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Images

Sur le dos: Une mouche Asilidae rarement observée, *Ommatius bromleyi* Pritchard (Diptera: Asilidae), Guadaloupe Canyon, Arizona. Photo: S.A. Marshall

Sous le titre: Une larve d'oestre humain, *Dermatobia hominis* (Linnaeus, Jr.) (Diptera: Oestridae), excisée de sous la peau de son hôte, Costa Rica. Photo: W.B. Strong.

1 Un bombyle, *Bombylius aurifer* Osten Sacken (Diptera: Bombyliidae), battant des ailes sur une feuille, Vernon, Colombie-Britannique. Photo: W.B. Strong

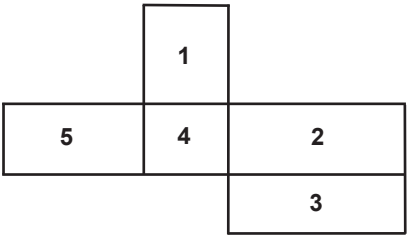
2 Les coordinateurs du Manuel des Diptères néarctiques en compagnie du diptériste allemand Willi Hennig lors de sa visite à l'Unité Diptères de la Collection nationale canadienne d'insectes (Ottawa) à l'automne 1967. Derrière de gauche à droite: Frank McAlpine, Herb Teskey, Guy Shewell; devant, de gauche à droite: Monty Wood, Dick Vockeroth, Bobbie Peterson, Willi Hennig. Photo: inconnu

3 Une mouche Stratiomyidae, *Caloparyphus decemmaculatus* (Osten Sacken) (Diptera: Stratiomyidae), Nouveau-Méxique. Photo: S.A. Marshall

4 Une tête de mouche des narcisses, *Merodon equestris* (F.) (Diptera: Syrphidae), une espèce introduite en Amérique de Nord à partir de l'Europe, Vernon, Colombie-Britannique. Photo: W.B. Strong

5 Parade/accouplement de mouches à longues pattes, *Dolichopus* Latreille (Diptera: Dolichopodidae), tourbière Copetown, Wentworth Co. Ontario. Photo: S.A. Marshall

Couverture arrière: Une mouche Stratiomyidae, *Odontomyia cincta* Olivier (Diptera: Stratiomyidae), près de parc national Elk Island, Alberta. Photo: H.C. Proctor



Up front / Avant-propos

Michel Cusson, President of ESC / Président de la SEC

How time flies!

As I begin writing my final "Up Front" column, I can't help being struck by the speed at which time has flown by since our 2011 annual meeting in Halifax. And that's largely because of the exciting times Canadian entomology and our Society are going through.

First, insects have made headlines on numerous occasions these past few months, drawing public attention to our work and to the creatures we are so passionate about. And for a change, non-pest insects (predominantly butterflies) have received frequent media coverage, largely as a result of their spectacular abundance (e.g., red admiral) and/or the northward expansion of their geographical range (e.g., monarch butterfly in Edmonton; giant swallowtail in Quebec) following a series of mild winters and favorable summer conditions (see article by Maxim Larrivée and Jeremy Kerr in this issue of the *Bulletin*). Of course, peskier critters such as the western and eastern

Ce que le temps file!

Alors que j'entame la rédaction de ma dernière chronique 'Avant-propos', je suis frappé par la vitesse à laquelle le temps a filé depuis notre congrès annuel de 2011 à Halifax. Et je crois que c'est principalement parce que l'entomologie canadienne et notre Société traversent une période des plus excitantes.

Premièrement, les insectes ont souvent fait les manchettes au cours des derniers mois, attirant l'attention du public sur notre travail et sur les bestioles qui nous passionnent. Et pour faire changement, ce sont souvent des insectes non-nuisibles (souvent des papillons) qui ont retenu l'attention des média, principalement en raison de leur abondance spectaculaire (ex. le Vulcain) et/ou de l'expansion vers le nord de leur aire de répartition (ex. le Monarque à Edmonton; le Grand porte-queue au Québec) suite à une série d'hivers doux et de températures estivales favorables (voir l'article de Maxim Larrivée et de Jeremy Kerr à ce sujet dans le présent numéro du *Bulletin*). Évidemment, des espèces à la réputation moins enviable telles la tordeuse des bourgeons de l'épinette et la tordeuse occidentale ont aussi fait les manchettes alors que leurs populations atteignaient des proportions épidémiques dans certaines régions du Québec et de la Colombie-Britannique, respectivement, nécessitant des pulvérisations insecticides. Les changements climatiques étant vraisemblablement responsables de la recrudescence récente de plusieurs espèces d'insectes au Canada, il semble probable que les services des entomologistes seront sollicités à une fréquence croissante au cours des prochaines années.

Deuxièmement, la SEC a été la scène de plusieurs nouveaux développements au cours de la dernière année. Le plus récent et le plus visible concerne son nouveau site web, lequel a fait l'objet d'un important remodelage par

spruce budworms have also found themselves in the news this past summer as their populations reached outbreak levels in portions of British Columbia and Quebec, respectively, requiring control actions. As climate change appears responsible for many recent insect flare-ups in Canada, the expertise of entomologists is likely to be called upon with increasing frequency in coming years.

Second, the ESC has seen several new developments in the past year. The most recent and visible one is our new website, redesigned by ESC webmaster Rick West, with inputs from various ESC representatives. I'm sure you'll like the clean new look and updated content of our redesigned website, and I invite you to take a peek (http://www.esc-sec.ca/index.php) if you haven't done so yet. I wish to thank Rick for the many hours he's invested in redesigning our website, which is something he felt was needed before he steps down as webmaster in 2013, and before we begin looking for a replacement. As an extension of the ESC website, the ESC Blog, launched in the spring, has also enjoyed tremendous success, featuring many fascinating blog posts and spectacular pictures (http://escsecblog.com/). I extend my thanks to Chris Buddle for instigating this project, and to Crystal Ernst and Morgan Jackson, for doing a fantastic job as blog administrators.

Talking about websites, you're also likely aware that our journal, *The Canadian Entomologist* (*TCE*), has a new home on the web, hosted by Cambridge University Press (CUP). Transition from *TCE*'s previous website to its new one was completed in July, and ESC members can now access all *TCE* issues and articles by following the instructions provided on the *TCE* page of our Society's website (http://www.esc-sec.ca/journal.php). There's no doubt that *TCE*'s future is currently looking very bright, largely thanks to the diligent work of our Scientific Editor, Chris Buddle, and his Editorial Assistant, Andrew Smith. Our contacts at CUP, Kathryn Wilson, Jon Speilburg, Jamie Hutchins and Anna Russell, have also worked hard to make our new partnership a productive and successful one. I thank them

le webmestre de la SEC, Rick West, avec la participation de divers représentants de la SEC. Je suis certain que vous apprécierez la nouvelle allure soignée et la mise à jour du contenu du site web remodelé, et je vous invite à y jeter un coup d'œil (http://www.esc-sec.ca/f-index.php) si vous ne l'avez déjà fait. Je tiens à remercier Rick pour toutes les heures qu'il a consacrées à cette tâche, laquelle il estimait importante avant que des recherches soient entamées pour lui trouver un successeur – Rick quittera ses fonctions de webmestre de la SEC en 2013. Considéré comme une extension de notre site web, le blogue de la SEC, dont les activités ont démarré au printemps, a connu un très vif succès, mettant en vedette plusieurs contributions fascinantes et des images spectaculaires (http://escsecblog.com/). Il me faut remercier Chris Buddle pour s'être fait l'instigateur de ce projet fort intéressant, ainsi que Crystal Ernst et Morgan Jackson, pour le merveilleux travail qu'ils réalisent comme administrateurs du blogue.

Parlant de sites web, vous savez déjà que notre revue, *The Canadian Entomologist* (*TCE*), réside maintenant à une nouvelle enseigne sur le web, sous la gouverne de Cambridge University Press (CUP). La transition de l'ancien vers le nouveau site web de *TCE* a été complétée en juillet, et les membres de la SEC peuvent maintenant accéder à tous les numéros et articles de *TCE* en suivant les instructions données sur la page consacrée à la revue sur le site web de la SEC (http://www.esc-sec.ca/f-journal.php). Il ne fait aucun doute que l'avenir de notre revue est présentement très prometteur, en grande partie grâce au travail assidu de son Rédacteur scientifique, Chris Buddle, et de l'Adjoint à la rédaction, Andrew Smith. Nos contacts chez CUP, Kathryn Wilson, Jon Speilburg, Jamie Hutchins and Anna Russell, ont aussi travaillé fort pour faire en sorte que notre nouveau partenariat soit productif et couronné de succès. Je les remercie tous pour leur contribution enthousiaste.

Récemment, le Comité du Contenu Internet a piloté le développement d'un autre outil web : un système de scrutin électronique

all for their enthusiastic contribution.

Recently, the Web Content Committee oversaw the development of another web tool: an anonymous electronic balloting system that the ESC plans to use for its annual election of a 2nd Vice-President and a Director-at-Large, as well as for votes on changes to our Society's rules and regulations between annual general meetings. The work was contracted out to Eric Barstad, who also developed the Joint Annual Meeting (JAM) online registration/abstract submission system, and the new system is now ready to be launched. This should greatly simplify the election process.

In closing, I'd like to thank all of my colleagues on the ESC Executive and Governing Board, as well as Trustees, committee chairs and members, and our Office Manager, Derna Lisi, for their continued dedication to the Society and for making my term as President pleasant, productive and memorable. I look forward to seeing you all at the upcoming JAM in Edmonton, which promises to be outstanding. If you have not registered yet, there is still time to do it. Please visit the JAM website at http://www.entsocalberta.ca/JAM2012/.

Michel Cusson
President

anonyme que la SEC compte utiliser pour l'élection annuelle du 2e Vice-Président et du Conseiller, ainsi que pour des changements aux règlements de la Société pour lesquels un vote est nécessaire entre les assemblées générales annuelles. Ce travail de conception a été réalisé par M. Eric Barstad, lequel a également développé le système d'inscription et de soumission de résumés en ligne pour nos réunions annuelles conjointes (RAC). Le système de scrutin électronique est maintenant prêt à être utilisé et il devrait grandement simplifier le processus d'élections.

En terminant, j'aimerais remercier tous mes collègues du Conseil exécutif et du Conseil d'administration de la SEC, ainsi que les fiduciaires, les présidents et membres des différents comités, et notre chef de bureau, Derna Lisi, pour leur dévouement à la Société et pour avoir contribué à rendre mon mandat à la fois agréable, productif et mémorable. J'espère vous revoir tous à la prochaine RAC à Edmonton, laquelle promet d'être exceptionnelle. Si vous ne vous êtes pas encore inscrit, il est encore temps de le faire. Je vous invite d'ailleurs à visiter le site web de la RAC à http://www.entsocalberta.ca/JAM2012/indexf.html.

Michel Cusson
Président

A. Ieroux

Spotted tussock moth caterpillar

Dear Buggy / Cher Bibitte

Dear Buggy,

I'm having trouble with what should be the easiest part of my paper - the methods! How much detail do I need? One supervisor says more, the other says less, and I can't seem to find a happy medium. Any advice?

Signed 'Methodless in Mount Pearl'

Your question brings to mind a comment I received on my recent column on reviewing. I was reminded that I had not mentioned that a paper should have enough detail to allow the experiment to be repeated. It's true. The methods section is arguably the most important part of any paper, but one that often receives the least attention. So, what do you need for a good methods section?

When I was just a larva, I was taught the 5 'W's used by news reporters: Who, What, When, Where and Why. A good news story should have all these elements. I'd argue that a good methods section should have them too.

The Who

First, let's dispense with the most obvious 'who'. This is you and the people that helped you collect your data. You should always acknowledge when you've had help with specific parts of an experiment — say a technician ran a set of assays for you, a taxonomist helped you with your identifications, or a statistician helped you with your analysis — but we don't usually list these people in the methods. That said, anyone who has made a significant contribution should at least be mentioned in the acknowledgements, or included as a co-author on the paper. It's also a good idea to ask that person to read your description of what they did to make sure you haven't missed anything important.

The most important 'Who' in your study are the plants, insects and other living things you used in your experiments. Give the common and latin names, where you obtained them, and anything relevant about their life history that pertains to your study. Your readers need to know as much about the organisms as is relevant to the study. I like to include this information at the very start of my methods because it often makes the rest of the section make more sense. You should also mention whether your kept vouchers of your specimens and where these are deposited for long term storage. Vouchers allow future researchers to confirm your identifications and can provide a valuable record of biodiversity (and see The Bug Geek on the importance of good labels: http://thebuggeek.com/2012/06/25/respect-your-specimens)

Chris MacQuarrie is a research scientist with Natural Resources Canada Canadian Forest Service in Sault Ste. Marie where he studies the management of native and invasive insects. Currently, he's looking forward to being back in his old stomping grounds in Edmonton for the JAM, and hopes to see you all there. Have an idea for a column? Send it to cjkmacquarrie@gmail.com, ping me on twitter @cmacquar, or post in the Facebook student group

The What

This is the meat of your methods. The 'what' of your methods sets out the order of your experiments. If you get this part right, it will be easy for your reader to see how your experiments link to your hypothesis and predictions made in the introduction. Get it wrong and your reader (or your reviewers) will be confused, or worse, annoyed.

If your experiments were simple, then laying out the structure of your methods in an organized way can be easy. Ideally, a logical methods framework should link to your hypotheses. Use headings and subheadings to make these connections obvious. This will also allow you to break up the experiments into sensible units that are easy to understand. Where you can, put information that is common to all the experiments (for instance, you used the same chambers to rear your bugs) first and then refer back as needed.

In reality, many experiments aren't simple and the methods are complex. When you're faced with writing a complex methods section, the trick is to explain all the parts and have it make sense. What this means is that you need to do a lot more thinking before you begin to write.

One way to start is to create a diagram of the entire methods section to help you visualize the elements of your study. Visualizing your study can help in a few ways. First, you can see where sections of your study can be encapsulated and described in easy-to-explain 'chunks'. Visualizing your methods should also reveal the internal framework of your study and should help you to put these 'chunks' into a logical order, and help you separate the important information from the trivial. Always keep in mind that you must give enough information to allow someone to repeat the study. And of course, if your study is very complex you can always include your visualization as a figure!

Regardless of whether your study is simple or complex, you will need to decide what information is important. Following the advice 'more is better' will generally not get you in trouble, although in reality there are limits. Where possible, you can save space by citing papers that used the same methods or describe very complex sections in an appendix. In an extreme case you might extract your complex methods and submit them as a separate paper. While this may take more time and work, you will have two papers instead of one, and the plus side is that methods papers often are well cited and stay relevant longer than regular research publications.

Telling your reader 'what' also means a few more mundane tasks. Always include the name of the manufacturer for any specialized material you used. This includes software, chemicals, and traps that were obtained from a particular supplier. This information can be easy to overlook but it's important to include. With this information, someone can repeat your experiment under the same conditions and with the same equipment. More importantly, it tells us about any biases that might be in your results that you were not aware of (e.g., machine calibration issues, bad software routines).

The When and Where

'When' and 'where' go together in the writing of your methods section. They describe the environmental conditions of your experiment and tell your reader the context of your results and place them in time and space. You should give the latitude and longitude of your field sites and the time of year you were working. Your readers need this for two reasons: 1) so they can find your sites again if they want to repeat the study or collect new data; and 2) so they can extrapolate the physical conditions experienced by the experiment's subjects. Also, with this data, if someone later comes up with a different result in a different location, they may have enough information to be able to figure out why.

But what if you work in the lab? It's still important to provide details of the source of your insects even if they came from a lab culture. What light and temperature regimes were your

insects reared under? Insect populations (and a good many other organisms) have traits that vary with time and space. If someone wants to repeat your experiment, they would want to try and collect insects from the same population. When you ran your experiments is probably less important (unless you're doing behavioural studies of nocturnal insects). That you were in the lab at 2 am is of little interest to anyone, except, perhaps, your supervisor!

The Why

The 'why' in your methods section is different from the 'why' in your introduction. In your introduction you told us why you are asking the question. The 'why' in your methods explains your choice of methods. That's perhaps a bit confusing, so I'll explain.

Your overriding task in the methods section is to explain to your reader how the methods you chose can answer the questions you asked. For instance, you might have wanted to know how a particular species chooses its host. Let's say you design an experiment where you put two host plants in a cage with some adults of your insect and then count how many eggs are laid on each plant. That's a fairly common design that could answer your question, but there are many other methods you could have used to answer the same question. You could put insects on live plants in the field, you could only put one plant in the cage, you could put single adults onto different parts of the plant, etc.., etc... So you need to explain why you chose this method; Was it because others have? Was it because something about this design will give you additional information? Was it because you wanted to isolate the insect from field conditions. The issue is really one of choice, but the task then falls to the you to convince readers that your design can answer your questions. Studies that do this part well are simple to understand and a joy to read.

Well Methodless, I hope I've helped. Write an organized and easy to read methods section and you'll be well on your way to a well received paper.

Cheers

Buggy

A. Ieroux

Libellulid dragonfly

The student wing / L'aile étudiante

Chandra Moffat

Happy September, ESC Students! Whether you were out doing fieldwork, in the lab running experiments, or in the office writing, I hope you enjoyed the warm summer months! I spent my summer finishing my MSc thesis, doing a month and a half of remote field work, then driving across Canada to my new home in New Brunswick. Driving across the country, almost from coast to coast (Kelowna to Fredericton), I thought a lot about entomology in Canada. I thought of all the wonderful entomologists and entomology students I have met from each province in the past few years at the ESC meetings, and how neat it is to know entomologists and what types of projects they work on across the country. I also had this one idea: that it would be neat for my column here, if I could think of one insect to represent each province – perhaps one that is particularly relevant at this time. Immediately, the mountain pine beetle (*Dendroctonus ponderosae*) came to mind for B.C., but even though I'm from there, I don't feel this would be the insect I would choose to represent that province. In Alberta I saw some nice dragonflies, and in Saskatchewan I was totally amazed by the sheer number of grasshoppers, butterflies and other flying insects (hundreds of which ended up rather glued to

Joyeux septembre, étudiants de la SEC! Que vous soyez dehors à faire du travail de terrain, dans le labo à faire des expériences, ou dans le bureau à rédiger, j'espère que vous avez apprécié les mois chauds de l'été! J'ai passé mon été à terminer mon mémoire de maîtrise, faire un mois et demi de travail de terrain reculé, et ensuite traverser le Canada vers mon nouveau chez-moi au Nouveau-Brunswick. Conduisant à travers le pays, presque de côte à côte (de Kelowna à Fredericton), j'ai beaucoup pensé à l'entomologie au Canada. J'ai pensé à tous les fantastiques entomologistes et étudiants en entomologie que j'ai rencontré dans chaque province dans les dernières années aux réunions de la SEC, et comme c'est agréable de connaître les entomologistes et les projets sur lesquels ils travaillent dans tout le pays. J'ai aussi eu cette idée : ce serait bien pour cet article si je pouvais penser à un insecte pour représenter chaque province – peut-être un qui serait particulièrement approprié en ce moment. J'ai immédiatement pensé au dendroctone du pin ponderosa (*Dendroctonus ponderosae*) pour la Colombie-Britannique, mais même si je suis de là-bas, je ne pense pas que je choisirais cet insecte pour représenter la province. En Alberta, j'ai vu de belles libellules, et en Saskatchewan, j'ai été impressionnée par le nombre de criquets, papillons et autres insectes volants (parmi lesquels des centaines ont fini écrasés sur ma voiture…). J'ai vite réalisé que je serais incapable de choisir un insecte pour représenter ma courte expérience dans chaque province. J'ai ensuite pensé qu'il y avait sans doute un insecte provincial pour chaque province, mais mes résultats de recherche sur Internet ont donné un seul résultat – le papillon amiral (*Limenitis arthemis*) a été choisi comme insecte provincial au Québec, bien que l'approbation du gouvernement soit requise. Au contraire, au moins 39 états des États-Unis ont un insecte! Évidemment, plusieurs sociétés entomologiques ont un insecte spécifique sur

the grill of my car…). I quickly realized I was in no way able to pick one insect to represent even my short experience in each province. I then thought that there surely must be a provincial insect for each province, but my internet searches yielded one result. Apparently, the white admiral butterfly (*Limenitis arthemis*) has been chosen as the provincial insect for Québec, though this still requires government approval. By contrast, at least 39 states in the U.S.A. have a state insect! Of course, many of our provincial entomological societies have a specific insect on their logos, but if there are provincial insects for the other provinces, I could not find out about them. Reading up on the Société d'entomologie du Québec's Insect Emblem Committee webpage (http://www.seq.qc.ca/english/activites/insemb_eng.htm) about their initiative, which took place in the mid-1990s, they list several benefits to adopting a provincial insect:

Help people learn more about insects and, especially, better understand their importance;

Highlight our entomological heritage;

Contribute to protecting and conserving these little-known and misunderstood creatures;

Teach people about wildlife habitats and the importance of conserving them to safeguard our insect heritage and biodiversity;

Explain the essential roles of insects in ecosystems.

I think this could be an excellent initiative for the provincial societies and the ESC to partner in – so let me know if you are interested in starting an initiative to solicit nominations for provincial insects!

JAM 2012

The Joint Annual Meeting of the Entomological Society of Canada and the Entomological Society of Alberta is coming up quickly, and I for one am excited! The Student Affairs Committee (SAC) is working hard to organize some great events.

Student Mixer and Insect Trivia Contest

Call for Trivia Questions! Since our knowl-

leur logo, mais s'il y a des insectes pour les autres provinces, je ne les ai pas trouvés. Sur le site Internet du comité de l'insecte emblème du Québec de la Société d'entomologie du Québec (http://www.seq.qc.ca/activites/embleme/insemb.htm) concernant leur initiative, qui a eu lieu dans le milieu des années 90, ils font la liste de plusieurs avantages à adopter un insecte provincial :

Amener la population à mieux connaître et surtout à mieux apprécier les insectes;

Valoriser notre patrimoine entomologique;

Contribuer à la protection et à la conservation de ce groupe méconnu et mal-aimé;

Faire découvrir les habitats fauniques et l'importance de leur conservation pour la sauvegarde du patrimoine entomologique et de la diversité;

Faire connaître les rôles essentiels que jouent les insectes dans les écosystèmes.

Je pense qu'il pourrait s'agir d'une excellente initiative pour les sociétés provinciales et la SEC de s'associer – alors faites-moi savoir si vous êtes intéressés à lancer l'initiative afin de solliciter des nominations pour les insectes provinciaux!

Réunion conjointe annuelle 2012

La réunion conjointe annuelle de la Société d'entomologie du Canada et de la Société d'entomologie de l'Alberta arrive à grands pas, et j'ai hâte! Le comité des affaires étudiantes travaille fort afin d'organiser des évènements intéressants.

Cocktail étudiant et quiz entomologique

Appel à questions pour le quiz ! Puisque notre connaissance des insectes est probablement aussi diverse que les organismes que nous étudions, le comité des affaires étudiantes aimerait que vous soumettiez vos questions pour le quiz entomologique !

Les questions peuvent être soumises par courriel à students@esc-sec.ca.

Le comité des affaires étudiantes organisera le cocktail étudiant et le quiz entomologique une fois de plus. Le cocktail étudiant est une excellente opportunité de venir rencontrer

edge of insects is likely as diverse as the organisms we study, the SAC would love you all to submit questions for the Insect Trivia Contest! Questions can be submitted by email to students@esc-sec.ca.

The Student Affairs Committee will be hosting the Student Mixer and Insect Trivia Contest once again. The Student Mixer is a great opportunity to come out and meet your fellow students and let loose (without worry that your current or future supervisor may be watching), so make sure you look for the details of the Student Mixer & Insect Trivia contest in the meeting program!

Graduate Student Symposium

The Graduate Student Symposium Committee (Boyd Mori, Paul Abram, and Nadir Erbilgin) is busy organizing what promises to be an interesting and informative session. This year's theme is Arthropod Biodiversity, and students are asked to relate their specific research topic to this theme. The GSS Committee would like to thank everyone who submitted abstracts this year, and a list of the successful applicants is on page 111.

Silent Auction

As always, the SAC is organizing a Silent Auction to be held during the Meeting. All funds raised through the Silent Auction are donated to the ESC Student Scholarships and Awards fund. If you or someone you know is cleaning out the office and looking to get rid of entomology related books or other items (trinkets, artwork, jewellery, field gear, t-shirts, etc.), the Silent Auction would love to have them. Please bring them along with you to the meeting and drop them off at the Silent Auction tables. For large or heavier items, or if you would like to ship your donations in advance (please note, shipping charges will not be reimbursed), please send them to:

Attention: Boyd Mori, Department of Biological Sciences, CW 405 Biological Sciences Building, University of Alberta, Edmonton, AB, T6G 2E9.

The Silent Auction is a great opportunity to find really neat books and things at excellent

vos collègues étudiants et vous relâcher (sans crainte que votre directeur actuel ou futur vous voit !), alors consultez les détails du cocktail étudiant et du quiz entomologique dans le programme de la réunion !

Symposium des étudiants gradués

Le comité du symposium des étudiants gradués (Boyd Mori, Paul Abram, et Nadir Erbilgin) est occupé à organiser ce qui promet d'être une session intéressante et informative. Le thème de cette année est Biodiversité des arthropodes, et les étudiants devront liés leur sujet de recherche à ce thème. Le comité du symposium des étudiants gradués aimerait remercier tous les étudiants qui ont soumis un résumé cette année et la liste des étudiants sélectionnés pour le symposium se trouve à la page 111.

Enchères silencieuses

Comme toujours, le comité des affaires étudiantes organise des enchères silencieuses qui se tiendront durant la réunion. Tous les fonds amassés lors des enchères silencieuses seront versés au Fonds des prix et bourses étudiants de la SEC. Si vous ou quelqu'un que vous connaissez fait du ménage dans son bureau et cherche à se débarrasser de livres ou objets en lien avec l'entomologie (pièces d'art, bijoux, accessoires de terrain, t-shirts, etc.), les enchères silencieuses adoreraient les avoir. Merci de les amener avec vous lors de la réunion et de les déposer à la table des enchères silencieuse. Pour des objets plus gros ou lourds, ou si vous voulez envoyer vos dons en avance (veuillez noter que les frais de port ne seront pas remboursés), merci de les envoyer à :

Attention: Boyd Mori, Department of Biological Sciences, CW 405 Biological Sciences Building, University of Alberta, Edmonton, AB, T6G 2E9.

Les enchères silencieuses sont une excellente opportunité pour trouver des livres et des objets à d'excellents prix et de montrer votre soutien aux membres étudiants de la SEC. Alors venez faire un tour et fouiner sur les tables des enchères silencieuses – vous

prices and to show your support for student members of the ESC. So, be sure to come by and browse the Silent Auction tables - you never know what you might find!

Thesis Roundup

As always, we like to know when a student defends their thesis. If you have (or anyone you know of has) defended a thesis recently, please send me your name, degree and date achieved, thesis title, supervisor's name, university and email address to students@esc-sec.ca.

That is all I have for now, I hope to see many of you in Edmonton!

~Chandra

students@esc-sec.ca

ne savez pas ce que vous pourrez y trouver !

Foisonnement de thèses

Comme toujours, nous aimerions savoir quand un étudiant soutient sa thèse. Si vous (ou quelqu'un que vous connaissez) avez soutenu votre thèse récemment, merci d'envoyer les noms, diplôme, date d'obtention, titre de thèse, nom du directeur, université et adresse courriel à students@esc-sec.ca.

C'est tout pour l'instant, j'espère vous voir nombreux à Edmonton!

~Chandra

students@esc-sec.ca

Charbonneau, Lise. MSc, 2012. *Effects of fungal parasites on honey bee learning and memory*. (lisechar@hotmail.com). Supervisors: Dave Shutler and Kirk Hillier, Acadia University.

Stephens, Danielle T. MSc, 2012. *Pollination ecology and the floral rewards of* Vaccinium myrtilloides *and* V. vitis-idaea *(Ericaceae)*. (danielle.stephens@usask.ca). Supervisor: Art Davis, University of Saskatchewan.

Kelly, Jillian. MSc, 2012. *Development towards a pheromone-based monitoring system for red-striped fireworm,* Aroga trialbamaculella *(Lepidoptera: Gelechiidae), a pest of wild blueberries*. (077911k@acadiau.ca). Supervisor: Kirk Hillier, Acadia University.

Little, Catherine M. MSc, 2012. *Interactions among mites (*Varroa destructor*), microsporidia (*Nosema spp.), chemotherapy, and immunocompetence in European honey bees (Apis mellifera*)*. (cate.little@acadiau.ca). Supervisors: Dave Shutler, Acadia University and Shelley Adamo, Dalhousie University.

Moffat, Chandra. MSc, 2012. *Cryptic host-associated and frequency-dependent patterns of host species selection of a candidate weed biological control agent in its native range*. (chandra.moffat@gmail.com). Supervisors: Bob Lalonde and Jason Pither, University of British Columbia, Okanagan.

Veilleux, Jonathan. MSc, 2012. *Establishment of* Scolytus schevyrewi *Semenov (Coleoptera: Curculionidae: Scolytinae) in the Prairies: life cycle, hosts and impact*. (jdebeloeil@hotmail.com). Supervisor: Neil Holliday, University of Manitoba.

Graduate Student Symposium: Arthropod Diversity

After careful consideration, the GSS Committee selected the following students and talks for the Symposium:

Colin Bergeron (University of Alberta) – Fire history, arthropod diversity, and indicators of sustainable forest management.

Kurt Illerbrun (University of Alberta) – Spatial variation in an alpine plant-herbivore interaction: Behaviour, host attributes, and encroaching habitat edge.

Krisztina Mosdossy (University of Calgary) – Relative insect abundance in a tropical seasonal environment.

Lukas Seehausen (Université Laval) - Silviculture in practice: Does partial cutting influence parasitism of two key insect defoliators?

Sarah Semmler (University of Manitoba) - The short term effects of fire and climate on plant-insect interactions in Canada's tall grass prairie.

Tyler Wist (University of Alberta) - Semiochemically-mediated interactions in a tritrophic system: *Fraxinus*, *Caloptilia fraxinella*, and *Apanteles polychrosidis*.

JOINT ANNUAL MEETING OF THE ENTOMOLOGICAL SOCIETY OF CANADA AND THE ENTOMOLOGICAL SOCIETY OF ALBERTA

The Coast Edmonton Plaza Hotel, Edmonton, Alberta
Sunday 4 November – Wednesday 7 November 2012

Edmonton 2012 esc esab

The Entomological Society of Alberta invites you to the 2012 Joint Annual Meeting of the Entomological Society of Canada and the Entomological Society of Alberta, from 4-7 November 2012, with the theme of **Arthropod Biodiversity.** The deadline for abstract submissions has now passed, but there is plenty of time to register and attend the meeting.
Online registration site: http://www.esc-sec.ca/ee/index.php/jam-registration
Our venue is the Coast Edmonton Plaza Hotel, 10155 105th Street, Edmonton, AB T5J 1E2 (see http://www.coasthotels.com/hotels/canada/alberta/edmonton/coast_edmonton/overview). Room rates start at $114 per night plus taxes. Reserve hotel rooms online at: http://www.coastpromos.com/996 or by phone: 1-800-663-1144. Be sure to quote the **Entomology Society JAM group code: CEP-GFC9107**.

Program Highlights:

Planned Symposia:
Plenary Symposium: Arthropod Biodiversity
Insects on the Internet
Insect Behaviour and Biodiversity
Spruce Budworm Genomics and Diversity
Agricultural Entomology
Biological Survey of Canada Symposium
Graduate Student Symposium

Heritage Lecture
Student paper and poster competitions
Regular poster and oral presentation sessions
Arthropod photo contest

After-banquet jam session - bring your musical instrument and join in!
Contact Julian Dupuis for details: jrdupuis@ualberta.ca
Pre-conference workshop (Sunday, 4 November 2012, morning)
Perspectives on the Publication Process
(Note this workshop is free to ESC/ESAB members but requires advance registration)
See separate announcement on page 114.

Associated event (Saturday, 3 November 2012)
University of Alberta Department of Entomology Alumni Reunion
(Note this is a separate event that requires separate registration)
Contact Doug Craig for details: dcraig@ualberta.ca

Check the ESAB webpage (www.entsocalberta.ca/JAM2012/) for updated information on symposia and other events and the call for papers.

For scientific program queries, contact Maya Evenden: mevenden@ualberta.ca
For registration queries, contact Heather Proctor: hproctor@ualberta.ca
For all other queries contact JAM committee chair Greg Pohl: gpohl@nrcan.gc.ca

RÉUNION CONJOINTE ANNUELLE DE LA SOCIÉTÉ D'ENTOMOLOGIE DU CANADA ET DE LA SOCIÉTÉ D'ENTOMOLOGIE DE L'ALBERTA

Hôtel Coast Edmonton Plaza, Edmonton, Alberta
Dimanche 4 novembre – mercredi 7 novembre 2012

La Société d'entomologie de l'Alberta vous invite à la réunion conjointe annuelle 2012 de la Société d'entomologie du Canada et de la Société d'entomologie de l'Alberta, du 4 au 7 novembre 2012, sur le thème de la **Biodiversité des arthropodes**. La date limite pour la soumission des résumés est passée, mais il reste beaucoup de temps pour s'inscrire et assister à la réunion.
Inscriptions en ligne : http://www.esc-sec.ca/ee/index.php/jam-registration/fr/
L'événement se tiendra à l'hôtel Coast Edmonton Plaza, au 10155 105e rue à Edmonton, AB, T5J 1E2 (voir http://www.coasthotels.com/hotels/canada/alberta/edmonton/coast_edmonton/overview).
Le tarif des chambres débute à 114$ plus taxes par nuit. Réservez vos chambres en ligne sur : http://www.coastpromos.com/996 ou par téléphone: 1-800-663-1144. Assurez-vous de mentionner le **code de groupe de la réunion conjointe de la Société d'entomologie : CEP-GFC9107**.

Points saillants du programme :

Symposiums planifiés:
Session plénière : Biodiversité des arthropodes
Les insectes sur Internet
Comportement et biodiversité des insectes
Génomique et diversité de la tordeuse des bourgeons de l'épinette
Entomologie agricole
Symposium de la Commission biologique du Canada
Symposium des étudiants gradués

Allocution du patrimoine
Compétition étudiante pour les oraux et affiches
Sessions régulières pour les oraux et affiches
Concours de photos d'arthropodes

Session de "jam" post-banquet – apportez vos instruments et participez!
Contactez Julian Dupuis pour les détails : jrdupuis@ualberta.ca
Atelier pré-conférence (dimanche 4 novembre 2012, matin)
Perspectives sur le processus de publication
(Notez que cet atelier est gratuit pour les membres de la SEC/SEAB, mais nécessite une inscription préalable)
Voir annonce séparée à la page 115.

Évènement associé (samedi 3 novembre 2012)
Retrouvailles des anciens du département d'entomologie de l'Université de l'Alberta
(Notez que cet évènement distinct demande une inscription distincte)
Contactez Doug Craig pour les détails: dcraig@ualberta.ca

Consultez le site Internet de la SEAB (http://www.entsocalberta.ca/JAM2012/indexf.html) pour des informations à jour sur les symposiums et autres évènements, et pour l'appel à soumission.

Pour des questions sur le programme scientifique, contactez Maya Evenden : mevenden@ualberta.ca
Pour des questions sur les inscriptions, contactez Heather Proctor : hproctor@ualberta.ca
Pour toute autre question, contactez le président du comité de la réunion conjointe annuelle Greg Pohl : gpohl@nrcan.gc.ca

Workshop: *Perspectives on the Publication Process*

On Sunday, 4 November 2012, from 9 am to 12 noon, immediately before the start of 2012 Joint Annual Meeting in Edmonton, the Entomological Societies of Canada and Alberta will jointly host a workshop on the publication process at the JAM venue. This goal of this workshop, focusing on entomology in Canada, is to provide practical information and demystify the publication process from writing to reviewing to editing to publishing. This workshop is intended for anyone with an interest in the publication process, irrespective of career stage, experience, or age.

The workshop will start with four short and informative presentations:

Introduction (Chris Buddle, Department of Natural Resource Sciences, McGill University & Editor-in-Chief, *The Canadian Entomologist*)
An editor's perspective on process and issues in publication (Mark Goettel, Editor-in-Chief, *Biocontrol Science and Technology*)
Some basic rules for writing a manuscript (Jeremy McNeil, Department of Biology, University of Western Ontario)
A publisher's perspective on current challenges and opportunities in scientific publishing (Jonathan Speilburg, Cambridge University Press)

This will be followed by moderated break-out sessions on five topics (selected based on feedback from ESC members). These sessions are meant to be informal and interactive. Participants will be able to attend two breakout sessions.
The peer review process
Picking the right journal
Ethics, authorship and data
How to review a scientific manuscript
Current challenges in scientific publishing

The workshop will finish with take-home messages from each of the break-out sessions and with a panel discussion with the featured speakers.

Attendees MUST sign up for the workshop by ticking the correct box on the form when pre-registering for JAM (http://www.entsocalberta.ca/JAM2012/registration.html). This is ***a first come, first serve event with limited space*** and is filling up fast. So if you want to attend, register soon! Registration will include a food break, and is free to ESC and ESAB members; $50 for non-members (to be paid at the workshop).

Workshop Organizing Committee:
Chris Buddle (chris.buddle@mcgill.ca**)**
Kenna MacKenzie (Kenna.MacKenzie@agr.gc.ca)
Rosemarie De Clerck-Floate (Rosemarie.DeClerck-Floate@agr.gc.ca**)**

Atelier : *Perspectives sur le processus de publication*

Le dimanche 4 novembre 2012, de 9h00 à 12h00, immédiatement avant le début de la réunion conjointe annuelle 2012 à Edmonton, les Sociétés d'entomologie du Canada et de l'Alberta organiseront conjointement un atelier sur le processus de publication sur le site de la réunion. L'objectif de cet atelier, principalement sur l'entomologie au Canada, est de fournir des informations pratiques et de démystifier le processus de publication, de l'écriture à la révision, de l'édition à la publication. Cet atelier s'adresse à tous ceux qui ont un intérêt pour le processus de publication, indépendamment de leur étape de carrière, expérience ou âge.

L'atelier débutera avec quatre courtes présentations informatives :

Introduction (Chris Buddle, Department of Natural Resource Sciences, McGill University & Rédacteur scientifique, *The Canadian Entomologist)*
La perspective d'un éditeur sur le processus et les problèmes en publication (Mark Goettel, Rédacteur en chef, *Biocontrol Science and Technology*)
Quelques règles de base pour écrire un manuscrit (Jeremy McNeil, Department of Biology, University of Western Ontario)
La perspective d'une maison d'édition sur les défis et opportunités actuels dans la publication scientifique (Jonathan Speilburg, Cambridge University Press)

Ces présentations seront suivies par des sessions de groupes avec modérateur sur cinq sujets (choisis en fonction des commentaires des membres de la SEC). Ces sessions ont pour but d'être informelles et interactives. Les participants pourront assister à deux sessions de groupes.
Le processus de révision par les pairs
Choisir le bon journal
Éthique, auteurs et données
Comment réviser un manuscrit scientifique
Les défis actuels dans la publication scientifique

L'atelier se terminera avec un message de conclusion de chaque session de groupe ainsi qu'avec un panel de discussion avec les conférenciers invités.

Les participants DOIVENT s'inscrire à l'atelier en cochant la case appropriée sur le formulaire d'inscription de la réunion conjointe annuelle (http://www.entsocalberta.ca/JAM2012/registrationf.html). Les inscriptions se font sur la base du ***premier arrivé, premier servi : les places sont limitées***, et les places se remplissent vite. Alors si vous désirez y assister, inscrivez-vous bientôt! L'inscription inclut une collation et est gratuite pour les membres de la SEC et de la SEAB; les frais sont de 50$ pour les non-membres (à payer sur le site de l'atelier).

Comité organisateur de l'atelier :
Chris Buddle (chris.buddle@mcgill.ca)
Kenna MacKenzie (Kenna.MacKenzie@agr.gc.ca)
Rosemarie De Clerck-Floate (Rosemarie.DeClerck-Floate@agr.gc.ca)

ESC 2012 award winners / Gagnants des prix SEC 2012

Gold Medal Award

Felix A.H. Sperling

Dr Felix A.H. Sperling is the 2012 recipient of the Entomological Society of Canada's Gold Medal. In its 50th year since inception, the award recognizes outstanding achievement in Canadian entomology, including "superior research accomplishment", "meritorious contribution" and "dedicated and fruitful service in the field of entomological education in Canada", all of which aptly describe the legacy of Dr Sperling.

Deemed a pioneer in the integration of traditional methods of insect taxonomy with modern molecular methods in systematics, Dr Sperling is internationally acclaimed for his cutting-edge research that ranges from tackling theoretical questions on speciation and species definition to problem-solving in forest entomology, forensic science, health science, biological control, biodiversity and species conservation. His work has not only led the way to standardization of what molecular regions are used in insect systematics, but he is the originator of the 'Genomic Integrity Species Concept', which proactively integrated genomic advances with the classical delineation of species. Although renowned as an expert in Lepidoptera systematics, his research interests have enveloped a diverse number of arthropod taxa. He has been exceedingly prolific, producing over 100 publications through his career to date, several described as "foundational" in the field of systematics, with one receiving over 250 literature citations alone. He also has had notable success in securing research funding, receiving as either Principal Investigator or as part of collaborative research teams over $10 million from both Canadian (e.g., Natural Sciences and Engineering Research Council, Genome

Médaille d'or

Felix A.H. Sperling

Dr Felix A.H. Sperling est le récipiendaire 2012 de la médaille d'or de la Société d'entomologie du Canada. Pour sa 50e année depuis sa création, ce prix reconnait les accomplissements exceptionnels en entomologie canadienne, incluant l'« exécution de recherche de qualité supérieure », la « contribution méritoire » et l'« engagement dévoué et fructueux en matière d'éducation en entomologie au Canada », qui décrivent tous l'héritage du Dr Sperling.

Réputé comme étant un pionnier dans l'intégration des méthodes traditionnelles en taxonomie des insectes avec les méthodes moléculaires en systématique, Dr Sperling est internationalement acclamé pour ses recherches de fine pointe allant des questions théoriques sur la spéciation et la définition des espèces à la résolution de problèmes en entomologie forestière, sciences judiciaires, sciences de la santé, lutte biologique, biodiversité et conservation des espèces. Son travail a non seulement ouvert la voie à la standardisation des régions moléculaires utilisées en systématique des insectes, mais il est également à l'origine du concept d'intégrité génomique des espèces (« Genomic Integrity Species Concept » en anglais), qui intègre de façon proactive les avancées en génomique avec la délimitation classique des espèces. Bien qu'il soit reconnu comme un expert en systématique des lépidoptères, ses intérêts de recherche englobent des taxons d'arthropodes variés. Il a été extrêmement prolifique, produisant plus de 100 publications durant sa carrière jusqu'à ce jour, plusieurs décrites comme « fondamentales » en systématique, et une ayant été citée plus de 250 fois à elle seule. Il a également eu un succès notable dans le financement de la recherche, recevant comme principal investigateur ou faisant partie d'une équipe de collaboration en recherche plus de 10

Canada) and American funding agencies.

Dr Sperling is deeply committed to teaching, mentorship and professional service, and inspires through his palpable passion for entomology and the pursuit of knowledge. His avid interest in insects began early on his family's farm in southern Alberta, and his career in entomology in 1980 upon enroling in a MSc (obtained in 1986) with Dr George Ball at the University of Alberta. After completing a PhD (1991) with Dr Paul Feeny at Cornell University, and a postdoctoral fellowship at the University of Ottawa in the lab of Dr Donal Hickey (1991-1994), he embarked on his successful teaching career, first in a faculty position at the University of California, Berkeley (1994-2000), and then returning home to the University of Alberta in 1999, where he currently is a full professor. He has been instrumental in training the next generation of insect taxonomists, having supervised and personally encouraged the careers of 25 graduate students and 14 post-doctoral fellows, many of whom are now well-established in entomology positions in Canada and abroad. Dr Sperling has had a long, distinguished record of serving the scientific community as an editor (six international scientific journals), reviewer, and active participant on several prestigious scientific panels and committees (e.g., Biodiversity Panel for the Canadian Council of Academies, Committee on the Status of Endangered Wildlife in Canada, Systematic Biology Review Panel of the US National Science Foundation) and within various entomological organizations (e.g., ESC, Alberta Lepidopterists' Guild, Biological Survey of Canada, Entomological Society of Alberta, Lepidopterists' Society). He also has been a key player and advocate in the modernization (via digitization and online access) of both the University of Alberta's E.H. Strickland Entomological Museum and national insect collections, thereby greatly increasing the outreach and appreciation of entomology and biodiversity in Canada.

millions $ d'agences de financement canadiennes (e.g. Conseil de Recherche en Sciences Naturelles et en Génie, Génome Canada) et américaines.

Dr Sperling est largement impliqué dans l'enseignement, le mentorat et les services professionnels, et inspire par sa passion palpable pour l'entomologie et la poursuite du savoir. Son intérêt avide pour les insectes a débuté tôt sur la ferme familiale dans le sud de l'Alberta, et sa carrière en entomologie a débuté en 1980 lors de son inscription à la maîtrise (obtenue en 1986) avec Dr George Ball à l'Université de l'Alberta. Après l'obtention de son doctorat (1991) avec Dr Paul Feeny à l'Université Cornell, et son postdoctorat à l'Université d'Ottawa dans le labo du Dr Donal Hickey (1991-1994), il a débuté sa carrière prolifique en enseignement, d'abord avec un poste à l'Université de Californie, Berkeley (1994-2000), puis en retournant à la maison à l'Université de l'Alberta en 1999, où il est actuellement professeur titulaire. Il a été déterminant dans la formation de la prochaine génération de taxonomistes des insectes, ayant supervisé et personnellement encouragé la carrière de 25 étudiants gradué et 14 stagiaires postdoctoraux, dont plusieurs sont maintenant bien établis dans des postes entomologiques au Canada et à l'étranger. Dr Sperling a eu un long et distingué service pour la communauté scientifique en tant qu'éditeur (six revues scientifiques internationales), réviseur, et comme participant actif dans plusieurs comités scientifiques prestigieux (e.g. Comité d'experts sur les sciences de la biodiversité du Conseil des académies canadiennes, Comité sur la situation des espèces en péril au Canada, comité consultatif sur la biologie systématique de la Fondation nationale pour la science aux États-Unis) et dans plusieurs organisations entomologiques (e.g. SEC, guilde des lépidoptéristes d'Alberta, Commission biologique du Canada, Société des lépidoptéristes). Il a également été un joueur clé et un défenseur de la modernisation (via la numérisation et l'accès en ligne) du Musée entomologique E.H. Strickland de l'Université de l'Alberta et des collections nationales d'insectes, augmentant ainsi de façon notable la portée et l'appréciation de l'entomologie et de la biodiversité au Canada.

C. Gordon Hewitt Award

Brent Sinclair

The 2012 recipient of the Entomological Society of Canada's C. Gordon Hewitt Award, for outstanding achievement in Canadian entomology by a researcher under the age of 40 years, is Dr Brent Sinclair. Currently an associate professor in the Department of Biology at the University of Western Ontario, Dr Sinclair has in a relatively short period of time built a reputation as a world authority in insect cold-hardiness. His research as an eco-physiologist has not only contributed to our basic understanding of insect overwintering, but has been applied to topics and insects of relevance to Canada, for example, climate change, insect biogeography, and the population dynamics of invasive species such as the emerald ash borer.

Dr Sinclair began his life and research interests in New Zealand, completing a BSc and PhD at the University of Otago, the latter in 2001 on the "*The Ecology and Physiology of New Zealand Alpine and Antarctic Arthropods*". After two very productive postdoctoral fellowships (University of Stellenbosch, South Africa, 2001-2004; University of Nevada-Las Vegas, USA, 2004-2006), he obtained his present faculty position in 2006 where his career has continued to soar. He has shown remarkable success, as a principal investigator or co-investigator, in obtaining national (e.g., Natural Sciences and Engineering Research Council [NSERC], Canadian Foundation for Innovation) and international (South Africa, New Zealand) research grants, which currently total over $1 million. He also has been exceedingly prolific in scientific publication, producing 82 peer-reviewed papers to date, 32 of these in major journals in the last 3 years. The outcome of all this productivity has been

Prix C. Gordon Hewitt

Brent Sinclair

Le récipiendaire 2012 du prix C. Gordon Hewitt de la Société d'entomologie du Canada pour une contribution exceptionnelle en entomologie canadienne par un chercheur de moins de 40 ans est Dr Brent Sinclair. Présentement professeur agrégé au département de biologie à l'Université de Western Ontario, Dr Sinclair s'est, à l'intérieur d'une période relativement courte, bâti une réputation en tant qu'autorité mondiale en résistance au froid des insectes. Ses recherches en tant qu'écophysiologiste ont non seulement contribué à notre compréhension de base de l'hivernage des insectes, mais elles ont été appliquées à des sujets et des insectes pertinents pour le Canada, par exemple les changements climatiques, la biogéographie des insectes et la dynamique des populations d'espèces envahissantes telles que l'agrile du frêne.

Dr Sinclair a débuté sa vie et ses intérêts de recherche en Nouvelle-Zélande, effectuant un baccalauréat et un doctorat à l'Université d'Otago, ce dernier en 2001 sur l'écologie et la physiologie des arthropodes alpins et antarctiques de Nouvelle-Zélande. Après deux stages postdoctoraux très productifs (Université de Stellenbosch, Afrique du Sud, 2001-2004; Université du Nevada-Las Vegas, É.-U., 2004-2006), il a obtenu son poste actuel de professeur en 2006, et sa carrière est montée en flèche. Il a eu un succès remarquable, en tant qu'investigateur principal ou de co-investigateur, pour obtenir des subventions de recherches nationales (e.g. Conseil de Recherche en Sciences Naturelles et en Génie [CRSNG], Fondation canadienne pour l'innovation) et internationales (Afrique du Sud, Nouvelle-Zélande), pour un total de plus

numerous international invitations to speak on his research and the receipt of prestigious awards, for example, the *Boutilier New Investigator Award* (2010) for young scientists excelling in the field of zoology from the Canadian Society of Zoologists.

Despite his busy schedule, Dr Sinclair finds time to devote to service. He has been involved in the training of 12 graduate students, 3 postdoctoral fellows, and in the past 5 years, over 70 undergraduate volunteers, as he believes in encouraging "capacity and enthusiasm for research". Included on his list of encouraged future researchers have been nine honours thesis and eight summer NSERC students, and a high school student that he has mentored to success twice at the Canada-wide Science Fair (2010, 2011). He also is dedicated to public outreach, which has ranged from provincial park presentations to helping with First Nations science camps in Ontario. Beyond his professional service as an avid reviewer of papers (45 journals) and grants 8 granting agencies) and on various advisory committees (e.g., Emerald Ash Borer Science Advisory Committee), Dr Sinclair is committed to collaboration and building entomological research possibilities in Canada and abroad.

de 1 million $. Il a également été extrêmement prolifique dans les publications scientifiques, produisant 82 articles évalués par les pairs jusqu'à maintenant, dont 32 dans des revues majeures durant les 3 dernières années. Le résultat de cette productivité est qu'il a reçu de nombreuses invitations internationales afin de parler de ses recherches et des prix prestigieux, par exemple le *Boutilier New Investigator Award* (2010) pour des jeunes scientifiques excellant dans le domaine de la zoologie de la Société canadienne des zoologistes.

Malgré son horaire chargé, Dr Sinclair trouve le temps de se dévouer. Il a été impliqué dans la formation de 12 étudiants gradués, 3 stagiaires postdoctoraux et, dans les 5 dernières années, de plus de 70 bénévoles de premier cycle, puisqu'il croit en l'encouragement des « capacité et de l'enthousiasme pour la recherche ». Sur sa liste des futurs chercheurs encouragés se trouvent neuf mémoires de premier cycle, huit étudiants d'été du CRSNG, et un étudiant du secondaire qui a été mené avec succès deux fois à l'Expo-Science pancanadienne (2010, 2011). Il est également dédié à la sensibilisation du public, que ce soit par des présentations dans les parcs provinciaux ou d'aide dans des camps scientifiques des premières nations en Ontario. En plus de son service professionnel en tant que réviseur avide d'articles (45 revues) et de subventions (8 agences de financement) et des différents comités consultatifs (e.g. comité consultatif scientifique de l'agrile du frêne), Dr Sinclair est engagé dans la collaboration et l'établissement de possibilités de recherches entomologiques au Canada et à l'étranger.

Fellows of the Entomological Society of Canada, 2012

We applaud the following worthy members of the Entomological Society of Canada (ESC) whom are to be made *Fellows* of our Society in recognition of their major contributions to entomology.

Dr Robb Bennett

Dr Robb Bennett is exemplary in his scientific contributions and dedicated service to entomology in Canada. As an entomologist with the British Columbia (B.C.) Ministry of Forests, Lands and Natural Resource Operations (1992-2010), he created and expanded a major research program in cone and seed pest management that had international collaborative spread and influence. His successful lobbying for provincial support garnered $400,000 in annual funding and the establishment of the Pest Management Technical Advisory Committee of the B.C. Forest Genetics Council, which he initially chaired (2003-2010). During this period, his participation was critical for ground-breaking research that produced the first ever description of a cecidomyiid fly pheromone (named "Bennettin" in recognition of his work), and the use of infrared radiation by a herbivore in host-finding (*Leptoglossus occidentalis*). Dr Bennett also is highly respected as one of Canada's leading spider systematists, and has shared this expertise through volunteer curation of the spider collections at the Royal British Columbia Museum (Victoria), where he is a Research Associate, and the Canadian National Collection of Insects, Arachnids and

Membres associés de la Société d'entomologie du Canada 2012

Nous applaudissons les membres suivants de la Société d'entomologie du Canada (SEC) qui deviendront *membres associés* de notre Société en reconnaissance de leurs contributions majeures à l'entomologie.

Dr Robb Bennett

Dr Robb Bennett est exemplaire par ses contributions scientifiques et son service dévoué à l'entomologie au Canada. En tant qu'entomologiste avec le ministère des forêts, des territoires, et des opérations des ressources naturelles de Colombie-Britannique (1992-2010), il a créé et élargi un programme majeur de recherche sur la gestion des ravageurs de cônes et de graines, avec des collaborations et des influences internationales. Ses pressions pour du soutien provincial a amené 400 000$ en financement annuel et l'établissement du comité consultatif technique sur la gestion des ravageurs du Conseil des ressources génétiques forestières de Colombie-Britannique, qu'il a initialement présidé (2003-2010). Durant cette période, sa participation a été critique pour la recherche révolutionnaire ayant produit la première description de la phéromone d'une cécidomyie (nommé « Bennettin » en reconnaissance de son travail), et l'utilisation de radiations infrarouges par un phytophage dans sa recherche d'hôte (*Leptoglossus occidentalis*). Dr Bennett est également respecté comme un des plus grands systématiciens d'araignées du Canada, et a partagé cette expertise via des identifications bénévoles dans les collections d'araignées du Musée Royal de Colombie-Britannique (Victoria),

Nematodes (Ottawa) (CNC). The results of his scientific efforts are 45 peer-reviewed papers, 44 technical publications, 3 on-line arthropod identification guides, and the mentoring of many undergraduate and graduate students. He also has been an active advocate in conservation entomology where he has volunteered on various committees as a Specialist, Member or Chair: for example, B.C. Ministry of Environment Invertebrates-at-Risk Team (2001-06), Committee on the Status of Endangered Wildlife in Canada, Arthropods Specialists Subcommittee (2006-present). Of particular note have been his contributions to the ESC, for which he has served on several committees starting in 1998 and as Editor-in-Chief of *The Canadian Entomologist* (*TCE*) (2007-11). In the latter role, he is to be commended especially for elevating the quality of the journal, thereby setting a solid stage for its move to electronic publication and a new publisher.

où il est chercheur associé, et à la Collection nationale canadienne d'insectes, d'arachnides et de nématodes (Ottawa) (CNC). Ses efforts scientifiques ont mené à 45 articles évalués par les pairs, 44 publications techniques, 3 guides d'identification des arthropodes en ligne, et le mentorat de nombreux étudiants du premier cycle et gradués. Il a également été un défenseur de la conservation en entomologie puisqu'il a été bénévole sur des comités en tant que spécialiste, membre ou président : par exemple, sur l'équipe des invertébrés en péril (« Invertebrate-at-risk team ») du ministère de l'environnement de Colombie-Britannique (2001-06) ou sur le comité sur la situation des espèces en péril au Canada, dans le sous-comité de spécialistes des espèces d'arthropodes (2006-aujourd'hui). Il faut également noter ses contributions à la SEC, pour laquelle il a servi sur différents comités depuis 1998 et en tant que rédacteur en chef de *The Canadian Entomologist* (*TCE*) (2007-11). Dans ce dernier rôle, il doit être félicité particulièrement pour avoir élevé la qualité de la revue, construisant ainsi une solide base pour le passage vers la publication électronique et une nouvelle maison d'édition.

Dr Gary Gibson

Dr Gary Gibson is internationally respected for his research contributions in the taxonomy and systematics of the Chalcidoidea (Hymenoptera), contributing significantly to our understanding of the evolution, morphology and systematics of this group of parasitoid wasps for over 30 years. During his productive career as a Research Scientist with Agriculture and Agri-Food Canada (AAFC), Ottawa, the taxonomy of numerous chalcidoid taxa has been stabilized and unified for use by others, particularly those involved in pest management research. He has long been committed to providing

Dr Gary Gibson

Dr Gary Gibson est respecté internationalement pour ses contributions en recherche sur la taxonomie et la systématique des Chalcidoidea (Hyménoptères), contribuant significativement à notre compréhension de l'évolution, la morphologie et la systématique de ce groupe de guêpes parasitoïdes pendant plus de 30 ans. Durant sa carrière productive en tant que chercheur scientifique avec Agriculture et agroalimentaire Canada (AAC) à Ottawa, la taxonomie de plusieurs taxons de Chalcidoidea a été stabilisée et unifiée pour l'utilisation par les autres, particulièrement ceux impliqués dans la recherche en gestion des ravageurs.

taxonomic support in the identification of parasitoids for use as biological control agents against insect pests affecting some of Canada's major agricultural industries (e.g., canola, dairy and beef). His publication record of 59 refereed papers, 19 books and book chapters, and numerous technology transfer articles, including on the internet, has allowed a broad outreach of his valuable research. Particularly notable is his leadership in being one of the first to develop web-based insect identification services.

Dr Gibson also is being recognized for his long-time dedicated service to entomology within AAFC and the ESC. He has served in various capacities to enhance the CNC and the CanaColl Foundation, a non-profit organization that supports visits by experts to curate portions of the CNC. In his 30+ years as an active member of the ESC, he has also served in a number of societal roles, including as Associate Editor of *TCE* (1990-95), Chair of the Finance Committee (1992-95), and Treasurer (1996-2004).

Il a longtemps été dévoué en fournissant du soutien taxonomique pour l'identification de parasitoïdes pour l'utilisation en tant qu'agent de lutte biologique contre les insectes affectant certaines des industries agricoles majeures au Canada (e.g. canola, produits laitiers, bœuf). Il a publié 59 articles évalués par les pairs, 19 livres et chapitres de livres, et plusieurs articles de transfert de technologie, incluant sur Internet, ont permis à ses recherches d'être diffusées plus largement. Il faut également noter son leadership, étant un des premiers à développer des services d'identification des insectes sur Internet.

Dr Gibson a également été reconnu pour son service dévoué de longue durée à l'entomologie au sein d'AAC et de la SEC. Il a servi de différentes façons afin de promouvoir la CNC et la Fondation CanaColl, une organisation à but non lucratif qui soutient les visites par les experts afin d'identifier des portions de la CNC. Durant ses plus de 30 années en tant que membre actif de la SEC, il a également servi dans un nombre de rôle sociétaux, incluant éditeur associé du TCE (1990-95), président du comité des finances (1992-95) et trésorier (1996-2004).

Dr Neil Holliday

During his 35 year career as a faculty entomologist at the University of Manitoba (U of M), where he is currently an emeritus professor, Dr Neil Holliday has contributed significantly in the areas of crop protection and forest entomology research, entomology education, student mentorship and departmental and societal administration. His research interests and internationally-recognized contributions range from the population biology and ecology of carabid beetles and geometrid moths, the biodiversity of arthropods in natural and

Dr Neil Holliday

Durant ses 35 années de carrière en tant que professeur en entomologie à l'Université du Manitoba (U de M), où il est actuellement professeur émérite, Dr Neil Holliday a contribué de façon significative à la recherche en protection des cultures et en entomologie forestière, à l'éducation en entomologie, au mentorat d'étudiants et à l'administration départementale et sociétale. Ses intérêts de recherche et ses contributions reconnues internationalement vont de la biologie des populations et l'écologie des carabes et des géométridés, ainsi que de la biodiversité des arthropodes

managed ecosystems, to the more applied studies of biological and cultural control of insect pests of forests and crops. The tangible output of his efforts has been 60 peer-reviewed papers and 82 other publications providing extension of his work to the scientific community, agricultural industry and public. He is particularly respected as a dedicated and hard-working educator, who has taught in 24 different university courses mostly in agricultural science and entomology, supervised or co-supervised 34 graduate students and 20 undergraduate student projects, and has earned 2 teaching awards (U of M; 1991, 2009). He has excelled at administrative tasks and his service on several ESC committees over the years has been greatly appreciated. He also served for 15 years at the U of M as Head of the only remaining Department of Entomology in Canada, during which time he led its rescue from near extinction. The Department has recently hired three entomology faculty members and an instructor, thereby adding new blood and a sense of optimism to the Canadian entomological community at large. In recognition of his many outstanding contributions to Canadian entomology, Dr Holliday received the ESC's Gold Medal in 2009.

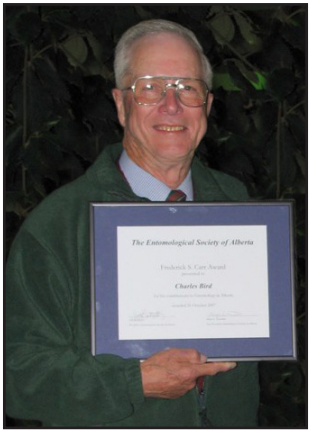
dans les écosystèmes naturels et aménagés, aux études plus appliquées sur la lutte biologique et culturale des insectes ravageurs des cultures et des forêts. Ses efforts ont mené à des résultats tangibles tels que 60 articles évalués par les pairs et 82 autres publications, diffusant ainsi son travail à la communauté scientifique, l'industrie agricole et le grand public. Il est particulièrement respecté en tant qu'éducateur dévoué, ayant enseigné 24 cours universitaires, principalement en sciences agricoles en en entomologie, supervisé ou co-supervisé 34 étudiants gradués et 20 projets d'étudiants de premier cycle, et ayant reçu 2 prix d'enseignement (U de M; 1991, 2009). Il a excellé dans des tâches administratives et ses 15 ans à l'U de M en tant que directeur du seul département d'entomologie restant au Canada et qu'il a sauvé de l'extinction. Le département a récemment engagé trois entomologistes et un instructeur, ajoutant ainsi du sang neuf et de l'optimisme à la communauté entomologique canadienne. En reconnaissance de ses nombreuses contributions remarquables à l'entomologie canadienne, Dr Holliday a reçu la médaille d'or de la SEC en 2009.

J. Mlynarek

Pelenicid wasp

Criddle Award: 2012 Recipient

Dr Charles Durham Bird



Each year the Entomological Society of Canada recognises outstanding contributions to Entomology by an amateur, with the Criddle Award. It is awarded "to recognize the contribution of an outstanding non-professional entomologist to the furtherance of entomology in Canada". This year the Society recognises the contributions of Dr Charles Durham Bird of Erskine, Alberta.

Charley was born on 7 July 1932, in Oklahoma. He is the quintessential "old school" naturalist, with a broad biological background and an avid interest in natural history. His father was an entomologist, and his mother was a botanist, so he was brought up in an environment very rich in the theme of natural history. As a child, Charley spent many days at the 'Entomology Lab' at Aweme, Manitoba, where his father worked with Norman Criddle. He knew the Criddle family very well; the biological interests of Norman and his brothers, Stuart and Evelyn, and sister Maida clearly left a strong impression on him. As a young man, Charley spent three summers working on the Northern Insect Survey (including a year with Alexander Klots at Churchill, Manitoba) and two years in forest entomology in Manitoba. Charley obtained a BSc from the University of Manitoba, and a MSc and PhD in botany from Oklahoma State University. In 1962 he took a teaching position in botany at the University of Calgary. He retired from the university in 1979 to become a rancher, which he pursued full-time until his final retirement in 1992. Then, rather than adopting a life of leisure, he continued to pursue his biological interests with a passion. At

Prix Criddle : Récipiendaire 2012

Dr Charles Durham Bird

Chaque année, la Société d'entomologie du Canada reconnaît, par le prix Norman Criddle, la contribution remarquable d'un amateur à l'entomologie. Il est remis « afin de reconnaître la contribution exceptionnelle d'un entomologiste amateur à l'avancement de l'entomologie au Canada ». Cette année, la Société reconnaît la contribution du Dr Charles Durham Bird de Erskine, en Alberta.

Charley est né le 7 juillet 1932 à Oklahoma. Il est le naturaliste typique de la « vieille école », avec de vastes antécédents en biologie et un intérêt avide pour l'histoire naturelle. Son père était entomologiste et sa mère était botaniste, il a donc grandit dans un environnement très riche concernant l'histoire naturelle. Enfant, Charley a passé de nombreuses journées au labo d'entomologie, à Aweme au Manitoba, où son père travaillait avec Norman Criddle. Il connaissait très bien la famille Criddle : les intérêts biologiques de Norman et de ses frères, Stuart et Evelyn, ainsi que de sa sœur Maida, ont clairement laissé une forte impression sur lui. Jeune homme, Charley a passé trois été à travailler sur l'inventaire des insectes nordiques (incluant une année avec Alexander Klots à Churchill au Manitoba) et deux ans en entomologie forestière au Manitoba. Charley a obtenu un baccalauréat de l'Université du Manitoba, ainsi qu'une maîtrise et un doctorat en botanique de l'Université de l'état de l'Oklahoma. En 1962, il a obtenu un poste d'enseignement en botanique à l'Université de Calgary. Il a quitté l'université en 1979 afin de devenir éleveur, ce qu'il a continué à temps plein jusqu'à sa retraite finale en 1992. Ensuite, plutôt que

that time he moved with his wife to Erskine, a small community northeast of Calgary.

In the 1960s while at the University of Calgary, Charley became involved with John Legge in writing a book on Alberta butterflies. When Legge left Calgary a few years later, Charley took over the project, and enlisted the help of a group of young butterfly enthusiasts, Gerald Hilchie, Ted Pike, and Felix Sperling. With the help of Norbert Kondla, *Alberta Butterflies* was published in 1995 by the Provincial Museum of Alberta. It is a beautiful and comprehensive guide to the butterflies of our area, and stands as a model for later field guides to other jurisdictions.

After completing the butterfly book, Charley expanded his attention to moths. He embarked on a campaign to document in detail the moths and butterflies of the Aspen Parkland of central Alberta. For the past 15 years, he has regularly surveyed a number of sites in the parklands and badlands of central Alberta, to build comprehensive species lists for these sites. He also runs annual public butterfly counts in a number of these sites. He maintains a database of his collection activities and an extensive collection of vouchers, and produces annual reports for these sites, which include a number of parks and protected areas. He also has submitted many voucher specimens and a large amount of data to the University of Alberta for their "Virtual Museum" online database. His extensive collecting for many years has produced a comprehensive inventory of Lepidoptera species in central Alberta, and their phenologies.

Over the years, Charley has published many papers and notes on insects, and in 2005 he co-authored a paper documenting 57 species of microlepidoptera new to Alberta. He has always been quick to offer assistance and expertise to other entomologists, both professional and amateur. He is always quick to respond to requests for specimens, and has sent material to taxonomists from all over North America and beyond, for new species descriptions and to fill out distribution maps.

Charley is one of the charter members of the

d'adopter une vie de détente, il a poursuivi ses intérêts biologiques avec passion. Il a, à ce moment, déménagé avec sa femme à Erskine, une petite communauté au nord-est de Calgary.

Alors qu'il était à l'Université de Calgary dans les années 60s, Charley s'est impliqué avec John Legge dans la rédaction d'un livre sur les papillons d'Alberta. Quand Legge a quitté Calgary quelques années plus tard, Charley a repris le projet, et a engagé un groupe de jeunes enthousiastes des papillons pour l'aider : Gerald Hilchie, Ted Pike et Felix Sperling. Avec l'aide de Norbert Kondla, *Alberta Butterflies* a été publié en 1995 par le Musée Provincial de l'Alberta. Il s'agit d'un guide magnifique et complet sur les papillons de notre région, et a servi de modèle pour les guides d'identifications dans d'autres juridictions.

Après avoir compléter le livre sur les papillons, Charley a élargi son intérêt aux papillons de nuit. Il s'est embarqué dans une campagne afin de documenter en détail les papillons et papillons de nuit des forêts-parcs de trembles du centre de l'Alberta. Durant les 15 dernières années, il a régulièrement inventorié bon nombre de sites dans les forêts-parcs de trembles et les badlands du centre de l'Alberta afin de monter une liste complète d'espèces pour ces sites. Il organise également des décomptes annuels publics de papillons dans certains de ces sites. Il maintient une base de données de ses activités de collecte et une vaste collection de spécimens témoins, et il produit des rapports annuels pour ces sites, qui incluent des parcs et des aires protégées. Il a également soumis de nombreux spécimens témoins et une large quantité de données à l'Université de l'Alberta pour leur base de données en ligne, le Muséum virtuel. Ses vastes collectes durant de nombreuses années ont fourni un inventaire complet ainsi que la phénologie des espèces de lépidoptères du centre de l'Alberta.

Avec les années, Charley a publié de nombreux articles et notes sur les insectes, et en 2005, il a coécrit un article documentant 57 espèces micro-lépidoptères nouveaux pour l'Alberta. Il a toujours été prompt à offrir

Alberta Lepidopterists' Guild, formed in 1999. He has also been involved for many years with the Calgary Field Naturalists' Society, the Federation of Alberta Naturalists, the Buffalo Lake Naturalists, The Entomological Society of Alberta, and the (International) Lepidopterists' Society. Previously, he has been the recipient of the Entomological Society of Alberta's Carr Award for his entomological contributions, and Nature Alberta's Emerald Award, for his contributions to environmental conservation and education.

Charley's entomological work has been done entirely at his own expense. It is clear that he does this not only for the joy of discovering and documenting Alberta's insect diversity, but because of his keen sense of the importance of documenting natural history, and preserving and passing on that information. For these immense contributions to entomology in Canada, Charley Bird is recognised with the Criddle Award.

Greg Pohl
Natural Resources Canada, Canadian Forest Service
Edmonton

son aide et son expertise aux autres entomologistes, autant les professionnels que les amateurs. Il répond toujours rapidement aux requêtes pour des spécimens, et il a envoyé du matériel à des taxonomistes de toute l'Amérique du Nord, et au-delà, pour de nouvelles descriptions d'espèces et pour remplir nos cartes de répartition.

Charley est un des membres fondateurs de la Guilde des Lépidoptéristes d'Alberta, formée en 1999. Il a également été impliqué durant plusieurs années avec la Société des naturalistes de terrain de Calgary, la Fédération des naturalistes d'Alberta, les Naturalistes de Buffalo Lake, la Société d'entomologie de l'Alberta et la Société (internationale) des lépidoptéristes. Auparavant, il a été récipiendaire du prix Carr de la Société d'entomologie de l'Alberta pour ses contributions entomologiques, et du prix Emerald d'Alberta pour ses contributions à la conservation de l'environnement et à l'éducation.

Le travail entomologique de Charley a été conduit entièrement à ses frais. Il est clair qu'il fait cela non seulement pour la joie de découvrir et de documenter la diversité des insectes de l'Alberta, mais aussi à cause de son sens de l'importance de documenter l'histoire naturelle et de préserver et transmettre cette information. Pour ces immenses contributions à l'entomologie au Canada, Charley Bird est reconnu par le prix Norman Criddle.

Greg Pohl
Ressources Naturelles Canada, Service Canadien des Forêts
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Tracking migratory insects using stable isotopes

Keith A. Hobson

Animal migration ranks among the most spectacular phenomena in the natural world and has truly captured the imagination of lay person and scientist alike. Although insect migration (Johnson 1969) may be less studied and understood compared to the periodic movements of birds and mammals, most will be aware of the annual movements of the eastern North American population of monarch butterflies (*Danaus plexippus*) (Fig. 1) that link natal sites in eastern Canada and the United States with overwintering sites in the highlands of central Mexico. Indeed the monarch migration has come to symbolize the fragility of the migration phenomenon and the importance to conservation of establishing migratory connections at continental scales. Other examples will include the impressive movements of dragonflies such as the common green darner (*Anax junius*) (Fig. 2) that regularly migrates from the northern United States south to Texas and Mexico (May and Matthews 2008) and the globe skimmer or wandering glider (*Pantala flavescens*) that may migrate up to 18 000 km during its multi-generational treks between India and east Africa (Anderson 2009). Considering origins of migrant insect populations also are clearly related to the need to establish natal origins of migrant pests that may impact distant crops (Chen et al. 1989). However, while there are considerable challenges to tracking the origins of birds and mammals, these are dwarfed by the challenges in tracking small insects. As such, our understanding of migration in insects and of the origins of individuals and populations at various spatial scales is extremely fragmentary at best.

Keith Hobson

Fig. 1. The eastern population of the monarch butterfly (*Danaus plexippus*) in North America as been traced isotopically to natal origins based on collections at winter roost sites in central Mexico (see Wassenaar and Hobson 1998).

Steve Marshall.

Fig. 2. The green darner (*Anax junius*) has been the subject of isotopic analyses to infer migratory origins in North America (see Hobson et al. 2012).

Important advances in our knowledge of insect movements have been made through fairly simple conventional mark-recapture techniques with a famous example again involving the eastern population of the monarch butterfly. By using numbered sticky wing tags Monarch Watch (http://monarchwatch.

Keith Hobson (Keith.Hobson@ec.gc.ca)is a senior research scientist with Environment Canada in Saskatoon and an adjunct professor in Biology at the University of Saskatchewan. Over the last 20 years, with colleagues, he has pioneered isotopic techniques to studying animal migration with emphasis on birds.

org/) established a citizen-based program that resulted in recoveries of tags from two accessible winter roost sites in Mexico. However, the recovery rate for tags remains exceptionally low despite a reward system and only 2 of about 12 extant roosts were regularly sampled on the wintering grounds. Other clever approaches have included the VHF radiotracking (Lorch et al. 2005), including tracking of *Anax junius* using tiny 300 mg transmitters by Wikelski et al. (2006). Such small VHF transmitters can theoretically be located by satellite and there is the real possibility of the global surveillance of insect movements such as those of locusts if a satellite system could be installed (Swenson et al. 2004). Gathering information on movements of populations of insects is also possible using radar and analyses of weather variables in order to infer likely origins and movement patterns (Chen et al. 1989). So, with considerable effort and expense, there are ways of tracking the movements of individual insects with conventional exogenous passive or active tags but there are obviously huge shortcomings. Apart from requiring recovery or following of individuals, one very serious disadvantage to the use of extrinsic markers is the fact that the marked population is biased to individuals so marked. Hence, when considering origins of individuals at continental scales, it becomes almost impossible to mark a population of individuals that represents the range of possible origins. Fortunately, the use of intrinsic or endogenous markers that avoids this and other problems is made possible through the measurement of naturally occurring stable isotopes of several of the light elements common to animal foodwebs (C, N, H, O, S; Hobson and Wassenaar 2008).

Elements often occur in more than one stable form as isotopes with identical chemical properties but different mass. Typically the heavier isotope of an element is rare relative the lighter isotope. Mass differences in elements confer different kinetic properties to molecules containing those elements and this allows for the biogeochemical discrimination between the two isotopes. In terms of applications, we are typically interested then in the ratio of heavier to lighter isotope of a specific element in an inorganic substrate or in animal tissues derived from the supporting foodweb. These ratios are expressed in a delta notation (δ) which simply relates the ratio in a particular substance of interest to the ratio in an international standard. Thus, we typically see the following notations for the common light elements of interest and their corresponding isotopic ratios: $\delta^{13}C$ ($^{13}C/^{12}C$), $\delta^{15}N$ ($^{15}N/^{14}N$), $\delta^{2}H$ ($^{2}H/^{1}H$), $\delta^{18}O$ ($^{18}O/^{16}O$), $\delta^{34}S$ ($^{34}S/^{32}S$). Importantly, these stable isotope ratios of elements in nature differ according to a variety of biogeochemical processes. If patterns of stable isotope ratios vary spatially, especially at continental scales and are predictable (i.e., forming "isoscapes"), then it may be possible to derive information on the origins of migratory animals that may have come into isotopic equilibrium with a foodweb at one location (i.e., with one characteristic isotope ratio) and then moved to another location (with a different isotope ratio) where it is measured. Tissues that are metabolically inert following formation, like keratins in hair or feathers or insect wing chitin, will lock in isotopic signals of foodwebs at the location of formation (under equilibrium conditions) and so are often ideal for tracking animal origins. In the case of insects, chitin in wings or exoskeleton is relatively inert following formation and so this material may be ideal for isotopic analysis as a means of inferring natal origins of Lepidoptera and Odonata for example. If only metabolically active tissues are available then the signal of origin will only be detected for a temporal window that is related to the elemental turnover rate of that tissue. Fast turnover tissues will have a smaller window of opportunity than slower turnover tissues.

The key to successfully applying stable isotope measurements of insect tissues to provenance is knowing how stable isotope ratios change from established isoscape patterns to actual animal tissue (e.g., wing chitin). These so-called discrimination factors or transfer functions allow us to then convert isoscapes based on inorganic substrates or perhaps primary production to tissue isoscapes. The best way to derive these functions is to raise insects under controlled conditions

and isotopically homogenous diets. Alternatively, for isoscape patterns that are linked to known continental patterns, a calibration can be obtained by large scale sampling of insects of known origin across isotopic gradients. The most useful isoscapes to date for inferring animal origins relate to strong isotopic patterning in $\delta^{13}C$ associated with plant photosynthetic pathways (C3, C4, CAM) and those of the water isotopes ($\delta^{2}H$, $\delta^{18}O$) related to continental patterns in precipitation. Isotopic signals in primary production or ambient waters are transferred up foodwebs to tissues of higher-order consumers allowing inferences of source to be made once the so-called patterns of isotopic discrimination linking these steps have been established.

In natural systems, the percentage of C3 and C4 plants differs according to mean monthly temperature and rainfall. C3 plants (mean -27‰) are more depleted in ^{13}C than C4 plants (mean -12‰), and it is relatively easy to infer if insects are coming from C3 or C4 plant-based biomes. Relatively sophisticated models of predicted plant $\delta^{13}C$ values are now available for several continents, including Africa and South America and can be modified to account for crop coverage and the percent of woody (i.e., C3) infiltration into (otherwise C4) savannahs (Still and Powell 2010). Closed canopy forest is almost exclusively C3. At more local scales, it is often feasible to track insects feeding on various C4 crops since these are often imbedded within an otherwise C3 biome. For example, corn is a C4 crop grown extensively throughout the world, including temperate C3 environments making it relatively easy to distinguish those animals deriving carbon from this plant source. Similarly, cane sugar and millet are C4 plants whose use by insects can in principle be traced isotopically.

Plant $\delta^{15}N$ values at continental scales have similarly been described and are based on plant physiology models (Craine et al. 2009). However, using insect $\delta^{15}N$ values to help infer origins is problematic due to the fact that a number of anthropogenic factors can also influence plant $\delta^{15}N$ values. These include the use of chemical or animal waste fertilizers and the enrichment of soil $\delta^{15}N$ values due to ammonification following land clearing and tilling of soils. This isotope is also linked strongly with trophic level (Bennett and Hobson 2009) and so any insect populations that may have broad trophic niches are difficult to relate to provenance per se using this isotope. Nonetheless, all things being equal, insect communities from temperate or tropical canopied forest are expected to be generally less enriched in ^{15}N than those deriving from more agricultural or open habitats (Hobson 1999, Gagnon and Hobson 2009).

The use of insect $\delta^{13}C$ and $\delta^{15}N$ values has considerable potential to assist researchers in assigning spatial origins or potential biome use to migratory insects. However, the major breakthrough in the field was the demonstration that the measurements of hydrogen isotopes ($\delta^{2}H$) in animal tissues could be related to well-established continental patterns of $\delta^{2}H$ in precipitation and environmental waters (Hobson and Wassenaar 1997). Isotope hydrologists had known for years that there were strong gradients in precipitation $\delta^{2}H$ across continents based primarily on the Global Network of Isotopes in Precipitation ([GNIP] database IAEA 2011). That database was started some 50 years ago to trace radioisotope (e.g., ^{3}H) concentrations and stable ($\delta^{2}H$, $\delta^{18}O$) isotope ratios in waters as a means of tracking the occurrence of atmospheric bomb tests around the globe. In North America, a number of processes related to the transport of waters across the continent (see Bowen et al. 2005), result in a strong latitudinal pattern of $\delta^{2}H$ in precipitation with highest values around the Gulf coast and lowest values in the high arctic. Because all H in plants is ultimately derived from environmental waters, this strong isotopic gradient is passed on to plant tissues and the rest of the foodweb including insects and higher trophic levels. One of the earliest demonstrations of the transfer of this environmental isotopic signature to organisms was provided by monarch butterflies raised by school children on milkweed plants across North America (Hobson et al. 1999). That exercise produced monarchs of known origins and so provided a monarch wing chitin isoscape or basemap that could then be used to place

monarchs collected on their Mexican roost sites to their natal origins in the United States and Canada (Wassenaar and Hobson 1998). This approach immediately provided information on the origins of 1300 monarchs examined in Mexico from the 13 existing roost sites at that time and showed that the majority of them were produced in the corn belt of the USA (where genetically modified BtK corn is grown) and that the Mexican roost sites were panmictic, being composed of individuals from across their range.

Since that pioneering isotopic work on monarchs, several other studies have used this approach to further our understanding of monarch migration. Notably, Dockx et al. (2004) established that monarchs arriving in Cuba in November were derived from natal populations in the north-eastern United States and could be readily distinguished from the resident subspecies. Recently, Miller et al. (2010, 2012) used wing δ^2H measurements to examine spring movement patterns of monarchs in the United States and Canada and established origins of late arrivals crossing the Appalachian mountains. Other researchers have now applied the technique in Europe to examine origins of European red admirals (*Vanessa atalanta*). However, the precipitation δ^2H gradient in Europe is perhaps less useful than that in North America for tracking migrants that can often move along broad latitudinal bands of similar precipitation δ^2H.

The isotope approach has been reasonably well established for applications involving terrestrial Lepidoptera. However, many insects of interest are aquatic emergents and calibration relationships between the precipitation δ^2H and wing chitin δ^2H was expected to differ for insects with an aquatic life-stage that originally synthesized their wing chitin compared to those purely terrestrial species. Establishing a calibration relationship linking ambient water δ^2H with wing chitin δ^2H for dragonflies in particular was then a priority due to the numerous species of aquatic emergents that are also migratory or that may disperse considerable distances. To tackle this, Hobson et al. (2012) obtained known origin non-migratory dragonflies (*Aeshna interrupta*, *Aeshna umbrosa, Pachydiplax longipennis*) from across North America and linked their wing chitin δ^2H with expected local surface water δ^2H values. A strong relationship (r^2=0.75) was found permitting the creation of a dragonfly wing chitin δ^2H isoscape for North America (Fig. 3). That surface was then used to demonstrate how the approximate origins of migratory *Anax junius* moving through southern Texas in the fall could be determined. These origins ranged from as far as the north eastern United States through to the Gulf coast. With colleague Charles Anderson, we are currently applying the same techniques to establish origins of *Pantala flavescens*. Large numbers of this species arrives at the Maldives during October-December, when individuals are *en route* presumably from southern India to east Africa (Anderson 2005).

Despite some impressive successes in using stable isotopes to infer origins of migratory or dispersing insects, there are limitations to the approach. One clear limitation is that we are simply at the mercy of what isoscapes are available in regions of interest. Currently, the use of the precipitation δ^2H isoscape for North America gives very useful latitudinal information but often poor

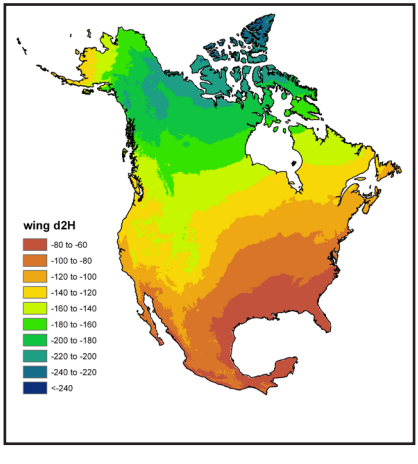

Fig. 3. Proposed dragonfly δ^2H wing chitin model isoscape for North America. From Hobson et al (2012).

longitudinal resolution. In addition, complications can arise if insects derive from crops that have been irrigated by ground waters or river waters that are not similar to those expected from the precipitation isoscape. The use of a multi-isotope approach can indeed increase resolution but this again requires a priori knowledge of those element-specific isoscapes or biomes, and these may get complicated in anthropogenically altered landscapes. However, we are now at a point where much of the needed controlled isotope studies and ground truthing has been done to clearly demonstrate that stable isotope measurements of insect tissues (especially wing chitin) can be used to infer origins at continental scales. Combined with sophisticated Bayesian statistical assignment approaches and GIS methods, the field has now progressed to a reasonable level of sophistication. While the entomological community has been slow to adopt these approaches, that will likely change rapidly in the next few years. It would be particularly gratifying to see the approach used more widely by those engaged in agricultural entomology where the benefits of establishing migratory connectivity between areas of food production and insect source are obvious.

Acknowledgments

Numerous colleagues have worked with me over the years to refine isotopic methods to track migratory animals. In particular, I thank Len Wassenaar and Steve Van Wilgenburg. Thanks to Cedric Gillott for inviting this contribution. Steve Marshall kindly provided the *Anax junius* picture.

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Eastern Canadian butterfly range expansions

Maxim Larrivée and Jeremy Kerr

Species have adapted to previous climate and environmental change periods. However, current global change impacts on species are manifesting themselves at a rate with no historical equivalent, compromising their ability to adapt to current and upcoming changes (Chen et al. 2011). Altered distributions and phenology have already been demonstrated for numerous plant and animal species (Parmesan et al. 2006; Dobrowski et al. 2011). In particular, northern range shifts have been observed frequently over the last decade. However, most species are not keeping pace with the speed at which their climate niche is shifting (Devictor et al. 2012). Increasing gaps between a species' realized niche and its fast shifting climate niche will lead to higher extinction probabilities as the percentage of a species' range within the suitable climatic niche keeps diminishing over time. Here we examine these climate change driven range expansions in butterflies of eastern Canada.

Butterflies are ideal organisms to detect and quantify rapid adaptations to climate change for many reasons: 1) their time to reproduction is short, increasing their rate of response; 2) their distribution is dictated primarily by climate in Canada (White and Kerr 2006, 2007); 3) their ecology and species interactions are well documented especially for an insect; and 4) their distributions and abundance have been recorded for many years by professionals and citizen scientists alike. Online databases of this information are now available including the Ontario and Maritime online butterfly atlases (Jones et al. 2012; Klymko et al. 2012) and now eButterfly a new online citizen science project (Larrivée et al. 2012).

Figure 1: Examples of some eastern Canadian butterflies whose range has expanded rapidly northward over the past two decades. From left: *Papilio cresphontes* (giant swallowtail); *Anatrytone logan* (Delaware skipper); *Lycaena hyllus* (bronze copper); *Lycaena epixanthe* (bog copper).

In the past 20 years, various observers and experts have suspected that butterfly species of eastern Canada have expanded northward. Here we test if various resident and migratory butterfly species have moved north in the past 20 years at a faster rate than in the previous 20 years in eastern Canada. We assembled all records for our species of interest contained in the

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Ontario atlas (Jones et al. 2012), Butterflies of Canada (Layberry et al. 1998) and the eButterfly databases from 1969 to present. We predict that the butterfly species ranges are shifting north at rates beyond the average northern expansion rates of 16 km/10 years documented in the literature (Chen et al. 2011).

As a first step, we focused on 12 well known and collected species that are from different butterfly families and for which confusion with other species is unlikely (Table 1; Fig. 1). Each species was observed, on average, 710 ± 331 times over the past 43 years.

We quantified northern range expansions in 2 ways, using 2-tailed T-tests assuming unequal variances to compare the average latitude of all occurrences and the 10 northernmost records in 2 time periods: from 1969-1989 and from 1990-2012. We then subtracted the post-1990 from the pre-1990 latitude values. We converted the resulting value into kilometres to obtain a measure of the northern edge shift (km/year) and the mean latitude of the occurrences pre- and post-1990. We conducted linear regressions for each species to quantify the rate of change between latitude and year of occurrence.

Table 1: Linear regression of latitude and time of occurrences of butterfly species in eastern Canada

Species	Linear model				
	n	F-stat	R2	Slope	P-value
Anatrytone logan (Edwards)	697	506.5	0.4208	0.051	< 0.0001
Ancyloxypha numitor (Fabricius)	1536	28.37	0.01814	0.014	< 0.0001
Erynnis baptisiae (Forbes)	244	40.19	0.1436	0.039	< 0.0001
Pompeius verna (W. H. Edwards)	303	141.3	0.3181	0.039	< 0.0001
Thorybes pylades (Scudder)	1346	3.04	0.002251	-0.003	0.0817
Papilio cresphontes (Cramer)	778	473	0.3781	0.061	< 0.0001
Lycaena epixanthe (Bois. & Lec.)	439	2.03	0.004611	0.010	0.1546
L. hyllus (Cramer)	839	21.71	0.02522	0.019	< 0.0001
Enodia anthedon Clark	1763	0.87	0.000496	-0.002	0.3500
Satyrium liparops (Leconte)	937	14.08	0.0148	-0.019	0.0002
Junonia coenia Hubner	544	18.72	0.03327	0.023	< 0.0001
Hylephila phyleus (Drury)	234	21.98	0.08586	0.034	< 0.0001

Eight of the twelve species analyzed showed significant positive relationships between latitude and the year of occurrence in eastern Canada since 1969, while only *Satyrium liparops* (Leconte) (Lycaenidae) had a significant negative relationship between latitude and year (Table 1). The northern edge of the species' occurrences also significantly shifted to the north for 11 of the 12 species while the mean latitude of the occurrences also shifted north significantly for 7 species and significantly south by 0.13 km/year for *S. liparops* (Fig. 2). The mean northern edge shift from 1990-2012 for all species analyzed ranged from 0.13 km/year to 15.3 km/year for the resident species analyzed and up to 18.6 km/year for *Junonia coenia* Hubner (Nymphalidae), a migratory species (Fig. 2). Shifts in the mean latitude of occurrences ranged from 1.08 km/year (*Thorybes pylades* [Scudder]; Hesperiidae) to 5.9 km/year (*Papilio cresphontes* [Cramer]; Papilionidae). The pre-1990 mean latitude of eastern Canadian ranges shifted 2.1 ± 2.2 km/year while the northern edges shifted 7.1 ± 5.9 km/year.

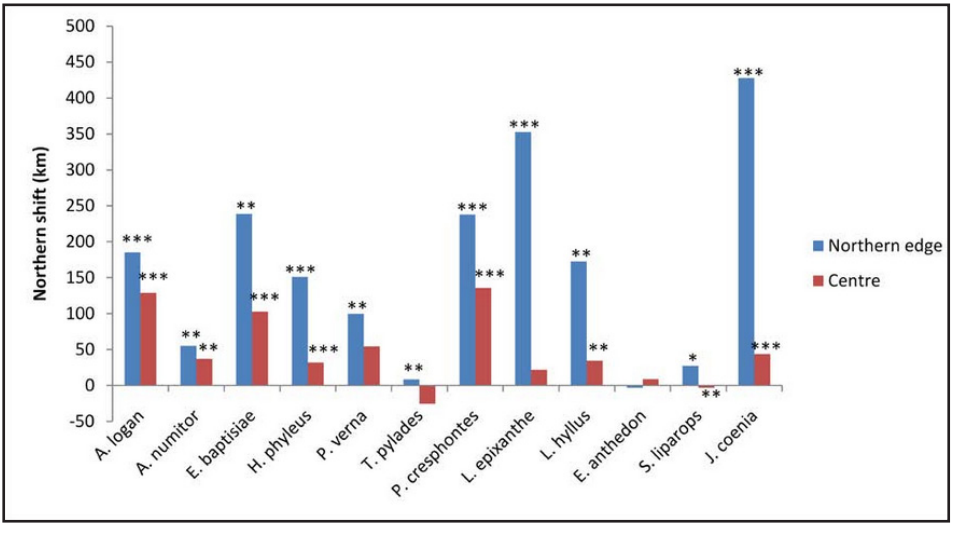

Figure 2: Northern shift (km) in the edge and the centre of species occurrences in eastern Canada before and after 1990. The northern edge represents the average of the 10 northernmost records in each time period while the centre of occurrences is the average latitude of all occurrences for each time period. We conducted a two-tailed T-test with unequal variance to test for significant difference in the average latitude of pre- and post-1990 occurrences. **= P<0.001; ***=P<0.0001

Our results clearly demonstrate that some eastern Canadian butterflies and southern migrant species are shifting north at a pace well beyond the latest documented rates of 1.6 km/year (Chen et al. 2011). Most of the species expanding their northern range limits are more temperate species previously found only in the extreme south of eastern Canada or the northern U.S.A. For example, the expansion of *P. cresphontes* has recently been associated with delays and reduction of frost days in the fall increasing larval survival and also extending the development period of the larvae (Finkbeiner et al. 2011). On the other hand, the rapid expansion of *Erynnis baptisiae* (Hesperiidae) (Forbes) was initially attributed to a host shift from wild indigo (*Baptisia australis*) to crown vetch (*Coronilla varia*) (Cech and Tudor 2005). This host shift may interact with climate change as seen in other butterfly species (Pateman et al. 2012). Our results demonstrate latitudinal northern shifts of butterfly occurrences but do not link such northern shifts directly to

a warming climate. However, there is a well demonstrated strong correlation between latitude and climate, with climate becoming cooler as latitude increases. Land cover modifications, especially rapidly expanding road networks and increases in open modified habitats, are expected to play a part in northern range expansions in conjunction with a warming climate by providing suitable habitat to southern opportunistic species. The extremely rapid expansion of the northern limit of *Lycaena epixanthe* (Boisduval and Leconte) (Lycaenidae) since 1990 can only be attributed to a warming climate as land cover has not been modified extensively beyond 50°N in eastern Canada, and *L. epixanthe*'s host plant, a cranberry (*Vaccinium oxycoccos* L.), was available north of the known range of the species prior to 1990. Also, many northern expeditions by expert lepidopterists prior to 1990 did not yield any *L. epixanthe* specimens in places where it is now extremely common up to 54°N along the James Bay Highway.

We also demonstrate a significant shift in the mean latitude of species occurrences for 9 of 12 species. Interestingly, the extent of the shift of the mean latitude is less than half that of the northern edge, suggesting expansion rates are faster at the northern edge of species' ranges. This shift is not an artefact of a temporal bias in the latitudinal distribution of collections since it has been similarly distributed over time and the ranges of the species documented varied from southern Ontario to north of 50°N, yet their response follow a similar trend.

Our results also show that some species found in eastern Canada have not shifted their distribution to the north and some may have even retracted their range to the south during the period we investigated. Range retractions of north temperate to boreal ranging butterfly species have recently been linked to climate warming in Massachusetts, U.S.A (Breed et al. 2012). It will be essential to analyze the full eastern Canada butterfly fauna but also to look at overall impacts of climate and land use change on bioclimatic niche shifts to draw a complete portrait of the impacts of global change on eastern Canadian butterflies. Finally, the dynamic butterfly range shifts we present here are most likely underway among other groups of insects, yet the present level of information about the current ranges of other insect groups is limited. The time is ripe for a consolidated online citizen science platform similar to eButterfly to rapidly document these shifts for other insect groups to compare current ranges with historical data.

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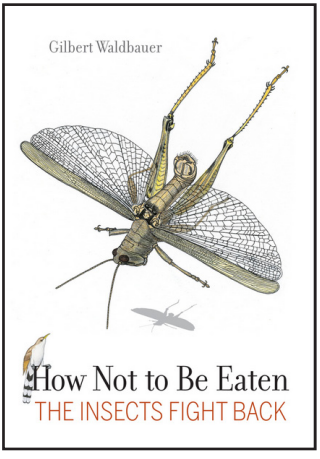
How Not to Be Eaten: The Insects Fight Back. Waldbauer, G. 2012. University of California Press, Berkeley. xiv + 222 pp. ISBN 978-0-520-26912-5, US$27.95 (hardcover).



As noted in a previous book review (*Bulletin* **42**:219-221), I have been familiar with some of Gilbert Waldbauer's primary research for many years and have read two books of his before this one. Being impressed with those previous works, I eagerly offered to review this book for the *Bulletin* when I saw that the opportunity was available. I thought the title was intriguing and, being familiar with at least some of the ways in which insects fight back, I looked forward to a refresher on those I knew and some enlightenment about those of which I was unaware – knowing insects (and Waldbauer's writing), there were sure to be some!

The book is divided into 10 chapters plus a brief Prologue and a somewhat longer Epilogue. The Prologue begins by stating the biological imperative that all animals must eat, and then offers glimpses of a few of the highlights in the chapters that follow. The Epilogue provides a broader view, emphasizing how the interplay between predators and prey is a dynamic regulating force in population ecology, central to the functioning of ecosystems, and provides selective pressures that contribute to the evolution of both predators and their prey.

The first chapter outlines the role of **Insects in the Web of Life**, not only emphasizing their all-important abundance as a high-quality food source for other animals, but also outlining crucial aspects of insect biology and evolution. This is no easy task, and on first reading I was a little disappointed by a seemingly inconsistent compromise between entomological jargon and plain language. However, I was not at all certain that I could do any better and after reading the chapter a second time I was satisfied that it meets the requirements quite adequately.

The second chapter introduces **The Eaters of Insects**, noting that the vast majority of them are in fact other insects, but that they also include a wide range of animals from other arthropods to fish, amphibians, reptiles, birds, and mammals both small and large. This chapter describes numerous examples of the wide variety of strategies used by different types of predators to obtain their insect prey. One statement that I must point out as not entirely accurate is that "parasitic insects are best referred to as *parasitoids*." This may be true of insects that parasitize other insects, but ignores the fact that many insects are true parasites of other types of animals.

The survey of predator avoidance strategies is arranged roughly in order of increasing elaboration and begins in the third chapter with perhaps the most basic options, **Fleeing and Staying under Cover**. Simple examples of such strategies include the prodigious abilities of many insects to jump and to fly and not only to find places in which to hide but to construct hiding places of their own. **Hiding in Plain Sight**, the most basic form of camouflage, involves colours and patterns that allow an insect to simply blend in with its surroundings. More elaborate forms of camouflage, such as **Bird Dropping Mimicry and Other Disguises**, may not make an insect inconspicuous but make it appear to be something inedible and thus uninteresting to a predator. A more aggressive form of camouflage involves **Flash Colors and Eyespots**. These are usually kept concealed by a well-camouflaged insect until a predator comes uncomfortably close and then suddenly revealed, serving to deter the predator by the sudden appearance of something

conspicuous and unexpected (flash colours) or by representing something potentially dangerous (eyespots). This allows the insect time to escape or may even cause the predator to flee. **Safety in Numbers** refers to the lower probability of an individual being selected by a predator when it is part of a group than when it is alone, despite the fact that the group may be more conspicuous than a single individual. Various mechanisms, both passive and active, are described that form and maintain groups. **Defensive Weapons and Warning Signals** often go hand in hand, with warning signals indicating the existence of defensive weapons. Insects are masterful biochemists and most of their defensive weapons are chemical. These defensive chemical weapons may operate in a relatively passive way, such as toxic compounds accumulated from foodplants and sequestered within the insect's body to confer their adverse effects on any predator unwise enough to eat the insect. They may be actively synthesized, such as various venoms and other noxious compounds, and delivered through stingers, urticating hairs, or other means. Many insects that possess such defensive weapons have evolved warning signals – often bold patterns of red or yellow and black that may also be emphasized behaviourally when the insect is threatened – to advertise the fact that they are so defended. **The Predators' Countermeasures** are among the most interesting strategies described in this book – at least for me, being familiar with relatively few of them – and are mostly behavioural adaptations allowing predators to avoid or neutralize certain defence mechanisms that they recognise certain insects possess. The tenth and final chapter returns to predator avoidance with **Protection by Deception**, wherein an insect resembles something not inconspicuous or uninteresting but downright unpleasant or dangerous. This includes the classic examples of mimicry wherein harmless insects closely resemble other insects that possess effective defence mechanisms.

A single black and white illustration, very finely rendered by James Nardi, near the beginning of each of the 10 chapters effectively represents an important concept in the respective chapter. The book has an extensive index and is well referenced with publications from throughout the last century and a half, ranging from classic texts to recent research reports, with citations integrated into the narrative of the text rather than being presented in the formal scientific style. The references are grouped by chapter rather than listed in a single bibliography, which leads to some redundancy, and I did notice one reference listed under the wrong chapter (and only there) as well as a couple of others I could not find listed at all. Other than those few problematic references, I found no noteworthy technical errors of any kind. The text is very well written and, as usual, I found Waldbauer's style quite engaging and easy to read.

In the end, this book is almost as much about the ingenuous ways various animals (including insects and other arthropods) have evolved to be successful predators on insects as it is about the remarkable strategies insects have evolved to avoid predation. After all, one can hardly discuss one in detail without reference to the other. Although the focus is clearly on insects throughout the book, the numerous examples described for each of the various strategies often include some from other animal groups, including birds and mammals. Rather than detracting from the focus on insects, I think this inclusion of other types of animals helps to illustrate the concepts in a way that might be more accessible to those less familiar with insects and also reaffirms the place of insects as members of the animal kingdom, along with the rest of us.

As of this writing I've not yet seen any indication of a forthcoming paperback edition, but for the technologically inclined (or paper averse), the book is available as an Adobe PDF E-Book (also US$27.95) from the University of California Press website (www.ucpress.edu).

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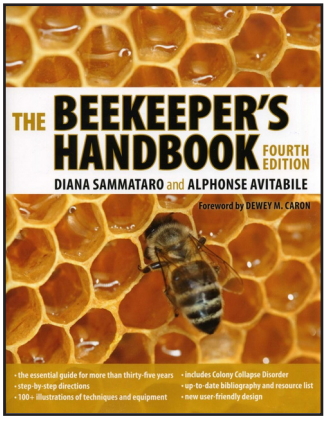
The Beekeeper's Handbook. Fourth Edition. Sammataro, D., and Avitabile, A. 2011. Cornell University Press, Ithaca, New York, 308 pp. (softcover – ISBN 978-0-8014-7694-5, US$29.95; hardcover – ISBN 978-0-8014-4981-9, US$65.00).



With its North American emphasis, this handbook supplies updates helpful to experienced and novice beekeepers, plus extension apiculturists and scientists, about recent maladies such as Colony Collapse Disorder, the association of many viral diseases with *Varroa* mite infestations, increased spread of the Africanized honey bee in the southern U.S.A., and the establishment of a serious pest, the small hive beetle (*Aethina tumida*) plus another adult bee disease, *Nosema ceranae*. These problems are among the pressing issues expanded upon or newly covered in this 4th edition, which supersedes the 3rd edition (190 pp.) published 13 years ago. Indeed, the severity of these and pre-existing woes of beekeeping operations has climbed markedly over the past 25 years or so. Thus, I anticipate that even the full-time beekeeper will appreciate, like I did, the healthy dose of humour sprinkled by the authors to keep things light. For example, the woodwork of the domicile is referred to as "hive furniture"; late in her hive-time, the worker bee's duties include "removing the trash"; the warning that many apiaries have poison ivy and other "goodies"; substandard queen excluders are referred to as "leaky"; subheadings such as "Getting Along with your Back" and identification of the prime vertebrate pest of bees, "Vandals (*Homo sapiens*)". Finally, under the subheading "Optional Equipment" directed to the beginner, the authors recommend purchase of "*Another* good beekeeping book" (italics mine).

Following the book's Foreword (by D.M. Caron), Preface, Acknowledgements and 2-page Introduction are 15 chapters (pp. 3-244), then 8 brief but useful appendices (pp. 245-267), an extensive glossary (pp. 269-277), a large number of references recommended for further reading (pp. 279-306), and a 2-page Index. Chapter structure includes headings and subheadings, plus the text features regular and effective cross-referencing. Moreover, after explanations of many beekeeping techniques wherein choices in management are available, in bullet format follows a list of advantages and disadvantages to help the discriminating reader. Furthermore, well-conceived boxes or "sidebars" containing specific tips or facts are embedded within the text of several chapters.

Chapters 1 (Understanding Bees) and 2 (Colony Activities) provide many helpful basics about honey bees, especially their development and behaviour. Evolutionary and taxonomic frameworks, including the European races of *Apis mellifera* introduced to North America, are identified. General adult bee structure is considered. A discussion of life stages and development centres on the worker, then queen and drone. Chapter 2 emphasizes the division of labour among the female castes that allows a colony's existence. Inside-the-hive activities are followed by outdoor topics such as flight and foraging.

Chapters 3 (Beekeeping Equipment) and 4 (Obtaining and Preparing for Bees) logically appear early and sequentially in the handbook. The former deals with terminology, construction and maintenance of hive equipment, plus a section "For the Beginner" that precedes a discussion of beekeeper apparel. Chapter 4 provides helpful pros and cons of the many ways to start as a beekeeper. Important information about choice of apiary location, hive orientation, usefulness of scale hives, and the keeping of accurate records, is included.

The next three chapters are short, each focusing on select topics of importance to proper hive management. Chapter 5 (Working Bees) emphasizes the technique of smoking bees and the process of examining a colony's frames. This chapter ends with sage advice on dealing with the inevitable: bee stings. Chapter 6 (Package Bees) provides step-by-step instructions for package installation under various circumstances, and then closes with trouble-shooting the reasons for package failures. Chapter 7 (Feeding Bees) concerns methods to feed sugar syrup to strengthen weak colonies or as surplus stores for wintering, before ending with a full discussion of pollen, including trapping and feeding pollen, supplements or substitutes, to encourage brood rearing.

Overwintering preparations are covered in Chapter 8 (Winter/Spring Management). "Other Wintering Options" includes indoor wintering of honey bees (described by Dr R.W. Currie, University of Manitoba), a strategy utilized by certain beekeepers facing Canada's relatively extreme winters. Then procedures for late-winter and spring maintenance are provided. Chapter 9 (Summer/Fall Management) supplies tips about estimating colony strength, keeping colonies from overheating, recognizing the "honeyflow" and methodology about supering. Its major emphasis is on honey production, including harvesting and extracting liquid honey, the production of comb honey, plus management tasks to be achieved in autumn.

At 23 pages, Chapter 10 (Queens and Queen Rearing) is the handbook's longest. Understandably, this topic of paramount importance to a healthy, queenright colony deserves detailed attention. Direct and indirect methods of requeening are explained. Types of queens, ordering and caring of caged queens, queen marking and clipping, the selection of breeder queens based on a colony's desirable traits, plus the intricacies of queen rearing (grafting and non-grafting methods), are discussed. This chapter's wide but concise coverage was impressive, particularly when one considers that entire monographs are dedicated to this topic.

Chapter 11 (Special Management Problems) presents a catch-all for important but miscellaneous topics including uniting weak colonies; preparing, loading and moving bee colonies; robbing behaviour; and laying workers. Its greatest focus, however, is dedicated to swarming, including stimuli, various methods for prevention, and collecting and hiving swarms. With additional detail than on p.16, swarming is then compared again to supersedure (pp. 165-166), so that the reader can make the important distinction between these two natural events involving queen-cell construction.

Naturally, the first half of Chapter 12 (Products of the Hive) concerns honey: its properties; honeydew (sweet excretions from sternorrhynchous hemipterans sometimes collected by foraging workers); various forms of honey; honey packaging and labeling; honey extraction and honey-house design; and cooking with honey. Note that manuka honey from New Zealand (p. 175) is not produced from nectar of *Eucalyptus* spp. (native to Australia), but rather from one or two species of *Leptospermum*. The chapter's remainder deals with beeswax, bee brood as food, bee venom, royal jelly, propolis, pollen, and wax moth larvae.

Honey bee colonies generally are experiencing great challenges from other organisms. Accordingly, two large sections – Chapters 13 (Pathogens and Parasites of Honey Bees) and 14 (Pests of Honey Bees) – concern these subjects. The first covers Colony Collapse Disorder and adult bee maladies such as nosema and amoeba disease, but also dysentery and "The Pesticide Problem". This chapter finishes with five diseases of brood and five viral diseases of adult honey bees. Chapter 14's initial focus is on tracheal and varroa mites then turns to serious insect enemies such as the wax moths, small hive beetle and Africanized honey bees, plus vertebrate pests like bears, skunks and mice.

From a botanical perspective, the final chapter (15) on pollination featured some unfortunate errors in "The Mechanics of Fertilization". Technically, pollen grains are not "the sperm cells" (p. 233), which they contain. Other terms such as ovary, ovule, zygote, seed, endosperm and

gymnosperm often were utilized inaccurately. These items aside, this chapter includes useful topics such as bees as pollinators; recommendations for growers; pollination contracts and leasing bees; common plants of importance to honey production (with an extensive table on pp. 242-243); and a list of poisonous plants (p. 241) plus notes on other problem plants.

The appendices are diverse. Appendix A points out external and internal structures of adult bees, and includes drawings plus 10 scanning electron micrographs. Appendix B (Pheromones) summarizes knowledge from worker, queen and drone, plus outlines various glandular systems and their secreted substances. Appendix C is devoted to local and systemic reactions that may arise from bee stings, plus desensitization or immunity. Appendix D discusses the topic of paraffin dipping of wooden hive equipment. Appendix E features two tables outlining differences in the physical, behavioural and developmental characteristics of European versus Africanized honey bees, plus the mass of many immature stages. Easier consultation between the tables would occur if the column order was consistent (e.g., Africanized bee always listed first). In the mindset of "If you can't beat them, join them!", Appendix F (Rearing Wax Moth) outlines a lucrative sideline for some beekeepers who intentionally rear wax moth larvae ("waxies") as pet food or for the fish bait industry. Eleven points about beekeeping within city limits are elaborated in Appendix G by J. Fischer of New York City Beekeeping. Finally, Appendix H provides two tables, a "Mite Density Chart" to assist estimation of the levels of colony and apiary infestations based on number of *Varroa* mites collected from subsamples of adult bees; and "Chemotherapy for Control of Varroa Mites", a helpful summary of acaricides currently used in beekeeping.

Disappointingly, numerous (at least 36) typographical, grammatical or spelling errors were noted, particularly later in the handbook. For example, "principle" should be changed to "principal producers of honeydew" (p. 121) and "principal pollinator" (p. 235). Near the end of p. 140, "ovaries" should read "ovarioles". From p. 170 onward, 14 of 19 errors were misspelled taxonomic names.

Beyond the appealing colour image on the softcover, the book itself is illustrated extremely well with clear figures of appropriate magnification that readily complement the text's explanations of colony management and the like. However, certain illustrations, particularly in Chapter 15, require improvement in accuracy or labeling. For instance, the direction of the dancing by bees on the comb surface (p. 33) does not reflect the drawing's position of the sun. Recruiters instead should be performing the wagtail portion of the figure-eight dance approximately 45°, rather than 120°, left of vertical. The simplest correction is to shift the image of the sun plus the vertical line, *to the right*, *directly above* the picture of the hive. On p. 191, the line drawings comparing isolated digestive systems of *Nosema*-infected versus healthy adult worker bees (evidently fashioned after the photograph on p. 637 of Gochnauer et al, 1975), have the rectal sacs incorrectly labeled as "honey stomach". In reality, the foregut's honey sac and proventriculus are shown immediately *to the right* of the correctly-labeled midgut. And because the worker's hind leg possesses the corbicula ("pollen basket") on the tibia's *external* surface, but the "pollen combs" are located only on the basitarsus's *internal* surface, appropriate adjustments are required to the line drawing and caption for Figure 'e' on p. 246.

Preparation of such a comprehensive text devoted to the world's most studied, beneficial insect species, is a daunting task. The authors are to be congratulated for fulfilling this goal. Despite its faults, there are so many positive attributes in its broad coverage that I heartily recommend this handbook to new and established beekeepers, extension apiculturists, and scientists alike. It contains a wealth of knowledge, including a multitude of "Fun Facts" on the inside cover plus conversion factors for length, weight, volume and temperature printed inside the back cover. In softcover, the handbook is a worthy investment and I can envisage a copy residing in the glove compartment of many bee trucks, for ease of consultation even within the apiary. I shall

be reaching for my copy as a reference for many years ahead.

Reference

Gochnauer, T.A., Furgala, B., and Shimanuki, H. 1975. Diseases and enemies of the honey bee. *In* The Hive and the Honey Bee (edited by Dadant & Sons), Hamilton, Illinois, U.S.A

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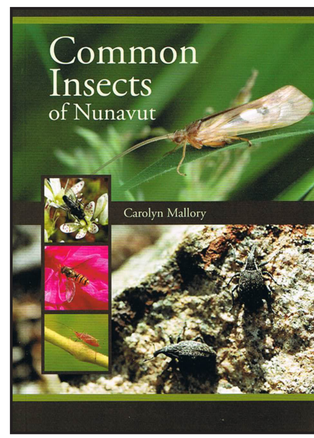
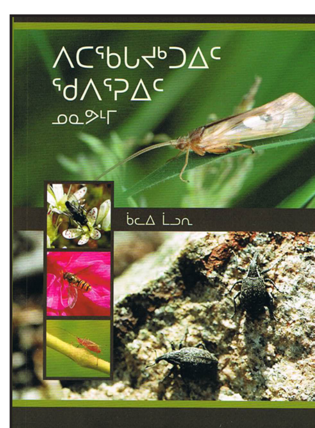
Common Insects of Nunavut (ᐱᑕᖅᑲᒐᔭᒃᑐᐃᑦ ᖁᐱᖅᑭᐃᑦ ᓄᓇᕗᒻᒥ). 2012. Mallory C. (ᑳᓚᐃ ᒫᓗᓂ). Inuktitut translation by Ruth Devries (ᕉᑎ). Inhabit Media, Iqaluit & Toronto. Cost ca. $20.00. Available through Amazon Canada.





When I started working in Arctic entomology, I was informed that the Inuit had little interest in insects and terrestrial arthropods and had few names for them. As I became more conversant with the Inuit appreciation of the environment, the more I realized that what I had been told was wrong. One of my favourite names for an insect in Inuktitut is *tuktujak* (there are also other words). *Tuktu* (ᑐᒃᑐ) is Inuktituk for caribou; *tuktujak* (ᑐᒃᑑᔭᖅ) means "like a caribou" and seems perfect for an insect with long gangly legs supporting a big body and that mostly seem to galumph across the ground rather than fly.

Carolyn Mallory's book is just fascinating. The version I have is written in Inuktituk and English, as two books in one, back to back at 172 pages each. She has embraced the insect fauna of the Arctic fully and thoroughly. That is no mean feat given the entomological constraints she faced. How to place the relatively depauperate fauna of Arctic arthropods into a schema that is satisfactory to entomologists, useful to the public, and embraces a wealth of traditional knowledge has required a thorough knowledge of entomology, insect natural history, and appreciation of traditional indigenous knowledge.

After a general introduction to arthropod and insect form and function, and taxonomy, Carolyn presents each taxon in accordance with a practical consideration for her readership. Some groups are presented only at the ordinal or higher level because there are few representatives or because they are inconspicuous and not well-known to people in general. Others, such as Coleoptera, Diptera, Lepidoptera, and Hymenoptera are presented at the familial level, often with reference to genera and species. The useful Descriptions, accounts of Life

Cycles, Food & Feeding, Habitat, and Range are followed by interesting "Do you know?" facts. The introduction to each group includes notes on their names in Inuktitut. For some groups it is surprising that she was not able to discover what those insects are called in Inuktitut (e.g., the notorious blackflies [Simuliidae], horseflies [Tabanidae], and various spiders, some of which have traditional significance as explained). She asks that anyone with knowledge of such names to please send them to her.

The Inuktituk part, printed in syllabics, of the book follows standard, 'western' scientific classification, as in the English part. Although Inuit have a keen appreciation of the diversity of arthropods in their environment, know of the relationships between life stages and adults and some general groupings that embrace more specific names and their owners, a formalized phylogenetic nomenclature has not been part of Inuit tradition. Some of the 'western' scientific epithets have been transliterated into syllabics; for others, for which words in Inuktituk apply, that has not been done.

This book is beautifully presented and amply illustrated with exquisite photographs of Arctic insects, and with line drawings that illustrate particular points that Carolyn has made. She gives credit to a large number of people who have helped with photographs and technical information. Interestingly, a cover picture is of the marmalade hover fly, *Episyrphus balteatus* (Diptera: Syrphidae), well known from Europe east, and as far west as Iceland (the origin of the picture, Carolyn told me), but not recorded in Canada.

The book is dedicated to Rob Roughley (1950-2009) (consummate insect naturalist), with whom Carolyn participated in the Arctic Entomology course at the Churchill Centre for Northern Studies in 2003–2008 when Rob and I taught together (Underwood et al. 2003; Woodcock et al. 2008).

All in all, this book is a remarkable and unique achievement for its general and scholarly content. I recommend it highly to anyone fascinated with insect and arthropod life on Earth, and anyone interested in ethnoentomology and Inuit indigenous entomology (ᖁᑯᐱᖁᑕᓗᓂᖅ ᑕᑯᒃᑐᐃᓂᖅ).

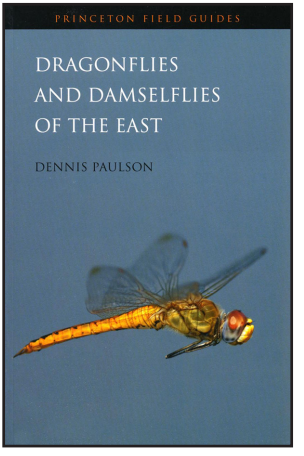
As a caution, though, the edition on sale to the public (Amazon.ca carries it) is only in English. I am informed that the bilingual Inuktitut and English edition was reserved for educational institutions and the like. That strikes me as a pity. Even though I do not read syllabics, the bilingual edition has charm.

ᐅᒥᖏᒪᒃ (Umingmak)
a.k.a. Peter Kevan
University of Guelph

Underwood, R., Kevan, P., and Roughley, R. 2003. The first Arctic and Boreal Entomology course - 2003. *Bulletin of the Entomological Society of Canada* **35**: 192-193.

Woodcock, T., Kevan, P., and Roughley, R. 2008. Arctic & Boreal Entomology Field Course - 2008. *Bulletin of the Entomological Society of Canada* **41**:75-78.

***Dragonflies and Damselflies of the* East.** Paulson, D. 2011. Princeton University Press, Princeton, New Jersey, 576pp. (softcover). ISBN: 978-0-69-112283-0. US$29.95.



When Dennis Paulson published his *Dragonflies and Damselflies of the West* (also Princeton University Press) in 2009 there was much anticipation for the eastern companion: *Dragonflies and Damselflies of the East*. One may ask 'What is the purpose of yet another field guide to odonates with so many already available?'. Paulson is very aware of this, noting that "there are still no comprehensive field guides to all the Odonata of North America".

The two primary goals of this field guide and its western companion are: 1) to facilitate identification of the 462 odonate species of North America; and 2) to give interesting natural history observations to encourage enthusiasm about this group of insects.

This guide includes all 336 species of odonates that are present in the United States and Canada east of the western boundaries of Ontario, Minnesota, Iowa, Missouri, Arkansas and Louisiana.

This book begins with a short introduction followed by several sections before the dragonfly and damselfly species are discussed. The section on the general natural history of the order is quite interesting. It includes short paragraphs on perching, thermoregulation, roosting, flight, migration, vision, feeding, predator and prey defences, parasites, sexual patrol, courtship and mating, egg laying and hatching, larval life history, metamorphosis and emergence, and sexual maturation. Before discussing and illustrating the species, Paulson also presents sections on odonate anatomy, odonate colors, odonate names, finding odonates, odonate photography, odonate collecting and collections, odonate threats and conservation, odonate research, odonates in the east and explanation of species accounts. These sections are all useful as an introduction to the wonderful world of odonates.

After this life history introduction, Paulson presents every species of damselfly and dragonfly that is present in the East. He tries to follow as much as possible the phylogeny of the group. He begins by the Zygoptera starting with the Calopterygidae, followed by the Lestidae and the Coenagrionidae. This is followed by the Anisoptera with the species of Petaluridae, Aeshnidae, Gomphidae, Cordulegastridae, Macromiidae, Corduliidae and Libellulidae. Each species is presented by both the common name and the scientific name. Each species has pictures, description, identification, natural history, habitat, flight season and distribution attached to it. Each of these sections aids in the proper identification of the possible species an odonate enthusiast may encounter and is well worth the time to read. The pictures are very helpful and include one for each sex and morph. At the end of each group there is usually a drawn guide for critical morphological features such as the male appendages, the female appendages (mesostigmal plates in Coenagrionidae, subgenital appendages or abdominal tips in various anisopteran groups). These drawings are very clear and help immensely in the identification of the odonates.

At the end of this field guide, Paulson adds four species to his Dragonflies and Damselflies of the West book that were not found in time for 2009. He also adds a short, but very useful, appendix on dragonfly publications and resources in case the enthusiast is looking for additional information.

Dennis Paulson has achieved his goal in creating a comprehensive field guide to the eastern North American species of odonates. This field guide is very clear. A major problem is that

when you have no clue as to the species of odonate you have in hand, you have to flip through many pages. This problem is not unique to Paulson's contribution but is common to many field guides. An additional problem is the weight of this field guide. For a book its size, it is quite heavy, probably due to the glossy heavyweight paper. Even with these negative points, I think this is an excellent guide that every entomologist should have on their bookshelf, if not in their collecting bag. Because I work with Zygoptera, I always have it with me in my bag; I leave the others behind because I am always more confident that this one has the species I may stumble upon in the field.

Julia Mlynarek
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Books available for review

The ESC frequently receives unsolicited books for review. A list of these books is available online (http://www.esc-sec.ca/bulletinbooks.html) 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 (Kevin Floate, Kevin.Floate@agr.gc.ca). You should briefly indicate your qualifications to review the topic of the book, and be able to complete your review within 8 weeks.

Preference will be given to ESC members.

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.

Livres disponibles pour critique

La SEC reçoit fréquemment des livres non demandés pour des critiques. Une liste de ces livres est disponible en ligne (http://www.esc-sec.ca/fr/f-bulletinbooks.html) 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 (Kevin Floate, Kevin.Floate@agr.gc.ca). Vous devez brièvement indiquer vos qualifications pour critiquer le sujet du livre, et être en mesure de terminer votre critique en 8 semaines.

La préférence est donnée aux membres de la SEC.

Lignes directrices

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

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

Currently available

Gilbert, N., and Raworth, D. 2012. Why Sex? Amazon Digital Services. 178 pp. (for details, see http://www.amazon.com/Why-Sex-e-book/dp/B0089QT3DM/ref=sr_1_1?s=digital-text&ie=UTF8&qid=1341089763&sr=1-1&keywords=ecology+genetics+gilbert)

Foster, G.A., and Mathis, W.N.. 2011. A Revision of the Nearctic Species of the Genus *Trixoscelis* Rondani (Diptera: Heleomyzidae: Trixoscelidinae). Smithsonian Contributions to Zoology, number 637, viii + 128 pages, 187 figures, 1 table.

Pfau, H.K. 2011. Functional Morphology and Evolution of the Male Secondary Copulatory Apparatus of the Anisoptera (Insecta: Odonata). 103 p., 65 figures, 31 x 23 cm (Zoologica, Volume 156) ISBN 978-3-510-55043-2 paperback. (for details, see http://www.schweizerbart.de/publications/detail/isbn/9783510550432

Stuart Dixon

1922 - 2012

Stuart Dixon - insect physiologist, Unitarian chaplain, father of three and great friend to many - passed away this past February. Stuart was best known to those of us in the entomological community as a gifted and inspiring teacher, and fondly remembered by my cohort of University of Guelph graduates as the man who made insect physiology interesting (especially to my wife Christine, who became his last graduate student, graduating a year before he retired). Nobody could bring Wigglesworth to life like Professor Dixon! He continued to maintain contact with his friends in the entomological community until the end. He could always be counted on for an insightful and eloquently expressed opinion, good conversation and genuine interest in how and what you were doing. Aside from being among the broadest and most widely read entomologists I have known, Stuart was an incredibly kind man with a genuine concern for others. Along with other bits of wit and wisdom with which he peppered his discussions ("ask the insect"), he used to say "to be a good scientist, you must also be a good person". And that he was.

Although he never spoke much of his early days, Stuart came up through the "school of hard knocks", born in Hamilton to an impoverished family that endured considerable hardship. He apparently had a knack for science (especially chemistry) early in life, but he also had another calling and entered the Toronto Bible College at the age of 17. Three years later he was a student at McMaster University, reading Darwin and working in restaurants to pay for tuition. Soon after graduation, while working at a factory to pay off his loans, Stuart received an offer of employment from the Agricultural College in Guelph (now part of the University of Guelph). The rest, as they say, is history. After 5 years at Guelph, he left for a period at Cornell University, where he acquired his PhD in entomology and also met his wonderful wife, Dorothy (Sherry) Hynes. Until his retirement in 1982, he remained on faculty at the University of Guelph, where he worked closely with his colleague Reg Shuel to study honeybee physiology and development. Professor Dixon left a legacy of inspired undergraduates, devoted graduates and admiring colleagues. He will be greatly missed, but fondly and always remembered.

Steve Marshall, Guelph

Robert H. Burrage

1920-2012

Robert Harcourt Burrage was born in Davidson, Saskatchewan, on 18 March 1920. He spent his early years with his two brothers on the family ranch near town. Bob received his elementary education in Regina and Disley, Saskatchewan, but completed his High School in Vancouver, British Columbia. After serving in the R.C.A.F. (1940-1945) as a wireless operator, air gunner and pilot, he embarked on a university education in entomology at the Ontario Agricultural College in Guelph. During those years, his summer employment included working on a farm in Ontario, as a student assistant involved in spruce budworm research with the Ontario Department of Forestry, and as a research assistant on insect pests of alsike clover for the Province of Ontario. These applied experiences provided him with a solid background for his future career in economic entomology. From the University of Guelph, Bob went directly to Cornell University, Ithaca, New York, to commence his doctoral studies. During his tenure as a graduate student, he was employed as a research assistant and, between terms of academic studies, conducted research on insect pests of field crops. Bob graduated with a PhD in insect ecology from Cornell University in 1952. His thesis was titled: "*A statistical study of the problems encountered in sampling populations of European chafer* Amphimallon majalis *(Razoumowsky) larvae in permanent pasture sod*". After graduation, Bob accepted a research position with Agriculture Canada - Saskatoon Research Station in 1953. Here he initiated renewed studies of the biology, and the cultural and chemical control of wireworms in western Canada. Many of his innovative techniques in soil sampling and studies of population dynamics led to more effective suppression and improved control of wireworms. Bob was also involved in developing and implementing effective IPM strategies for flea beetles and other oilseed pests. He went on to become Head of the Entomology Department until his retirement in 1982. He served as President of the Entomological Society of Saskatchewan in 1954 and 1972. Bob was inducted as a *Fellow of the Entomological Society of Canada* in 1975.

Bob's family and friends describe him as 'having a zest for life'. His children remember him as a supportive and generous father, an intelligent, hard-working and compassionate man. Bob was by nature curious and, as a result, he believed in lifelong learning, being an avid reader with many interests. He was known to all as a passionate outdoorsman. He loved exploring the Saskatchewan countryside and delighted in hunting, fishing, camping and canoeing. He was cheerfully outgoing, enjoyed meeting and talking with people and was always prepared to help others in any way that he could. Bob lived his life with the belief that one should give more than they receive. He was a tireless volunteer who, over the years, lent his experience and expertise to many organizations on the local, provincial and national levels. He spent many enjoyable years as an active member of the Riverside Badminton and Tennis Club in Saskatoon.

Bob is survived by his five children, six granddaughters, a brother Doug, a number of nieces and nephews, and many dear friends. He was predeceased by his wife Kit (Kathleen) and brother Dick.

Owen Olfert and John Doane, Saskatoon

Summary of items arising from the Executive Council Meeting by conference call, 20 June 2012

Alec McClay, Secretary

Industry Certification Program

The President has had some discussions with the Entomological Society of America on the possibilities of developing a certification program for entomologists practising in industry, similar to the ESA's Board Certified Entomologist designation.

Electronic Balloting System

An electronic balloting system is being developed for ESC elections and other items requiring a membership vote.

Treasurer

The audit of the 2011 finances by Bouris Wilson LLP took place during the week beginning 12 March 2012 and went smoothly. Recommendations are being developed for the long-term use of the C.P. Alexander Fund now that page charges are not being levied for publication in *TCE*.

Headquarters Building

An ad hoc committee is considering the future of the Headquarters building and will report with recommendations to the Governing Board. Some repairs have been made to the building and others are still required.

Scientific Editor

The outlook for *TCE* is very positive; enough papers are in production to fill the 2012 Volume (144) and papers currently in review or revision will go into Volume 145. There will be some excess page charges from Cambridge University Press for Volume 144 because of the length of the papers for the Diptera Festschrift. The current rejection rate is 68.5% and turnaround time from manuscript submission to final decision is around 22 days. This is due to an incredible team of Subject Editors, and to the tireless work of the Editorial Assistant, Andrew Smith. The quality of submissions appears to be improving and there are more frequent submissions from the USA and Europe. The ScholarOne system is working well and some revisions are underway to improve it further, such as incorporating copyright forms into the system. Only six papers have been received for the special issue on Arctic Arthropods, which is disappointing. A process still needs to be developed for submitting proposals for special issues and review articles. Some issues need to be resolved with CUP, such as the transfer of archives from the NRC site, how to switch library access from NRC to CUP, resolution in PDF files, and delayed appearance of issues in SCOPUS.

Nominations Committee

Two nominations were obtained for Second Vice-President and two for Director-at-Large. Biographies were published in the *Bulletin* and paper ballots were sent out by the Office Manager.

Achievement Awards Committee

The Committee's nominees for the 2012 Gold Medal (Dr Felix Sperling) and C. Gordon Hewitt Award (Dr Brent Sinclair) were approved by the Board. The Entomological Society of Alberta notified ESC of their nominee for the Norman Criddle Award, Dr Charley Bird. There will be no Bert and John Carr Award given this year. A list of three nominees for Fellows of the ESC

was presented to the Executive for ratification and Drs Gary Gibson, Robb Bennett, and Neil Holliday were named Fellows of the ESC. A proposal to raise the age of eligibility for the C. Gordon Hewitt Award will be brought to the Governing Board in November.

Bylaws, Rules and Regulations

An amendment has been made to the Student Awards Committee Guidelines regarding the procedure for delivering awards when students cannot attend the meeting where they are to be presented. Standing Rule amendments pertaining to the structure of the Editorial Board and the publishing of *TCE* (Sections VI, VIII, IX, X, XII) have been passed on to the Bilingualism Committee for translation to French.

Science Policy and Education

The Society has provided advice to the Royal Canadian Mint on the depiction of insects on Canadian coins, and wrote a letter in support of continued funding for the Experimental Lakes Area which was sent to the Prime Minister and the Ministers of Fisheries and Oceans and Environment, as well as the opposition party leaders.

Marketing and Fund-Raising Committees

Proposals are being developed to merge these two Committees.

62nd Annual General and Governing Board Meetings

The Annual General Meeting of the Entomological Society of Canada will be held at the Coast Edmonton Plaza Hotel on Tuesday, 6 November 2012, from 17:00 to17:45. The Governing Board Meeting will be held at the same location on Saturday, 3 November 2012 from 08:30 to 17:00. Matters for consideration at either of the above meetings should be sent to Alec McClay, Secretary of the ESC.

62e assemblée générale annuelle et réunion du conseil d'administration

L'assemblée générale annuelle de la Société d'entomologie du Canada se tiendra à l'hôtel Coast Edmonton Plaza le mardi 6 novembre 2012 de 17h00 à 17h45. La réunion du conseil d'administration se tiendra au même endroit, le samedi 3 novembre 2012 de 8h30 à 17h00. Tout sujet pouvant faire l'objet de discussion pour chacune de ces réunions doit être envoyé à Alec McClay, secrétaire de la SEC.

Answers to Entomological Crossword #2

Across 7. Hostess **8.** *Iresine* **9.** Terminate **10.** Midge **12.** Ernst **13.** Overtures **15.** Chelate **17.** Busy set **18.** Arthropod **20.** Ensor **21.** Torso **23.** Silurians **24.** Initial **25.** Chinche

Down 1. Astringent **2.** Relict **3.** Escalope **4.** *N. Irene* **5.** Termites **6.** Kind **9.** Trenchant **11.** Easy terms **14.** Resistance **16.** *Agriotis* **17.** Body lice **19.** Pestle **20.** Earwig **22.** Rain

ENTOMOLOGICAL SOCIETY OF CANADA

Consolidated Statement Of Financial Position

For The Year Ended December 31, 2011	2011	2010
Assets		
Current		
Cash (note 7)	$ 118,421	$ 239,957
Accounts receivable	21,793	1,745
Inventory (notes 3, 7)	2,180	3,588
Prepaid expenses	2,151	2,524
Investments (notes 5, 7)	109,505	25,611
	254,050	273,425
Investments (notes 5, 7)	474,305	477,726
Digital archives (note 3)	55,000	55,000
Property, plant and equipment (notes 3, 6, 7)	145,314	149,702
	$ 928,669	$ 955,853
Liabilities and Net Assets		
Current		
Accounts payable and accrued liabilities (note 7)	$ 51,123	$ 29,638
Deferred revenue	29,074	68,861
	80,197	98,499
Unrestricted Net Assets		
General Fund	363,421	378,583
Restricted Net Assets (note 7)		
Endowment Fund	75,664	74,921
Building Fund	145,314	149,702
Scholarship Fund	256,800	245,576
Book Project Fund	7,273	8,572
	485,051	478,771
	$ 928,669	$ 955,853

The attached notes and schedules form an integral part of these consolidated financial statements.

Approved on behalf of the Board of Directors:

_____

_____

BOURIS, WILSON LLP

Chartered Accountants

To view the complete statements please visit the Members area of the ESC website

IOBC/WPRS Pheromones and other Semiochemicals Conference
Bursa, Turkey, 1-5 October 2012
http://www20.uludag.edu.tr/~bitkik/iobc/iobc_pheromone_2012.html

Joint Annual Meeting of the Entomological Societies of Canada and Alberta
Edmonton, Alberta, 4-7 November 2012

Annual Meeting of the Entomological Society of America
Knoxville, Tennessee, 11-14 November 2012
Entomology 2012

Joint Annual Meeting of the Entomological Societies of Ontario and Canada
Guelph, Ontario, 20-23 October 2013
Theme: Predating the Nation - A Sesquicentennial Celebration of Entomology in Canada

ECE X (Tenth European Congress of Entomology)
York, UK, 3-8 August 2014
www.ece2014.com

XXV International Congress of Entomology
Orlando, Florida, 25-30 September 2016

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.

UNIVERSITY of GUELPH

ONTARIO AGRICULTURAL COLLEGE
School of Environmental Sciences

The Rebanks Family Chair in Pollinator Conservation

The School of Environmental Sciences (SES) at the University of Guelph seeks applications from leaders in the field of pollinator conservation for a newly created endowed chair. The successful candidate will be a recognized champion in the welfare and conservation of pollinators and will be expected to create a globally recognized program in pollinator conservation.

The Chair will be expected to lead the development of Canada's first national roundtable on the risks to native and managed pollinators and their conservation, thereby becoming a key voice in the evolution of public policy that influences the conservation of pollinators at municipal, provincial, national and international levels ; create new knowledge and build partnerships that will contribute to the development of effective and practical approaches to ameliorating human impacts on pollinators; establish and lead a multi-disciplinary research program on conservation of pollinators in agricultural and rural-urban ecosystems; create an expert advisory group to guide outreach and research program strategies, raising public awareness of our dependence on pollinators as a fundamental component of food production and ecosystem health; develop and implement a comprehensive communications and outreach strategy; and, contribute to undergraduate and graduate teaching in SES. The Chair will play an important leadership role in the SES and the University of Guelph.

The successful candidate will have a Ph.D. in conservation biology, ecology, entomology, or related fields and will be a leader in pollinator conservation with demonstrated experience and a proven desire to engage with the public, government, NGOs and industrial stakeholders. He or she will have a strong and sustained record of excellence in research and academic publications on topics that may include the ecosystem services provided by native and managed pollinators, and the extinction risks to and conservation strategies for important pollinator species. The successful candidate will be expected to complement, but not duplicate, existing strengths in honey bee research at the University of Guelph. He or she will also have a strong record of teaching including the training of graduate students and post-doctoral fellows, supporting their career advancement in academia, government, industry and conservation organizations. The successful candidate will be eligible for a tenured appointment at the Associate or full Professor level.

SES is one of six academic units of the renowned Ontario Agricultural College (OAC). As a founding college of the University of Guelph, OAC has a long history of expertise in teaching, research and outreach in agricultural and environmental sciences including globally recognized programs in beneficial insect culture and management, and sustainable agricultural production systems. SES faculty members conduct research on applied problems that deal with the human impact on our physical and living environment. The school has about 40 faculty, 150 graduate students and 50 post-doctoral fellows and staff. More information can be found at www.uoguelph.ca/ses.

The deadline for applications is September 1, 2012 though the competition will remain open until suitable applicants can be identified. The nominal starting date is January 1, 2013. Salary is negotiable and commensurate with qualifications. Please send curriculum vitae, vision statement for the position and contact information for three references to:

Jo-Anne Scarrow
Secretary to the Director
School of Environmental Sciences
University of Guelph
Guelph, ON N1G 2M7
jscarrow@uoguelph.ca

The University of Guelph is committed to equity in its policies, practices, and programs, supports diversity in its teaching, learning and work environments, and ensures that applications for members of underrepresented groups are seriously considered under its employment equity policy. All qualified individuals who would contribute to the further diversification of the University community are encouraged to apply.

GUELPH • ONTARIO • CANADA • N1G 2W1 • 519- 824-4120, EXT. 53920 • FAX 519-837-0442
http://www.ses.uoguelph.ca

2011 Pest Management Research Report

The 2011 Pest Management Research Report is now available at:
http://www.cps-scp.ca/pest_mangement-reports.shtml

News from the Biological Survey of Canada

Volume 31(1) (Summer 2012) of the Newsletter of the Biological Survey of Canada is available at: http://www.biology.ualberta.ca/bsc/news31_1/bscsummer2012.pdf.

As well, three new issues of the Canadian Journal of Arthropod Identification have been published and may be viewed at the following links:

Siricidae (Hymenoptera: Symphyta: Siricoidae) of the Western Hemisphere
Bees of the Genus Dufourea Lepeletier (Hymenoptera: Halictidae) of Canada
Cluster Flies (Calliphoridae: Polleniinae: Pollenia) of North America

Who cares about endangered species?

(continued from page 160)

species, the government describes the insect as a 'charismatic predator' and also notes that tiger beetles are so 'popular' that they have their own field guide.

Listing a species as endangered does have costs associated with it, including the development of strategies to preserve the species' habitat and to recover the species should its numbers continue to decline. That said, on the face of it, the government's decisions on what species are at risk do seem to have been made on anthropomorphic rather than scientific grounds.

Qui se préoccupe des espèces menacées?

(suite de la page 160)

acées du Canada. Ce coléoptère, trouvé au Canada seulement dans le sud de la vallée d'Okanagan, se retrouve également dans l'Ouest des États-Unis aussi loin au sud que l'Orégon central. Cependant, dans sa justification d'ajouter cette espèce, le gouvernement décrit l'insecte comme un « prédateur charismatique » et note également que les cicindèles sont tellement « populaires » qu'elles ont leur propre guide d'identification. Ajouter une espèce menacée a un coût associé, incluant le développement de stratégies afin de préserver l'habitat de l'espèce et de redresser l'espèce si son nombre continue de décroître. Ceci étant dit, la décision du gouvernement d'ajouter ou non des espèces à risque semble avoir été faite sur des bases anthropomorphiques plutôt que scientifiques.

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Dirigeants des Sociétés associées, 2011-2012

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http://www.usask.ca/biology/ess/

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http://home.cc.umanitoba.ca/esm/

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Vice-présidente	Jade Savage
Président sortant	Bruno Fréchette
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Past President	Christine Noromha
Journal Editor	Don Ostaff
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Atlantic Forestry Centre
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Tel: (506) 452-3785
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http://www.acadianes.org/index.html

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

Bulletin of the Entomological Society of Canada

Editor: Cedric Gillott
Assistant Editor: Julia Mlynarek

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

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

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Bulletin de la Société d'entomologie du Canada

Rédacteur: Cedric Gillott
Rédactrice adjointe: Julia Mlynarek

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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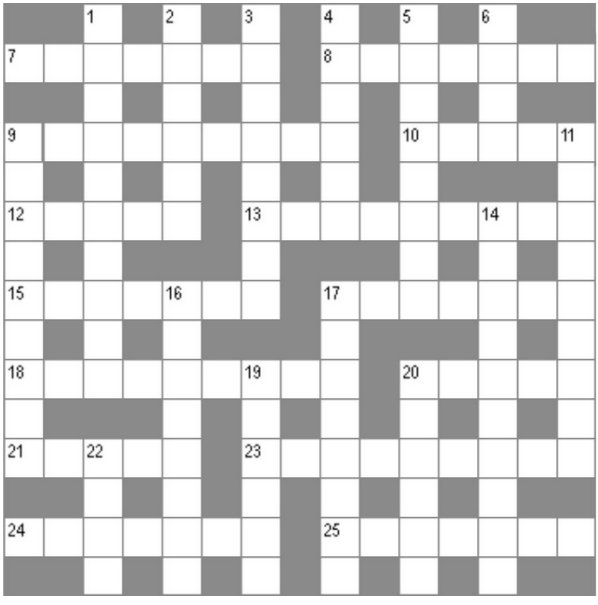
Cryptic entomological crossword / Mots croisés entomologiques cryptiques

Entomological Crossword #2 / Mots croisés entomologiques #2

A mix of cryptic, straight and simply 'odd' clues!
Answers are shown on bottom of page **151**



Across

7. What a cow might be to a tsetse (7)
8. Occasional host of hemispherical scale (7)
9. Put an end to insect found across Northern Australia (9)
10. Turned up, say, obscure insect (5)
12. --- Mayr, a 20th century Darwin (5)
13. Music played by groups of cicadas (9)
15. Revolutionary, dead, as a nipper (7)
17. What social workers might be (on a hot day) (4,3)
18. Jointed limb creature (9)
20. James – (1860-1949), a peculiar insect (5)
21. Odd sort with nothing gets thoraco-abdomen (5)
23. Very early apterygotes perhaps (9)
24. First part of 4 (7)
25. Seed feeding bug (eastern), or Spanish bed mate (7)

Down

1. Caustic stinger ant outbreak (10)
2. Ancient insect (possibly before time began), yet still around (6)
3. Look into fly found on slice of meat (8)
4. This damsel is a peaceful sprite (1,5)
5. Bugs one group sent back after school period (8)
6. Popular sort of species (4)
9. Ditch worker for cutting (9)
11. Tick given for using a plain vocabulary (4,5)
14. Insects are developing immunity (10)
16. By eye, say, change cutworm to click beetle (8)
17. In person (stranger) before church provides parasites (4,4)
19. Sort of step before the French club(6)
20. Listener with toupé finds insect (6)
22. *Pleocoma* spp. love this weather (4)

Who cares about endangered species?

It's been a pretty interesting summer, entomologically speaking.

Like me, many *Bulletin* readers will have followed with great interest reports that Ontario had experienced some of the earliest sightings of migrating red admiral butterflies (*Vanessa atalanta*) on record, while by mid-June monarchs (*Danaus plexippus*) were setting new northern limits to their range in Alberta.

However, two quite contrasting media reports published in early August really caught my attention. In the first, the Saskatchewan Government has budgeted $800 000 to battle mountain pine beetle (MPB) (*Dendroctonus ponderosae*). But wait! In Saskatchewan MPB is found only in the Cypress Hills Interprovincial Park where there has been no outbreak since the mid-1980s. So what's the money to be used for? Now a 'have' Province, Saskatchewan is actually 'giving' money to Alberta! $450 000, to be precise, will be provided to enable Alberta to detect and remove infested jack pine at the leading edge of the MPB invasion in an attempt to slow its move eastwards. It is hoped that by slowing the MPB's range expansion, critical weather events will occur to collapse the outbreak before the beetle reaches Saskatchewan. (It should be noted that Alberta is to spend $40 million in its own

Qui se préoccupe des espèces menacées?

L'été a été particulièrement intéressant du point du vue entomologique.

Tout comme moi, plusieurs lecteurs du Bulletin ont suivi avec un grand intérêt les rapports disant que l'Ontario a connue une des migrations rapportées les plus hâtives de papillons vulcains (*Vanessa atalanta*), alors que vers la mi-juin, les monarques (*Danaus plexippus*) établissaient une nouvelle limite nordique à leur répartition en Alberta.

Cependant, deux rapports plutôt contrastés dans les médias, publiés au début août, ont vraiment attiré mon attention. Dans le premier, le gouvernement de Saskatchewan investissait 800 000$ afin de lutter contre le dendroctone du pin ponderosa (MPB) (*Dendroctonus ponderosae*). Mais attendez! En Saskatchewan, ce dendroctone ne se trouve que dans le parc interprovincial Cypress Hills où il n'y a eu aucune épidémie depuis le milieu des années 80. Alors à quoi servira l'argent? Maintenant une province « riche », la Saskatchewan donne de l'argent à l'Alberta! 450 000$, pour être précis, seront fournis afin de permettre à l'Alberta de détecter et retirer les pins infestés sur la limite de l'invasion du MPB, afin de tenter de ralentir sa progression vers l'est. Il est souhaité qu'en ralentissant l'expansion du MPB, des évènements climatiques critiques pourront se produire afin d'anéantir l'épidémie avant que les dendroctones n'atteignent la Saskatchewan. (À noter que l'Alberta dépensera 40 millions $ de ses programmes sur le MPB afin de financer le travail d'échantillonnage et de contrôle ainsi que la reforestation des régions où les attaques ont endommagé les forêts de pins). Les 350 000$ restants seront versés à un entrepreneur privé pour des échantillonnages forestiers, le marquage d'arbres infestés à retirer, et pour mettre en place des stations de piégeage dans le nord ouest de la Saskatchewan et dans les Cypress Hills. Je touche du bois – jusqu'à maintenant aucun

MPB program to fund survey and control work and reforestation of areas where attacks have damaged pine forests.) The remaining $350 000 is being shelled out to a private contractor to survey forests, mark infested trees for removal, and set up baiting stations in north west Saskatchewan and the Cypress Hills. Touch wood – so far no MPB have been detected in north-west Saskatchewan's pine forests.

The second report concerned the Canadian government's decision not to list coast manroot (*Marah oreganus*) (a Vancouver Island and some Gulf Islands rarity), four-leaved milkweed (*Asclepias quadrifolia*), and a dragonfly, Laura's clubtail (*Stylurus laurae*), both from Ontario, as endangered species. (The media report noted that one manroot tree near Victoria was being 'whacked away' by *maintenance* crews!)

In typical fashion, a media officer carefully sidestepped the question of how much the government would save by not listing the species, saying only that "We are taking *active steps* to ensure that we are spending *resources diligently* and *responsibly*, and ensuring that *recovery efforts* are *focused* on species that have a greater chance of recovery in Canada." (italics mine – this person sure knows all the buzz words!).What received little attention in the media report was that the Canadian localities of the three species represent the very edges of their range. All are still widespread in the U.S.A.: manroot is found south as far as central California, the milkweed occurs in most of the eastern half of the country, and Laura's clubtail can be seen in 17 states, including Ohio, Kentucky, Louisiana, Georgia, Florida, and Michigan.

The above seems to be in strong contrast to the government's decision in July to add Wallis' dark saltflat tiger beetle (*Cicindela parowana wallisi*) to Canada's endangered species list. This beetle, found in Canada only in the southern Okanagan Valley, also occurs in the western USA as far south as central Oregon. However, in its rationale for adding this

(continued on page 155)

MBP n'a été détecté dans les forêts de pins du nord ouest de la Saskatchewan.

Le deuxième rapport concerne la décision du gouvernement canadien de ne pas ajouter le marah d'Orégon (*Marah oreganus*) (une rareté de l'île de Vancouver et de quelques îles du Golfe), l'asclépiade à quatre feuilles (*Asclepias quadrifolia*), ainsi qu'une libellule, le gomphe de Laura (*Stylurus laurae*), tous deux d'Ontario, sur la liste des espèces menacées. (Le rapport des médias a noté qu'une plante du marah d'Orégon près de Victoria était tondue par une équipe d'entretien!)

De façon typique, un agent des médias a soigneusement évité la question du montant que le gouvernement économiserait en n'ajoutant pas ces espèces sur la liste, disant seulement que « Nous prenons des *mesures actives* afin de s'assurer que nous dépensons les *ressources de façon diligente et responsable*, en s'assurant que les *efforts de rétablissement* sont *concentrées* sur les espèces qui ont une meilleure chance de rétablissement au Canada » * (l'italique est de moi – cette personne connaît certainement tous les mots à la mode!). Ce qui a reçu peu d'attention dans ce rapport est que les localités canadiennes de ces trois espèces représentent la limite de leur aire de répartition. Elles sont toutes répandues aux États-Unis : le marah d'Orégon se trouve aussi au sud que la Californie centrale, l'asclépiade se trouve dans presque toute la moitié est du pays, et le gomphe de Laura a été vu dans 17 états, incluant l'Ohio, le Kentucky, la Louisiane, la Géorgie, la Floride et le Michigan.

Ceci semble être fortement en contraste avec la décision du gouvernement, en juillet, d'ajouter la cicindèle de Wallis (*Cicindela parowana wallisi*) à la liste des espèces men-

(suite à la page 155)

**** Citation originale en anglais** : "We are taking active steps to ensure that we are spending resources diligently and responsibly, and ensuring that recovery efforts are focused on species that have a greater chance of recovery in Canada."*

Entomological Society of Canada, 2011-2012
Société d'entomologie du Canada, 2011-2012

Executive Council / Conseil exécutif

President / Président
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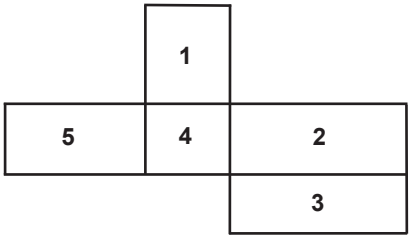

Images

On the spine: A rarely observed robber fly, *Ommatius bromleyi* Pritchard (Diptera: Asilidae). Guadaloupe Canyon, Arizona. Photo: S.A. Marshall

Beneath the title: Larva of a human botfly, *Dermatobia hominis* (Linnaeus, Jr.) (Diptera: Oestridae), excised from under the skin of a host, Costa Rica. Photo: W.B. Strong

1 A bee fly, *Bombylius aurifer* Osten Sacken (Diptera: Bombyliidae), wing-fanning on a leaf, Vernon, British Colombia. Photo: W.B. Strong

2 The Manual of Nearctic Diptera coordinators with German dipterist Willi Hennig, during his visit to the Diptera Unit of the Canadian National Collection of Insects (Ottawa) in fall of 1967. Back, left to right: Frank McAlpine, Herb Teskey, Guy Shewell; front, left to right: Monty Wood, Dick Vockeroth, Bobbie Peterson, Willi Hennig. Photo: Unknown

3 A soldier fly, *Caloparyphus decemmaculatus* (Osten Sacken) (Diptera: Stratiomyidae), New Mexico. Photo: S.A. Marshall

4 Head of Narcissus bulb fly, *Merodon equestris* (F.) (Diptera: Syrphidae), a species introduced to North America from Europe. Vernon, British Colombia. Photo: W.B. Strong

5 Courting/mating long-legged flies, *Dolichopus* Latreille (Diptera: Dolichopodidae), Copetown Bog, Wentworth Co., Ontario. Photo: S.A. Marshall.

Back cover: A soldier fly, *Odontamyia cincta* Olivier (Diptera: Stratiomyidae), near Elk Island National Park, Alberta. Photo: H.C. Proctor.

Français à l'intérieur de la couverture avant.

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