hearn et al. 2019; Sliva and Shorthouse 2006). These cells, called nutritive cells, are found nowhere else in the host plant and are packed with nutrients such as lipids, proteins and sugars (Bronner 1992). Leonard read that innermost nutritive tissue did not contain starch, though increasing amounts of starch are found towards the periphery of the gall; the inner nutritive tissue also contains high levels of lipid droplets and proteins (Bronner 1992; Rohfritsch 1992; Pawlowski et al. 2017). One of Leonard's quests is to discover how cynipid larvae control these nutrient concentrations.

In November of 2020, Leonard thought he had found large deposits of starch granules in gall cells, so we both began reading about starch synthesis and distribution (e.g., MacNeill et al. 2017). He sent photographs of dense crystals lining the vascular bundles in the host leaflet tissues (Figure 11) and near the site of initiation in the *D. rosae* galls (Figure 12). We first assumed that the crystals were starch as they were not found in nutritive cells; however, upon closer examination and undertaking histochemical analysis, it was evident that the structures were not starch. We now believe the crystals are calcium oxalate (CaOx), which are common in plants (Webb 1999). Of interest, they are sometimes used by plants to defend themselves against herbivores (Franceschi and Nakata 2005).

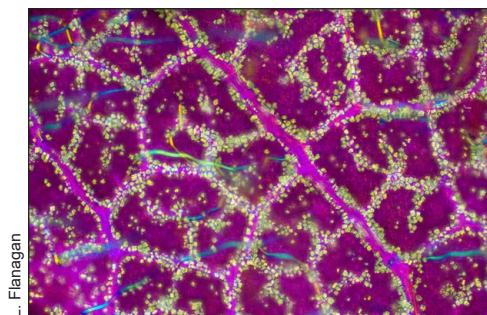


Figure 11. Dense crystals of calcium oxalate, visible by using differential interference contrast and/or polarizing microscopy, along the vascular bundles of fresh host leaves near gall of *Diplolepis nebulosa*.

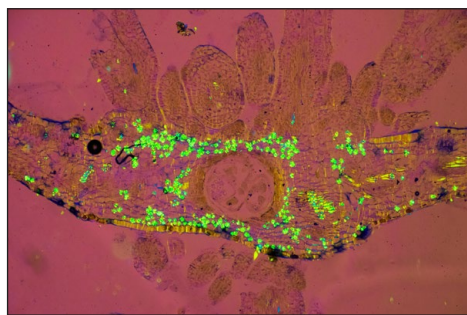


Figure 12. Crystals of calcium oxalate, highlighted by using polarized light microscopy, through an early gall of *Diplolepis rosae*. Section through the larval chamber (larva barely visible) surrounded by nutritive cells. Protrusions above the larval chamber are early proliferating fronds.

Leonard has suggested that CaOx crystals in galls may allow 'alarm photosynthesis' to occur in the gall and thereby generate sugars for nutritive cells. 'Alarm photosynthesis' describes CaOx crystals as an internal reserve of carbon that is used in photosynthesis when sufficient atmospheric carbon dioxide is not available (Tooulakou et al. 2016). He proposes that in galls of *D. rosae*, a proliferation of CaOx crystal-producing cells first occurs under the influence of the larvae, then

many of these CaOx crystals are later broken down by enzymatic processes to supply nutritive tissue with sugars for the larvae.

Like other students of galls, Leonard is sure that the stimuli driving proliferation, differentiation, and physiology of cynipid gall cells comes from the feeding larvae (Hearn et al. 2019). There have been many attempts to identify this gall-inducing factor with suggestions varying from hormones to viruses, and it is assumed they come from salivary secretions. Whatever the factor, Leonard was aware that the spectacular part of gall biology is when insects send the differentiation of plant cells on a new trajectory. That is, messages imparted by the larvae are sent from nutritive cells, as they are being eaten, to adjoining cells causing them to become packed with nutrients as they wait to be consumed. Somehow, variations in these messages result in different combinations of plant cells resulting in species-specific structurally distinct galls.

Leonard has concentrated on the potential role of *Wolbachia* in gall development. *Wolbachia* are maternally inherited endosymbiotic bacteria (archaea) of arthropods known to have numerous effects on their host insects, with the most interesting being the disturbance of reproduction leading to cytoplasmic incompatibility, thelytokous parthenogenesis, feminization of genetic males, male-killing, increased mating success of infected males via sperm competition and the host's complete dependence on bacteria for egg production (examples of good reviews are Floate et al. 2016; Correa and Ballard 2016; Kajtoch and Kotásková 2018).

Having read the above citations, Leonard was excited to see that *Wolbachia* have been found in the adults of insects inhabiting cynipid galls (Yang et al. 2013), including the galls of *Diplolepis* (e.g., Plantard et al. 1999; Cambier et al. 2019; Schilthuizen and Stouthamer, 1998), and hypothesized that *Wolbachia* are also involved with gall initiation and development. He was intrigued that Correa and Ballard's (2016) reported that *Wolbachia* is a yet poorly understood source of evolutionary innovation for invertebrates resulting in enhanced host fitness.

Leonard is convinced that *Wolbachia* have such an intimate relationship with cynipid galls on roses, they contribute to the ability of the wasp larvae to control and redirect the development of leaf cells. He predicts that the gall factor in larval saliva will not be a secretion of the wasp but instead an infection of *Wolbachia* in the salivary glands. He goes on to suggest that if *Wolbachia* mediates gall growth, then a variety of *Wolbachia* evolving in tandem with the rose and wasp larvae likely contributes to speciation within the genus *Diplolepis* and the structural differences in their galls.

Immunofluorescence microscopy has revealed some intriguing evidence so far. Frozen gall sections incubated with anti-*Wolbachia* antibodies which are then tagged with fluorochromes seem to indicate the presence of fluorochrome-tagged *Wolbachia* around and in contact with the enlarged nuclei of some gall nutritive tissue cells of *D. rosae*. He tells me that more work needs to be done to solve autofluorescence issues and proper controls, and progress is slow given his need to learn the craft and do legal work that pays, as well as science. Sections of larvae he has made and processed with standard histological techniques suggest that in *D. rosae*, *Wolbachia* is concentrated in larval salivary glands and the foregut.

These maternally transmitted *Rickettsia*-like microorganisms can also be detected through PCR assays with specific primers that have been made widely available to amateur researchers by Vanderbilt University's "Wolbachia Project." (<https://www.vanderbilt.edu/wolbachiaproject/>). So far, Leonard has been unable to detect *Wolbachia* in gall tissue using PCR assays, but he suspects that the concentration is low, and has undertaken only a few tests to date on the gall tissue.

One interesting result from Leonard's PCR assays on wasp tissues, when looking for *Wolbachia*, is that it appears that in *D. rosae*, at least, the microorganisms are highly concentrated in larvae, and are much less concentrated or even absent in adults. He suggests that in evaluating whether or not a species is infected with *Wolbachia*, it is important to test larvae rather than adults.

Leonard has been experimenting with the antibiotic doxycycline hyclate in an attempt to remove *Wolbachia* from plant cells and those of the larvae, thus resulting in a population of infection-free *D. rosae* females that may or may not be able to initiate and develop normal galls. He has concocted an artificial diet for *Diplolepis* larvae and succeeded in having them feed successfully on a medium in the individual compartments of serum plates. He took tissues for the diet from maturing rose hips, after determining that many nutritional values are similar to those of gall nutritive cells. Schönrogge et al. (2001) provided evidence that nutritive cells are similar to cells within seeds suggesting that cynipid larvae are capable of switching on parts of a development pathway similar to that found in seeds.

In work done since the gall wasp festival, Leonard added various mineral nutrients and vitamin C to a paste he placed in the wells of serum plates and added larvae at various stages of growth (Figure 13). Although there were significant mortalities, about a third of the antibiotic-treated larvae appeared to grow normally to the stage where they eliminated meconium prior to entering the prepupal stage (Shorthouse and Leggo 2002) in preparation for winter. Apparently, this is the first time cynipid larvae have been sustained on a nutrient medium outside their galls. The technique should provide researchers the opportunity to dose the larvae with antibiotics and theoretically produce bacteria-free adults that can then be used in gall initiating experiments, or as controls in locating *Wolbachia* infection in wild larvae. The only other attempt we know of to grow larvae of gall wasps (a eurytomid wasp on an invasive weed) on an artificial diet is by Moran et al. (2014), and they were not successful.



L. Flanagan

Figure 13. Well of a serum plate with larvae of *Diplolepis rosae* feeding on an artificial diet.

It appears less is known about the role of *Wolbachia* in plants than in insects. However, Chrostek et al. (2017) described the horizontal transmission of intracellular symbionts in plants and suggested that biological interactions could occur where the plant provides nutrients for the *Wolbachia*. Chrostek et al. (2017) showed *Wolbachia* in phloem cells and suggested that they can impact plant development. Leonard believes that *Wolbachia* is transfected into host plant cells by larval predation, creating a short-term and localized infection in the host plant that must be continually renewed by the feeding larva to induce gall growth. For this reason, and because of its role in inducing parthenogenetic reproduction in *D. rosae*, he thinks *Wolbachia* are primary endosymbionts essential for *Diplolepis* survival.

Li et al. (2017), studying whiteflies, were among the first to show that bacteria can be transmitted horizontally between insects and their host plants and then from infected host plants back to uninfected insects. They also suggested that horizontal transmission occurs through the actions of parasitoids. This would make sense for cynipid galls since most gall populations harbour several species of parasitoids (Shorthouse 2010).

The key to understanding the means by which cynipids control gall growth and development likely lies in larval feeding. How first-instar vs. full-grown larval cynipids feed is poorly understood; however, it is unlikely that freshly hatched larvae can tear into nutritive cells. Bronner (1992) suggested that cell walls are broken down by autolysis and the secretion of proteolytic enzymes which somehow impact cellular hypertrophy and hyperplasia. Leonard is suggesting that *Wolbachia* are also involved with this early larval feeding.

I recently told Graham Stone of the University of Edinburgh, a well-known authority on all aspects of gall biology, about Leonard's studies, and especially his success at sustaining larvae on an artificial diet. Graham recognized that sustaining larvae in this manner provides a new opportunity to obtain genetic material from the salivary glands and Malpighian tubules, long thought of as the source of the gall-inducing factor(s) (Hearn et al. 2019). Graham has proposed a joint study with Leonard, along with Jack Hearn, who has led a team studying this topic (Hearn et al. 2019). Graham has proposed a 'Flanagan protocol' in determining the contents of the larval salivary glands and whether or not larval gene expression and secretion of metabolites are associated with gall development. By using the Flanagan protocol, we hope it will be possible to determine if *Wolbachia* or other bacteria such as *Cardinium*, *Flavobacteria*, *Rickettsia*, and *Arsenophonus*, are involved or other plant hormone candidates such as cytokines, auxin, gibberellin, zeatin, or again perhaps other plant messenger molecules such as arabinogalactans or plant sRNAs.

Rokas et al. (2002) studied *Wolbachia* in cynipid gall wasps and discussed horizontal transmission of bacteria between inducers and inquiline cynipids in the same gall, but found no connection with gall development. However, adult wasps were used in this study and it appears that *Wolbachia* infections may be more prevalent in the larvae than in adults. They also suggested that *Wolbachia* infections are transmitted by generalist parasitoids as they oviposit in the chambers of inducers and inquilines.

Cambier et al. (2019) and Hearn et al. (2019) found no evidence in oak gall wasp adults for involvement of third-party symbionts in gall induction, for effector delivery using virus-like-particles, or for gall wasp expression of genes coding for plant hormones. Their findings argue against a fundamental role for *Wolbachia* in cynipid gall development, but it is worth pointing out that rose gall wasps are only distantly related to oak gall wasps within the gall wasp family Cynipidae. This leaves the door open for different gall induction mechanisms in different branches of the gall wasp family tree, and Leonard is not deterred.

However, all current researchers agree that gall wasps somehow drive gall development by hijacking the plant's cellular machinery and development, resulting in the creation of completely new structures with features and functions of a novel plant organ that support gall wasp development (Shorthouse et al. 2005; Stone and Schönrogge 2003; Giron et al. 2016; Pawlowski et al. 2017). The Flanagan Protocol may provide testable hypotheses for future functional dissection of cynipid gall development. Time will tell if Leonard is right and the *Wolbachia* that inhabit larvae of *Diplolepis* somehow mediate the expression of gall tissues. Perhaps, as he predicts, differences in various species of cynipid-inhabiting *Wolbachia* explain the different gall structures that each cynipid species induce on roses. And even if he is wrong, the techniques he has developed may prove useful in identifying gall-induction factors.

Concluding comments

My time with Leonard in Seattle in 2019, and the following exchange of emails, many late at night (gall-studying lawyers are apparently sleepless in Seattle), has been the most intellectually stimulating experience of my career. I have never seen anyone who produces such a steady stream of interesting hypotheses and questions.

Leonard made it clear in 2019 that he was not trained in the sciences and was not concerned about publishing his findings; his efforts were motivated by nothing but amateur curiosity. Thankfully, he has agreed to share his findings and has already prepared outlines of possible publications.

My purpose in writing this article was to draw attention to how a talented amateur citizen scientist used modern technology to develop a hobby with potential far above anything possible

even 20 years ago. There likely are more Leonard Flanagans in our world, so let's hope we recognize them in the early stages of their 'hobby' and they reach out to others. If they do, they will not only enhance our lives, but make unexpected contributions in science. In his words, his annual gall wasp festival was designed to 'promote radical participatory science and to share the joy of exploration, all as a countervailing experience for children and adults to the anti-intellectual and anti-science currents of the Trump years'.

Leonard does not fit the usual definition of a 'citizen scientist' which is the engagement of non-professional scientists in observation and recording of data for scientific projects (Everett and Geoghegan 2016). Such projects are growing exponentially with millions of volunteers world-wide collecting vast amounts of data to support research in disciplines from astronomy to zoology (Baker 2016). Much of the public interest in participation has been driven by technology and attention from the media. Low-cost, user-friendly technology allows people across the globe to participate in a wide variety of scientific projects, and this trend is expected to mushroom far into the future (Baker 2016).

Most citizen science projects in entomology involve the gathering of data to monitor some aspect of the natural world such as geographic range, abundance, and phenology (Acorn 2017). The goal of most projects is to collect data for researchers, over one or two days per year. Such amateurs gain pleasure in knowing their contributions aide an overall understanding of insect biology.

There is clearly another group of amateurs such as Leonard who wish to understand complex biological systems or engage in other scientific inquiry whose work is greatly facilitated by the internet. This work is hypothesis-driven and in Leonard's case, has already revealed important facts about gall physiology that were not previously known. It is my hope, and Leonard's, that professional scientists will remain open to assisting amateur citizen scientists with their investigations and making the practice of science a familiar part of life for as many people as possible.


I asked Leonard if he could explain how a Puget Sound (the large Pacific coast inlet in northwestern Washington State whose shores are home to Seattle) citizen like himself could become so intensively involved with studying galls, and I wondered aloud whether it was something in the Seattle air. Leonard reminded me that not far from my hotel room was the birthplace of many large companies such as Boeing, Microsoft, Amazon (and their e-book reader Kindle), Alaska Airlines, Costco, Nordstrom, Weyerhaeuser and Starbucks and he suggested their current success in attracting talent was influenced by a strong association between people attracted to the Pacific Northwest and the outdoors. Washington State is an ecologically rich area, and within a few hours drive of Seattle lies a diversity of landscapes including marine, mountainous slopes of ancient volcanoes, Palouse grasslands and deserts. Sadly, the experience of wild nature is becoming less frequent for most North Americans as urbanization sprawls across the land. If Leonard is correct that the presence of wild nature spurs human creativity and inquiry, then events like his gall wasp festival are the ideal remedy. Perhaps as scientists, educators, parents, and citizens, we should be nursing this kind of deliberate connection among people and the scientific study of nature.

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A bit of Cool and a bit of Cruel – The apple maggot, *Rhagoletis pomonella*, the logo insect that now represents the entirety of its regional society

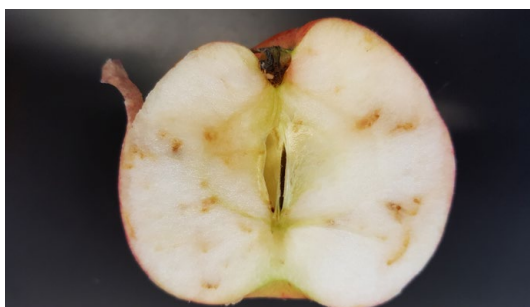
Carolyn Parsons

For those of us who study insects, it is never a surprise to open that email or text message and discover the often-blurry photo of an insect, plant, or speck of dirt. Or to find specimens left on your desk or in your mailbox, in every sort of container imaginable by friends, family and strangers looking for a name to put on something interesting or damaging they found in their home, in the garden or on a walk. Most of the time it's something quite common and easy to identify but every once-in-a-while we open it up and think, "I've never seen that before" or "that's not supposed to be here", and the excitement begins.

This was the case in the summer of 2016. My aunt sent me a message describing 'worms' in the apples picked from my late grandfather's apple trees in Port Blandford, Newfoundland and Labrador. To her credit, the subsequent photos were not blurry and clearly showed tunnels running through an apple (Figure 1). I knew the brown tunnels were characteristic of the feeding damage caused by the apple maggot, *Rhagoletis pomonella* (Walsh 1867) (Diptera:

Tephritidae), but this insect had never been recorded from the Province. Could they actually be apple maggots? A sample in hand was definitely necessary and she sent some maggoty apples to the St. John's Research and Development Centre of Agriculture and Agri-Food Canada (AAFC), so I could have a closer look. Through host association and taxonomic keys provided by Brad Sinclair (Canadian National Collection of Insects/ Ottawa Plant Laboratory, Canadian Food Inspection Agency), it was possible to put a tentative ID on the larvae; the first record of *R. pomonella* on the island of Newfoundland (Parsons and Sinclair 2018). After the news of the discovery spread through the family, my father and uncle enthusiastically offered to go on an apple collecting trip. They sampled from the original apple tree as well as from trees at four other sites within the small community of Port Blandford. From the apples collected at the 5 sites, 146 puparia were extracted. These were reared under various temperatures with the first adult emerging on 16 November 2016. A few more adults emerged without a diapause period and were sent to Brad Sinclair where he verified the first record of apple maggot from the island.

The 'cool' method of discovering Newfoundland's first record of the apple maggot isn't the only reason this insect is being featured as one of Canada's Coolest and Cruellest Bugs. The apple



C. Parsons

Figure 1. Characteristic feeding damage caused by the apple maggot (*Rhagoletis pomonella*).

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maggot is a 'cruel' pest of apple and also finds itself featured on the Acadian Entomological Society (AES) logo.

The apple maggot is native to Eastern North America and has been recorded in Canada from portions of British Columbia, Alberta, Saskatchewan, Manitoba, Ontario, Quebec, Nova Scotia, New Brunswick, Prince Edward Island and as of 2016, the island of Newfoundland. Flies are

5-6 mm long with distinct-

ive zig-zag black markings on the wings (Figure 2). Emerging in mid-summer, after overwintering as puparia in the soil, the flies are sexually mature in 7-10 days. After mating, females seek out host fruit based on scent and shape and lay eggs under the skin of the fruit, with a single female laying upwards of 500 eggs over her 2-4-week lifespan. Although reared from over 50 host plant species, primary hosts include hawthorn (*Crataegus* spp.) and domesticated apple (*Malus pumila* P. Mill.). It is a textbook example of sympatric speciation with recognized host races that have evolved to emerge, mate and seek apple (apple flies) or hawthorn (haw flies) as a host. The two races have altered diapause periods and host choice behaviours which allows them to co-exist in the same geographical area (Filchak et al. 2000).

Rhagoletis pomonella has been a pest of apples in eastern Canada for over 100 years and is the number one pest in Nova Scotia, New Brunswick and Prince Edward Island apple orchards (Suzie Blatt, pers. comm.). The apple maggot is regulated by the Canadian Food Inspection Agency (CFIA 2020), which restricts the movement of potential apple maggot host materials (fresh fruit, rooted plants, used containers and soil) into areas that are still considered pest free. Management primarily involves monitoring with yellow sticky cards or red spheres baited with attractant followed by use of approved insecticides, with an economic threshold of one fly per trap and recommendations to spray at repeated intervals (usually every 10-14 days depending on product). There is zero tolerance for apple maggots in fruit for export. Regional management in a 'control zone' of wild and abandoned apple trees, which act as reservoirs, is a key management strategy to reduce pest pressure. If left unmanaged, the apple maggot has the potential to cause extensive damage.

So how can such a notoriously damaging insect ever be considered 'cool'? To most apple growers, the answer is most certainly, never. To entomologists, especially on the east coast of Canada, it symbolizes the regional society, and is featured on the logo of the AES (Figure 3). Like those of some other societies (see Canada's Coolest/Cruellest Bugs articles in the March and June 2020 issues of the *Bulletin*), the exact origin of the first adoption of *R. pomonella* on the AES logo remains a bit of a mystery, and may never be known. It has been suggested that the apple maggot was selected as it was the only indigenous insect



Figure 2. Apple maggot fly showing distinct 'F' shape on wing (left). Apple maggot flies on apples in the Annapolis Valley, NS. (right).



Figure 3. Logo of the Acadian Entomological Society.

familiar in Nova Scotia where the Society first started. Given the history of entomology and apple production in Nova Scotia at the time, this seems reasonable. In the late 19th and early 20th centuries, apple production in Nova Scotia was booming, production systems were intensifying, and associated pest problems required more attention. One pest of particular concern was the brown-tail moth, *Euproctis chrysorrhoea* (Lepidoptera: Erebidae), an introduced species from Europe with few natural enemies. The arrival of this insect into apple orchards precipitated an increase in monitoring efforts by inspectors and study by entomologists. This growth of expertise in the region helped build the foundation of the precursor to the AES, the Nova Scotia Entomological Society, founded in Truro, Nova Scotia in 1915. Given much of the attention at the time was focused on introduced pests, it is likely that early members of the society chose an insect that was both familiar and indigenous to the region, and the apple maggot would certainly have been a good candidate.

In 1921, in hopes of expanding the Society, the name was changed to the Acadian Entomological Society, and the first meeting outside Nova Scotia was held in Saint John, New Brunswick. The Society waned shortly thereafter and went through a period of inactivity followed by informal meetings of entomologists from the maritime provinces (NS, NB, PEI), the State of Maine and Newfoundland (NL was not a part of Canada until 1949). In 1950, when the Entomological Society of Canada (as it is known today) came into being and there was a push to involve regional societies, the AES was revitalized (Adams 1965). As for the logo, even though the Society has long included members from the four Atlantic provinces and Maine, it turns out it wasn't until 2016 that *R. pomonella* would be recorded from the last geographic region represented by the AES, making it a truly representative insect for the Society's logo.

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Dr Olga Kukal contributed much to our understanding of insect overwintering and low temperature survival, but she was also an entrepreneur, an inspiring teacher and my collaborator and friend. She died on 30 September 2020, just before her 64th birthday, following complications after a brave 2-year battle with oesophageal cancer.

Olga was born in Prague, Czech Republic. When Olga was a teenager, she and her younger sister and mother, who was a paleontologist, immigrated to Canada to join her step-father, a biogeographer at Carleton University. Her parents were undoubtedly a strong influence and as a result she learned to enjoy collecting insects and insect fossils throughout North America and beyond. Indeed, as a young woman she supported herself by collecting insects from many parts of the world including Australia, New Guinea, Central America, and Africa for deposit into well-respected museums including the Biosystematic Research Centre in Canada, Harvard's Museum of Comparative Zoology, Chicago's Field Museum of Natural History, and the British Museum of Natural History. She also completed her BSc honours degree in Biology from Carleton University over the same time period. After graduation in 1979, she spent a year as a visiting scientist at the Biological Research Institute in St. Petersburg, Russia, after which she worked at a number of research positions including in aquaculture, Pleistocene sediments, and landscape architecture.

Ironically, it was her expertise in paleontology, nurtured by her mother, which earned her a place as a field assistant for Wes Blake, from the Geological Survey of Canada. It was due to Wes Blake's careful research that we now know that the Canadian High Arctic was covered with the Innuittian Ice Sheet during the last glaciation. He sent Olga to Cape Hershel on Ellesmere Island and she immediately fell in love with the Canadian High Arctic. A biological field station was only a few kilometers away in Alexandra Fiord, a stunningly beautiful spot on the edge of a biologically fascinating polar desert. It was a remarkable collision of her interests, and she immediately started an insect collection and had her first encounter with the Arctic woollybear caterpillar, *Gynaephora groenlandica*. Upon return from the Arctic, she enrolled in an MSc in Environmental Biology at the University of Guelph with Peter Kevan in 1982. Although Peter is best known for his research on pollinating insects, he encouraged Olga's interest in larval woollybears and their impressive multi-year life cycle, which has been recently re-examined by Richard Ring (University of Victoria). Hugh Danks from the Biological Survey of Canada served as Olga's external advisor, just after his seminal book, "Arctic Insects" was published: she could not have had better tutelage!

One of Olga's many important discoveries on woollybears was the initially curious observation that about 70% of the caterpillars died during the seemingly benign summer months compared to only 13% that die during extreme winter conditions. She and Peter Kevan realized that the poor woollybears were unmercifully targeted by parasites in the summer, but Olga took the problem of their remarkable overwinter survival to her PhD studies with John Duman at Notre Dame University in Indiana. Here, she investigated physiological cues to the insect's overwintering survival ensuring her inclusion with those that have contributed much to our understanding



Tom Allen

Olga Kukal
(17 Oct. 1956 – 30 Sept. 2020)

of low temperature adaptations. *Gynaephora groenlandica* enter diapause in autumn, usually in hibernacula, and degrade their mitochondria so as to suspend metabolism, accumulating cryoprotectants such as glycerol, alanine and betaine in response to the resulting anaerobic conditions. Taken together, these and other adaptations allow survival in temperatures as low as -70 °C!

Olga subsequently did three short postdoctoral fellowships (1988-91) allowing her to share her understanding of cold tolerance with leaders in the field of insect low temperature adaptations including Richard Lee from Miami University in Ohio, David Denlinger from Ohio State and Richard Ring at the University of Victoria. It was in Ohio that she met her husband, Tom Allen, a physical chemist. They formed a strong partnership that was to take them back to the Arctic many times, with professorial appointments at the University of Victoria and Acadia University. Together, they leveraged Olga's knowledge of insect overwintering into commercial successes. As a team, they founded three biotechnological companies including Tolga Ltd. using the cryoprotectants discovered in Arctic insects to preserve germplasm for agriculture, and CryoStasis Ltd. for preservation of human tissues and organs. Two patents were awarded. To facilitate their investigations, Tom and Olga established a small but well-equipped private laboratory close to the Rideau lakes system, with Olga accepting an Adjunct Associate Professorship at Queen's University.

When Jerry Wyatt (see In Memory, *Bulletin of the Entomological Society of Canada*, Vol 51, 2019) retired and the undergraduate laboratory course, Entomology, was bequeathed to me, I felt that I could not do it justice. Thus, I cowardly changed the name to Modern Insect Science and invited Olga and Tom on our winter field trips to the Queen's Biological Research Station. Olga was an enthusiastic and encouraging teacher for all the students and generously assisted them with taxonomic identifications that were tough for me. Olga also kindly served on my students' theses committees and we collaborated on the use of antifreeze proteins as adjuncts in the CryoStasis Ltd. protocols. There is no doubt that her work with woollybears laid the groundwork for innovations that will help save lives of future transplant patients. This important research continues, but we yearn for her enthusiasm, her teaching and student support, her insightful research suggestions, and most of all her laughter. She is greatly missed by all her friends, family, colleagues, students and especially Tom, who was her constant devoted companion during the last difficult years.

Virginia K. Walker
Professor Emerita and Queen's University Research Chair



A woollybear caterpillar, *Arctia opulenta* (Lepidoptera: Erebidæ), seen on tundra vegetation near Rankin Inlet, NU, July 2005. This species has a more southerly distribution than *Gynaephora groenlandica*, though it does extend into the arctic tundra zone.

Remembered as a polite, kind, soft-spoken and patient gentleman, Paul Syme was someone who enjoyed a good challenge. If it was too easy an undertaking, it would likely not pique his interest.

His first big challenge was to pursue higher education. Paul obtained his BA in Biology from the University of Toronto in 1956, MSc from McMaster University in 1957, and PhD from the University of Toronto in 1962. His doctoral thesis, completed under the supervision of Dr Carl Atwood, was titled: *The morphology of Lepidopterous eggs, with descriptions of two hundred and forty-eight species*. As a Master's student and budding scientist, he jointly described and authored three new blackfly species in the *hirtipes*-complex: *Prosimulium fontanum* Syme & Davies, 1958; *Prosimulium fuscum* Syme & Davies, 1958; and *Prosimulium mixtum* Syme & Davies, 1958 (Syme and Davies 1958).

In the midst of this busy period of his life, Paul and Evelynne married. That was 12 September 1959, and with relatively little disposable income they took a modest honeymoon, taking walks in the quiet autumn woods and paddles on the waterways near Algonquin Park from the comfort of a rented cabin.

Immediately upon completing his PhD dissertation in 1961, Paul was hired as a research scientist with the Canada Department of Forestry and Rural Development (Forestry Branch), Ontario Region. Coincidentally, Carl Atwood (father of the renowned writer Margaret Atwood) had served as the first Director of the Forest Insect Laboratory (as this federal agency was first known) in 1944. This move with his family to Sault Ste. Marie turned out to be Paul's last relocation.

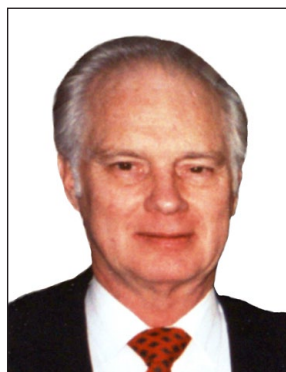
Paul then took on his next challenge, that of examining potential biological control options for the European pine shoot moth (*Rhyacionia buoliana* [Schifferrmüller]). The pest was discovered in North America early in the 20th century and had become a concern for the health of planted pine plantations, with red pine (*Pinus resinosa* Ait.) experiencing particularly serious damage. His studies were concentrated on the relatively sterile dry, sandy soil habitats commonly chosen for the establishment of red pine plantations.

For about the first decade of his career he spent his summers in the field, accompanied by his family, researching effective means by which parasites and predators could be promoted to contain the damage caused by *R. buoliana*. His field work took place in southern Ontario, with Elmira Field Establishment in Waterloo County, Ontario, serving as the base of operations.

Specifically, Paul's research examined several ectoparasites of *R. buoliana*, with particular focus on *Orgilus obscurator* Nees, an introduced parasite, and *Hyssopus thymus* (Girault) and *Exeristes comstockii* (Cresson), both native parasites (Syme 1975).

He documented the life history and biology of *H. thymus*, determining it to be the most effective native parasite of *R. buoliana* in Ontario (Syme 1971a). He also reported that the non-competitive behaviours of the introduced parasite *O. obscurator* and the native parasite *H. thymus* were complementary, together causing greater total *R. buoliana* mortality without suppressing either parasite population (Syme 1970).

He determined that *O. obscurator* was one of the most effective introduced parasites affecting *R. buoliana* populations. Once the importance of this parasite was recognized, Paul directed his studies towards an understanding of the ecological factors influencing its effectiveness. This included discovering the relationships between the presence of certain flowering species favoured as food sources by the parasite, concluding that the availability of certain food sources resulted



Evelynne Syme

Paul Denness Syme
(16 April 1932 – 28 Sept.
2020)

in extended longevity of the parasite and resultant greater efficacy as a biological control method. He observed that key flowering plant species used as food sources by the parasites were often absent or occurred in low abundance in typical pine stands. He identified this to be a key factor in decreasing longevity and lowering fecundity of the parasites, thus reducing their capacity to parasitize the shoot moth (Syme 1975, 1977).

Paul made a number of other novel findings during the course of this decade of research. He made the first recorded discovery of *Agathis binominata* (Muesebeck), a native parasite of the shoot moth, parasitizing *R. buoliana* (Syme 1968). He identified the potential for the ectoparasite *Lypha dubia* (Fallén) to be effective in controlling the shoot moth (Syme 1971b). He also found that the European parasite *Pristomerus* sp. behaved cleptoparasitically with respect to the beneficial parasite *O. obscurator*, and thus was not a suitable candidate for introduction into North America (Syme 1969).

Paul's contributions from this body of work on biological control culminated in a series of management practice recommendations for establishing red pine plantations in Ontario in a manner that reduced the risk and extent of damage from *R. buoliana* (Syme 1976).

To conduct trials under a range of plantation conditions necessitated the enlistment of a number of cooperative woodlot owners and land management agencies as far north in the province as Manitoulin Island. He would explain to prospective owners and agency representatives the objectives and merits of his research, convincing them to allow study plot establishment, sample collection, and in some cases parasite release on their plantations.

In the late 1970s, Paul found a new challenge when he shifted from entomological research to insect taxonomy. He assumed the position of Senior Insect Taxonomist with the Forest Insect and Disease Survey Unit of the Great Lakes Forest Research Centre. In addition to becoming one of a small group of national specialists in forest insect pest identification, he published summaries of forest pest survey results, revised comprehensive lists of insects and mites (Syme and Nystrom 1988), and documented the biology and control options for pests of greatest concern to the forest industry (Syme 1990). Notably, he published a synopsis of entomological, pathological and physiological problems associated with eastern white pine (*Pinus strobus* L.) in Ontario (Syme 1985). As one former colleague put it: "Without his expertise, there would have been little information to deliver to forestry practitioners, and plenty of gaps in our knowledge of forest disturbance and in predictive capabilities."

In the course of his career Paul served on the Executive of the Lepidopterists' Society, and was a member of the Entomological Society of Canada, Entomological Society of Ontario and Entomological Society of Michigan.

Paul held numerous personal interests over his lifetime, some of which evolved into challenging endeavours. He was born and raised in Hamilton, Ontario, and developed a love for nature at a young age. His early interests included collecting Lepidoptera, which led to a 3-month cross-continental trip with his friend Monty Wood. In 1957 they drove west across Canada and back across the United States, capturing virtually every butterfly and moth they found along the way. Paul crafted the cases and drawers in which he stored and mounted the specimens he found throughout his life. His extensive collections were recently donated to the Canadian Museum of Natural History in Ottawa and the University of Calgary.

Other interests included collecting rocks and minerals, photography, fishing, and bird watching. Paul was also a life-long stamp collector, and post-retirement took up collecting Canadian coins. In 1984 he began to look into his family history and joined the genealogy club in Sault Ste Marie. He became the Cemetery Co-ordinator for the club, playing a lead role in the mapping and recording of local cemeteries. He wrote and self-published two books on his family history. He even created a model railway in the basement of the house he had lived in since its construction

in 1965.

Paul is well-remembered within Ontario's hiking community as the founding father of the Voyageur Trail Association. What began in 1973 as a local discussion to build a hiking trail on the outskirts of Sault Ste. Marie quickly grew into Paul's vision for what was to become the Voyageur Trail, extending from South Baymouth on Lake Huron to Thunder Bay on Lake Superior, a distance of some 1,100 km! No doubt his analytical mind quickly broke this herculean task into manageable components. His career experience in working with landowners to allow him to install

research plots on their land would have proven useful as he sought permission from sometimes-reluctant landowners along this trail route. He rallied a dedicated cadre of volunteers to mark and clear sections of trail, produce a trail guide and newsletter, and raise funds, completing the first 300 km of the Voyageur Trail in just a few short years.

Copies of hundreds of error-free typewritten letters (in the days before word processors) bearing his signature appeared in the VTA archives from his 10 years as President of the Association. In 1990 Lieutenant Governor Lincoln Alexander awarded Paul the Corps d'Elite Ontario. This award was designed to acknowledge Ontario residents from all sectors of the community, recognizing outstanding efforts by those volunteers or recreational professionals who contributed to the development of recreation at either the provincial or regional level. Paul was recognized as being "a tireless worker for recreation and conservation, [who also] served in executive positions with Hike Ontario and the National Trails Association". His legacy lives on, as the hundreds of kilometres of trail completed to date continue to attract winter and summer outdoor enthusiasts from across the province and beyond.

As evidenced by the foregoing commentary, Paul was highly focused on any challenge he chose to face, and was known to leave no stone unturned in trying to reach the desired outcome. Once he set out to achieve a goal, he was laser-focused on reaching that target. In rare instances when he hit an impenetrable brick wall, he would reluctantly refocus his energy on an alternative course of action. He was a proponent of the 'a place for everything, and everything in its place' philosophy; everything he kept was meticulously labeled and filed. His many and varied interests, activities, and achievements are a testament to his curiosity, energy, patient disposition and persistence in seeing a task through to completion. It was not the prospect of an accolade that motivated him. In fact, Paul once remarked on the satisfaction that comes from being part of an idea that is greater than oneself.

Paul retired in the mid-1990s, and Evelynne followed shortly afterwards. They celebrated that momentous occasion by embarking on a memorable 75-day trip across the western part of Canada in 1996. Travelling in their station wagon packed with camping gear, they ventured as far as Port Hardy on Vancouver Island. From there a ferry ride through the Inland Passage to Skagway and bus to Whitehorse awaited. Picking up a rental pickup camper, they explored the Yukon from the comfort of this vehicle. This leg of the trip involved two highly memorable day flights: one to Tuktoyaktuk and a second to the Queen Charlotte Islands. Paul had meticulously planned the



Paul Syme at the unveiling of a plaque honouring his 10 years leading the Voyageur Trail Association, accompanied by Bud Wildman, Member of the Provincial Parliament, September 1985.

trip, identifying prime tent camping stops across western Canada and the Yukon. At each stop, the Coleman stove came out for meal preparation and the local points of interest were investigated. This trip was a well-deserved respite from a busy life, and more importantly a second honeymoon with the love of his life. Although Evelyne was never formally feted, she was Paul's 'silent partner' who raised their family while holding down a position as a full-time nurse, allowing him the freedom to pursue his dreams.

Paul Syme passed away in Sault Ste. Marie, Ontario, at the age of 88. He is survived by his wife of 61 years, two sons, two daughters and four grandchildren. He will be missed by the many people whose lives he touched, principal among them his family, many friends and colleagues, who can take comfort in knowing that his legacy will live on through his many achievements and contributions.

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Stephen Dominy (former Director, Forest Ecology, Natural Resources Canada, Sault Ste. Marie), with contributions and/or assistance from Evelyne Syme, David Syme, Shelley Hanninen, Nichelle Thompson, Vince Nealis, Barry Lyons and Guy Smith.

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 (Deepa Pureswaran, deepa.pureswaran@canada.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 (Deepa Pureswaran, deepa.pureswaran@canada.ca).

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

La préférence est donnée aux membres de la SEC.

Lignes directrices

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

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

Books available for review

- Curtain C.G. and Allen T.F.H. [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].
- Eiseman C. 2019. Leafminers of North America. [e-book].
- Forman R.T.T. 2019. Towns, Ecology and the Land. Cambridge University Press. ISBN 978-1-316-64860-5 [paperback].
- Frank B., Klikman J.A. and Marchini S. 2019. Human-Wildlife Interactions. Turning Conflict into Coexistence. Cambridge University Press. ISBN: 978-1-108-40258-3 [paperback].
- Gibson D.J. and Newman J.A. [Eds.]. 2019. Grasslands and Climate Change. Ecological Reviews. Cambridge University Press. ISBN 978-1-316-64677-9 [paperback].
- Kaufman A.B., Bashaw M.J. and Maple T.L. [Eds.]. 2019. Scientific Foundations of Zoos and Aquariums: Their Role in Conservation and Research. Cambridge University Press. ISBN 978-1-316-64865-0 [paperback].

- Klimaszewski J., et al. 2020. Synopsis of Adventive Species of Coleoptera (Insecta) Recorded from Canada. Part 5: Chrysomeloidea (Cerambycidae, Chrysomelidae, and Megalopodidae). Advanced Books. [e-book] doi: 10.3897/ab.e50613.
- Leidner A.K. and Buchanan G.M. [Eds.]. 2018. Satellite Remote Sensing for Conservation Action: Case Studies from Aquatic and Terrestrial Ecosystems. Cambridge University Press. ISBN 978-1-10845670-8 [paperback].
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- 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].
- Skevington J., Locke M.M., Young A.D., Moran K., Crins W.J. and Marshall S.A.. Field Guide to the Flower Flies of Northeastern North America. 2019. Princeton University Press. ISBN 978-0-691-18940-6 [paperback].
- Volis S. 2019. Plant Conservation: The Role of Habitat Restoration. Cambridge University Press. ISBN 978-1-108-72733-4 [paperback].
- Wilson K., Fenton A., and Tompkins D. [Eds.]. 2019. Wildlife Disease Ecology. Linking Theory to Data and Application. Cambridge University Press. 978-1316-50190-0 [paperback].



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/>.

JAM 2021 and ESC Business Meetings

Recently, the ESC Executive Council met with members of the Local Organizing Committee (LOC) for the meeting to discuss the implications of the COVID-19 pandemic. The Council learned that, although the LOC has taken steps to limit financial penalties, in the absence of a legislated prohibition of meetings, the penalty for cancelling the contract with the meeting hotel would be about \$75,000. The Council also learned that the electronic infrastructure at the hotel is not adequate for the meeting to be a “hybrid”, with on-line and in-person participants. We are optimistic in light of Canada’s plans to vaccinate the majority of the adult population against COVID-19 by September 2021. ESC encourages members to attend the JAM if possible, but the Council is aware that some members will not be able to attend an in-person meeting because their employer will not approve travel to the conference. Although a final decision will be made in May 2021, the above information leads the ESC Executive Council to conclude that the most probable scenario for JAM 2021 is:

- There will be an in-person JAM 2021 on 14–17 November 2021 at Niagara Falls, Ontario (see <https://www.entsocont.ca/esceso-2021-jam-english.html>).
- The meeting is expected to have lower attendance than normal, but will have the full range of scientific and social events normal at a JAM. There will **not** be an opportunity for on-line participation in these events.
- Board meetings and the Annual Meeting of Members, will **not** occur at the JAM. They will be conducted by video conference in October or November 2021, on dates that do not conflict with JAM.

Further information will be communicated to ESC members by E-mail and ESC news feeds, as soon as possible, and updates will be published in the June and September issues of the ESC *Bulletin*.

Réunion annuelle conjointe 2021 et réunions de la SEC

Le Conseil exécutif de la SEC a récemment rencontré les membres du comité organisateur local de la réunion afin de discuter des implications de la pandémie de COVID-19. Le Conseil a appris que, bien que le comité organisateur local ait pris des mesures pour limiter les pénalités financières, en l’absence d’une interdiction légale des réunions, la pénalité pour l’annulation du contrat avec l’hôtel de réunion serait d’environ 75 000 dollars. Le Conseil a également appris que l’infrastructure électronique de l’hôtel n’est pas adéquate pour que la réunion soit «hybride», avec des participants en ligne et en personne. Nous sommes cependant optimistes, compte tenu des plans du Canada visant à vacciner la majorité de la population adulte contre la COVID-19 d’ici septembre 2021. La SEC encourage les membres à participer à la réunion annuelle conjointe si possible, mais le Conseil est conscient que certains membres ne pourront pas assister à une réunion en personne parce que leur employeur n’approuvera pas le voyage pour se rendre à la conférence. Bien qu’une décision finale ne soit prise qu’en mai 2021, les informations ci-dessus amènent le Conseil exécutif de la SEC à conclure que le scénario le plus probable pour la réunion annuelle conjointe 2021 est le suivant :

- Une réunion annuelle conjointe se tiendra en personne du 14 au 17 novembre 2021 à Niagara Falls, Ontario (voir <https://www.entsocont.ca/esceso-2021-rac-franccedilais.html>).
- Le nombre de participants à cette réunion sera probablement inférieur à la normale, mais toute la gamme des activités scientifiques et sociales habituelles dans le cadre d’une réunion annuelle conjointe se déroulera. Il n’y aura **pas** de possibilité de participation en ligne à ces événements.
- Les réunions du conseil d’administration et l’assemblée générale des membres n’auront **pas** lieu lors de la réunion annuelle conjointe. Elles se dérouleront par vidéoconférence en octobre ou novembre 2021, à des dates qui ne sont pas en conflit avec celles de la réunion annuelle conjointe.

Des informations complémentaires seront communiquées aux membres de la SEC par courriel et par le biais des fils de nouvelles de la SEC dès que possible, et des mises à jour seront publiées dans les numéros de juin et de septembre du Bulletin de la SEC.

Highlights of the recent Board of Directors meeting

The ESC Board of Directors met by videoconference on Thursday, 10 December 2020. The meeting began with an orientation—given by ESC Executive Director, Geoff Powell—to ESC governance structures and procedures.

The Board received updates on progress in the organization of future Joint Annual Meetings (JAM). The organization of JAM 2021 is proceeding on track, and the Board learned that representatives of the Local Organizing Committee for this meeting would meet with the ESC Executive Council in January 2021 to discuss the implications of the pandemic. A draft memorandum of understanding between the co-hosts of JAM 2022 (Entomological Societies of America [ESA], British Columbia, and Canada) had been received from ESA, and was discussed. ESC representatives to the program committee for JAM 2022 were identified. Brief reports on JAM 2023 and JAM 2024 were received. ESC Secretary, Neil Holliday, reported that the new version of *A Guide to the Organization of the Annual Meeting of the Entomological Society of Canada*, had been sent to those involved in JAM 2021, JAM 2023, and JAM 2024, and had been posted in the members' area of the ESC website.

The Board received a report from ESC President, Bill Riel, on progress towards appointment of all committee chairs. He also reported that a welcome message from the ESC President would accompany all receipts for membership fees sent to new and renewing members. In addition to welcoming members, the message is intended to help members find the resources that are available to them through their membership. President Riel reported that a task-force, chaired by Kevin Floate, is examining the future financial sustainability of *The Canadian Entomologist* (TCE), and will be making recommendations to the Board at a future meeting. The task force includes the ESC Finance Committee and the Editors-in-Chief of TCE. The Board received a report on three priority initiatives for the 2020–21 society year that had been identified by the Executive Council. These are: to focus on Equity, Diversity and Inclusion issues to ensure that real progress is made in this area, to assess the feasibility of an on-line JAM 2021 should it prove impossible to meet in person, and to conduct the aforementioned review of the financial stability sustainability of TCE.

There was considerable discussion of problems with on-line delivery of the *Canadian Journal of Arthropod Identification* (CJAI). This publication is co-sponsored by the ESC and the Biological Survey of Canada (BSC), with ESC appointing the editors, and BSC hosting CJAI on its website and being responsible for payment of an honorarium to the technical editor. Downloading of the large illustrated pdf files and the use of the interactive keys in CJAI articles produce voluminous internet traffic. Consequently, bandwidth limits of the BSC website have prevented access to the website near the end of some recent months. As BSC has no current income, a request had been made to ESC to supplement funding for hosting the website so that bandwidth can be increased. The ESC Executive Council had approved supplemental funding for hosting until the end of the ESC's current fiscal year, and had asked for those involved to work towards a long-term solution to the problem. ESC's First Vice-president, Felix Sperling, was charged with bringing together all interested parties to develop such a solution.

The Board was informed of a plan to conduct a survey of the ESC membership that focusses on member services, the value of ESC maintaining lists of insect common names when several new lists of common names have emerged, the most effective and desired ways of the Society communicating with its membership, and satisfaction with JAMs. The issue of communication with members was discussed at length. While the importance of the *Bulletin* was affirmed as the official organ of communication of the Society, it was recognized that few members read the *Bulletin* from cover to cover, and some members are probably not aware of the existence of the

Bulletin. The need to find ways of communicating the contents of the *Bulletin* to a wider spectrum of members was agreed upon, and mechanisms to achieve this were discussed. Solutions to this communication problem that also address the dearth of news items on the ESC website main page were suggested.

There was also considerable discussion of whether future JAMs should include the option of on-line participation. Board members recounted the positive and negative experiences that they had had with on-line scientific conferences. It was pointed out that, regardless of pandemic restrictions, on-line access to JAMs would make them affordable by a larger proportion of members, and therefore participation could be more equitable, leading to increased interest and more members. Availability of on-line participation would also alleviate concerns about the greenhouse-gas emissions associated with travel to meetings. However, ESC would need to think about the financial implications of on-line participation reducing in-person JAM attendance, and it was noted that on-line meetings do not provide the quality and spontaneity of social and scientific interaction that is a major attraction and benefit of in-person meetings, and contributes to the mental well-being of members.

The Board fine-tuned changes to the standing rules and committee guidelines associated with the creation of the positions of Director of Equity Diversity and Inclusion, and Student and Early Professional Director. A summary of the changes to the standing rules is provided in a separate item in this issue of the *Bulletin*. The Board also approved changes to the committee guidelines to adapt to the first example in recent times where the ESC Treasurer is not located in Ottawa. The Board responded to several questions from the Chair of the Physical Assets Committee regarding the disposition and care of items held in the ESC's storage locker—items that had formerly been housed in the headquarters building, which was sold in 2015.

Second vice-president, Chris MacQuarrie, announced that it was now possible for federal employees to direct donations to the ESC Scholarship Fund during the annual United Way workplace charitable campaign. At the onset of the next campaign, he undertook to disseminate information to members on the method of directing their United Way donations in this manner.

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.

Announcement of Changes in the ESC Standing Rules

At its meeting on 14 October 2020, the Board of Directors of ESC approved changes to Standing Rule VII.(n)i), which elaborates on the duties of the Social Media Administrators. That section was changed from:

- i) The Social Media Administrators, although responsible to the Board, will normally consult with the Public Education Committee (specifically the E-media sub-committee) on policies relating to the choice of media employed and to allowable content, and with the Finance Committee on matters relating to expenditures and financing.
- to:
- i) The Social Media Administrator(s) shall determine the appropriateness of material to be shared and shall be responsible to ensure that content to be posted is consistent with the objects of the Corporation and is of value or interest to its members. In any situation where there is uncertainty about the appropriateness of an item, the Social Media Administrator(s) shall consult with the President before posting.

At the ESC Board of Directors meetings of 14 October 2020 and 10 December 2020, changes to the standing rules were approved to implement the creation of two new director positions on the Board: a Director for Equity, Diversity and Inclusion, and a Student and Early Professional Director. The new directorships are described in Standing Rule VI.8)(d) and VI.8)(e) respectively:

(d) Director for Equity, Diversity and Inclusion

- i) A Director for Equity, Diversity and Inclusion shall be elected once every three years at an Annual Members Meeting.
- ii) At the end of the Director for Equity, Diversity and Inclusion's term and prior to the next Annual Members Meeting the Board, through a Nominating Committee, shall seek from the members a recommendation of an individual to be submitted for election as a Director for Equity, Diversity and Inclusion at the next Annual Members Meeting.
- iii) The Director for Equity, Diversity and Inclusion shall be responsible for ensuring that Board initiatives and decisions are inclusive and consider impacts on diversity within the Corporation. The Director for Equity, Diversity and Inclusion shall monitor diversity within the Corporation and shall be a member of the Equity, Diversity and Inclusion Committee, and work with that Committee on initiatives to increase diversity and provide support to underrepresented groups within the Corporation.
- iv) If a Director for Equity, Diversity and Inclusion is unable to complete their term, a new Director will be elected at the next Annual Members Meeting to complete the remainder of the three year term.

(e) Student and Early Professional Director

- i) A Student and Early Professional Director shall be elected for a three-year term at an Annual Members Meeting. Prior to this meeting the Board, through the Corporation's Secretary, shall seek from the Student and Early Professional Affairs Committee the name of an individual recommended to be submitted to members for election as the Student and Early Professional Director.
- ii) The Student and Early Professional Director must qualify as either a Student Member or Early Professional Member of the Corporation for the duration of their term (Standing Rules I.1)(b) and (c).
- iii) The Student and Early Professional Director shall represent the concerns and perspectives of student and early professional members to the Board.

- iv) If a Student and Early Professional Director is unable to complete their term the Board shall seek another recommended candidate from the Student and Early Professional Affairs Committee to be submitted to members for election at the next Annual Members Meeting. The replacement Director's term shall be three years, unless terminated by resignation, or becoming ineligible under Standing Rule VI.8)(e)ii).

As a consequence of the introduction of these two new directorships, the former Standing Rule VI.(d) Other Directors, is renumbered as Standing Rule VI.(f) and is reworded as follows:

(f) Other Directors

In addition to the Directors described above, the Board may present to members for election as a Director one or more individuals not falling into any of these categories, provided the maximum number of Directors stipulated in the Articles of Continuance is not exceeded.

The position of Student and Early Professional Director, which has full voting privileges, replaces the non-voting Student and Early Professional Representative to the Board, and so at its meeting of 10 December 2020, the Board approved deletion of Standing Rule VII.(l) Student and Early Professional Representative.

The current version of the standing rules, dated 10 December 2020, is available for viewing in English and French in the members' area of the ESC website.

Changements dans les Règles permanentes de la SEC

Lors de sa réunion du 14 octobre 2020, le Conseil d'administration de la SEC a approuvé des modifications à l'article VII. n)i) des Règles permanentes, qui précise les devoirs des administrateurs des médias sociaux. Cet article a été modifié de :

- i) Les *administrateurs des médias sociaux*, bien qu'ils relèvent du CA, vont normalement consulter le comité d'éducation (spécifiquement le sous-comité des médias électroniques) sur les politiques concernant le choix des médias employés et du contenu permis, et avec le comité des finances sur les questions en lien avec les dépenses et le financement.

pour :

- i) Les *administrateurs des médias sociaux* déterminent si le matériel à partager est approprié et sont responsables de s'assurer que le contenu à publier est conforme aux objectifs de l'Organisation, et qu'il a une valeur ou un intérêt pour ses membres. Dans toute situation où il existe une incertitude à savoir si un élément est approprié, les administrateurs des médias sociaux doivent consulter le Président avant la publication.

Lors des réunions du conseil d'administration de la SEC du 14 octobre 2020 et du 10 décembre 2020, des modifications des règles permanentes ont été approuvées pour mettre en œuvre la création de deux nouveaux postes d'administrateur au sein du CA : un administrateur pour l'équité, la diversité et l'inclusion, et un administrateur pour les étudiants et jeunes professionnels. Les nouveaux postes d'administrateurs sont décrits respectivement dans les Règles permanentes VI.8)(d) et VI.8)(e) :

(d) Administrateur pour l'équité, la diversité et l'inclusion

- i) Un administrateur pour l'équité, la diversité et l'inclusion est élu par les membres à tous les trois ans lors d'une assemblée annuelle des membres.

- ii) À la fin du mandat de l'administrateur pour l'équité, la diversité et l'inclusion, et avant l'assemblée annuelle des membres suivante, le CA doit, par le biais d'un comité de nominations, rechercher auprès des membres une recommandation d'un individu à être soumis pour une élection comme administrateur pour l'équité, la diversité et l'inclusion à la prochaine assemblée annuelle des membres.
 - iii) L'administrateur pour l'équité, la diversité et l'inclusion est responsable de s'assurer que les initiatives et les décisions du CA sont inclusives et considèrent les impacts sur la diversité au sein de l'Organisation. L'administrateur pour l'équité, la diversité et l'inclusion doit surveiller la diversité au sein de l'Organisation et doit être membre du Comité de l'équité, de la diversité et de l'inclusion, et travailler avec ce Comité sur des initiatives visant à accroître la diversité et à apporter un soutien aux groupes sous-représentés au sein de l'Organisation.
 - iv) Si un administrateur pour l'équité, la diversité et l'inclusion est dans l'impossibilité de terminer son mandat, un nouvel administrateur sera élu à la prochaine assemblée annuelle des membres afin de compléter le reste du mandat de trois ans.
- (e) Administrateur pour les étudiants et jeunes professionnels
- i) Un administrateur pour les étudiants et jeunes professionnels est élu pour un mandat de trois ans lors d'une assemblée annuelle des membres. Avant l'assemblée, le CA doit, par le biais du secrétaire de l'Organisation, rechercher auprès du comité des affaires étudiantes et des jeunes professionnels le nom d'un individu recommandé pour être soumis pour une élection comme administrateur pour les étudiants et les jeunes professionnels.
 - ii) L'administrateur pour les étudiants et les jeunes professionnels doit se qualifier comme membre étudiant ou membre jeune professionnel de l'Organisation pour la durée du mandat (Règles permanentes I. 1) (b) et (c).
 - iii) L'administrateur pour les étudiants et les jeunes professionnels représente les préoccupations et les perspectives des membres étudiants et jeunes professionnels auprès du CA.
 - iv) Si un administrateur pour les étudiants et les jeunes professionnels est dans l'incapacité de terminer son mandat, le CA doit rechercher un autre candidat recommandé auprès du comité des affaires étudiantes et des jeunes professionnels pour être soumis aux membres pour une élection lors de la prochaine assemblée annuelle des membres. Le mandat du remplacement de l'administrateur doit être de trois ans, sauf s'il se termine par une démission, ou devient non-éligible en vertu de la Règle permanente VI. 8) (e) ii).

En raison de l'introduction de ces deux nouveaux postes d'administrateur, l'ancienne règle permanente VI. d) Autres administrateurs est renuméroté en article V1. f) et est reformulé comme suit :

(f) Autres administrateurs

En plus des administrateurs décrits ci-dessus, le CA peut présenter aux membres pour une élection comme administrateur un ou plusieurs individus qui ne correspondent à aucune de ces catégories, tant que le nombre maximum d'administrateurs stipulé dans les statuts de prorogation n'est pas dépassé.

Le poste d'administrateur des étudiants et jeunes professionnels, qui dispose d'un droit de vote complet, remplace le représentant des étudiants et jeunes professionnels au Conseil d'administration, qui n'a pas le droit de vote. Lors de sa réunion du 10 décembre 2020, le Conseil d'administration a donc approuvé la suppression de la Règle permanente VII.(l) Représentant des étudiants et jeunes professionnels.

La version actuelle des Règles permanentes, datée du 10 décembre 2020, peut être consultée en anglais et en français dans la zone réservée aux membres du site web de la SEC.

Seventeenth Annual Photo Contest

The 17th Annual Photo Contest to select images for the 2022 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' 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.

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 2021. Entries should be submitted as an attachment to an email message; the subject line should start with "ESC Photo Contest Submission". Send the email message to: photocontest@esc-sec.ca.



Dix-septième concours annuel de photographie

Le dix-septième 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 2022 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 » 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.

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 2021. Les soumissions doivent être faites en pièces jointes d'un courrier électronique. L'objet du message doit débiter par « Soumission pour le concours de photographie de la SEC ». Envoyez vos courriels à : photocontest@esc-sec.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.



Journal of the Entomological Society of British Columbia Volume 117 (2020)

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.

Articles

[The balsam bark weevil, *Pissodes striatulus* \(Coleoptera: Curculionidae\): life history and occurrence in southern British Columbia](#)

L.E. MacLauchlan, J.E. Brooks pages 3-19

[PDF](#)

[Beetles in the city: ground beetles \(Coleoptera: Carabidae\) in Coquitlam, British Columbia as indicators of human disturbance](#)

R. McGregor, V. Wahl pages 20-30

[PDF](#)

[Effects of trail pheromone purity, dose, and type of placement on recruiting European fire ants, *Myrmica rubra*, to food baits](#)

D. Hoefele, J.M. Chalissery, R. Gries, G. Gries pages 31-41

[PDF](#)

[Geographic range and seasonal occurrence in British Columbia of two exotic ambrosia beetles as determined by semiochemical-based trapping](#)

E. Stokkink, J.H. Borden, L.M. Humble, L. J. Chong pages 42-48

[PDF](#)

[Andrena \(*Melandrena*\) *cyanura* Cockerell \(Hymenoptera: Apoidea, Andrenidae\), a valid North American species](#)

C.S. Sheffield pages 49-59

[PDF](#)

Scientific Notes

[First record of the Palearctic seed bug *Metopoplax fuscinervis* Stål \(Hemiptera: Oxycarenidae\) in North America](#)

C.G. Ratzlaff, G.G.E. Scudder pages 60-63

[PDF](#)

Natural History & Observations

[Plecoptera from the Crooked River, British Columbia](#)

D.J. Erasmus, D.P.W. Huber pages 64-68

[PDF](#)

[New distribution records and range extensions of mosquitoes \(Diptera: Culicidae\) in British Columbia and the Yukon Territory](#)

D.A.H. Peach, L.M. Poirier pages 69-74

[PDF](#)

Obituary

[Leland Medley Humble: \(3 November 1951 – 4 August 2020\)](#)

M. Noseworthy, E. Allen pages 75-78

[PDF](#)



Proceedings of the Entomological Society of Manitoba

Volume 75 (2019)

(published online 20 November 2020)

(https://home.cc.umanitoba.ca/~fieldspg/pdf/Proceedings/ESMproceedings_V75.pdf)

Scientific notes

Earwigs (Dermaptera) of Manitoba: records and recent discoveries.

Jordan A. Bannerman, Denice Geverink, and Robert J. Lamb, pages 6–14.

Submitted papers

Microscopic examination of *Lygus lineolaris* (Hemiptera: Miridae) feeding injury to different growth stages of navy beans.

Tharshi Nagalingam and Neil J. Holliday, pages 15–30.

Studies in the biology of North American Acrididae development and habits. Norman Criddle. Preamble to publication of the original manuscript.

Neil J. Holliday and Lynda J. Donald, pages 31–33.

Studies in the biology of North American Acrididae development and habits.

Norman Criddle, pages 34–69



Journal of the Acadian Entomological Society

Volume 16 (November 2020)

Movement and infectivity of entomopathogenic nematodes in sandy loam soil from a carrot field in Nova Scotia: a laboratory study.

Suzanne E. Blatt and Shauna Barry Pages 1-6

[Full Text](#)

Evaluating late summer pollen substitutes on the growth and overwintering success of honey bee colonies and analyzing natural fall pollen nutrition in Nova Scotia, Canada.

Robyn McCallum, Sawyer Olmstead, Jillian Shaw and Jennifer Harrison, Pages 7-14

[Full Text](#)

Announcements / Annonces

Biological Control Programmes in Canada – call for chapter proposals

The next book of the series *Biological Control Programmes in Canada*, covering work done from 2013 to 2021 is currently in the early stages of planning. **At this stage, we are requesting any researcher interested in authoring a chapter to send a short proposal of about 300 words in which they will present the pest species (insect or weed or pathogen), a summary of the content they will cover, and a tentative list of co-authors.**

At this stage, all proposals are subject to evaluation by the editors. Only chapters approved by the editors will be invited for submission of full chapters. As the information on each species needs to be grouped in a single chapter, we might suggest that some authors work together on specific chapters. Our aim is to receive the written chapters around December 2021.

You can have a look at the first three volumes freely on the ESC website:

<https://esc-sec.ca/publications/biological-control-programmes-in-canada/>.

The deadline for submitting your **300-word** chapter proposal to the co-editors is **12 March 2021**. If you have any questions, do not hesitate to contact us. We aim to contact successful authors by mid May 2021.

Meghan Vankosky (AAFC) and Véronique Martel (NRCan), Co-editors

meghan.vankosky@canada.ca, veronique.martel@canada.ca

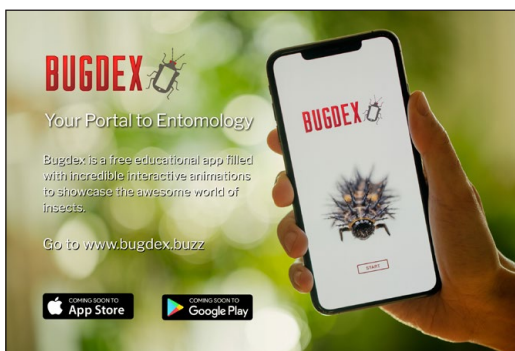
Bugdex: when insect guides meet digital design

Charles-Étienne Ferland

Head scratching and eyebrows frowning, you know the look, stuck upon a particularly challenging couplet from a dichotomous taxonomic key; any undergraduate student who has taken a course in biology has been there before. Accurate morphological identification of insects relies on good keys with precise and easily understandable characters. The lack of visual support makes it difficult and frustrating at times for both novices and experts. We need a game changer. Enter Bugdex, your portal to entomology: an extravagantly illustrated and animated guide to insect diversity.

The primary target groups are first year undergraduate students and senior high school students with a strong interest in biology. In principle, anyone that is curious about nature should get a kick out of Bugdex. The idea from the start has been to create something that is accessible for people potentially interested but not necessarily with a lot of prior knowledge of insects. Of course, the hope is that Bugdex will appeal even to the most experienced bug enthusiasts too!

Bugdex is the brainchild of a team of like-minded creative entomologists bringing together their skill, passion and dedication into a cohesive free app to promote entomology. Dave Cheung is a University of Guelph graduate and former collection manager at the Natural History Museum



of Denmark, and now runs DKB Digital Designs, a company dedicated to developing visually stunning educational software like Bugdex and BugFinder. His partner in crime from the earliest stages of Bugdex, Line Kræmer, is a University of Copenhagen graduate and full-time lead photographer and designer on the project. She dedicated her MSc to the development and testing of Bugdex and now continues her dream to contribute to the growth of the project. When the two entomologists met in Denmark back in 2014, they immediately felt a strong chemistry. While mastering the art of immortalizing live specimens through macrophotography and animating them afterwards, they discovered the desire to develop educational guides harnessing the power of interactive visual design which the video game industry had been refining for decades.

Lars Vilhelmsen, a wasp systematics researcher and curator at the Natural History Museum of Denmark, came along as project administrator. He also teaches several courses for undergraduate students at the University of Copenhagen, including a field course for which Bugdex is scheduled to become the primary reference. Retired McMaster entomology instructor Marvin Gunderman, a long-time friend and mentor of Dave, became chief publicity strategist to support outreach activities. Marvin brought his passion and knowledge of entomology, photography and pedagogy to help Bugdex achieve its mission. Charles-Étienne Ferland came on board as social media manager. Assisting in project development with content creation, communications, networking, Charles brings together his skills as a published author, entrepreneur and entomologist.

This project blends design, interactivity, high quality photography, didactics and entomology. There's a plethora of novelties that Bugdex is bringing to modern educational apps, which elevates traditional textbook knowledge to the next level. Filled with amazing animations, images and videos, the users will get to experience a very personal and up-close encounter with the small and mysterious creatures with which we share our world. Bugdex is being packed with interactive features, such as wing folding animations, that make learning easy and fun. At launch, the app will include a key to insect orders. Keys to the families of beetles, flies, true bugs, bees and wasps will follow shortly after, with improvements planned over the next three years.

Don't miss the Spring 2021 launch by subscribing to the mailing list on www.bugdex.buzz!

Bugdex: lorsque les guides d'insectes rencontrent le design numérique

Charles-Étienne Ferland

Grattage de tête et sourcils froncés, vous connaissez la chanson, lorsqu'on reste accroché sur un couplet particulièrement difficile d'une clé dichotomique; tout étudiant de premier cycle ayant suivi un cours de biologie l'a déjà vécu. L'identification morphologique des insectes repose sur de bonnes clés avec des caractères précis et facilement compréhensibles. Le manque de soutien visuel rend la tâche difficile et parfois frustrante pour les novices et les experts. Nous avons besoin de changer la donne. Découvrez Bugdex, votre portail vers l'entomologie: un guide extravagamment illustré



et animé pour apprécier la diversité des insectes.

Les principaux groupes cibles sont les étudiants de première année au baccalauréat et les finissants de l'école secondaire, ou les cégépiens, férus de biologie. En principe, quiconque s'intéresse à la nature devrait avoir un réel plaisir à essayer Bugdex. L'idée dès le départ a été de créer une plateforme accessible aux personnes potentiellement intéressées, mais pas nécessairement avec beaucoup de connaissances préalables sur les insectes. Bien sûr, nous espérons que Bugdex plaira même aux entomologistes plus expérimentés!

Bugdex est le fruit d'une équipe d'entomologistes créatifs partageant les mêmes idées, réunissant leurs compétences, leur passion et leur dévouement dans une application éducative gratuite pour promouvoir l'étude des insectes. Dave Cheung est diplômé de l'Université de Guelph, ancien directeur de collection au Musée d'histoire naturelle du Danemark et dirige maintenant DKB Digital Designs, une entreprise dédiée au développement de logiciels éducatifs visuellement impressionnants comme Bugdex et BugFinder. Line Kræmer, sa complice depuis les premiers stades de Bugdex, est diplômée de l'Université de Copenhague. Elle est photographe principale et designer à temps plein sur le projet. Elle a consacré sa maîtrise au développement de Bugdex, et poursuit désormais son rêve de contribuer à la croissance du projet. Lorsque les deux entomologistes se sont rencontrés au Danemark en 2014, ils ont tout de suite connecté. Tout en maîtrisant l'art d'immortaliser des spécimens vivants grâce à la macrophotographie et celui de les animer par la suite, ils ont découvert le désir de développer des guides pédagogiques exploitant la puissance du design visuel interactif que l'industrie du jeu vidéo raffine depuis des décennies. C'est pourquoi ils ont décidé de se lancer dans Bugdex.

Lars Vilhelmsen, chercheur en systématique des guêpes et conservateur au Musée d'histoire naturelle du Danemark, est embarqué à titre d'administrateur du projet. Il enseigne également plusieurs cours pour les étudiants de premier cycle à l'Université de Copenhague, dont un cours de terrain pour lequel Bugdex devrait devenir le principal outil. Marvin Gunderman, professeur d'entomologie retraité de McMaster, ami de longue date et mentor de Dave, est devenu responsable de la publicité pour soutenir les activités de diffusion. Marvin apporte sa passion et ses connaissances de l'entomologie, de la photographie et de la pédagogie pour aider Bugdex à atteindre ses objectifs. Charles-Étienne Ferland a rejoint l'équipe en tant que responsable des médias sociaux. Contribuant au développement de projets avec la création de contenus, la communication et le réseautage, Charles rassemble ses compétences en tant qu'auteur publié, entrepreneur et entomologiste.

Ce projet allie design, interactivité, photographie professionnelle, didactique et entomologie. Bugdex apporte une foule de nouveautés aux applications éducatives modernes, ce qui élève les connaissances traditionnelles des manuels scolaires à un niveau supérieur. L'application étant remplie d'animations, d'images et de vidéos incroyables, ses utilisateurs pourront rencontrer de près les petites et mystérieuses créatures avec lesquelles nous partageons notre monde. Bugdex regorge de fonctionnalités interactives, telles que des animations de pliage d'ailes, qui rendent l'apprentissage plus facile et amusant. Au lancement, l'application comprendra une clé des ordres d'insectes (en anglais et en danois). Les clés des familles de coléoptères, de diptères, d'hémiptères et d'hyménoptères suivront peu de temps après, avec des améliorations prévues au cours des trois prochaines années. Des versions dans d'autres langues, dont le français, sont dans les plans.

Ne manquez pas le lancement du printemps 2021 en vous inscrivant à la liste de diffusion sur www.bugdex.buzz!



Entomofaune du Québec Inc.
Saguenay, November 2, 2020.

Les Cahiers

Léon-Provancher

Les « Tableaux d'Histoire naturelle
de la Province de Québec » :
un projet de Léon Provancher

Jean-Marie Perron



Numéro 8
Novembre 2020

The non-profit organization **Entomofaune du Québec** is proud to announce the upcoming release of the eighth volume of the series “Les Cahiers Léon-Provancher” (The Léon-Provancher Notebooks), entitled “Tableaux d’Histoire naturelle de la Province de Québec” (Portraits of Natural History in the Province of Quebec). This volume summarizes the enormous body of work done by the author, the priest Léon-Provancher. This historical scientific work has been made available through the research done by Dr Jean-Marie Perron, Professor Emeritus at Laval University.

L’organisme à but non lucratif « **Entomofaune du Québec inc.** » est fier d’annoncer la parution prochaine du huitième tome de la série « Les Cahiers Léon-Provancher » intitulé : Les « Tableaux d’Histoire naturelle de la Province de Québec ». Ce projet de Léon-Provancher résume à lui seul l’énorme quantité de travail effectuée au 19^e siècle par l’auteur, l’abbé Léon-Provancher. Les recherches du créateur de la série, Jean-Marie Perron Dr Sc., professeur émérite à l’Université Laval, rendent maintenant disponible cette œuvre du patrimoine scientifique et historique du

Dr Perron introduces this work by Provancher as follows: “*The priest Léon Provancher was more of a man of the land than a theoretician. His primary objectives were cataloguing known living creatures, naming and describing unknown species, and classifying them according to the knowledge of the time. His secondary goals involved providing his contemporaries with documents that were easy to use and understand, in order to facilitate their study. His favored disciplines were botany, horticulture, entomology, and molluscs. From 1862 to 1891, he successively published four treatises in domains that, before him, were unexplored: the Canadian flora, the Canadian orchard, the small entomological fauna of Canada, the molluscs of Quebec. The eight portraits that he proposed publishing in 1881, and that we reproduce in this notebook, were a synthesis of his studies that had occupied the previous 50 years of his life as a naturalist, and that he wanted to make available to the public. They demonstrate the imagination and the energy that Provancher was able to use to persuade his fellow citizens to study the sciences.*”¹

This 36-page, 23.5 cm x 28.5 cm work is printed on thick paper that is folded and inserted in plastic pockets, and bound together with black spiral binding. Many pages are in color, and show the details of Provancher’s work that has never been published until now.

Given that the state of science has changed since 1881, Dr Perron has included important notes pointing out the differences between what is presented and the current state of the natural sciences. He states that: “*The objective of this book is to present the work of Provancher as it was conceived, according to his knowledge and methods*”, and adds: “*We hope that the annotations that we have added help the reader to compare the knowledge of the day with current knowledge today. We present some updates that are relevant after 140 years of ensuing additions to knowledge.*”¹

Québec.

Monsieur Perron présente ainsi cet ouvrage de Provancher : « *L’abbé Léon Provancher n’était pas un théoricien mais plutôt un homme de terrain. Répertoire sur le territoire québécois les êtres vivants connus, nommer et décrire les espèces inconnues, classer l’ensemble selon les connaissances de son temps, étaient ses premiers objectifs. Donner à ses contemporains des documents faciles de compréhension et d’utilisation, afin de les initier à leur étude, fut le second grand volet de ses préoccupations. La botanique, l’horticulture, l’entomologie, les mollusques furent ses quatre pôles favoris. La Flore canadienne, le Verger canadien, la Petite Faune entomologique du Canada, les Mollusques de la province de Québec, quatre traités dans des domaines inexplorés avant lui, paraîtront successivement entre 1862 et 1891. Les huit tableaux qu’il se proposait de publier, en 1881, et que nous reproduisons dans ce Cahier, étaient une synthèse de ses études qui ont occupé les cinquante dernières années de sa vie de naturaliste et qu’il voulait offrir à son public. Ils démontrent l’imagination, la volonté et l’énergie que Provancher pouvait déployer pour inviter et persuader ses concitoyens à étudier les sciences.* »

Les huit tableaux imprimés sur un papier robuste au format 63,5 × 78,75 cm, pliés et insérés dans des pochettes en plastique 21 × 28 cm dans les pages de texte du cahier et le tout sous reliure spirale noire, forment la partie maîtresse de cet ouvrage de 36 pages de 23,5 x 28,5 cm, dont certaines en couleur, et illustrent en détails ce projet de Provancher qui n’a jamais été publié à ce jour.

Étant donné que l’état de la science a changé depuis 1881, le Dr Perron a inclus un important Nota signalant certaines différences avec les sciences naturelles actuelles. Il mentionne : « *L’objectif de ce cahier est de présenter le projet de Provancher tel qu’il l’a conçu selon les connaissances et sa méthodologie* » et il ajoute : « *Nous osons espérer que les quelques annotations que nous apportons aideront le lecteur à faire certaines correspondances*

¹Translation by the Bulletin

For more information **or to reserve your copy**, please contact Entomofaune du Québec, Inc. at ceq@uqac.ca.

You can also find more information on the entire *Notebooks of Léon-Provancher* series at: <http://entomofaune.qc.ca/Cahiers.html>.

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Adrélec : ceq@uqac.ca

qui s'imposent entre les connaissances de cette époque et celles d'aujourd'hui. Nous présentons quelques ajustements qui s'imposent après cent quarante ans d'ajouts aux connaissances. »

Pour des détails supplémentaires ou **pour réserver votre copie**, prière de vous adresser à Entomofaune du Québec inc. à l'adresse suivante ceq@uqac.ca

Vous trouverez également plus de détails sur toute la série *Les cahiers Léon-Provancher* en allant sur la Toile à l'adresse : <http://entomofaune.qc.ca/Cahiers.html>

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RÉSUMÉ

Ce huitième Cahier a pour objectif de sortir de l'oubli un grand projet innovateur de Léon Provancher. Il montre l'esprit d'initiative peu commun qui animait le naturaliste et sa volonté d'activer et de populariser l'étude des sciences avec des méthodes nouvelles. Il voulait inviter ses concitoyens à s'inscrire dans un courant populaire apparu en Europe et en Amérique. Les huit tableaux faisant partie de ce projet ont été reconstitués le plus fidèlement possible selon ses indications. Ils sont illustrés de figures montrant la flore et la faune du Québec dessinées par l'artiste Adolphe Rho. Le texte original accompagne chaque tableau.

ABSTRACT

The aim of this eighth « Cahier » is to bring out of oblivion a great innovative project of Léon Provancher. It shows the uncommon spirit of initiative that animated the naturalist and his desire to activate and popularize the study of science with new methods. He wanted to invite his fellow citizens to join a popular movement that had appeared in Europe and America. The eight paintings part of this project have been reconstructed as faithfully as possible according to his indications. They illustrate with figures flora and fauna of Quebec drawn by the artist Adolphe Rho. The original text accompanies each painting.



Canadian Weed Science Society
Soci t  canadienne de malherbologie

CWSS-SCM Newsletter

The Society has recently adopted a new style for its newsletter so that there is no longer a Table of Contents. To see what's new in Canadian weed science, go to:

<https://weedscience.ca/wp-content/uploads/2021/02/cwss-scm-newsletter-january-2021.pdf>





THE CANADIAN PHYTOPATHOLOGICAL SOCIETY

LA SOCIÉTÉ CANADIENNE DE PHYTOPATHOLOGIE

CPS-SCP News

VOL. 64, NO. 2 (Sept / Dec 2020)

https://phytopath.ca/wp-content/uploads/2020/11/CPS-SCP-News-64-2-Dec2020_v2.pdf

President's Message.....	22
Message de le président.....	24
Meetings	
2020 CPS AMOM	25
Advancing Women in Agricultural Conferences.....	26
Committee Reports	
CPS Awards Committee.....	28
In Memorium	
Dr. Roy Davidson Whitney	31
People	
Congratulations Dr. José Ramón Úrbez-Torres!	32
Congratulations Askarian /Akhavan family!	34
Congratulations Qinqin Zhou, Mahnoor Asif, and Bohan Wei!	35
Congratulations Dieter Kahl and Jared Hrycan!	35
Congratulations Dr. Junye Jiang!	36
Announcements	
2021 Canadian Plant Disease Survey: Call for Reports.....	37
Land Acknowledgements in Scientific Publications.....	39
Young Scientists' Corner.....	41
Publications	
ISPP.....	42
Entomological Soc. of Canada.....	44
Contact the Editors.....	46



<http://biologicalsurvey.ca/newsletter/bsc.vol39.2.pdf>

In this issue

From the editor's desk.....	2
Information on Membership.....	3,15
President's Report.....	4
BSC on facebook & twitter.....	5
Contributing to the BSC Newsletter.....	5
Highlights of the 2020 AGM.....	6
Request for Specimens.....	7
Carabidae from across North America (Kevin Floate)	
Certain Paraleptophlebia and <i>Rhithrogena</i> from eastern Canada (Steve Burian)	
Elateridae from across Canada (Scott Gilmore)	

Project Update:

Spider Diversity of British Columbia: Almost 900 Species & Still Counting Robb Bennett, Darren Copley and Claudia Copley.....	8
--	---

New Projects:

1. Warm & Comfortable within Hollow Stems, Leaf-mines and Galls: Little known habitats for Entomologists & Botanists to explore Peter G. Kevan, Charlotte Coates, Patricia Nunes Silva, & Marla Larson.....	11
2. A New Citizen Science Project Called Chronolog Kevin Rose.....	16
3. Citizen scientist spots a newcomer on Canadian elm trees Véronique Martel	17

Feature Article:

Sandhill Gold: The Goldsmith Beetle (<i>Cotalpa lanigera</i> , Scarabaeidae, Coleoptera) in the Sandhills of Southwestern Manitoba, Robert Wrigley and Tim Arendse.....	19
---	----

Notices

Nature Challenge 2021.....	24
Entomology Enthusiast.....	25
Canadian Journal of Arthropod Identification: 2020 papers.....	27
BSC Publications Available on the Website.....	27

Meeting announcements / Réunions futures

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

Entomological Society of America: 2021 International Branch Virtual Symposium

26–28 April 2021

<https://www.entsoc.org/international/2021-virtual-symposium>

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

Helsinki, Finland, 18–23 July 2022 (**NOTE: New date**)

<https://ice2020helsinki.fi/>

XVI International Conference on Ephemeroptera and XXI International Symposium on Plecoptera

Postponed to 2022, dates and location to be confirmed

(no website to date)

Society for Invertebrate Pathology Annual Conference: 2021

Virtual meeting, dates to be confirmed

<http://www.sipweb.org/meetings.html>

Joint Annual Meeting of the Entomological Society of Canada and the Entomological Society of Ontario / Réunion annuelle conjointe de la Société d'entomologie du Canada et de la Société d'entomologie de l'Ontario

Niagara Falls, 14–17 November / novembre 2021

<https://www.entsocont.ca/esceso-2021-jam-english.html>

<https://www.entsocont.ca/esceso-2021-rac-franccedilais.html>

Entomological Society of America Annual Meeting

Denver, 31 October–3 November 2021

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

10th International IPM Symposium: Implementing IPM across Borders and Disciplines

Denver, 28 February–03 March 2022

<https://ipmsymposium.org/2021/>

Society for Invertebrate Pathology Annual Conference: 2022

Port Elizabeth, South Africa, Dates to be confirmed

<http://www.sipweb.org/meetings.html>

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

Vancouver, 13–16 November 2022

(no website to date)

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

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

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Rédacteur: Cedric Gillott

Rédactrice adjointe: Donna Giberson

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

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

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Date de tombée pour le prochain numéro: 30 avril 2021

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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.



Strange times require extraordinary solutions!

The COVID-19 pandemic has changed the everyday lives of most Canadians, including professional entomologists in universities and government institutions. These organisations have essentially been closed for a year, with employees and students working largely from home.

This sea change in daily routine has resulted in unprecedented adaptation (and dedication) on the part of researchers in order to continue their studies and, in many cases, to preserve their research material. A remarkable example of such ‘devotion to duty’ was reported by the Natural Resources Canada newsletter *Simply Science* (<https://www.nrcan.gc.ca/simply-science/when-bringing-your-work-home-means-make-room-fridge/23068>). The article featured our very own Véronique Martel and forestry technician Stéphane Bourassa (Laurentian Forestry Centre) who between them brought home and stored in their fridges over 6000 diapausing spruce budworms. (I know you’re wondering, but the article makes no mention of the fate of the eggs, cheese, salad materials, beverages, etc. that are normally kept here!) As well, Véronique and other members of the team ‘welcomed’ into their homes thousands of dead insects caught in forest traps, which were sorted and identified on dining room tables as part of their studies on the parasitoids of this devastating pest.

Véronique, Stéphane and colleagues’ actions

Des temps étranges demandent des solutions extraordinaires!

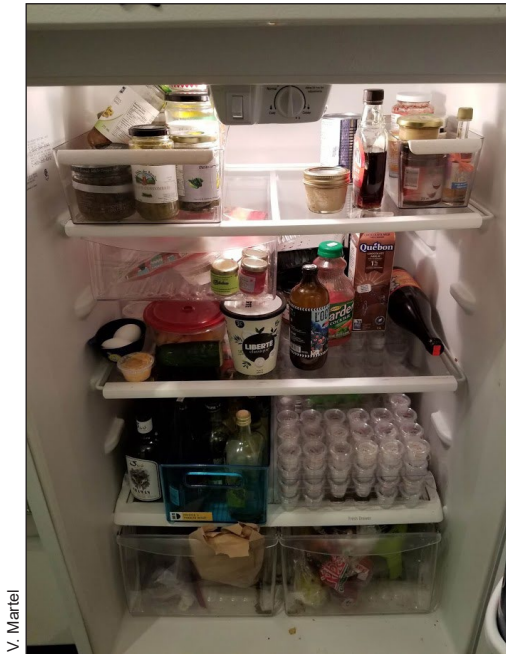
La pandémie de COVID-19 a changé la vie quotidienne de la plupart des Canadiens, y compris des entomologistes professionnels dans les universités et les institutions gouvernementales. Ces organisations ont essentiellement été fermées pendant un an, les employés et les étudiants travaillant en grande partie à domicile.

Ce changement radical dans la routine quotidienne a entraîné une adaptation (et un dévouement) sans précédent de la part des chercheurs afin de poursuivre leurs travaux et, dans de nombreux cas, de préserver leur matériel de recherche. Un exemple remarquable de ce « dévouement pour le devoir » a été rapporté par le bulletin de Ressources naturelles Canada, *La science simplifiée* (<https://www.nrcan.gc.ca/la-science-simplifiee/articles/quand-ramener-du-travail-la-maison-equivaut-plutot-faire-de-la-place-dans-le-frigo/23069>). L’article mettait en vedette notre propre Véronique Martel et le technicien forestier Stéphane Bourassa (Centre de foresterie des Laurentides) qui, à eux deux, ont rapporté et conservé dans leurs réfrigérateurs plus de 6000 tordeuses des bourgeons de l’épinette en diapause. (Je sais que vous vous posez des questions, mais l’article ne fait aucune mention du sort des œufs, du fromage, de la salade, des boissons, etc. qui sont normalement conservés à cet endroit!). De plus, Véronique et d’autres membres de l’équipe ont « accueilli » chez eux des milliers d’insectes morts pris dans des pièges en forêt, qui ont été triés et identifiés sur les tables de la salle à manger dans le cadre de leurs études sur les parasitoïdes de ce ravageur.

Les actions de Véronique, Stéphane et de

are but one example of many, I'm sure, of special steps taken to ensure that research programs have continued during the pandemic. If you are aware of some unusual/amusing steps taken to facilitate research in these strange times, let us know. We may even start a new series 'Cool solutions for hot research during a pandemic'.

leurs collègues ne sont qu'un exemple parmi tant d'autres, j'en suis sûr, des mesures spéciales prises pour garantir la poursuite des programmes de recherche pendant la pandémie. Si vous avez connaissance de mesures inusitées/amusantes prises pour faciliter la recherche en ces temps étranges, faites-le nous savoir. Nous pourrions même lancer une nouvelle série intitulée « Des solutions cool pour faire de la recherche pendant une pandémie ».



V. Martel

A view of the interior of Véronique Martel's refrigerator, showing the vials of diapausing spruce budworms.

Entomological Society of Canada, 2020-2021

Société d'entomologie du Canada, 2020-2021

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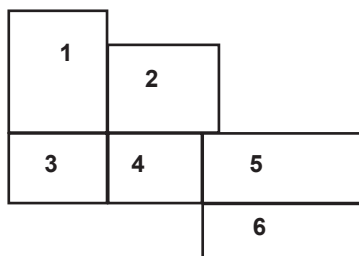
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Front cover/Page couverture:

1. Portrait of a male American rubyspot, *Hetaerina americana* (Odonata: Calopterygidae), photographed along the Châteauguay River on 13 August 2020. A small population of this colourful damselfly was discovered at this site, well north of its usual range, several years ago [Ste-Martine, Quebec, Canada]
Portrait d'un mâle de la courtisane d'Amérique (*Hetaerina americana*) (Odonata : Calopterygidae) photographié le long de la rivière Châteauguay le 13 août 2020. Une petite population de cette demoiselle colorée a été découverte sur ce site, bien au nord de sa distribution habituelle, il y a quelques années. [Sainte-Martine, Québec, Canada]
[Photo: Richard Yank]
2. A presumed Acrididae grasshopper (Orthoptera) found hanging out in a backyard [Summerland, British Columbia, Canada]
Une sauterelle Acrididé (Orthoptera) présumée trouvée dans une cour arrière [Summerland, Colombie-Britannique, Canada]
[Photo: Andrea Brauner]
3. Two male rhinoceros beetles (Xylotrupes: Dynastinae) preparing to 'fight.' Prize fighters are bred and bets are placed on which male will throw the other off a cylindrical piece of wood [Chiang Mai, Thailand]
Deux mâles scarabées rhinocéros (Xylotrupes, Dynastinae) se préparant à se « battre ». Les combattants sont issus d'élevage et les paris sont placés sur le mâle qui lancera l'autre sur un morceau de bois cylindrique. [Chiang Mai, Thaïlande]
[Photo: Matt Muzzatti]
4. Subadult female black widow spider (*Latrodectus* sp.) walking on her web [Tsawwassen, British Columbia, Canada]
Une femelle subadulte de la veuve noire (*Latrodectus* sp.) marchant sur sa toile. [Tsawwassen, Colombie-Britannique, Canada]
[Photo: Andreas Fischer]
5. *Enallagma civile* (Odonata: Coenagrionidae) watching the foot traffic along a boardwalk [Riding Mountain National Park, Manitoba, Canada]
Enallagma civile (Odonata : Coenagrionidae) observant la circulation piétonne le long d'un trottoir [Parc national Riding Mountain, Manitoba, Canada]
[Photo: Mel Hart]
6. Collecting insects and setting up pan traps on the dry slopes as part of the Biodiversity Galiano Project [Galiano Island, British Columbia, Canada]
Récolte d'insectes et installation de pièges à interception sur des pentes sèches dans le cadre du projet Biodiversité Galiano [île Galiano, Colombie-Britannique, Canada]
[Photo: Chris Ratzlaff]

Back cover/Quatrième de couverture:

Samurai wasp, *Trissolcus japonicus* (Hymenoptera: Scelionidae), parasitising eggs of *Halyomorpha halys* [Delémont, Switzerland]
La guêpe samuraï, *Trissolcus japonicus* (Hymenoptera : Scelionidae), parasitant des oeufs de *Halyomorpha halys* [Delémont, Suisse]
[Photo: Tim Haye]