

# Bulletin

Entomological Society of Canada  
Société d'entomologie du Canada

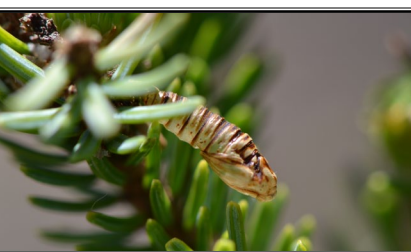
Volume 48  
Number / numéro 2



June / juin 2016

Published quarterly by the  
Entomological Society of Canada

Publication trimestrielle par la  
Société d'entomologie du Canada



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Calliphoridae (Diptera), Oyama, BC. Sitting on a bright chrysanthemum, this blow fly seems to be making up in aesthetics what it lacks in personal hygiene. Photo: Ward Strong

Calliphoridé (Diptère), Oyama, C.-B. Posée sur un chrysanthème coloré, cette mouche semble compenser ses lacunes en hygiène personnelle par l'esthétique. Photo : Ward Strong.



### Taking Care

We're getting into the busy season for entomology in Canada. Field season is already underway for field people whose arthropods of choice are early emergers. Indeed, some of the late winter and early spring rarities have already been replaced by the bugs of summer. For those of us whose research success depends on good field data, we're already making plans.

Of course, summer is a busy time in other ways too. With the end of the teaching year at most universities, researchers are freed up from teaching, TAing, taking classes, and going to meetings, and have more time to devote to lab work. This is the time of year when a lot of data pours out of labs as well as field sites. This is also the time of year when summer students can gain valuable training and experience, and earn even more valuable money, working in university and government labs, parks and protected areas, NGOs, and private companies.

It's also a season of analysis and writing, as graduate theses are finished off, as we finally find time to wrap up the backlog of manuscripts, and as we write applications and proposals to see if we can find the financial support and the outstanding new students to keep doing the work we love.

It's often such a busy time of year that it's

### Prendre soin

Nous entrons dans la saison occupée pour l'entomologie au Canada. La saison de terrain est déjà en cours pour les gens de terrain dont les arthropodes émergent hâtivement. En effet, certains des rares arthropodes de fin d'hiver et début de printemps ont déjà été remplacés par les insectes d'été. Pour ceux d'entre nous dont le succès en recherche dépend de bonnes données de terrain, nous faisons déjà des plans.

Bien sûr, l'été est un temps occupé de différentes façons. Avec la fin de l'année d'enseignement dans la majorité des universités, les chercheurs sont libérés de l'enseignement, des auxiliaires d'enseignements, de prendre des cours et d'aller dans des réunions, et ont plus de temps à dévouer au travail de labo. Il s'agit du temps de l'année où beaucoup de données sortent des laboratoires ainsi que des sites de terrain. Il s'agit aussi du temps de l'année où les étudiants d'été acquièrent une formation et de l'expérience importante, et gagnent aussi de l'argent, travaillant dans des labos universitaires et gouvernementaux, dans des parcs et aires protégées, dans des organismes non gouvernementaux et pour des compagnies privées.

Il s'agit également de la saison des analyses et de la rédaction, puisque les thèses gradués se concrétisent, puisque nous trouvons finalement du temps pour récupérer le retard dans les manuscrits, et puisque nous écrivons des applications et des propositions pour voir si nous pouvons trouver le soutien financier et les incroyables nouveaux étudiants afin de continuer à faire le travail que nous aimons.

Il s'agit souvent d'une période de l'année tellement occupée qu'il est aisé d'oublier qu'il y a plus pour les travaux sur le terrain, au labo et sur l'ordinateur que de produire. Il y a eu beaucoup de discussion récemment sur le rythme effréné de la vie académique (ou la vie scientifique en général) et la saison estivale de

easy to forget that there is more to the field work, lab work and computer work than producing the product. There's been a lot of discussion recently about the hectic pace of academic life (or science life in general) and summer research season is, ironically, one of the times when burnout can sneak up on you before you know it.

"Be Productive" is an ever-present mantra of modern science. But right alongside that, remember to be safe, be happy, and be healthy.

The two first rules of fieldwork in our lab are: You should always feel safe in the field; and fieldwork should be fun. It's critical to have meetings about field safety before going in the field. Know the potential dangers and hazards and talk about them; know where the first aid kits and safety gear are and how to use them; know the procedures for dealing with emergencies; and have clear lines of communication if trouble or conflict between team members arises. But, fieldwork should also be fun. Schedule days off, especially if you're in wonderful places. Build some flexibility into the schedule, because everybody has a bad day every now and then. People work more effectively if they have some free time to recharge. As crowded as field vehicles and camps can get, there is always room for music, or art supplies, or books. As an introvert, I'm also keenly aware of the importance of quiet time. Especially in field sites where people are stuck together far more than they might normally be, the power of some alone time can't be overlooked.

Many of the same considerations apply to lab work. Research labs often get busier in summer with new students and assistants. Every lab is different, so have safety protocols for your lab and make sure everybody is familiar with them. It's everybody's responsibility to know the rules for handling chemicals, equipment, live organisms, etc. and to know the emergency procedures. Lab work can be repetitive, but if it's managed well, it doesn't have to be mind-numbing. I worked in factories for 2 years after I finished high school, so the mental cost of doing one

recherche est, ironiquement, une des périodes où l'épuisement peut s'immiscer sans que vous vous en aperceviez.

« Soyez productif » est un mantra omniprésent dans la science moderne. Mais en même temps, rappelez-vous d'être prudent, d'être heureux, et d'être en santé.

Les deux premières règles du travail de terrain dans notre labo sont : vous devez toujours vous sentir en sécurité sur le terrain; et le travail de terrain devrait être amusant. Il est important d'avoir des réunions concernant la sécurité sur le terrain avant d'aller sur le terrain. Connaissez les dangers potentiels et les risques et parlez-en; sachez où sont les trousseaux de premier soin et l'équipement de sécurité et comment les utiliser; connaissez les procédures pour affronter les urgences; et ayez des voies de communications claires si du trouble ou des conflits entre membres d'une équipe surgissent. Mais le travail de terrain doit aussi être amusant. Planifiez des journées de congé, particulièrement si vous êtes dans de magnifiques endroits. Amenez de la flexibilité dans vos horaires, parce que tout le monde peut avoir une mauvaise journée de temps à autre. Les gens travaillent plus efficacement quand ils ont du temps libre pour charger leurs batteries. Aussi chargés que puissent être les véhicules et les camps, il y a toujours de la place pour de la musique, de l'art ou des livres. En tant qu'introverti, je suis aussi fortement conscient de l'importance du temps de tranquillité. Particulièrement sur les sites de terrain où les gens sont coincés ensemble pour plus longtemps qu'ils le feraient normalement, le pouvoir d'avoir un peu de temps seul ne doit pas être négligé.

Plusieurs des mêmes considérations s'appliquent aussi au travail de labo. Les labos de recherche sont souvent plus occupés l'été avec les nouveaux étudiants et assistants. Chaque labo est différent, ayez donc des protocoles de sécurité pour votre labo et assurez-vous que tout le monde est familier avec ceux-ci. Il est de la responsabilité de chacun de connaître les règles pour manipuler les produits chimiques, l'équipement, les

single thing, all day, every day, is stamped into my memory. We try to have at least two or three different tasks that student volunteers or interns can work on from day to day, or even within a day. That way, after a few hours of specimen curation, a switch to computer work or collaborating with another student on a research project is a welcome break. And on a sunny summer day when the world outside is calling, there's almost always time for a long lunch break under the trees, or an ice cream field trip.

Staying on top of your research progress in a busy summer is important, but so are eating well, getting enough sleep, wandering around outside, taking a weekend off, surprise snacks in the lab, colouring, playing music, getting some exercise, baking cookies, running around with dogs, unplanned tea breaks, gardening, or doing any of the other things entomologists do for fun. It's good for your physical health and good for your mental health. And ultimately, it's good for your productivity and your enjoyment of the work.

So, as many of you don rubber boots or lab coats or headphones and prepare to dive into a summer of exciting arthropod research, have a productive summer season, by all means. But have a fun summer too. You'll thank yourself for it one day.



organismes vivants, etc. et de connaître les procédures d'urgence. Le travail de labo peut être répétitif, mais s'il est bien géré, il n'a pas besoin d'être abrutissant. J'ai travaillé dans une usine pendant 2 ans après avoir fini le secondaire, alors le coût mental de faire une seule chose, toute la journée, tous les jours, est bien imprimé dans ma mémoire. Nous essayons d'avoir au moins deux ou trois tâches différentes sur lesquelles les étudiants bénévoles ou les stagiaires peuvent travailler d'une journée à l'autre, ou lors d'une même journée. De cette façon, après quelques heures de conservation de spécimens, un changement vers du travail sur l'ordinateur ou en collaboration avec un autre étudiant sur un projet de recherche est une pause bienvenue. Et lors d'une journée d'été ensoleillée quand le monde extérieur nous appelle, il y a presque toujours du temps pour une longue pause-dîner sous les arbres, ou une expédition pour de la crème glacée.

Se maintenir à jour dans le progrès de votre recherche durant un été occupé est important, mais le sont également bien manger, dormir suffisamment, se balader dehors, prendre une fin de semaine de congé, avoir une collation-surprise au labo, colorier, jouer de la musique, faire de l'exercice, faire cuire des biscuits, courir avec les chiens, prendre des pauses thé non planifiées, jardiner, ou faire toute autre chose que les entomologistes font pour le plaisir. C'est bon pour votre santé physique et mentale. Et ultimement, c'est bon pour votre productivité et votre appréciation de votre travail.

Ainsi, alors que plusieurs d'entre vous portent des bottes de caoutchouc, des sarraus, ou des écouteurs, et vous préparez à plonger dans un été excitant de recherche sur les arthropodes, ayez une saison estivale productive, évidemment. Mais ayez un été amusant aussi. Vous vous remercieriez un jour.

## Interactions among insects and people – some personal reflections on entomology in the Anthropocene



I was genuinely surprised when I learned I was the recipient of the ESC Gold Medal. Word had leaked that I'd been nominated but I never thought I would actually receive this prestigious honour. Thanks very much to those considerate peers who nominated me and to the ESC Awards Committee for their decision. I would not be receiving this award if not for the contributions of a very large number of collaborators, students, and technicians who have done the lion's share of work in our research projects - I'm just the guy who usually gets to present the results at meetings like this.

In an effort to tie my address in with the theme of this year's meeting, I did a little research on the term "Anthropocene" and learned it was popularized in 2000 by atmospheric chemist and Nobel laureate Paul Crutzen. Since then it has appeared in nearly 200 peer-reviewed articles and there are now at least 3 journals that focus on the topic:

*The Anthropocene*; *The Anthropocene Review*; and *Elementa*. Lewis and Maslin (2015, Defining the Anthropocene. *Nature* **519**: 171–180) summarized some of the more significant impacts of people on our planet and environment:

- invention of the Haber-Bosch process (early 1900s) that converts atmospheric nitrogen into ammonia for fertilizer has fundamentally altered the global nitrogen cycle;
- emission of about 555 billion metric tons of carbon since 1750 has increased atmospheric CO<sub>2</sub> to levels not seen for a million years - Earth's next glaciation event may be delayed;
- the increase in CO<sub>2</sub> levels has in turn increased ocean water acidity at a rate not exceeded in the last 300 million years;
- appropriation of 25–39% of net primary productivity for humans has reduced the amount available for other species;
- land-use conversion (for food, fibre, fuel, etc.) and targeted hunting and harvesting has resulted in species extinctions 100–1000X greater than background levels; and
- human-mediated movement of organisms among continents and oceans has led to a global homogenization of Earth's biota and new hybrid species.

The last point is one that I am quite familiar with because many of the invasive forest insects in North America (e.g., the emerald ash borer and brown spruce longhorn beetle) were inadvertently transported from Asia or Europe in wooden pallets or "dunnage" used to pack material in shipping containers. Other pathways for human-assisted movement of species include live plants in the global nursery trade, the discharge of ship ballast, and deliberate introductions (e.g., for classical biological control of an invasive species). For example, many species of European ground beetles now present in Canada likely arrived in the 1800's in soil and rocks used as ballast in wooden ships.

To be recognized an official epoch there has to be a measurable effect or layer in the geological strata attributed to human activity. The International Union of Geological Sciences convened a group to decide by 2016 whether or not to officially declare that the Holocene is over and the Anthropocene has begun. Whatever the official decision is, it is clear that humans have had (and are having) a huge impact on the planet, and much of it negative, for example, mass extinctions

of plants and animals, pollution of the oceans, and altering of the atmosphere. The clumsy segue to the rest of my talk is that people have had a largely positive impact on my life. So, most of my address is a tribute to mentors, collaborators, students, and others who have had a positive influence on my life and entomological career, related through stories and highlights of research over the years. Apologies to those I do not have time to mention (as well as to those of you who might have preferred that I hadn't mentioned them).

First and foremost I thank my lovely wife, Lindsey Laidlaw, for her patience, love and support and for putting up with me for so many years. It's not easy being married to someone like me who, when you're out for a "brisk" walk in the woods together, likes to stop every few metres to inspect a tree, mushroom, flower, for beetles or whatever - "Can we please just keep walking for a change?" I owe much of my love of nature to my parents who took my brothers and me camping a lot and encouraged our exploring of the outdoors; that is, "You kids get outside - I'll give a shout when supper is ready." We spent a lot of time turning over rocks to see what was underneath, and observing (and harassing) ant colonies and wasp nests. If you've ever lit a plastic dish detergent bottle on fire and dripped the molten plastic on yellow jackets foraging on rotting apples in your friend's backyard, you'll know the distinctive and weird sound they make (the dropping bits of flaming molten plastic that is, not the unsuspecting and unlucky wasps - "dVOOOooop...dVOOOooooop"). A dud firecracker also makes a good miniature flamethrower if you break it in half, light the broken end, and aim it at a bunch of ants scrambling to rebuild a section of the nest you just blew away with a non-dud firecracker. Fortunately, my cruel phase did not last long and I spent many hours simply observing ants and spiders in our backyard.

My first real introduction to entomology and the incredible diversity of insects was a wonderful 3<sup>rd</sup> year undergraduate course at Simon Fraser University, taught by Thelma Finlayson with Dave Gillespie and Bob Footitt as teaching assistants. Until I took that course I'd dreamed of becoming a marine biologist or maybe someone who tranquilized, tagged and followed the movement of grizzly bears from helicopters, "as seen on TV" in Jacques Cousteau or National Geographic specials. John Borden was a big influence. I took two courses from John and he was a great teacher. I still remember some of his Biology 101 exam questions: "Why are there no corn trees?" or "Little Suzie is out in the garden one morning and suddenly runs into the house hell-bent for Moose Jaw shouting 'Mommy, the tomato plants are crying!'" Describe the phenomenon she observed." John's 4<sup>th</sup> year forest entomology course challenged students with projects like developing and testing a sampling method for a forest insect of your choosing, and a semester long project in which you were responsible for rearing an insect species in the SFU insect production facility. I picked an ichneumonid parasitoid, *Itopectis conquisitor*, and had a great time observing its behavior and comparing suitability of pupae of different host species.

I also enjoyed the "Pestology" course taught by Brian Beirne with guest lectures by H.R. ("Mac") MacCarthy. One of our assignments was to suggest ways that bee keepers could manage the problems they were having with black bears disturbing the bee hives. Dr MacCarthy said that trapping the bears and releasing them far away in the woods didn't really solve the problem because bears were territorial. So if you dropped the problem bear into another bear's territory it would lead to a confrontation with another bear and the losing bear would move into another bear's territory, leading to another confrontation, and so on in domino fashion with a bear eventually back raiding the hives. I was stumped and remember standing at the urinal one day when Dr Beirne appeared at the urinal on my right. I told him I was having trouble finding an effective solution to the problem (in hopes he might provide a helpful hint or clue). He zipped up and said only "We want you to think." I got to know Dr MacCarthy much better when I was in graduate school at the University of British Columbia because his son Dermot worked in our lab. Mac was an excellent writer and gave me a lot of helpful advice when I was writing my



PhD thesis, for example, “You’ve got to make an outline.” I always hated writing outlines but I followed his advice and it really helped with the organization and flow of the thesis.

I thank Peter Fankboner and Louis Druehl for organizing field trips in their courses (Invertebrate Zoology and Biology of Nonvascular Plants, respectively) and for encouraging us to participate because, as Dr Fankboner said “Years from now you won’t remember a lot of what you heard in the lecture hall but you will remember the field trip” and he was so right. I have vivid memories of watching an octopus emerge one tentacle at a time from the small tear drop opening in a pop can we’d dredged up from the ocean floor. Later on we watched the same octopus change colours to match its background as it moved along the bottom of a large aquarium at the Friday Harbour lab. Another fond memory is a midnight hike of the entire class to the beach at low tide at Bamfield, Vancouver Island, and hearing the sound of one of our TAs playing a big piece of bull kelp that sounded like a French horn with crashing surf in the background – really cool.

John McLean was a very supportive PhD supervisor, always keen and encouraging, for example, “How are you going? Good on you.” I learned a lot in John’s graduate course in forest entomology, in which Jerry Carlson, Joe Churcher and I would take turns presenting seminars on different areas of insect ecology, for example, White’s stress hypothesis and Rhoades “talking trees”. John made sure we got to meetings, like the joint annual meetings of the ESC and Western Forest Insect Work Conferences (WFIWC). Have a look at the photo of John and some of his former graduate students and post-docs and see how many you recognize before reading the caption. Other professors from whom I learned a great deal at UBC were Judy Myers (biological control), Bill Wellington (influence of weather and climate on insects), John Worrall (excellent dendrology and tree physiology course), Lee Gass (advanced ecology and philosophy of science



John McLean (UBC) with current and former members of his lab at the Western Forest Insect Work Conference, Spring 1986, Pacific Forestry Centre, Victoria, British Columbia. From left to right, Top row: Jerry Carlson, Russ Cozens, Joe Churcher, Peter Hall; Middle row: Staffan Lindgren, Liu Yongbiao, Jon Sweeney, Scott Salom, Terry Shore; Bottom row: John McLean, Tom Maher, Tim Ebata, Laurie Friskie, and Ervin Kovacs. Photo credit unknown.



- “Yeah, but how do you know what you know?”), Tony Kozak (best stats course ever), and Youssry (Ben) El-Kassaby (sampling methods).

Staffan Lindgren is well known for inventing the Lindgren funnel trap, initially developed for mass trapping ambrosia beetles around sawmills and log sorting yards in British Columbia, and used worldwide in surveys for bark beetles and wood-boring beetles. Staffan was a post-doc in John McLean's lab in the early 1980's and during my first field season in the summer of 1982 we worked together testing various pheromone-baited trap designs for monitoring the Douglas-fir tussock moth. The urticating hairs on the larvae, cocoons, exuviae and egg masses of the tussock moth cause allergic reactions in about 1 in 4 people. I had handled hundreds of tussock moth larvae the previous summer (working for the BC Forest Service on a project led by Canadian Forest Service scientists Roy Shepherd and Imre Otvos testing nucleopolyhedrosis virus for control of the tussock moth) and had no allergic reaction. However, in the summer of 1982 I started breaking out in hives every day and was using so much Calamine lotion I started to look like Boo Radley from “To Kill a Mockingbird”. [Bonus points if you know the name of the actor who played Boo Radley; take a guess before looking it up in IMDB.] One day while I was collecting tussock moth pupae and egg masses, Staffan took the van into Ashcroft for an errand. I was wearing latex gloves to avoid direct contact with the urticating hairs but by the time Staffan returned I was itching like crazy and trying to scratch myself with my elbows, forearms, and anything except my hair-covered gloves. Staffan thought my itchy and scratchy moves looked comical at the time but I didn't think he'd remembered the incident until I read a tweet he sent during the 2015 JAM: “Did you know tussock moths make him (i.e., Sweeney) dance?” Staffan kindly included me as a co-author on a paper on our tussock moth trapping studies - my very first publication. In March of 1983, Staffan and I drove a rented Chevette from Vancouver to Santa Rosa, California, for the WFIWC and then on to Riverside to visit Tom Baker and his students who were doing state-of-the-art studies on pheromone-mediated behavior of moths. It was a great experience – meeting Tom Baker and his students, seeing sea otters and radiata pine in their native habitats in Monterey, and feeling pretty small walking amongst giant redwoods near Eureka (a “Eureka moment”).

I was introduced to seed and cone insects by Gordon Miller and Doug Ruth during my post-doc at Pacific Forestry Centre (PFC) in Victoria and that fun and productive year and a half (during which Lindsey and I were married) led to an indeterminate position as a research scientist at Atlantic Forestry Centre (AFC) in Fredericton where my research focus was ecology and management of seed orchard insect pests. While at PFC I spent many hours examining the genitalia of flies collected on sticky cards to identify species of cone flies. I found the diversity of structures of fly male genitalia quite fascinating, so much so, that one morning while eating breakfast and watching a fly bounce along the kitchen window I found myself wondering what its genitalia looked like. At AFC, I was privileged to work on seed and cone insects with many excellent collaborators like Dan Quiring, Jean Turgeon, Peter de Groot, Ecki Brockerhoff, Robb Bennett, Laura Fidgen, Graham Thurston, Doug Eidt, and Ward Strong, and had terrific technical support from Garvice (Gus) Gesner. While working on sampling plans for cone maggots, Jean and I had noticed that the distribution of cone fly eggs was quite uniform, rather than random or clumped, suggesting that females were avoiding cones in which eggs had been laid, and possibly using a host-marking pheromone. Dan, Robb and I investigated this further and showed that female cone flies did indeed mark cones on which they had laid an egg, and subsequently avoided these marked cones. Dan always stressed the value of observing an insect's daily activity pattern and we spent a few days and evenings watching spruce cones to see what we could learn of cone fly foraging behavior. I remember the thrill of seeing for the first time, a female cone fly land on a white spruce cone, lay an egg, and then walk up, down and around the cone for about a minute,

all the time “licking” the cone surface with her mouthparts. We’d expected the females to mark the cones by dragging their ovipositor, like apple maggot flies.

In 1999, the brown spruce longhorn beetle (BSLB), *Tetropium fuscum* (Fabr.), was discovered in Point Pleasant Park, Halifax, Nova Scotia, and I switched gears from seed and cone insects to the ecology and management of longhorn beetles and invasive species. The BSLB was declared a quarantine pest by the Canadian Food Inspection Agency (CFIA) and from 2000–2006 the CFIA led an intensive and ambitious effort to delimit its distribution and eradicate it from Nova Scotia. There was a lot of media attention, controversy and opposition from some members of the public who, quite understandably, were upset at CFIA’s plan to cut and burn BSLB-infested spruce trees in Point Pleasant Park. The Friends of Point Pleasant Park were successful in obtaining a court injunction that halted tree cutting in the park for a few months but it was eventually overturned on appeal. Then, Hurricane Juan hit Nova Scotia in September 2003, taking out most of the mature spruce in Point Pleasant Park and generating a large swath of stressed trees and blowdown from Halifax towards Prince Edward Island that was susceptible to *T. fuscum* infestation, and which may have increased its rate of spread. In spring 2007, after surveys had found *T. fuscum* at several sites beyond the original quarantine boundary, CFIA expanded the boundary and changed the goal from eradication to containment and slowing the spread.

One of the first things we did to help CFIA deal with *T. fuscum* was develop some phytosanitary treatments and practical tools for survey and monitoring of *T. fuscum*. Both heat treatment (with Dan Quiring) and chipping (with CFS colleagues, Eric Allen and Lee Humble), were demonstrated to be effective phytosanitary treatments, which allowed export of kiln-dried spruce from Nova Scotia, and free movement of chips. For surveys, decks of spruce “bait logs” were used in 2000 and 2001 and worked reasonably well at detecting *T. fuscum* but were heavy, labour intensive and slow to produce results. *Tetropium fuscum* could not be reliably differentiated from the native and closely related congener, *Tetropium cinnamopterum* Kirby, until larvae had reached the prepupal stage (by milling/peeling logs in the fall) or had emerged as adults. Working closely with Peter de Groot, chemist Linda MacDonald (CFS-Sault Ste. Marie), and the folks at PheroTech Inc., we developed a trap lure that simulated the smell of weakened spruce trees which CFIA has used in surveys since 2002. Thanks to Sandy Smith and contacts she made while on sabbatical in Montpellier, we managed to test our lures in Europe as well as Nova Scotia and not only got data on response of *T. fuscum* to our lures but also data on response of other non-native longhorn beetles at risk of accidental introduction to North America, for example, *Tetropium castaneum* L. I have collaborated every year since then with one of Sandy’s original contacts, Dr Jerzy M. Gutowski, of the Forest Research Institute in Białowieża, Poland. Jerzy lives beside the Białowieża forest, one of the oldest forests in Europe with oaks > 500 years old, mature linden, Norway spruce and many other species, and it’s an ideal place to test the efficacy of traps and lures for detection of European bark beetle and wood-boring beetle species at risk of establishing and becoming invasive in North America – more on that later.

In around 2004, Peter Silk joined our team at CFS Fredericton and brought with him much expertise and years of experience in insect pheromone chemistry. I’d first met Peter back in the 1980’s when we were studying pheromone mediated behavior of western spruce budworm and he visited John McLean’s lab at UBC. Peter identified a volatile compound emitted by male *T. fuscum* in early 2006, which he synthesized and we tested in the field that summer. The pheromone (“fuscumol”) was not very active by itself but when combined with the host volatile lures that simulated a stressed spruce tree, it synergized attraction and increased trap catches of both sexes 5-fold. Subsequent research by Acadia University MSc student, Colin MacKay, co-supervised by Kirk Hillier and me, showed that about 30% of *T. fuscum* olfactory neurons responded to fuscumol and even a greater percentage responded to linalool, a plant

volatile emitted by stressed spruce. CFIA added fuscumol to their host volatile-baited traps in 2007 surveys and by the end of the season had detected *T. fuscum* at several places beyond the quarantine zone boundary that had just been expanded in spring of that year (the insect had obviously already been established there but had gone undetected in earlier surveys with the less sensitive lure). The three component lure of fuscumol, spruce blend and ethanol has been used by CFIA for *T. fuscum* surveys every year since 2007. Fuscumol is also emitted by males of *T. cinnamopterum* and attracts both sexes of that species as well as those of another European species, *T. castaneum* L. Interdisciplinary collaboration with chemists like Peter Silk and his team, including Peter Mayo and Gaetan LeClair, is critical for advancing our knowledge of insect chemical ecology.

We've tested a few applications of fuscumol for control of *T. fuscum* and slowing its spread, with the idea of targeting low density isolated populations at or beyond the leading edge of its distribution that may have arisen due to human-assisted movement. With Peter Silk, Marc Rhainds, Ed Kettela, and others, we tried mating disruption (broadcast applications of fuscumol in biodegradable flakes from a helicopter) and mass trapping to suppress local BSLB populations. We got promising results with the mating disruption, consistently reducing the percentage of mated females by half in treated plots.

*Tetropium fuscum* also uses contact sex pheromones in its mating behavior; that is, males recognize conspecific females by the presence of certain long-chain hydrocarbons (e.g., S-11-methyl-heptacosane) on the female's cuticle that they sense on antennal contact. As soon as a male *T. fuscum* touches a fresh freeze-killed female with his antennae he mounts her and attempts copulation. However, the same male will ignore the female if she has been rinsed in solvent to remove the cuticular hydrocarbons. These species-sex recognition mechanisms likely help reduce inter-specific mating, especially in the case of *Tetropium* spp. and other longhorn beetles that are attracted to the same long-range aggregation pheromones. Peter Silk identified the key compounds on the cuticle of females of both *T. fuscum* and *T. cinnamopterum*, and we were able to elicit copulatory behavior in males by applying these compounds to the bodies of solvent-rinsed females.

One of the first questions we asked about *T. fuscum* was how healthy were the spruce trees it was infesting in Nova Scotia? In Europe, it infests Norway spruce that have been weakened or stressed by things like root rot fungi, wind damage, or defoliation, and in most cases the crowns of susceptible trees appear thin and shabby. In Nova Scotia, *T. fuscum* appeared to be acting more aggressively, infesting apparently healthy red spruce with full, green crowns. However, when we compared the annual rings of infested vs. un-infested spruce growing on the same sites, we found that infested trees had been growing significantly more slowly than uninfested trees for as many as 35 years prior to becoming infested; that is, *T. fuscum* was colonizing slow growing trees of low vigor. However, the "healthy tree" question kept coming up until Leah Flaherty did a series of manipulative field experiments as part of her PhD, co-supervised by Dan Quiring and me, in collaboration with Deepa Pureswaran. Leah showed that when not given a choice, *T. fuscum* females laid similar numbers of eggs on healthy trees and stressed trees but when given a choice, they preferred to both land on and lay eggs on stressed spruce vs. healthy spruce. Leah also showed that *T. fuscum* performance was lower in healthy spruce than in stressed spruce: larval development rate was greatly reduced and survival to adults was almost nil in healthy trees. We concluded that *T. fuscum* presented very low risk to healthy spruce but still posed risk to spruce forests under stress, for example, spruce with suppressed growth rates due to several successive years of defoliation by spruce budworm. In that scenario, many spruce undergoing a temporary period of suppressed growth which would likely survive and resume normal growth following an outbreak, could instead be colonized by *T. fuscum* during the period of low vigor, and become

re-infested year-after-year until death in 1–5 years. Rob Johns and others may be able to test this hypothesis in the next few years as the current spruce budworm outbreak in Quebec starts to move east towards areas in which *T. fuscum* is established in Nova Scotia.

Deepa Pureswaran, with Steve Heard (University of New Brunswick), Rob Johns and several graduate students presenting talks here at the 2015 JAM, has been leading a study on *T. fuscum* and how its invasion success and rate of spread may be influenced by interactions with the native community of bark beetles and wood-boring insects, predators and parasitoids in Nova Scotia. One of the students, Ken Dearborn, found evidence that *T. fuscum* may be displacing *T. cinnamopterum* in Nova Scotia. Allyson Heustis is investigating the possible effects on *T. fuscum* invasion success of two native koinobiont parasitoids of *T. cinnamopterum* that also exploit *T. fuscum*. Jennifer Anderson is looking at the possibility of inter-specific mating and hybridization between *T. fuscum* and *T. cinnamopterum* and how that might affect fitness and invasion success, and Mallory MacDonnell has been studying effects of *T. fuscum* infestation on spruce budworm feeding and defoliation-damage relationships in red spruce.

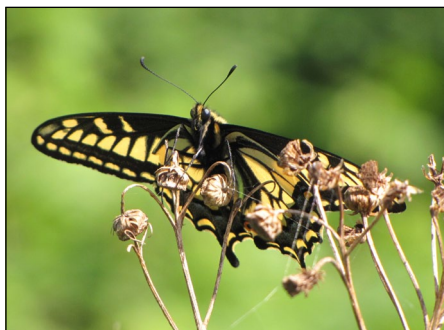
Finally, I'd like to mention some research to develop improved tools for surveillance and early detection of potentially invasive species of bark beetles and wood-boring beetles. The use of solid wood packaging in international shipping has resulted in many introductions of wood-boring beetles to new continents and habitats, and some of these have established and become invasive pests, for example, the emerald ash borer which came from Asia to North America and the red turpentine beetle that went from North America to China. Early detection of established invasive species is critical for rapid response, eradication or containment. Regulatory agencies such as CFIA conduct annual trapping surveys in areas at high risk of exotic species introductions, for example, urban forests near industrial parks in cities that receive a lot of imports. For many years they have baited these traps with host volatile attractants like ethanol and alpha-pinene that are somewhat attractive to a broad range of species but are not as sensitive at detecting low populations of target species in the way that, for example, a sex pheromone is for detecting a species like gypsy moth. However, in the last decade or so, sex and aggregation pheromones have been discovered in many species of longhorn beetles that greatly increase detection efficacy (the labs of Jocelyn Millar and Larry Hanks have been especially productive). Furthermore, the pheromone structures in longhorn beetles are highly conserved, that is, a few structures like 6- and 8-carbon hydroxyketones, alkanediols, fuscumol, fuscumol acetate, and monochamol are attractive to many longhorn beetle species, so by baiting survey traps with pheromones as well as host volatiles, we get increased trap sensitivity to a fairly large number of species and increase the probability of detecting exotic longhorn species that may be present.

For the last few years, with many collaborators in Canada, the USA, and overseas, we have done a series of field trapping bioassays testing the effects of different pheromone-host volatile combinations, trap designs, trap colors, trap height, and other factors on the diversity and abundance of bark beetles and wood-boring beetles captured in traps. This research has been well supported by CFS, CFIA, USDA Animal & Plant Health Inspection Service, Forest Protection Limited, Ontario Ministry of Natural Resources, the Atlantic Canada Opportunities Agency, and SERG-International. We've replicated experiments in a large variety of forest habitats in New Brunswick, Ontario (Krista Ryall, Jeremy Allison, Bruce Gill), Saskatchewan (Roy McIntosh) Alberta (Leah Flaherty, Greg Pohl and David Langor) and British Columbia (Lee Humble), as well as in the US (Dan Miller, Kevin Dodds, Joe Francese, Brian Strom), Poland (Jerzy Gutowski), Jilin, China (Meng Qingfan, Li Yan) and the Russian Far East (Vasily Grebennikov). Running the experiments in Europe and China is particularly informative because it tell us how effective our lures and traps are at detecting species that may be at risk of introduction to North America. The opportunity to test some lures in the Russian Far East with Vasily Grebennikov was

thanks to a snowstorm that precipitated a chance meeting at the Canadian National Collection one morning. Shipping ethanol lures to Russia was problematic due to dangerous goods regulations so we asked PheroTech to ship empty lure pouches which Vasily filled with vodka he purchased in Vladivostok, and for which he received “great respect” from the local shopkeeper. Turns out that ethanol (vodka included) often enhances or synergizes attraction of longhorn beetles to their pheromones and the pheromones only rarely interfere with attraction of some scolytine bark beetle species to ethanol. CFIA now includes longhorn beetle pheromones on their ethanol-baited traps in annual exotic beetle surveys.

We started placing traps in the tree canopy as well as in the understory thanks to Rob Johns who taught us the latest techniques he had learned during a post-doc in Japan. Traps in the tree canopy often collect a different set of species than traps in the understory, so placing traps in both strata generally increases the number of different species detected per trap sample. In fact, even the species of tree in which we place a trap can sometimes influence catches. In general it seems the more diversity in trap placement, attractants used, trap color, etc., the greater diversity of bark beetles and wood-boring beetle species detected. Of course, traps often collect a lot of non-target species which are often tossed or ignored as “bycatch”. Thanks to Reggie Webster, who has both the expertise and passion for discovering and collecting as many beetle species of New Brunswick as possible, and the expertise of taxonomists like Jan Klimaszewski, Patrice Bouchard, Bob Anderson, and others, we had the opportunity to examine our beetle bycatch as well as our target groups. It turns out that the Lindgren funnel traps are very good at collecting many beetle species in addition to bark beetles. This collaboration resulted in many new species descriptions, new Canadian records, and several hundred new provincial species records for New Brunswick (see Webster et al. 2016. History of Coleoptera collecting in New Brunswick. *ZooKeys* **573**: 1–18).

In closing, I would like to thank and acknowledge all of the hard working scientists, technicians, foresters and students with whom I have worked over the years and without whom I would never have got anything done. I don't have room or time to mention everyone but I gratefully thank Cory Hughes, Kate Van Rooyen, Garvice Gesner, Wayne MacKay, Chris Lucarotti, Wayne Mackinnon, Vincent Webster, Chantelle Alderson, Robert Lavalée, Claude Guertin, Serge Laplante, Andy Bennett, Henri Goulet, John Huber, Ed Hurley, Steve Holmes, Andrew Morrison, Chris MacQuarrie, Laura Fidge, Martha McClure, Stephanie Sopow, Art Doane, Tom Walsh, Jessica Price, Andrea Sharpe, Karen O'Leary, Nichole Brawn, Lisa Leachman, Tom McCarthy, Mary Luco, Tyler Nelson, Simon Pawlowski, Sarah Weatherby, Gretta Goodine, and Paula Stewart.



D. Gliberson

Anise Swallowtail (*Papilio zelicaon*, Lepidoptera, Papilionidae)



## International Congress of Entomology (ICE) Update

Congratulations to all graduate students chosen for the International Graduate Student Showcase (IGSS) at ICE. The Canadian graduate students will have a strong presence at the IGSS, with three out of the eight available slots allocated to Jess Vickruck (Brock University), Leanna Lachowsky (University of Calgary), and M. Lukas Seehausen (University of Toronto).

## Science Policy Committee

We are looking for a student/ early professional representative for the recently formed Science Policy Committee, which shall be responsible for coordinating ESC programs related to Science Policy, including national issues relating to endangered species, for suggesting new programs and activities, and for reporting on these in one comprehensive report. If you are a student or early professional, and interested in being the representative please contact us at [students@esc-sec.ca](mailto:students@esc-sec.ca).

## New Award - The Danks Scholarships

We are delighted to note that two new scholarships are available for postgraduate student members of the Society. Please see page 44 for full details.

## Research Roundup

We continue to publicize graduate student publications to the wider entomological community through our Research Roundup initiative. Check out the ESC blog for the most recently featured articles. If you want your

## Mise à jour sur le Congrès international d'entomologie (ICE)

Félicitations à tous les étudiants sélectionnés pour la vitrine internationale aux étudiants gradués lors de l'ICE. Les étudiants gradués canadiens seront fortement représentés avec trois créneaux sur les huit disponibles alloués à Jess Vickruck (Université Brock), Leanna Lachowsky (Université de Calgary), et M. Lukas Seehausen (Université de Toronto).

## Comité de la politique scientifique

Nous sommes à la recherche d'un représentant étudiant ou jeune professionnel pour le nouveau comité de la politique scientifique, qui sera responsable de coordonner les programmes de la SEC en lien avec la politique scientifique, incluant les questions nationales concernant les espèces menacées, pour suggérer de nouveaux programmes et activités, et pour rapporter le tout dans un rapport exhaustif. Si vous êtes étudiant ou jeune professionnel et que vous êtes intéressé à être ce représentant, merci de nous contacter à [students@esc-sec.ca](mailto:students@esc-sec.ca).

## Nouveau prix – Les bourses Danks

Nous sommes heureux de mentionner que deux nouvelles bourses sont disponibles pour les membres étudiants gradués de la Société. Consultez le page 44 pour toutes les informations.

## Aperçu de la recherche

Nous continuons de faire de la publicité pour les publications d'étudiants gradués auprès de la communauté entomologique via notre initiative Aperçu de la recherche. Consultez le blogue de la SEC pour les plus récents articles. Si vous désirez que votre article récemment publié y apparaisse (ou si nous l'avons raté le mois dernier!), envoyez-nous un courriel

recently published article featured (or we missed yours), send us an email at [entsoccan.students@gmail.com](mailto:entsoccan.students@gmail.com). For regular updates on new Canadian entomological research, you can join the ESC Students Facebook page ([Entomological Society of Canada Student Group](https://www.facebook.com/EntomologicalSocietyofCanadaStudentGroup)) or follow us on Twitter ([@esc\\_students](https://twitter.com/esc_students)).

We look forward to hearing from you,

Joanna and Miles

à [entsoccan.students@gmail.com](mailto:entsoccan.students@gmail.com). Pour des mises à jour régulières sur les nouvelles recherches entomologiques canadiennes, vous pouvez joindre la page Facebook des étudiants de la SEC ([Entomological Society of Canada Student Group](https://www.facebook.com/EntomologicalSocietyofCanadaStudentGroup)) ou nous suivre sur Twitter ([@esc\\_students](https://twitter.com/esc_students)).

Au plaisir d'avoir de vos nouvelles,

Joanna et Miles

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## Thesis Roundup / Foisonnement de thèses

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

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

**Abram, P.K.** PhD, 2016. Developmental, morphological, and behavioural plasticity in the reproductive strategies of stink bugs and their egg parasitoids. Supervisors: Jacques Brodeur, Université de Montréal, and Guy Boivin, Agriculture and Agri-Food Canada.

**Dupuis, Julian.** PhD. 2016. Speciation and hybridization in the Old World swallowtail butterfly (*Papilio machaon*) species complex. Supervisor: Felix Sperling, University of Alberta.

**Liu, Qi.** MSc, 2016. Diversity of wetland non-biting midges (Diptera: Chironomidae) and their responses to environmental factors in Alberta. Supervisors: Heather Proctor and Rolf Vinebrooke, University of Alberta.

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M. Larrivée

*Beallamira scalaris* (Coleoptera, Cerambycidae)



# The Danks Scholarships / Les bourses Danks

The Entomological Society of Canada is pleased to announce two new scholarships. The Danks Scholarships comprise two annual postgraduate awards of \$1,000 each.

The Danks Scholarships were endowed by Hugh and Thelma Danks in 2016 to support studies on the Canadian fauna in memory of David Danks, who died in 2008 at the age of 34 years.

Studies qualifying for the Scholarships aim to increase knowledge of the taxonomy, life history or environmental relationships of part of the native Canadian arthropod fauna, but without any focus or bias towards species of direct economic importance. These guidelines reflect the interests of David and of his father Hugh in environmental science and entomology.

David Danks pursued a career in environmental sciences after graduating from the University of Waterloo. He worked for several different companies in Canada and the United States from 1999 onwards, and achieved recognition as a Registered Professional Biologist. He dealt with investigations, regulatory requirements, remediation and other aspects of the work, and was known to his colleagues especially for completing tasks to a high standard as well as for doing so with integrity.

Hugh Danks retired in 2007 after many years as head of the Biological Survey of Canada (Terrestrial Arthropods). During his career in that role he helped to coordinate studies of the arthropod fauna of Canada. His research sought to characterize Canadian and arctic faunas, as well as to elucidate seasonal adaptations such as cold-hardiness and diapause. He also served the Entomological Society of Canada in many capacities, including President.

For more information on how to apply for these scholarships, please go to ESC Student Awards at: <http://www.esc-sec.ca/studentawards.php>

La Société d'entomologie du Canada est heureuse d'annoncer deux nouvelles bourses. Les bourses Danks comprennent deux bourses annuelles pour étudiants gradués de 1000\$ chacune.

Les bourses Danks ont été dotées par Hugh et Thelma Danks en 2016 afin d'appuyer des études sur la faune canadienne en mémoire de David Danks, qui est décédé en 2008 à l'âge de 34 ans.

Les études se qualifiant pour ces bourses visent à augmenter les connaissances de la taxonomie, l'histoire de vie ou les relations environnementales d'une partie de la faune arthropode native canadienne, mais sans aucune emphase ou biais envers des espèces ayant une importance économique directe. Ces lignes directrices reflètent les intérêts de David et de son père Hughes pour la science environnementale et l'entomologie.

David Danks a poursuivi une carrière dans les sciences environnementales après avoir gradué de l'Université de Waterloo. Il a travaillé pour différentes compagnies au Canada et aux États-Unis à partir de 1999, et a été reconnu comme Biologiste professionnel enregistré. Il s'est occupé d'enquêtes, exigences réglementaires, remédiation et d'autres aspects du travail, et été reconnu par ses collègues pour accomplir les tâches à des niveaux élevés ainsi qu'avec intégrité.

Hugh Danks a pris sa retraite en 2007 après plusieurs années à la tête de la Commission biologique du Canada (arthropodes terrestres). Durant sa carrière dans ce rôle, il a aidé à coordonner des études sur la faune arthropode du Canada. Ses recherches cherchaient à caractériser les faunes canadiennes et arctiques, ainsi que d'élucider les adaptations saisonnières telles que la tolérance au froid et la diapause. Il a également servi la Société d'entomologie du Canada dans différents postes, incluant comme président.

Pour plus d'informations sur les procédures d'applications pour ces bourses, visitez la page des bourses étudiantes de la SEC sur : <http://www.esc-sec.ca/f-studentawards.php>

### Canadian entomologists spread the biological control gospel in France

The Agricultural Academy of France frequently organizes events to review agricultural domains relevant to its mandate. Some of these events are made available to the public. On 9 March 2016 in Paris, during a session entitled “La lutte biologique: regards transatlantiques” (Biological control: transatlantic perspectives) (Odile Carisse, Charles Vincent & Catherine Regnault-Roger, organisers), the following presentation was made “La lutte biologique: principes, mode d’emploi, verrous et non-dits” (Biological control: principles, uses, drawbacks, unsaid), and the authors were: Charles Vincent, Susan Boyetchko, Tara Garipey, and Peter G. Mason. The video can be viewed by streaming at:

<http://www.academie-agriculture.fr/seances/la-lutte-biologique-regards-transatlantiques-0?090316>

### Des entomologistes canadiens répandent la bonne nouvelle en France concernant la lutte biologique

L’Académie d’agriculture de France organise fréquemment des événements pour faire le point sur des domaines pertinents à son mandat. Certains de ces événements sont rendus publics. Le 9 mars 2016 à Paris, durant une séance de l’Académie d’agriculture de France intitulée «La lutte biologique: regards transatlantiques» (Odile Carisse, Charles Vincent et Catherine Regnault-Roger, organisateurs), la présentation suivante a été faite: «La lutte biologique: principes, mode d’emploi, verrous et non-dits», et les auteurs étaient: Charles Vincent, Susan Boyetchko, Tara Garipey, et Peter G. Mason. La vidéo de la séance peut être visualisée en streaming au:

<http://www.academie-agriculture.fr/seances/la-lutte-biologique-regards-transatlantiques-0?090316>



D. Giberson

Cardinal meadowhawk (*Sympetrum illotum*, Odonata, Libellulidae)

### Rings and Wings: Observations from a Nest of the Western Yellowjacket, *Vespula pensylvanica* (Hymenoptera: Vespidae)

Robert Bercha

**Abstract:** During the summer of 2015 a large and active colony of *Vespula pensylvanica* occupied and grew in a hollow log in the author's backyard in Calgary, Alberta, Canada. This paper details the observations made over the summer of 2015 and finally in March, 2016 when the nest and its contents were investigated. Investigation of the nest and its occupants included examination of the envelope, combs and numerous specimens of dead *V. pensylvanica* within. The specimens were examined to determine species, wing length, facial pattern and continuity of the yellow loop around each eye to determine the range of variation among individuals within a single colony.

#### Introduction

*Vespula pensylvanica* (de Saussure, 1857), the western yellowjacket, is a common species found from Manitoba to British Columbia in Canada (Buck et al. 2008). The wasps have the typical yellow and black coloration associated with the name yellowjacket. The diagnostic characteristic of this species is reported as a complete yellow ring or loop around the top of each eye (Buck et al. 2008). Subterranean nesting sites such as rodent burrows are common (MacDonald et al. 1974), but other nesting sites with dark spaces may be selected, including attics and inter wall spaces in houses (Buckell and Spencer 1950) and hollow logs. This species of yellowjacket is both a predator of other arthropods (Akre et al. 1981) and a general scavenger (Kimsey and Carpenter 2012). As such, its foraging can bring it into conflict with humans, resulting in its designation as a pest species (Akre et al. 1981).

During the spring of 2015, a queen of *V. pensylvanica* took up residence in a large hollow log (1.5 m long) in the author's back yard in Calgary, Alberta, and founded a colony (Figure 1). The log provided an ideal location for an urban colony as it provided protection from the elements and it minimized the chance of unwanted disturbance. The log has a hole from an old branch 35 cm from its base that would later provide an ideal entrance/exit to the developing nest.

The author is a rapt observer of yellowjackets and as such the non-typical location (i.e., in a hollow log) of this colony



R. Bercha

Figure 1. Hollow log on south side of author's backyard on a typically sunny summer day. Note the opening, which would eventually become the entrance to the wasp nest.

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Robert Bercha ([rbercha@shaw.ca](mailto:rbercha@shaw.ca)) is a professional geologist and amateur entomologist who lives in Calgary, Alberta. His passion for insects and photography has been fused together on his website <http://www.InsectsofAlberta.com>. Since its inception in 2003, the website has become a mainstream resource devoted to educating the lay person about insects in Alberta. In 2014 he was awarded the Frederick S. Carr Award by the Entomological Society of Alberta for his contributions to the furtherance of entomology in Alberta. His research interests include Zygoptera, Bombini and Vespinae in Alberta.

provided an exceptional opportunity for observation and later investigation. Of specific interest were: 1) The rate the colony grew at and what precautions it took to prevent unwanted intrusions. Having previously observed guarding behavior in *Dolichovespula arenaria* (Calgary, Alberta) during the summer of 2008, the author wondered how it would manifest in *V. pensylvanica*. 2) How big was the nest - how many combs would there be and how many cells in each comb? 3) What variation existed among the individuals in a single colony? How often was the eye loop interrupted? (Buck et al. [2008] state that the eye loop in females is rarely interrupted) Was there a wide range of clypeal marking or only a few variations? What was the range of wing length - did this colony fall within the norms? A review of numerous published papers did not reveal any specific analysis of individual variation within a colony that answered these questions.

### Summer 2015 Colony Observations

Wasps were first observed on 12 July 2015 when a few wasps were noticed coming and going from the entrance hole in the log. The maximum number of wasps seen in the entrance at any given time was three and no guard wasps were seen at the entrance. A small amount of finely chewed wood debris lined the base of the hole, although the nest had not grown large enough to extend past the hole (Figure 2). After 5 weeks, the activity at the colony had increased markedly. Forty-six wasps were seen entering the nest and 26 leaving it over a 41-second period observed in a video captured at 6:12 PM on 19 August. There also appeared to be at least one dedicated guard at the entrance for the majority of the video. Additional photographs taken on 25 August showed a continued high activity level with up to six guard wasps (Akre et al. 1976) on duty (Figure 3). By this time, much of the original large hole had been filled in with small bits of wood debris. The first male *V. pensylvanica* was noted and photographed on a nearby (opposite side of the yard) sunflower leaf on 13 October 2015 (Figure 4). No male wasps were observed entering or exiting the nest, so it is not known if this male was produced by this colony. Colony activity subsequently declined as the ambient temperature slowly dropped below freezing over a period of 3 weeks and food sources became scarce.



R. Bercha

Figure 2. Entrance to nest with a small amount of wood debris lining the base of the entrance area, 12 July 2015.





R. Bercha

Figure 3. Level of activity around the entrance to the nest on 25 August 2015. By this time, the diameter of the entrance had been restricted by a thick layer of wood mulch (small, loose particles of decayed wood), and at least six guards were facing outward and monitoring the traffic into the nest.



R. Bercha

Figure 4. A typical male *V. pennsylvanica* photographed near the nest. Note the 13 antennal segments and 7 segments in the abdomen.

### Observations from Dissection of the Nest

The nest was investigated further after overwintering, to provide information on its contents and morphology. The log was frozen to the ground and covered in snow during the winter, but enough thawing had occurred by 5 March 2016 (after 2 weeks of warm weather) to examine the nest inside the log. The envelope of the nest extended to within 40 cm (Figure 5) of the base of the log and was later found to terminate 13 cm from the apex of the hollow area in the log. The length of the nest from the exterior edges of both envelopes was 70 cm. The inside dimensions (at the outside edge of the envelopes) were 19 cm wide by 14 cm high on the opening end of the log, tapering to 12 cm in diameter near the apex. Assuming an average diameter of 14.25 cm this would make the volume of the nest, including the envelope, approximately 11.2 litres. Removing the envelope allowed for examination of the nest morphology. The nest was made up of eight combs. Four combs were located just under the envelope (three large ones with numerous cells and a smaller one at the base; Figure 6), and four more combs were found further into the log. Cells within each comb varied in size, depending on whether they housed worker or reproductive wasps (Figure 7). The number of cells per comb ranged from 61 in the smallest comb to over 1060 in the largest comb, with an average of about 620 cells per comb (Table 1). Each comb (except the smallest) was 11.1–16.3 cm by 19.0–35.5 cm in size (Table 1).

### Observations of wasps from the overwintered nest

Ninety-four dead yellowjackets were found in the nest, including 3 queens and 91 workers. Antennal segments were counted for each specimen to determine sex, and based on the counts, none of the specimens were males. Upon removal from the nest, the specimens were stored frozen until further analysis was completed – at which point they were pinned and dried for storage in insect drawers. Of the three queens, one had damage to her wings and, assuming the damage is related to age, this might indicate that this one was the foundress. All specimens were *V. pensylvanica* and no other *Vespula* species were present.



R. Bercha

Figure 5. Appearance of the nest on 5 March 2016. The outer envelope of the nest extends to within 40 cm of the base of the log. The dimensions of the envelope are 19 cm wide by 14 cm high. The base of the envelope is buried under woody debris.





R. Bercha

Figure 6. Three of the four combs revealed upon removal of the envelope. Note the tapering pillars connecting the lower combs to the ones above. Interestingly, some of the dead *V. pensylvanica* were found in lifelike poses (see inset).



R. Bercha

Figure 7. Sample comb showing variation in cell size within the comb. This shows comb #6 which had 663 cells. The smaller cells (441) on the right are worker cells while the larger cells (222) on the left were constructed later in the season for reproductives.

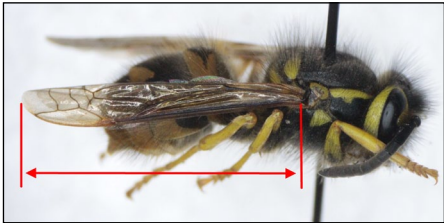


Table 1. Comb dimensions and number of cells

Comb #	Length (cm)	Width (cm)	# cells
1	35.5	13.3	857
2	25.1	12.2	1066
3	20.0	11.1	474
4	4.6	4.1	61
5	19.0	11.9	354
6	23.5	14.2	663
7	28.4	16.3	506
8	27.8	12.7	980
Average	23.0	12.0	620
Total			4961

Wing Lengths

The forewing lengths of 30 randomly selected workers and the 2 queens with undamaged wings were measured with digital calipers under a stereoscopic microscope at 10X magnification to determine the range of wing sizes for the wasps that died in the nest. Each wing length was measured from the base of the costal vein to the tip of the wing (Figure 8). The length of both wings on each specimen was measured twice and the average value of all four measurements was plotted in a frequency histogram (Figure 9). If a



R.Bercha

Figure 8. Lateral view of a *V. pennsylvanica* specimen showing the measurement points used in forewing length determination: base of the costal vein (just in front of the tegula) to the tip of the wing.

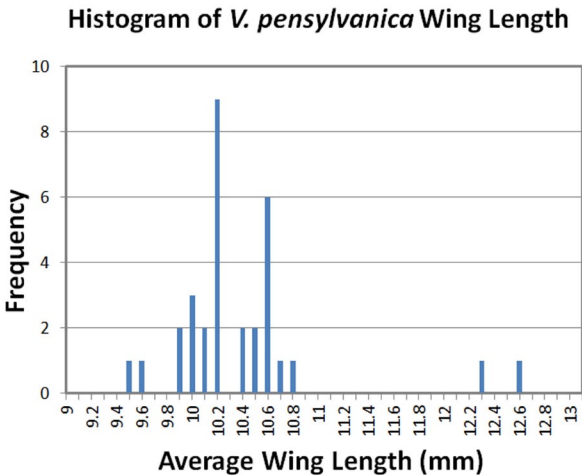


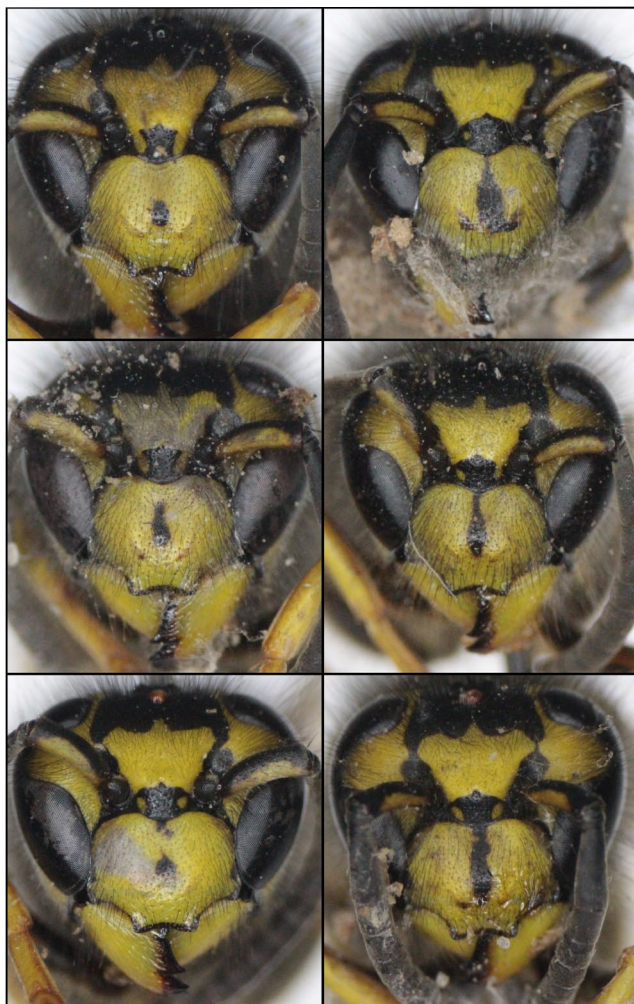
Figure 9. Frequency of wing length for 30 workers and 2 queens.

wing on a specimen was damaged or broken, the two measurements from the damaged wing were excluded from the average for that specimen. Worker wing lengths ranged from 9.5 to 10.8 mm with an average length of 10.26 mm. The most common length was 10.2 mm (found in 30% of the workers). The undamaged wings from the two queens were larger than those of the workers, with their forewings averaging 12.45 mm. These wing length ranges are similar to those published by Buck et al. (2008) for workers (8.5 – 10.5 mm) and on the low end of the range published by Jacobson et al. (1978) for queens (12.5 – 14.5 mm).

### Facial Patterns and Eye Loops

Variations in head markings were noted during examination of wasps from the nest, so these were examined more closely to determine the variation of markings within the colony. The front of the head of the 91 worker specimens was photographed at 12.5X magnification to determine the variation of markings on the clypeus. The spectrum of markings varied from a single “dot” to “anchor” shaped to a vertical “stripe” (Figure 10 and Table 2). The most common markings were dots (34%) and pendulums (32%), and the least common clypeus marking was the presence of two dots. It is also worth noting that the black marking between the antennal bases varied from a solid band to a star-shape that was abruptly narrowed on each side close to the antennal base.

One of the diagnostic characteristics of this species is a complete yellow ring or loop around the top of each eye (Buck et al. 2008). So, it was interesting to note that 15 out of the 91 specimens (16.5%) had broken loops with thin bands of black breaking the yellow loop (Figure 11). Of these 15, 7



R. Bercha

Figure 10. Clypeal and frontal markings of six *V. pensylvanica* workers. These fell into the six basic categories shown here: Column 1 top to bottom: Dot, Vertical Dash, 2 Dots; Column 2 top to bottom: Anchor, Pendulum and Stripe. The top two images show the star-shape (left) and solid band (right) between the antennal bases. (12.5X magnification)

Table 2. Variation in clypeus markings (workers only)

Marking	#	%
Dot	31	34.1%
Dash	13	14.3%
2 Dots	1	1.1%
Anchor	8	8.8%
Pendulum	29	31.9%
Stripe	9	9.9%
Total	91	



Figure 11. Variation in the structure of the characteristic yellow eye-loop in *V. pensylvanica* workers observed in this study. The top image shows an incomplete or broken loop above the eye (side view), and the bottom image shows a complete loop.

(7.7%) had both loops broken and 8 (8.8%) had one loop broken. It was also noted that specimens with broken eye loops predominantly have larger black markings, with none of the specimens having a dot or two dots. The two most common clypeal markings for workers with broken eye loops are pendulum (40%) and anchor (26.7%). Also 14 (93%) of the workers with broken eye loops showed no significant narrowing of the black band between their antennal bases.

Discussion

The observation and subsequent investigation of this *V. pensylvanica* colony have provided insight into the individual variation seen within a single colony in Calgary, Alberta. The wasps located the hollow log in just over a year after it was positioned, and the colony grew rapidly through the summer of 2015, producing eight combs. The presence of two additional queens in the nest is curious. Typically, new queens would have left the nest in search of mates and of overwintering sites (Akre et al. 1980). It is likely that these queens emerged too late in the season and did not have time to mature and leave the nest before the onset of unfavorable temperatures. Although this species of wasp is considered a pest, the author wasn’t subjected to aggressive behaviour from individual wasps during nest and colony observations.

Some variation was noted in facial markings and wing lengths for colony members. The taxonomically diagnostic character of a yellow loop above each eye showed the lowest variation, but 16.5% of the specimens examined did not possess this character. Even in such specimens the yellow extends much farther dorsally on the inside of each eye than in related species such as *V. germanica* (Buck et al. 2008) enabling them to be correctly identified. In contrast, facial markings on the clypeus and frons showed a wider range of variation, though two markings, a pendulum and dot shape made up 66% of the markings for the population. Specimens with broken eye loops tended to have larger black clypeal and frontal markings. Forewing lengths of workers also showed some spread, though the values generally fell within published values for wing lengths (Buck et al. 2008). One queen had damaged wings, likely due to age, and may have been the foundress of the colony. The two additional queens found in the colony in the spring had smaller forewing lengths than reported by Jacobsen et al. (1978), and may not have reflected the size of queens that were produced earlier in the season. Since the damaged wings of the

probable foundress queen could not be measured, it isn't possible to state whether the relatively low wing lengths of the other two queens were related to the time of year (and potentially low food resources) or whether they were typical of the colony.

### Acknowledgements

The author thanks Dr Matthias Buck, Dr Robin Leech and Dr Donna Giberson for their review of this article and suggestions for its improvement. Thanks are also given to Geoffrey Bercha for his help with photo editing. Dr Cedric Gillott is thanked for his guidance in seeing this paper through to publication. The specimens used in this study have been preserved and reside in the author's personal collection.

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## The Montreal Insectarium celebrates 25 years!

Julien Saguez

As the first insectarium based in North America, the Montreal Insectarium celebrated its 25th anniversary in 2015. It is one of the largest museums devoted exclusively to entomology worldwide. The 340 000 people who visit it each year have access to a museum with permanent and temporary exhibitions where it is possible to observe a huge collection of thousands of mounted and live insects; however, few of these visitors would know even a little about the background of the Insectarium. Through this article, you are invited to discover it! I invite you to meet those who participate in the life and evolution of the Insectarium. Enter a world teeming with activity yet which is in metamorphosis. Welcome to the Montreal Insectarium!

### The Insectarium through the years

The Montreal Insectarium was the original idea of one man, Georges Brossard. In 1986, he approached Jean Drapeau, the Mayor of Montreal, and Pierre Bourque, the Manager of the Botanical Garden, to include a dedicated space for an insect display in the garden. He exhibited a part of his collection at the Botanical Garden. The following year, he offered several thousand specimens from a hundred countries from his personal collection to the City of Montreal. Construction of the Insectarium began in 1989 (Figure 1 A-E). The same year, the City of Montreal received an important legacy (more than 100 000 specimens) of the collection of Brother Firmin Laliberté. The Insectarium officially opened on 7 February 1990 in the presence of Mayor Jean Doré before opening to the public a few days later (Figure 1 E-H).

Over the following years, the Insectarium experienced an impressive evolution, thanks to the popularity of its founder, the personal collections offered to the Insectarium, interactive permanent exhibitions and beautiful insects. To continue attracting visitors, the Insectarium added special events like "Insect Tastings", from 1993 to 2005, that enabled many visitors to learn about entomophagy. During the 1990s, the program "Monarchs without Borders"

#### The Montreal Insectarium: some key dates

- 1986:** Exhibition in the Botanical Garden "The most beautiful insects of the world" taken from Georges Brossard's collection
- 1987:** Georges Brossard give a part of his collection to the City of Montreal
- 1989:** The collection of Brother Firmin Laliberté is given to the City of Montreal
- 1990:** Opening of Montreal Insectarium
- 1993:** First edition of "Insect Tastings" (until 2005)
- 1994:** Beginning of "Monarchs without Borders"
- 1998:** First edition of "Butterflies Go Free"
- 2001:** The "Web of Insects" is available online
- 2004:** The "Blue Butterfly" movie is released
- 2009:** Opening of the BuzzGround, an outside family space
- 2010:** 20<sup>th</sup> birthday of the Insectarium
- 2011:** The exhibition "We are the Insects" is renewed
- 2014:** Theme of the year is "Slowness"
- 2015:** 25<sup>th</sup> birthday of the Insectarium;  
25 years of favourites;  
Theme of the year is "Light";  
"Génial! At the Insectarium" app is released

Julien Saguez ([saguezj@yahoo.com](mailto:saguezj@yahoo.com)) completed his PhD at the Université de Picardie Jules Verne (Amiens, France) in 2007. He worked in Agriculture and Agri-Food Canada from 2008 to 2015 with Charles Vincent and Chrystel Olivier, before moving to the Montreal Insectarium for a short project with Maxim Larrivée on the monarch butterfly. He is currently working with Geneviève Labrie (CÉROM) on a decision tree for wireworms in Québec, and is President of the Société d'entomologie du Québec.

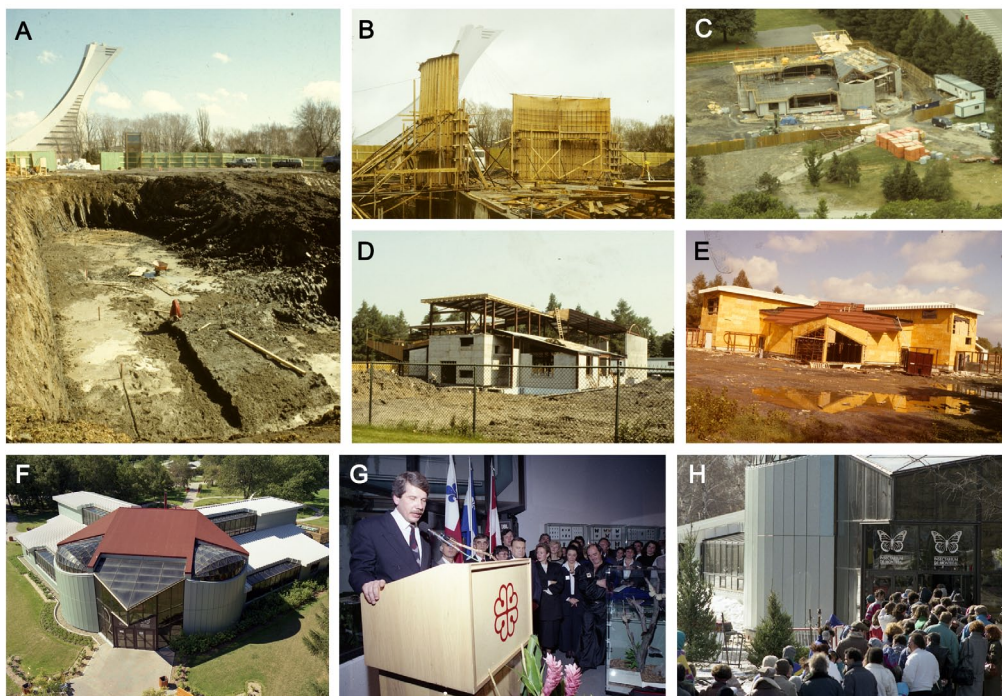


Figure 1. Building and opening of the Montreal Insectarium. **A-E.** Building steps of the Insectarium from 13 March to 20 September 1989. Photo Credit: Montreal Botanical Garden (Archives). **F.** Montreal Insectarium in 1990. **G.** Official opening by Jean Doré, Mayor of Montreal, in the presence of Georges Brassard, 7 February 1990. **H.** Opening to the public on 11 February 1990. Photo credits: **F, G** and **H:** City of Montreal (Archives by Raymond Gagnon).

emerged and the annual event “Butterflies Go Free” began in 1997. During the 2000s, the film “The Blue Butterfly”, inspired by an episode of Georges Brossard’s life, was released. The collection continued to grow, the “Web of Insects” was posted on the internet and a new space with outdoor games, the BuzzGround, was created. In 2010, the Insectarium celebrated its 20<sup>th</sup> birthday and initiated several changes, in order to maintain a beautiful, aesthetically pleasing museum. The year 2011 was highlighted by the renewal of the permanent exhibition “We Are the Insects...”.

Since the late 1990s, the Montreal Insectarium has been one of four scientific institutions that belong to the “Space for Life” which also includes the Biodome, the Rio Tinto Alcan Planetarium and the Montreal Botanical Garden. These four independent institutions work together closely, and have recently established joint programming themes like “Slowness” in 2014 and “Light” in 2015.

Anne Charpentier (Figure 2), a biologist specializing in botany and museology, became the Director of the Montreal Insectarium in 2008. Beforehand, she had participated in the creation of the Biodome in 1989. Then, she worked at the Botanical Garden before being entrusted with the management of the Insectarium. As Director, she manages 20 to 25 people depending



Figure 2. Anne Charpentier, Director.

on the season and events, gives orientation sessions, participates in the development of public programs, and manages the research within the Insectarium. She is also responsible for the museum's development projects, including the expansion project of the Insectarium named "Metamorphosis".

### **"It swarms at the Insectarium"**

Sonya Charest (Figure 3) is a biologist. After a brief period spent at the Botanical Garden, she joined the team of the Insectarium when the service of animation was created. She is now responsible for the department "Programming and Education" at the Insectarium. Sonya manages a team of people who design the animations: a coordinator of educational projects and events, an art technician and 2 to 12 animators. She ensures the development and implementation of permanent and temporary exhibitions, and the establishment and monitoring of thematic programs developed by Space for Life. The objective of her team is to familiarize visitors with the insect world in order to help them discover the essential and fascinating creatures in a funny atmosphere. Whatever their knowledge in entomology, visitors are welcomed with enthusiasm, to develop their curiosity for entomology and to encourage them to come back!

Entering the Insectarium, you will not just visit a museum. Do not think the Insectarium is only the impressive permanent exhibition "We Are the Insects ..." that presents the evolutionary success of insects using modern museology and integrating live and naturalized insects. Entering the Insectarium, the public is invited to live an experience!

The goal of the education department is to make entomology accessible and enjoyable by creating "love and respect" relationships between insects and humans, while maintaining essential scientific rigor. The educational approach is both immersive, relational and participative. The visitor can be in contact with living insects inside and outside the Insectarium (Figure 4).

Inside, several activities are offered each year, featuring live specimens. For example, visitors can discover the ants *Atta* spp. carrying pieces of leaves and flowers. Each animator, passionate biologist or entomologist that works for the Insectarium receives 5 to 7 days training before welcoming the public. This training allows them to learn about entomology, assimilate animation scenarios and practice in order to understand how to manage visitor emotions (fear, disgust, but also fascination). Animators should have an outgoing personality, as well as strong interpersonal and acting skills, because several animations aim to surprise visitors by capsules offered by disguised animators. Manipulating insects, they try to help visitors to forget their fears. Since 2015, children and adults have been encouraged to visit the Insectarium using the cell phone app "Genial! At the Insectarium". This app invites visitors to create their own virtual Insectarium, collecting specimens belonging to the collection of the Insectarium and capturing them by visual recognition. Videos, games and interactive information are also used to learn more about the specimens they have collected.

Outside, in the gardens of the Insectarium, educational and fun games encourage visitors to continue their immersion in the world of insects. The Oasis of the monarchs, the hives of the Insectarium, the hotels for insects and the BuzzGround are many spaces where visitors can interact with insects and learn about their living environments (Figure 4 JN).

The Insectarium also produces several events during the year. Recently, more and more work was done with designers and artists in order that visitors live sensory experiences such as in



Figure 3. Sonya Charest, Head of Programming and Education.





J. Saguez

Figure 4. “It swarms at the Insectarium”. **A-I.** Inside activities including permanent and temporary exhibitions with naturalized and living insects (**A-E**). Art and creativity are included in the Insectarium and Space for Life themes (**F-G**). Visitors can interact with living specimens (**H-I**). **J-N.** Outside activities included in the Botanical Garden, such as the Monarch Garden (**J-K**), the insect hotel (**L**) and exhibitions (**M-N**).

events like “Butterflies Go Free” and “Bearers of Light” (a special event in 2015). Visitors are immersed in the environment of living insects (in the greenhouses of the Botanical garden) or live artistic experiences.

“Butterflies Go Free” is an original idea by Stéphane Le Tirant (entomological assistant at the Insectarium), and is one of the most important annual events for the museum. For over 2 months, from February to April, visitors can discover 1500-2000 butterflies from 50 to 75 different species in the Great Greenhouse. This event requires a lot of logistics and preparation (see the article by Mario Bonneau, *Antennae* 21 [2]: 7), but delights and amazes all visitors.

“Monarchs without Borders” is another great educational project realized by the Insectarium during the great migration of monarchs, and includes several activities. Each year, 1200 breeding kits are available (60% to school groups and 40% to the general public). Participants must come to the Insectarium to receive their kit in early September. Each kit contains four caterpillars, two pupae and a tropical milkweed to rear them until the emergence of adults. Prior to their migration, each butterfly is identified with a label of the Monarch Watch program put on their wings. Each label contains an identification number corresponding to a record where all data are compiled (sex, date and place of release, etc.). The Monarch Watch program aims to track the movement of monarchs, and to identify their migration corridors and rest areas.

All these artistic, creative and immersive experiences are generally planned 2 years in advance and aim to reconnect people to nature. They offer a new look at, and new relationships with, insects. Their intent is to create original experiences and to transmit additional scientific information through animations. The artistic creation “Bearers of Light” presented in 2015 offered visitors the chance to create clouds of fireflies using lasers and bioluminescent materials. The designers of this project, Mathieu Le Sourd and Stephen Paquette, wanted to raise awareness of the fragility of fireflies and bioluminescent phenomena by inviting visitors to become bearers of light.

Finally, the Insectarium offers four travelling exhibitions managed by the Friends of the Insectarium. They are rented on request in order to be displayed in museums, exhibition centres, libraries or regions.

### Collections and Research at the Insectarium

Since 2012, Maxim Larrivée (Figure 5A) has been responsible of the section “Entomological Collections and Research” at the Montreal Insectarium.

Maxim obtained a Master’s degree in Landscape Ecology at Carleton University on the impact of forest fires and recent cuts on the diversity patterns of spiders. Then, he completed

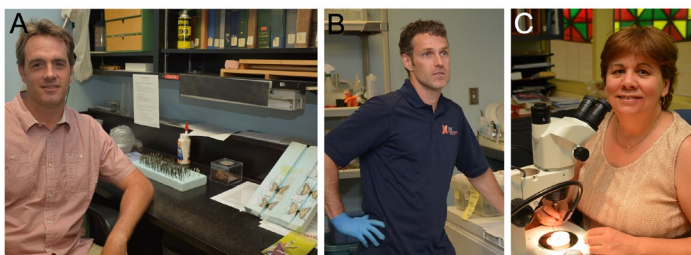


Figure 5. Research at the Insectarium. **A.** Maxim Larrivée. **B.** Mario Bonneau in the breeding room. **C.** Marjolaine Giroux from the entomological information service.

his PhD at McGill University on the spatial patterns of spiders in the canopy and shrub layers in three Quebec parks, with Chris Buddle as supervisor. He also did a 3-year post-doctoral stint at the University of Ottawa in the lab of Dr T. Jeremy Kerr on global change and ecology of butterflies in Canada. During his post-doctoral, Maxim was able to reconnect with his passion for butterflies that he developed as a 3-year old! His experience in insect collection and monitoring and his field expertise on butterflies led to his being recruited to develop the scientific research at the Insectarium. He also manages the personnel associated with the museum's entomological collections. The collection team has five technicians that work on breeding and conservation, but also on the event "Butterflies Go Free", that also mobilizes the technical services and the Botanical Garden for several months.

The Montreal Insectarium is composed of three collections. The first is the living collection used for exhibitions at the Insectarium and for traveling displays. It requires great expertise in breeding and presentation. The Insectarium's ability to present such beautiful living collections is the result of the unique expertise developed by the collection team members in breeding arthropods over the last 25 years. In addition, the Insectarium collaborates with a huge network of fair-trade farms of insects worldwide, allowing access to a wide variety of species while respecting nature. The Insectarium has also developed a great collaboration with the Botanical Garden which provides a large number of the plants used to feed the insects.

The second collection is the exhibition collection, which includes all mounted insects displayed in the permanent exhibition. The collection requires recurring curatorial actions to maintain and update it. There are many exchanges between the museum, other insectariums and university collections worldwide. The collection presented is impressive and stands out from others by its quality of popularization and aesthetic appeal. This involves a lot of logistics to obtain new specimens. Everything must be done legally, including the permit applications (with the Canadian Food Inspection Agency and sometimes CITES) for different species, notably those that are rare and unusual. These species are used to raise public awareness of insect conservation, but also to show the endless adaptations that insects utilise for survival. This collection also requires great expertise in mounting insects and its outstanding quality is recognized everywhere by leading specialists.

The third collection is the scientific collection which includes more than 250 000 specimens. It is located in the Centre for Biodiversity of the University of Montreal and its curation is an enormous task. This collection is the result of many donations and legacies of many Quebecers passionate about entomology. In addition to a beautiful representation of our native wildlife, this collection includes rare specimens or those that are extremely rare in very specific niches. This is actually its strength. In fact, the scientific collection stands out for its Coleoptera (notably its Scarabidae), its Orthoptera (95 to 99% of known species), its Morphos (thanks to a gift of a synoptic collection), and nearly 90% of the Sphingidae collected worldwide. Most collections of these taxa have been validated by world experts.

These three collections always evolve, live and grow. Therefore a 5-year plan was developed to increase the collection network. The goal is to be complementary and not redundant with collections elsewhere.

Regarding research, Maxim Larrivée has the responsibility to establish the museum's research program, and to ensure continuity and enhance the work initiated by the collection team on systematics and taxonomy of Coleoptera and Sphingidae. He also adds his expertise related to his passion for butterflies, especially with e-Butterfly, a citizen participation project, based on long-term monitoring of the distribution of butterflies in the context of global change (global warming, population migration, etc). One of the missions of the Insectarium is to raise awareness of insects

and the conservation of their habitat, while being educational. The objective of e-Butterfly is therefore to be able to record, organize and view data on the distribution of North American butterflies, all stored on an open database and available online and in real time. Every citizen can drop off their butterfly pictures as well as where and how they were observed on the <http://www.e-butterfly.org> website. Any comments will be reviewed and validated by experts before being integrated into the database. Ultimately, Maxim hopes that the project will become one of the most important sources of data on butterflies. e-Butterfly also incorporates historical data and collected data from other websites dedicated to butterflies and many scientific observers' collections, including that of Bishop's University, the Insectarium and the Ouellet-Robert collection of the University of Montreal. Since 2012, more than 160 000 entries have been stored in this database.

Additionally, Maxim co-supervises two graduate students working on several other projects. During summers, he regularly participates in field work to enlarge data collection on butterflies and spiders. He has also received funding to conduct research on the monarch and the expansion of its range. He wants to identify the essential elements of reproductive success in maintaining monarch populations in Canada, based on collected data. He would like to add an entomologist to his team to improve and grow the collection and research section.

Other team members are in charge of the entomological information service at the Insectarium. Many citizens are often worried by insects found in their environment. Thus, the Insectarium offers a free insect identification service. The Insectarium also refers the public to different sources of information, including its website. Each year, more than 1000 specimens are identified, mostly ants.

Finally, Maxim and part of his team, supported by several members of the Société d'entomologie du Québec, accepted the challenge of hosting the 2015 Joint Annual Meeting in Montreal and invited the participants to the welcome reception at the Insectarium.

### **The “Metamorphosis” of the Insectarium**

The “Metamorphosis” project aims to double the current surface area of the museum to offer a more diversified and exciting visitor experience and accommodate more visitors. The objective of “Metamorphosis” is to engage visitors in an experience that involves all the senses and the whole body, creating unsettling experiences, emotional encounters and incorporating more physical experiences.

Anne Charpentier noted that the metamorphosis of the Insectarium is a result of a global reflection on natural history and science museums. Currently, even if the museology of Insectarium is interesting and of quality, mounted specimens only weakly invite and engage visitors to live a real interaction with insects. The objective is to develop more interactions between humans and insects.

At the end of 2017, the Insectarium will undergo major work that will require its complete closure until 2019. The Insectarium will be almost totally demolished: collections, breeding facilities and staff will be relocated.

The new concept (Figure 6) will provide a better experience with larger areas to increase and satisfy the growing number of visitors. Spread over one floor with a linear circuit, its architecture will be inspired by insect habitats (wood, earth, water ...). Its area will be doubled with an encroachment on the Botanical Garden and will include greenhouses for production of plants. The new Insectarium will change perspectives and scales to disorient visitors who will be confused as they enter an insect body crossing part of the museum. Visitors can also experience intimate head-to-head contact with insects to face their fears (e.g., by putting their head in a vivarium or a





**MÉTAMORPHOSE  
DE L'INSECTARIUM**

**CANDIDATURE RETENUE:**  
KUEHN MALVEZZI-  
JODOIN LAMARRE PRATTE,  
SOUFLETTES PARISAU,  
SDK

Une expérience inédite.

Des espaces immersifs qui envoient  
dans le rapport humain-insecte et  
sollicitent davantage les sens.

Des rencontres surprenantes  
avec des insectes vivants.

**ASPECTS TECHNIQUES**

- matériaux favorisant une proximité  
maximale avec les insectes (bleu,  
gris, vert)
- nouvel espace immersif (cylindrique)
- nature morte échantillonnée de la perspective  
de l'architecture et de la morphologie
- chambres d'observation  
individuelles (cité-insecte  
avec les insectes)
- espaces de fonctionnement  
du musée (laboratoires, serres,  
quartiers d'élevage, bureau)
- ouvertures en transparence  
pour comprendre le fonction-  
nement, l'écologie du bâtiment  
et les processus de soutien aux  
insectes vivants



**1 Réset  
La décontextualisation**

**2 Mare aux insectes  
L'eau et la lumière**

**3 Serre de production  
des plantes  
La genèse**

**4 Espace perceptuel  
l'optique  
L'encadrement**

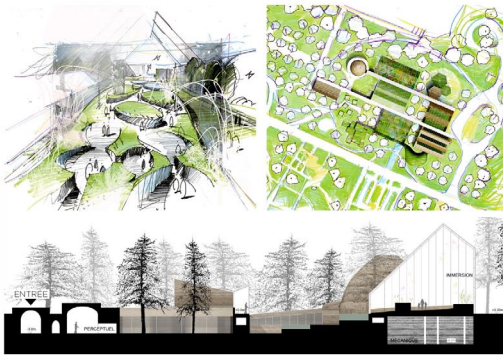
**5 Tapis à Tapis  
La régénérescence**

**6 Jardin d'évolution  
et d'écologie perceptuel  
l'optique  
L'émergence**

**7 Espace immersif  
La synthèse**

**8 Ateliers  
La transformation**

**9 Terrasses et zones  
lunch et lounge  
La machine**



Montréal



Montréal

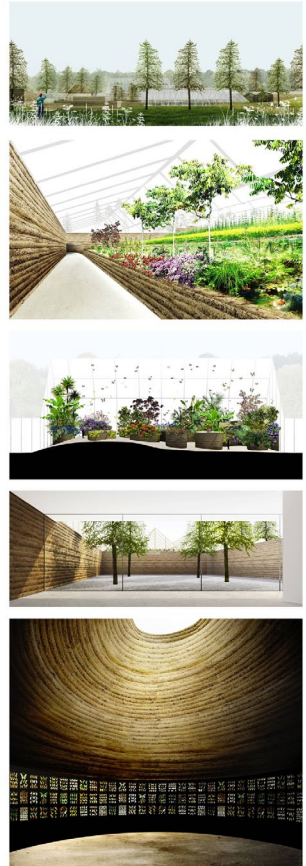


Figure 6. The “Metamorphosis” project. Photo Credits : Space for life and Kuehn Malvezzi-Pelletier De Fontenay-Jodoin Lamarre Pratte.

bubble filled with flies, and by discovering hidden insects by amplifying noises). The collection will be deployed in a cone-shaped room reminiscent of an insect nest. The tour will continue with segments on insect breeding as well as the production greenhouses. At the end of the tour, the public will have the opportunity to live an immersive experience as is done for “Butterflies Go Free”, but with more insect species. Finally, visitors and artists will be invited to develop their creativity (e.g., insect hotel, and activities that bring together artists and visiting scientists).

That’s what the Montreal Insectarium will become: a place to meet science, entertainment and creation, to the delight of children and adults who want to learn more about our insect friends. In the words of Sonya Charest and Anne Charpentier: “The Insectarium is the museum that piques curiosity, a Spice in Space for Life!”

### Acknowledgements

Thanks to the Insectarium team for their welcome, Nadine Fortin (responsible for communications at Space for Life) for her valuable collaboration, and Lise Servant (responsible for managing images at the Botanical Garden) for generously supplying archival images.

### To know more

Website of Space for Life: <http://espacepouurlavie.ca/en>

Website of the Insectarium: <http://espacepouurlavie.ca/en/insectarium>

To discover the Metamorphosis project video: [www.youtube.com/watch?v=UgoH2pxyvMI](http://www.youtube.com/watch?v=UgoH2pxyvMI)

If you missed the animation Bearers of Light: [www.youtube.com/watch?v=OZROmLDbDFE](http://www.youtube.com/watch?v=OZROmLDbDFE)

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# Index to Biography of Entomologists in Canadian publications / l'index des biographies des entomologistes dans les publications Canadiennes, 2011-2015

## THIRD ADDENDUM FOR INDEX TO BIOGRAPHY OF ENTOMOLOGISTS IN CANADIAN PUBLICATIONS, 2011-2015

## TROISIÈME ADDENDUM À L'INDEX DES BIOGRAPHIES DES ENTOMOLOGISTES DANS LES PUBLICATIONS CANADIENNES, 2011-2015

**Cedric Gillott, Bob Lamb & Jean-Pierre Bourassa**

The concept of a single source that provided links to biographical information of entomologists in Canadian publications came to fruition in March 2003 with the appearance of the Index to Biography of Entomologists in Canadian Publications (*Bull. Ent. Soc. Can.* **35**(1):17-48). The authors (D.C. Eidt, P.W. Riegert, and E.C. Becker) were strongly interested in biographical information on their fellow entomologists and recognized the value of bringing together such biographical details as an important component of the Entomological Society of Canada's heritage. The Index covered the period from 1869, when *The Canadian Entomologist* and the *Proceedings of the Entomological Society of Ontario* began publication, to the end of 2000.

The first Addendum to the Index, covering 2001-2005, inclusive, was published in the *Bulletin* (**39**[1]: 45-49) in March 2007, with the second (covering 2006-2010) appearing in June 2012 (*Bulletin* **44**(2):74-77). Their preparation was much simpler and more straightforward than that of the original contribution, not only because of the short time period covered but also because almost all the Canadian periodicals searched for entomological biographies had become available on the internet. Very rarely, biographical information was found *only* on a society's web page and did not appear in printed form. The last comment applies equally to the present version.

Le concept d'une seule source fournissant des liens vers les informations biographiques d'entomologistes dans les publications canadiennes a été concrétisé en mars 2003 avec l'apparition de l'Index des biographies des entomologistes dans les publications canadiennes (*Bull. Ent. Soc. Can.* **35**(1):17-48). Les auteurs (D.C. Eidt, P.W. Riegert, et E.C. Becker) étaient extrêmement intéressés par les informations biographiques de leurs collègues entomologistes et ont reconnu la valeur d'assembler de tels détails biographiques comme une composante importante de l'héritage de la Société d'entomologie du Canada. L'index couvrait la période débutant en 1869, lorsque *The Canadian Entomologist* et les *Proceedings of the Entomological Society of Ontario* ont débuté leur publication, jusqu'à la fin de 2000.

Le premier addendum à l'index, couvrant la période de 2001-2005, inclusivement, a été publié dans le *Bulletin* (**39**[1]: 45-49) en mars 2007, et le second (couvrant la période de 2006-2010) a été publié en juin 2012 (*Bulletin* **44**(2):74-77). Leur préparation a été beaucoup plus simple et plus directe que celle de la contribution originale, pas seulement à cause de la courte période couverte, mais également parce que la presque totalité des revues canadiennes dans lesquelles des informations biographiques étaient recherchées étaient maintenant disponibles sur Internet. Les informations biographiques n'étaient que très rarement trouvées seulement sur le site Internet d'une société, n'apparaissant pas en format imprimé. Ce dernier commentaire s'applique également à la version actuelle.



### Sources, with abbreviations used / Sources, avec les abréviations utilisées<sup>1</sup>:

**Abh** Entomological Society of Alberta web site – honorary members (available on line at / disponible en ligne sur <http://www.entsocalberta.ca/honmem.htm>)

**Abm** Entomological Society of Alberta web site – in memoriam (available on line at / disponible en ligne sur <http://www.entsocalberta.ca/memorial.htm>)

**An** *Antennae* (available on line at / disponible en ligne sur <http://seq.qc.ca/antennae/antennae.asp>)<sup>2</sup>

**Bo** *Boreus* (available on-line at / disponible en ligne sur <http://entsocbc.ca/publications/boreus-newsletter/>)

**Bu** *Bulletin of the Entomological Society of Canada* (available on line at / disponible en ligne sur <http://www.esc-sec.ca/bulletin.php>)

**Mn** *Newsletter of the Entomological Society of Manitoba* (available on line at / disponible en ligne sur <http://home.cc.umanitoba.ca/~fieldspg/news.html>)

**Mp** *Proceedings of the Entomological Society of Manitoba* (available on line at / disponible en ligne sur <http://home.cc.umanitoba.ca/~fieldspg/proc.html>)

**On** *Newsletter of the Entomological Society of Ontario* (available on line at / disponible en ligne sur <http://www.entsocont.ca/newsletter.html>)

**Sn** *Newsletter of the Entomological Society of Saskatchewan* (available on line at / disponible en ligne sur <http://www.entsocsask.ca/newsletters.html>)

<sup>1</sup>The following sources, used in preparation of the Index and/or earlier Addenda, contain no biographic information for the period 2010-2015: Acadian Entomological Society web site; *Journal of the Entomological Society of British Columbia*; *Proceedings of the Acadian Entomological Society*; *Proceedings of the Entomological Society of Alberta*; *Proceedings of the Entomological Society of Ontario* (became the *Journal of the Entomological Society of Ontario* in 2002); *Proceedings of the Entomological Society of Saskatchewan*.

<sup>2</sup>Certain entries (marked \*) are in issues of *Antennae* available only to members of the Société d'entomologie du Québec.

Other sources cited in the Index but not included here have ceased publication.

<sup>1</sup>Les sources suivantes, utilisées dans la préparation de l'Index et / ou des addendums antérieurs, ne contiennent pas d'informations biographiques pour la période 2006-2010: le site Internet de la Société d'entomologie acadienne; *Journal of the Entomological Society of British Columbia*; *Proceedings of the Acadian Entomological Society*; *Proceedings of the Entomological Society of Alberta*; *Proceedings of the Entomological Society of Ontario* (devenu le *Journal of the Entomological Society of Ontario* in 2002); *Proceedings of the Entomological Society of Saskatchewan*.

<sup>2</sup>Certaines sources (marquées \*) sont dans des numéros de *Antennae* disponibles seulement aux membres de la Société d'entomologie du Québec.

D'autres sources sont citées dans l'Index, mais non retenues ici puisque leur publication a cessé.

### Index of biographies / Index des biographies

For this addendum, we have included all articles that, in our judgement, contain significant biographical information: honours and awards, appointments, obituaries, retirements, and profiles. We have not included brief announcements of deaths, retirements, etc.

Pour cet addendum, nous avons inclus tous les articles qui, selon notre jugement, contiennent des informations biographiques significatives : honneurs et récompenses, nominations, notices nécrologiques, retraites et portraits. Nous n'avons pas inclus les brèves notices de décès, de retraite, etc.

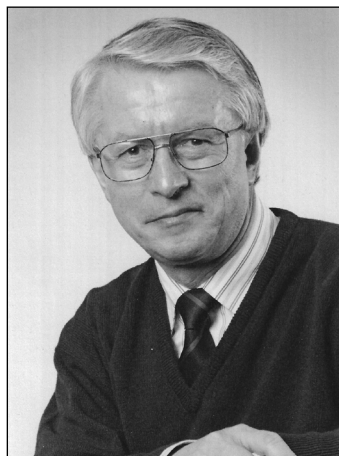
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**G**eorge Hilton Gerber was born on 19 March 1942 in St. Walberg, Saskatchewan, and passed away in Winnipeg, Manitoba, on 13 January 2016.

George began his entomological career at the Saskatoon Research Station of what is now Agriculture & Agri-Food Canada. He spent three summers working there on soil insects while studying towards his Bachelor of Science in Agriculture at the University of Saskatchewan. Upon graduation in 1964, George stayed in Saskatoon, enrolled in a graduate program in biology and completed a PhD thesis in 1968 entitled: "Structure, formation, histochemistry, fate and function of the spermatophore of the caragana blister beetle, *Lytta nuttalli* Say (Coleoptera: Meloidae)." George was hired in 1969 as a scientist at the Canada Agriculture Research Institute in Belleville, Ontario, where he began a long career investigating the biology of insect pests of crops. In September 1972, George and nine of his Belleville colleagues were transferred to the Canada Agriculture Research Station in Winnipeg. He became Head of the Crop and Stored-Products Pests Section at what by then was named the Cereal Research Centre, from 1989 to 1991. George worked there until his retirement in 1996.



**George H. Gerber  
(1942 – 2016)**

From the beginning, George focussed his research on the reproductive biology of insects, particularly the morphology, histology and physiology of reproduction in Coleoptera. His first published paper grew out of a graduate course project in insect physiology on the regulation of the female reproductive cycle in *Tenebrio molitor*. His graduate research was a comprehensive description of blister beetle reproduction (*Lytta spp.*). He sometimes broadened his perspective to apply the insights from this work to insect reproduction in general, and then moved on to repeat his detailed examination on other beetle species, first *T. molitor* and then the sunflower beetle, *Zygogramma exclamationis*. The latter project was done in collaboration with G.B. Neill, the first of four graduate students George advised while an Adjunct Professor at the University of Manitoba. In recognition of his early contributions to our understanding of insect reproduction, George was presented with the C. Gordon Hewitt Award for 1981 by the Entomological Society of Canada (Bulletin of the Entomological Society of Canada **13** [1981]: 72–73).

George believed strongly that basic research provides the best foundation for effective applied entomology. So, when he was transferred to an integrated pest management group in Winnipeg in 1972, he used his knowledge of insect reproduction as the starting point for contributing to the management of insect pests of canola. To broaden his expertise in pest management, George took a transfer of work to the Institute of Animal Resource Ecology at the University of British Columbia in 1979. In Winnipeg, he began working on a little known canola pest, red turnip beetle, *Entomoscelis americana*, with investigations of egg survival, and egg and larval development. This background knowledge on the development of red turnip beetle was extended to host plant interactions. He summed up the work on the life history of this native chrysomelid in reviews and applied the insights he gained to pest management recommendations. George also contributed his knowledge of insect

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*This article is also published in the Proceedings of the Entomological Society of Manitoba in an expanded form with citations and bibliography.*

reproduction to an important canola pest, bertha armyworm, *Mamestra configurata*, and other Noctuidae. George ended his research career with a series of papers from 1995 to 1998 on *Lygus lineolaris* in canola, beginning as usual with the reproductive aspects of the pest, but moving on to host plant relations and seasonal biology.

Besides maintaining an active research career, George contributed greatly to the Entomological Societies of Manitoba and Canada. In Manitoba, George served as Regional Director for the Entomological Society of Manitoba to the Entomological Society of Canada (1974), as editor of the *Manitoba Entomologist* (1981), as chair of the Scientific Program Committee (1983), and as Treasurer (1987–1989), as well as on Entomological Society of Manitoba committees. At the national level, George served as Secretary of the Entomological Society of Canada (1975–1978), as chair of the By-laws, Rules and Regulations Committee for many years, as Director-at-Large (1981–1984), and as President (1994). He always took his society responsibilities seriously, and gained a reputation as the person to ask about the intricacies of society business.

After 50 years as a bachelor, George's life took on a new dimension when he and Margaret Elliott were married in 1992. He and Margaret moved into a new house together and George enjoyed establishing another garden. Only 4 years later, George retired, sooner than he wished, at the time canola research was transferred from the Cereal Research Centre to the Saskatoon Research Centre. In retirement George moved on from entomology, but maintained his interest in natural history and photographing nature. Through his whole adult life, he was an enthusiastic curler, and continued this passion to the end. He was one of the "Aggie-Row Curlers", a mix of players from the Agriculture Canada Research Station and the University of Manitoba, Faculty of Agriculture. George was one of the keenest supporters of this group almost from the time he arrived in Manitoba. His well-known organizational skills were sometimes tested, when he had to combine his enthusiasm for arriving on time at the curling rink on a Friday afternoon, with his focussed attention to detail in his research life.

Robert Lamb, Winnipeg

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### Leonard A. Kelton (1923 – 2011)

Leonard Kelton, born in what is now the Ukraine, moved with his family to Saskatchewan when he was 9. He received a BSc in 1950 from the University of Saskatchewan, and Master's (1954) and PhD (1957) degrees from Iowa State College (now University) under the supervision of H.H. Knight. Soon after receiving his BSc, he began work in the Saskatoon Research Station of the Canada Department of Agriculture. He was transferred to Ottawa in 1954, working in the Canadian National Collection until his retirement in December 1984.

For a full account of Kelton's life and scientific accomplishments, including a complete list of his publications, please see the splendid article written by Henry and Gill (2016).

#### Reference

Henry, T.J. and Gill, B.D. 2016. Leonard A. Kelton, 1923-2011: Biographical sketch, list of publications, described taxa, and patronyms named in his honor. *Proceedings of the Entomological Society of Washington*, **118**: 131-139.

Cedric Gillott, Saskatoon

*The Book of Beetles: A Life-size Guide to Six Hundred of Nature's Gems*. Editor: Bouchard, Patrice and Contributors: Bouchard, Patrice; Bousquet, Yves; Carlton, Christopher; Lourdes Chamorro, Maria; Escalona, Hermes E.; Evans, Arthur V.; Konstantinov, Alexander; Leschen, Richard A.B.; Le Tirant, Stéphane; Lingafelter, Steven W. 2014. University of Chicago Press, Chicago, USA. 656 pages, 2400 color plates. ISBN: 978-0226082752. \$59.67 (cloth), \$33.85 (eBook)

E.O. Wilson (1985) wrote that "...each species of higher organism — beetle, moss, and so forth, is richer in information than a Caravaggio painting, Mozart symphony, or any other great work of art." Just choosing one group of organisms from his short list – the beetles – tells us in no uncertain measure that Wilson's statement is true. The full spread of beetle diversity is immense and, as has been pointed out in recent literature on the topic (McKenna et al. 2015), "... (beetles) account for ~25% of known species on Earth and ~40% of insects". This being the case, a book containing spectacular images and interesting information on hundreds of beetle species could very well be a Louvre in your living room.

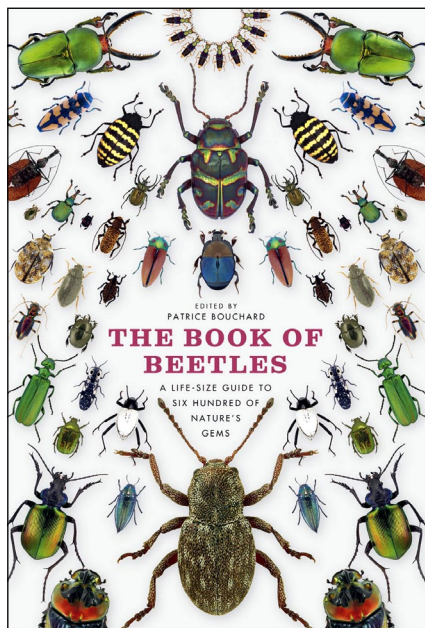
The book that I am referring to is simply titled "The Book of Beetles", with the subtitle "A Life-size Guide to Six Hundred of Nature's Gems". It is edited by Patrice Bouchard with contributions by a number of experts. Much like "Snakes on a Plane", the title tells you exactly what this book is about – beetles. But unlike the movie, this book is much more than its straight-forward title. This book runs over 650 pages and covers 600 of the hundreds-of-thousands of known, not to mention the many, many more unknown, species of beetles. McKenna et al. (2015) state that:

*"Curculionidae is the second most diverse family of metazoans (surpassed only by the rove beetle family Staphylinidae, which is older) with more than 51 000 named extant species in more than 4600 genera. Conservatively, it is estimated that there are more than 200 000 additional undescribed species of Curculionidae alone."*

In other words, if we suddenly and magically discovered every single curculionid species thought to be extant today, we would need to compile more than 400 volumes of this size just to cover that one group within the beetles. So the editor and contributors to the *The Book of Beetles* were required to complete the thoroughly daunting task of choosing a mere 600 beetles – a bit more than 0.1% of known species – to highlight.

In the introduction the authors set out their criteria for inclusion in this book. The authors chose among beetles that, variously:

- are "scientifically compelling"
- have "curious natural histories"
- are "culturally significant"
- are "economically important"
- are "rare and threatened"
- are "physically impressive"





Certainly many, many other beetle species besides the chosen 600 would meet many or all of these criteria but could not be included. Despite the daunting task, I argue that the editor and contributors did a fantastic job of selecting 600 compelling examples of these amazing insects – a curated selection that highlights a small, but still immense, range of their taxonomic, ecological, anatomical, and natural historical diversity.

Upon first encountering this large book (the cloth version, weighing in at 2.2 kg, is not one that is easily read in bed, but there is also an eBook option for those so inclined), the reader is immediately struck by the beauty of the jacket featuring an array of impressive insects surrounding the title. Remove the dust cover, and you will find three more gorgeous photographs of beetles on the front, spine, and back. These photographs all should simply whet your appetite for what you will find when you open the book.

The book begins with a short introduction to the volume followed by eight nicely illustrated chapters entitled “What is a beetle?”, “Beetle classification”, “Evolution & diversity”, “Communication, reproduction & development”, “Defense”, “Feeding behavior”, “Beetle conservation”, and “Beetles & society”. Each chapter covers exactly what its title indicates, and each is accessible for the non-expert, but engaging and full of enough detailed information to also keep career entomologists and other naturalists interested. The chapters are short, ranging from about two to six pages each; and by p.30 the real meat of the book – the description of the 600 chosen beetle species – begins. The book, at this point, is divided up into four parts covering species from the Archostemata, the Myxophaga, the Adephaga, and the Polyphaga. The latter two, of course, comprise by far the largest portion of the book.

Each page contains information on one beetle species, so each open pair of pages features two species. From top to bottom each page has a generalized range map (entire world minus Antarctica mapped on each page) for the species; a table of generalized taxonomic and natural history information (family, subfamily, distribution, macrohabitat, microhabitat, feeding habits, and a note); a dorsolateral line drawing of the insect along with a note on the typical adult length (sometimes for both male and female if divergent); the species name in both italics and in all caps, along with the taxonomic authority and date; a paragraph on the natural history of the insect; a paragraph detailing related species of note; a photograph of the insect at actual size; a dorsal macro photograph, always of high quality; and a small figure heading next to the macro photograph with a bit more interesting natural history. If you want to take a good look at what each species page entails, you can download a PDF sample of the book at the publisher’s website: <http://press.uchicago.edu/ucp/books/book/chicago/B/bo19341340.html>.

The level of detail in both the photographs and the text is exceptional. For the photographs, you will have to look at the sample linked at the publisher’s site to see what I mean. In terms of the text, each and every species is a joy to read about. For instance, we learn that specimens of the cigarette beetle (*Lasioderma serricorne*; p.372) have been found in Tutankhamun’s tomb; and that the larvae of the Florida tortoise beetle (*Hemisphaerota cyanea*; p.555) build up strands of their own feces over their bodies to protect themselves from enemies. And on and on it goes, page after page in rich and amazing detail.

The book ends with several short appendices including a glossary, a classification of the Coleoptera, and a list of other beetle resources.

This is not the sort of book that most people would likely read through one page at a time front to back and then put away. Rather, it is a book that can be read much as one might open drawers in an entomological collection, with the benefit of also having a studied natural historian at your shoulder to tell you what you are looking at. This book is a sheer pleasure to read and to look at, and everyone will learn from it. It most certainly belongs in the collection of every practicing entomologist or other naturalist who is interested in insects.

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Dezene Huber

University of Northern British Columbia

*Note: this review is a revised version of a review that appeared at Dezene Huber's blog 7 July 2015: <http://blogs.unbc.ca/huber/2015/07/07/book-review-the-book-of-beetles/>*

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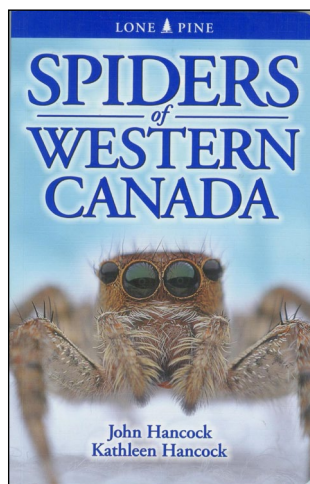
***Spiders of Western Canada.*** Hancock, J. & Hancock, K. 2015. Released February 2016. Lone Pine Press, Edmonton, Alberta. 191 pp. Printed in China (soft cover). ISBN: 978-155105-916-7. \$24.95 Canadian.

Because spiders are not central to the interests of most entomologists, amateur insect collectors and photographers, the nature of publications on spiders has remained technical. Spider books and articles are designed, for the most part, for the use of araneologists (e.g., Bradley 2013; Dondale & Redner 1978; Leech & Laird 1983; Paquin & Duperré 2003; Ubick et al., 2005). In order to study and examine spiders for species identifications with the references just mentioned, a microscope and other equipment are essential. Even with many pictures as seen in Kaston (1978) and Ubick et al. (2005), the small size of either the spider or the diagnostic morphological parts of the spider, a microscope is needed.

However, through the efforts of the Alberta Bugs mailing list (ref. Dr Felix Sperling, Biological Sciences, University of Alberta), many non-specialists and keen amateurs, who live in western Canada and the northwestern United States are finding spiders while photographing insects. They are becoming curious about spiders, and are taking pictures of them. This has led to many high-quality photos being taken of spiders by these amateurs, whose first question is, "Could someone please identify?" For the most part, spider identifications via the Alberta Bugs mailing list for western Canada have been dropped onto the shoulders of Robin Leech (Edmonton) and Donald Buckle (Saskatoon). Their ID loads are increasing.

With the advent of this book, *Spiders of Western Canada*, a number of things are going to happen. First, I am very pleased to see the publication of a book on spiders of western Canada. Such a book has been needed for a long time, and it may trigger the publishing of other, bigger and more inclusive books on western Canadian spiders. It may also signal that those araneologists (spider specialists) in western Canada may have to deliver courses in spider recognition and identification (probably through the Alberta Society of Professional Biologists). The amateurs are going to have another source to check.

The book has a selection of 27 families of spiders, and 85 of some of the more common spider



species in the 3 western Canadian Provinces. However, there are at least 1500 spider species in these provinces, many known from only a specimen or two. Knowing that, users will have to examine their specimens very carefully, as 85 species is about 5% of the area's spider fauna. Because of this, there is a considerable margin for error. The problem becomes one of applying a supposedly and hopefully correct name to a look-alike spider, but which in reality may be a spider that is not even in the same family.

The first 33 pages are devoted to spiders and their relatives, spider anatomy including the parts of the legs, mouth parts, spinnerets, molting, ballooning, reproduction, courtship, feeding and many other aspects about spiders.

The main body of the book from pages 36 to 179 covers the selected spider families and species. While there are a few photos, most illustrations are hand-drawn and beautifully colored images of spiders or some aspect of their habitat. The final pages are a glossary, references, a few websites (no pun meant here!) and an index.

The one situation new to me and found in *Spiders of Western Canada* is that almost all of the species listed in the book have been assigned a common name. This is interesting yet unusual, as most of the common spiders in western Canada have never previously been given a common name. In fact, few of the species have rarely been encountered even by an araneologist, let alone the public. It is usual that a common name is applied to a plant or an animal when it is seen and recognized by many. I cannot say that there is this kind of recognition for most of the spiders in this book.

The assignment of these common names was done by the authors of the book. It was done without considering that many of the very small spiders in the western provinces are not recognized even by araneologists to the family level unless studied by at least a 10X hand lens.

Most entomological and arachnological societies have a common names committee in order to ensure that there is no confusion or conflict between a common name being assigned to several species, or to ensure that several common names are not assigned to just one species. I don't think that the authors were necessarily aware of the purposes of these committees. To the authors' defense, I comment that where they came from (the United Kingdom), essentially all species of spiders are described, but not by a long shot have common names been given to most UK spiders. Why? Simply because most people, even arachnologists, when they see a small dark brown spider moving long quickly cannot identify it to family, even in the UK.

This is a delightful little book of a handy field book size (14x22x1cm). The cover picture shows a large, head-on view female jumping spider, leaving no doubt as to the contents. I did not see a note by the authors for the suggested users of this book, so I contacted one of them who told me, "The young student,...". However, I am not sure most amateur *young students* when using this book will be able to identify all shown spider families, or the shown species, without having had a spider taxonomy course, by having a microscope handy, and/or having someone knowledgeable along who can make positive identifications. To use this book, an amateur will have to "picture" hunt, as there are no keys. The authors have divided the spiders into two main groups: Hunting Spiders (wolf spiders, crab spiders, sac spiders, etc.) and Web-Weaving Spiders (funnel-web spiders, orb weaving spiders, comb-footed spiders, etc.).

The information about the family Sicariidae is wrong. Only one specimen has ever been found in British Columbia, in Vancouver, in 1961. It is the same for Alberta: only one specimen, found in Calgary in 2007. Both the Vancouver and Calgary specimens were captured alive, and most likely came into Canada as lone spiders. The family is not established in Canada. The two spiders are in the genus *Loxosceles*, of brown recluse spider fame.

Because of the above-mentioned shortcomings, I give *Spiders of Western Canada* a cautionary recommendation.

## Acknowledgements

I thank the following for communication and discussion during the review of this book: Don Buckle, John Hancock, Robb Bennett, Alberta Society of Professional Biologists (Peter Kingsmill, Jen Sipkens), Glavis Edwards, Paula Cushing, Faye Boer and Lorie J. Taylor Leech.

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Robin Leech,  
Edmonton



K. Knysh

*Dolomedes triton* (Araneae, Pisauridae)

## Books available for review / Livres disponibles pour critique

The ESC frequently receives unsolicited books for review. A list of these books is available online ( <http://www.esc-sec.ca/bulletinbooks.php> ) 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 (Tom Lowery, [Tom.Lowery@agr.gc.ca](mailto:Tom.Lowery@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.

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/f-bulletinbooks.php> ) 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 (Tom Lowery, [Tom.Lowery@agr.gc.ca](mailto:Tom.Lowery@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 for review / Disponibles pour critique

Schmidt, J.O. 2016. *The Sting of the Wild*. 280 pp., 13 colour plates. Johns Hopkins University Press.

ISBN: 9781421419282 [hardcover]

Halliday, T. 2016. *The Book of Frogs: A life-sized guide to six hundred species from around the world*.

656 pages, 1,230 colour plates. The University of Chicago Press. ISBN-13: 9780226184654.

Appel, E. and S.N. Gorb. 2015. *Comparative functional morphology of vein joints in Odonata*. *Zoologica* Vol. 159; 104 pages, 53 figures, 1 table; E. Schweizerbart'sche Verlagsbuchhandlung. ISBN-978-3-510-55046-3. [paperback]

Vega, F.E. and R.W. Hofstetter. 2015. *Bark Beetles: Biology and Ecology of Native and Invasive Species*. 640 pp.; colour photographs. Academic Press. ISBN print: 9780124171565; e-book: 9780124171732 [hardcover or e-book]

Cárcamo, H.A. & D.J. Giberson [Eds.]. 2014. *Arthropods of Canadian Grasslands*. Vol. 3: Biodiversity and Systematics, Part 1. 413 pp.; photos, maps, checklists. Biological Survey of Canada. ISBN 9780968932162 [soft cover]

Giberson, D.J. & Cárcamo, H.A. [Eds.]. 2014. *Arthropods of Canadian Grasslands*. Vol. 4: Biodiversity and Systematics, Part 2. 479 pp.; photos, maps, checklists. Biological Survey of Canada. ISBN 9780968932179 [soft cover]

Wright, D.J. & T.M. Gilligan. 2015. *Eucosma* Hübner of the Contiguous United States and Canada (Lepidoptera: Tortricidae: Eucosmini). 256 pp., 133 species accounts, 30 colour plates, 49 monochrome plates. Wedge Entomological Research Foundation. ISBN 9780933003163 [hardcover]



## Highlights from the Executive meeting of 21 January 2016

The Executive Committee met by conference call on 21 January 2016. Attending were Terry Wheeler (President), Neil Holliday (First Vice-President), Patrice Bouchard (Second Vice-President), Staffan Lindgren (Past President), Christopher Dufault (Treasurer), Alec McClay (Secretary), and Geoff Powell (Strauss Event & Association Management, Executive Director).

### Website issues

An Ad Hoc Committee will be appointed to come up with a new model for the structure and content of the website. This committee should include the webmaster and those responsible for the Society's other online presences including the Blog and Twitter feed. There was discussion of the process for ensuring that various aspects of the content of the website are kept up to date, and the need for different contact links for different aspects of the Society's business, such as membership enquiries or requests for entomological information. Under ESC's contract with Strauss, their commitment is to move the Society's existing website content to a WordPress platform. Further design work beyond this will involve additional hours that would be billed extra to the contract. Geoff can provide an estimate once the scope of work is defined.

Dicky Yu has requested to resign as webmaster.

### Plebiscite

Staffan reported that as chair of the Nominations Committee he has a full slate of candidates in place and is in the process of assembling biographies. The process for setting up the vote on the website was discussed; it should be possible to use the Society's YourMembership software for this.

### Scholarship Trust Fund

An update was received from Rebecca Hallett on the legal status and process for incorporation of the Trust Fund. Staffan and Christopher will request the Fund's records from the Charities Directorate, on behalf of the Board of the Trust.

A second cheque has been received for the Dosdall Memorial Scholarship, and a contract has been signed with the Danks family to set up a scholarship in memory of David Danks.

### International Congress of Entomology

The Executive reviewed the proposal for ESC business and social functions at ICE which had been prepared in 2014. It was suggested that Monday evening would be a better time for the President's Reception. It would also be desirable if the symposium submitted by Michel Cusson could be scheduled for Tuesday morning to keep this as an ESC day. Staffan will respond to ESA with these proposals. Funding for student travel awards for ICE has been received from Dow and invoiced to Enterra. The Student and Early Professional Awards Committee will be able to name the recipients of ICE travel awards very soon.

### Joint Annual Meetings issues

The Executive reviewed the draft policy on organization of the Joint Annual Meeting which had been provided to the Board at the meeting on 7 November 2015. Some revisions were made to clarify that that it will not impact the ability of regional societies to benefit from sharing any surplus from the JAM, that the use of Strauss's services for hotel negotiations is an option under our contract, not a requirement, and to refer to the need for regional societies to carry adequate insurance coverage in addition to that carried by ESC. A revised policy document will be circulated to regional societies for comment.

The Society's Comprehensive General Liability insurance covers our meetings anywhere in Canada or the USA at no additional premium, as long as the insurer is notified of the meeting. Regional societies and other groups that may meet in conjunction with ESC are not covered and need to obtain their own insurance.

The Treasurer reported on his investigation into potential sales tax liabilities from past JAMs. To date he has received all required information from the Manitoba and Saskatchewan societies, and partial information from the Quebec society.

### **Entomological Society of America**

Pat Bouchard will initiate discussions with ESA and ESBC in connection with planning the joint meeting in Vancouver in 2018.

### **Bilingualism**

The Executive confirmed that, as a standard operating procedure, all information to be sent out as emails by the Society should go to the Bilingualism Committee for translation, even when time is limited. The Société d'entomologie du Québec raised a concern about the lack of bilingual content in presentations at the recent JAM in Montreal. This was discussed by the Executive and the consensus was that the Society could not make rules about the content of scientific presentations. They recommended that some language be included in the next revision of the JAM guidelines to encourage presenters to make their presentations accessible to both anglophones and francophones.

### **Budget**

The Treasurer will work with Strauss to prepare a draft budget for review by the Executive in early April.

### **Membership renewals**

Geoff reported that renewal notices were sent out in mid December, first reminders were sent earlier in January, and a second reminder will be sent shortly. To date 215 members have renewed (not including emeritus members). The list to receive renewal reminders includes 515 names of members from 2014 and 2015.

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## **Highlights from the Executive meeting of 4 April 2016**

The Executive Committee met by conference call on 4 April 2016. Attending were Terry Wheeler (President), Neil Holliday (First Vice-President), Patrice Bouchard (Second Vice-President), Staffan Lindgren (Past President), Christopher Dufault (Treasurer), Alec McClay (Secretary), and Geoff Powell (Strauss Event & Association Management, Executive Director).

### **International Congress of Entomology**

Staffan reported that the schedule had been sent to Rosina Romano at ESA and all arrangements are in hand. All ESC events including the ESC Symposium will take place on Tuesday 27 September, other than the outgoing Board meeting on Saturday 24 September. There were 30 applicants for student and early professional travel awards, and 14 awards were given. Letters and cheques have been sent to all successful applicants.

### Joint Annual Meetings

Only the ESBC and ESM have responded to the policy document that was circulated. ESBC had no concerns. ESM expressed general approval of the document but raised some concerns about the process for negotiation of hotel contracts. The Executive agreed that these concerns did not require any changes to the policy document itself.

Full data have been received from Regional Societies for 8 of the past 10 Joint Annual Meetings with respect to assessing possible sales tax liabilities. Partial data has been received from SEQ for the Montreal 2006 meeting and from AES for the Halifax 2011 meeting. Once all data are received the Treasurer will discuss with our legal counsel and report back.

### Entomological Society of America

Pat has been in contact with the ESA regarding planning for the joint meeting in Vancouver in 2018.

### Membership renewals

The mailout of paper renewal forms in February was effective in encouraging renewals and membership now stands at 320. Lists of non-renewing members have been sent to Regional Directors for follow-up. Some software changes to the renewal system have been implemented and it now appears to be working well, but a glitch concerning ordering of Annual Reviews needs to be addressed.

### Budget 2016-2017

The Executive reviewed the draft budget for 2016 – 2017 and suggested some changes. A revised version will be presented for approval by the full Board at a teleconference meeting in June.

### Achievement Awards

The Executive received recommendations for the Bert and John Carr Award, an Honorary Membership, a Fellowship, and for the Gold Medal and C. Gordon Hewitt Award. Ballots of the Board will be conducted to ratify the Gold Medal and Hewitt nominees and a membership vote will be held on the Honorary Membership nomination.

### Nominations Committee

Two candidates have agreed to stand for each of the positions of Director at Large and Second Vice-President.

### Secretary position

The Secretary advised the Executive that, as he will soon have served 5 years in the position, he would like to step down when a replacement can be found.



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

The following have been nominated and agreed to stand for election in 2016 for the indicated positions. In accordance with our By-laws, a plebiscite will be held to select candidates for a slate of Directors. The slate will then be presented for formal election at the Annual Members' Meeting in Orlando in September. The current ballot will select candidates for a Director-at-Large and a Societal Director (Second Vice-President). The plebiscite will be conducted electronically. To access the plebiscite, please log in to the Members' Section of the website. Then go to the Members' Area and follow the survey link under Societal Business. Members will only be able to vote once and voting will close on **15 July 2016. PLEASE REMEMBER TO VOTE!**

Les personnes suivantes ont été nommées et ont accepté de se présenter pour les élections de 2016 pour les postes indiqués. Conformément à notre règlement intérieur, un plébiscite sera d'abord tenu afin de sélectionner les candidats pour une liste de directeurs. La liste sera ensuite présentée pour une élection formelle à la réunion annuelle des membres à Orlando en septembre. Ce vote sélectionnera les candidats pour les postes de conseillers et de directeur sociétal (second vice-président). Le plébiscite sera conduit électroniquement. Pour accéder au plébiscite, veuillez vous connecter à la section des membres du site Internet. Rendez vous ensuite dans la section des membres et suivez le lien sous les affaires sociétales. Les membres ne pourront voter qu'une seule fois et les votes se termineront le **15 juillet 2016. N'OUBLIEZ PAS DE VOTER!**

#### Candidates for Societal Director / Second Vice-President : Candidats pour le poste de directrice sociétale / seconde vice-présidente



Cynthia Scott-Dupree (University of Guelph) (left / gauche) and / et Fiona Hunter (Brock University) (right / droite).



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



Laura Timms (Credit Valley Conservation) (left / gauche), and / et Suzanne Blatt (AAFC, Kentville) (right / droite).



## **Seeking a Secretary**

The Entomological Society of Canada is looking for a member willing to serve in the position of Secretary, starting in September 2016. The duties of the Secretary are to support the President and Board by:

- Scheduling meetings of the Executive Council, Board, and the Members, preparing agendas, obtaining reports from Officers and others, sending out notices of meetings, attending the meetings, and recording minutes. Meetings are normally held by conference call, except for those that take place at the Society's Joint Annual Meeting.
- Working with our Association Management Company (Strauss Event and Association Management) to ensure that records of Society activities such as agendas, minutes, reports, and correspondence are preserved.
- Providing information on Society business to the Bulletin Editor, Webmaster, and Strauss for publication, posting, and circulation to the membership as necessary.
- Maintaining up-to-date membership lists and contact information for the Society's Board and Committees.
- Providing information as required to Strauss for the Society's annual filings with Corporations Canada and other government agencies.
- Preparing ballots and supporting information for plebiscites to recommend candidates for nominations as Societal Director and Director at Large, and for any other questions on which votes may be required, providing instructions on voting procedures, and notifying candidates and the membership of the results of voting. Advising affiliated societies when they need to provide names for nominations as Regional Directors.

A familiarity with the Society's by-laws, rules, and guidelines, past experience as a Board member, and the ability to work in French and English would all be assets. This is a great opportunity to serve one of the oldest biological societies in North America and to deepen your contacts with the Canadian entomological community. Any member interested in serving in this position should contact the President, Terry Wheeler [terry.wheeler@mcgill.ca](mailto:terry.wheeler@mcgill.ca), by 30 June 2016. The final selection will be made by an ad hoc committee convened by the President.

## **Secrétaire, SEC**

La Société d'entomologie du Canada cherche un membre prêt à remplir le poste de secrétaire dès septembre 2016. Les tâches du secrétaire sont de soutenir le président et le conseil d'administration en :

- Fixant les dates de réunions du conseil exécutif, du conseil d'administration et des membres, préparer les ordres du jour, obtenir les rapports des dirigeants et autres, envoyer les avis de réunions, assister aux réunions et préparer les comptes rendus.
- Travaillant avec la compagnie de gestion des associations (Strauss Event and Association Management) pour s'assurer que les documents des activités de la Société, comme les ordres du jour, comptes rendus, rapports et correspondance sont préservés.
- Fournissant de l'information sur les affaires de la Société au rédacteur du Bulletin, au webmestre et à Strauss pour la publication, l'affichage et la circulation aux membres lorsque nécessaire.
- Maintenant à jour la liste de membres et les coordonnées du conseil d'administration et des comités de la Société.
- Fournissant l'information requise à Strauss pour les rapports annuels de la Société avec Industrie Canada et les autres agences gouvernementales.
- Préparant les bulletins de votes et l'information pour les plébiscites afin de recommander des candidats pour les nominations de directeur sociétal et conseiller, et pour toute autre question pour laquelle le vote est nécessaire, en fournissant les instructions sur les procédures de vote et en avisant les candidats et les membres des résultats du vote. Avisant les sociétés affiliées lorsqu'elles doivent fournir des noms pour les nominations comme directeurs régionaux.

Une certaine connaissance du règlement intérieur, des règles permanentes et des lignes directrices, une expérience antérieure comme membre du conseil d'administration et la capacité de travailler en français et en anglais sont des atouts. Il s'agit d'une belle opportunité de servir une des plus vieilles sociétés biologiques en Amérique du Nord et d'approfondir vos contacts avec la communauté d'entomologistes canadiens. Tout membre intéressé à occuper ce poste doit contacter le président, Terry Wheeler [terry.wheeler@mcgill.ca](mailto:terry.wheeler@mcgill.ca) avant le 30 juin 2016. La sélection finale sera faite par un comité ad hoc convoqué par le président.



## **ESC Scholarship Fund**

Once again the Society would like to thank and acknowledge the very generous donors to the ESC Scholarship Fund. These tax-deductible donations are very important to the Society, as it is only because of these donations that the scholarship fund is self-sustainable. Donations can be made at any time and a receipt for income tax purposes in Canada will be issued. Please make cheques payable to the Entomological Society of Canada.

## **Le Fonds de bourses d'études de la SEC**

La Société tient à remercier, une fois de plus, les très généreux donateurs et donatrices au Fonds de bourses d'études de la SEC. Ces dons déductibles d'impôt sont très importants pour la Société, puisque c'est seulement grâce à ces dons que le Fonds de bourses d'études est autosuffisant. Les dons peuvent être faits en tout temps, et un reçu pour fin d'impôt vous sera envoyé. Veuillez libeller votre chèque au nom de la Société d'entomologie du Canada.

## **2015 Donors – Donateurs et donatrices pour 2015**

P.J. Albert	David Gillespie	Miriam Richards
John Arnason	Cedric Gillott	David Rosenberg
John Borden	David Halstead	Les Safranyik
E. Alan Cameron	Teresa Height-Dosdall	T.A. Sawinski
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Christopher Cloutier	Neil Holliday	J.D. Shorthouse
Conrad Cloutier	Robert Lamb	Juliana Soroka
Michel Cusson	Staffan Lindgren	Art Stock
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Hugh & Thelma Danks	Valin Marshall	Howard Thistlewood
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Daniel Doucet	W. Dean Morewood	
Wayne Fairchild	Jennifer Otani-Semach	Entomological Society of
Paul Fields	Steven Paiero	Alberta
Gary Gibson	Diether Peschken	
Bruce Gill	Therese Poland	

... and those who preferred to remain anonymous.

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



## Twelfth Annual Photo Contest

The Twelfth Annual Photo Contest to select images for the 2017 covers of *The Canadian Entomologist* and the *Bulletin of the Entomological Society of Canada* is underway. The cover images are intended to represent the breadth of entomology covered by the Society's publications. Insects and non-insects in forestry, urban or agriculture; landscapes, field, laboratory or close-ups; or activities associated with physiology, behaviour, taxonomy or IPM are all desirable. A couple of 'Featured Insects' (for the spine and under the title) are also needed. If selected, your photo will grace the cover of both publications for the entire year. In addition, winning photos and a selection of all submitted photos will be shown on the ESC website.

### Contest rules:

- Photos of insects and other arthropods in all stages, activities, and habitats are accepted. To represent the scope of entomological research, we also encourage photos of field plots, laboratory experiments, insect impacts, research activities, sampling equipment, etc. Photos should, however, have a clear entomological focus.
- Digital images must be submitted in unbordered, high-quality JPG format, with the long side (width or height) a minimum of 1500 pixels.
- Entrants may submit up to five photographs. A caption must be provided with each photo submitted; photos without captions will not be accepted. Captions should include the locality, subject identification as closely as is known, description of activity if the main subject is other than an insect, and any interesting or relevant information. Captions should be a maximum of 40 words.
- The entrant must be a member in good standing of the Entomological Society of Canada. Photos must be taken by the entrant, and the entrant must own the copyright.
- The copyright of the photo remains with the entrant, but royalty-free use must be granted to the ESC for inclusion on the cover of one volume (6 issues) of *The Canadian Entomologist*, one volume (4 issues) of the *Bulletin*, and on the ESC website.
- The judging committee will be chosen by the Chair of the Publications Committee of the ESC and will include a member of the Web Content Committee.
- The Photo Contest winners will be announced on the ESC website, and may be announced at the Annual Meeting of the ESC or in the *Bulletin*. There is no cash award for the winners, but photographers will be acknowledged in each issue the photos are printed.
- Submission deadline is 15 August 2016. Entries should be submitted as an attachment to an email message; the subject line should start with "ESC Photo Contest Submission". Send the email message to: [photocontest@esc-sec.ca](mailto:photocontest@esc-sec.ca).

## Douzième concours annuel de photographie

Le douzième concours annuel de photographie visant à sélectionner des images pour les couvertures de *The Canadian Entomologist* et du *Bulletin de la Société* d'entomologie du Canada pour 2017 est en cours. Les images sur la couverture doivent représenter l'étendue entomologique couverte par les publications de la Société. Des photos représentant des insectes ou autres arthropodes forestiers, urbains ou agricoles, des paysages, du travail de terrain ou de laboratoire, des gros plans, ainsi que montrant des activités associées à la physiologie, au comportement, à la taxonomie ou à la lutte intégrée seraient souhaitées. Deux « insectes vedettes » (pour le dos et sous le titre) sont également recherchés. Si elle est sélectionnée, votre photo ornera la couverture des deux publications pour l'année entière. De plus, vos photos gagnantes et une sélection de photos soumises seront montrées sur le site Internet de la SEC.

### Règlements du concours :

- Les photos d'insectes et autres arthropodes à n'importe quel stade, effectuant n'importe quelle activité et dans n'importe quel habitat sont acceptées. Afin de représenter les sujets de la recherche entomologique, nous encourageons également les photos de parcelles de terrain, expériences de laboratoire, impacts des insectes, activités de recherche, équipement d'échantillonnage, etc. Les photos doivent, cependant, avoir un intérêt entomologique clair.
- Les images numériques doivent être soumises sans bordure, en format JPG de haute qualité, avec le plus grand côté (largeur ou hauteur) d'un minimum de 1500 pixels.
- Chaque participant peut soumettre jusqu'à cinq photographies. Une légende doit être fournie pour chaque photo soumise : les photos sans légendes ne seront pas acceptées. La légende doit inclure la localisation, l'identification du sujet le plus précisément possible, la description de l'activité si le sujet n'est pas un insecte, et toute information intéressante ou pertinente. Les légendes doivent avoir une longueur maximale de 40 mots.
- Les participants doivent être membres en bonne et due forme de la Société d'entomologie du Canada. Les photos doivent avoir été prises par le participant, et le participant doit en posséder les droits d'auteur.
- Le participant conserve les droits d'auteur de la photo, mais l'utilisation libre de droits doit être accordée à la SEC afin de l'inclure sur la couverture d'un volume (6 numéros) de *The Canadian Entomologist*, un volume (4 numéros) du *Bulletin*, et sur le site Internet de la SEC.
- Le comité d'évaluation sera choisi par le président du comité des publications de la SEC et inclura un membre du comité du contenu du site Internet.
- Les gagnants du concours de photographie seront annoncés sur le site Internet de la SEC et pourront être annoncés à la réunion annuelle de la SEC ou dans le *Bulletin*. Il n'y a pas de prix en argent pour les gagnants, mais les photographes seront remerciés dans chaque numéro où les photos seront imprimées.
- La date limite de soumission est le 15 août 2016. Les soumissions doivent être faites en pièces jointes d'un courrier électronique. L'objet du message doit débiter par « Soumission pour le concours de photographie de la SEC ». Envoyez vos courriels à : [photocontest@esc-sec.ca](mailto:photocontest@esc-sec.ca).

# Announcements / Annonces

## Graduate student opportunities at Raine Pollinator lab, University of Guelph, Canada

Are you interested in the behaviour, ecology and conservation of pollinators and looking to take on the challenge of an MSc or PhD? Professor Nigel Raine is looking for enthusiastic, committed, and hard working students to join his lab in the School of Environmental Sciences at the University of Guelph.

### Research topics for prospective graduate students include:

1. Assessing the impacts of a range of environmental stress factors on native bees, their colonies and populations. Stress factors could include pesticide exposure, parasites and poor nutrition – both individually and in combination. The potential impacts of environmental stressors on native bees are comparatively unknown, and understanding effects on behaviour and ecology of these essential pollinators could have significant ramifications for agricultural production and maintenance of wild plant biodiversity.
2. Establishing pollinator habitat and monitoring pollinators. Opportunities could include working with farmers to design, establish and monitor demonstration plantings to support wild pollinators in agricultural landscapes, assessing the efficacy of pollinator seed mixes, the production of practical aids to support a wide range of stakeholders interested in creating and managing habitat for pollinator conservation, and involvement in a wider pollinator biodiversity monitoring program for Ontario. These projects aim to assess the current status and trends of wild pollinator biodiversity, and support sustainable ways to improve pollinator health, in the province.
3. Investigating how variation in learning and memory can affect foraging performance and reproduction of bees in the landscape. Learning and memory play a key role for bees when searching their environment and choosing which flowers to visit. Understanding how variation in cognitive traits might be adapted to different ecological conditions, and may affect how pollinators respond to environmental change, are important ongoing research questions in the Raine lab.

Professor Raine moved to Canada in 2014 to take up the prestigious Rebanks Family Chair in Pollinator Conservation at the University of Guelph. Prospective candidates would be applying to join a dynamic and growing research team working on a wide range of pollinator and pollination topics in the lab and field. Successful candidates would also be part of the renowned Ontario Agricultural College, founded in 1874, and with a thriving graduate research community.

There are a number of funded studentships currently available to join the Raine lab. Prospective applicants are encouraged to contact Professor Raine after researching outputs from his team (see link to references below) and thinking about research questions that really interest them. Applications will be assessed as they arrive and continue until positions are filled. If interested in applying, please email your C.V. (including contact information for references), a short statement of research interests, and a 1-page covering letter to [nraine@uoguelph.ca](mailto:nraine@uoguelph.ca)

A full list of publications can be found here: [https://www.researchgate.net/profile/Nigel\\_Raine](https://www.researchgate.net/profile/Nigel_Raine)

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Content of newsletters published by the Canadian Phytopathological Society and Canadian Weed Science Society

Contenu des bulletins publiés par la Société canadienne de phytopathologie et la Société canadienne de malherbologie



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THE CANADIAN PHYTOPATHOLOGICAL SOCIETY  
LA SOCIÉTÉ CANADIENNE DE PHYTOPATHOLOGIE

**CPS.SCP News**

**Vol 59(4)**

**December 2015**

[http://phytopath.ca/wp-content/uploads/2015/10/CPS-SCP-News-59\\_4-December-2015.pdf](http://phytopath.ca/wp-content/uploads/2015/10/CPS-SCP-News-59_4-December-2015.pdf)

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THE CANADIAN PHYTOPATHOLOGICAL SOCIETY  
LA SOCIÉTÉ CANADIENNE DE PHYTOPATHOLOGIE

**CPS.SCP News**

**Vol 60(1) March 2016**

<http://phytopath.ca/wp-content/uploads/2016/03/CPS-SCP-News-60-1-March-2016.pdf>

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## Meeting announcements / Réunions futures

### **The IX International Symposium on Phlebotomine Sandflies**

Reims, France, 28 June-1 July 2016

<http://www.univ-reims.eu/site/event/isops-ix.18817.html>

### **Beetles: Diversity, Identification and Natural History in Maine and Around the World**

Steuben, Maine, 17-23 July 2016

### **The Entomological Collections Management Workshop**

Washington, DC, 18-20 July 2016

[http://ecnweb.org/default.asp?Action=Show\\_Workshop](http://ecnweb.org/default.asp?Action=Show_Workshop)

### **A Short Course on Insect Genetic Technologies: Theory and Practice**

Rockville, Maryland, 24-29 July 2016

<http://igtrcn.org/technical-workshops/2016-technical-course/>

### **Society for Invertebrate Pathology**

Tours, France, 24-28 July 2016

<http://sip2016tours.org>

### **Ecology of Aphidophaga XIII**

Freising, Germany, 29 August-2 September 2016

<http://aphidophaga.de/>

### **Entomological Society of Canada Annual Meeting 2016**

Orlando, Florida, 25-30 September 2016

The meeting will be held in conjunction with the 2016 International Congress of Entomology.

### **XXV International Congress of Entomology (Entomology without Borders)**

Orlando, Florida, 25-30 September 2016

[www.ice2016orlando.org](http://www.ice2016orlando.org)

### **The Combined International Electropenetrography (EPG) Conference and Workshop on**

#### **New AC-DC Technology**

Lake Alfred, Florida, 2-7 October 2016

[http://www.crec.ifas.ufl.edu/extension/epg/epg\\_workshop.shtml](http://www.crec.ifas.ufl.edu/extension/epg/epg_workshop.shtml)

### **12<sup>th</sup> International Congress of Orthopterology (Orthoptera in a Changing World)**

Ilhéus, Bahia, Brazil, 30 October-3 November 2016

<http://www.ico2016.com.br/>

### **The 2016 Combined Meeting of the Australian Entomological Society and the Entomological Society of New Zealand**

Melbourne, Australia, 27-30 November 2016

<http://www.aesconferences.com.au/>

### **The 5th International Forum for Surveillance and Control of Mosquitoes and Mosquito-borne Diseases**

Nanjing, China, 22-26 May 2017

[www.mosquitoforum.net](http://www.mosquitoforum.net)

### **The Third Hemipteran-Plant Interactions Symposium**

Madrid, Spain, 4-8 June 2017

<http://www.hpis2017.csic.es/>

### **IOBC-WPRS working group: Integrated Control in Protected Crops, Temperate Climate**

4 to 8 June 2017 in Niagara Falls, Canada.

<http://iobccanada2017.ca/>

### **26th International Conference of the World Association for the Advancement of Veterinary Parasitology, WAAVP 2017**

Kuala Lumpur, Malaysia 4-8 September 2017

<http://www.waavp2017kl.org/index.php>

### **Entomological Society of Canada Joint Annual Meeting 2017**

Winnipeg, 22-25 October 2017

The meeting will be held in conjunction with the Entomological Society of Manitoba

<http://www.esc-sec.ca/annmeet.php>

*Readers are invited to send the Editor notices of entomological meetings of international, national or Canadian regional interest for inclusion in this list.*

*Les lecteurs sont invités à envoyer au rédacteur en chef des annonces de réunions entomologiques internationales, nationales ou régionales intéressantes afin de les inclure dans cette liste.*

## ***Bulletin of the Entomological Society of Canada***

Editor: Cedric Gillott

Assistant Editor: Donna Giberson

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

Published by the  
Entomological Society of Canada  
386 Broadway, Suite 503  
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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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ISSN: 0071-0741

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**Submission deadline for the next issue: 31 July 2016**



## ***Bulletin de la Société d'entomologie du Canada***

Rédacteur: Cedric Gillott

Rédactrice adjointe: Donna Giberson

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

Publié par la  
Société d'entomologie du Canada  
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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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ISSN: 0071-0741

Droits d'auteur 2016 Société d'entomologie du Canada

**Date de tombée pour le prochain numéro: 31 juillet 2016**

# Officers of affiliated Societies, 2015-2016

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





### A pleasing response

The response to my request in the March 2016 *Bulletin* was both immediate and strong. Within a few days, several members had contacted Tom Lowery (Publications Committee Chair) offering to review books, and we look forward to reading their thoughts on the titles chosen in future issues. Thank you!

Under Society Business in this issue you will find an advertisement for a new Secretary. After 5 years in the position, Alec McClay has decided to step down. A large debt of gratitude is owed to Alec for his hard work and diligence in this position, which is one of the most important in the Society. Once again, the Society is looking for a volunteer prepared to devote their time and energy to ensure the effective running of the Society's affairs.

In the same section, you will find concrete examples of members volunteering to give a major commitment of time to the Society, namely, the candidates standing for election as Second Vice-president and/or Director-at-Large. Again, these individuals deserve a large 'Thank you' for allowing their names to stand. We owe it to them to cast our ballots to select who we consider the most suitable candidates ..... And may the best women win!

### Une réponse plaisante

La réponse à ma requête dans le *Bulletin* de mars 2016 a été immédiate et forte. En quelques jours, plusieurs membres ont contacté Tom Lowery (président du comité des publications) pour offrir de critiquer des livres, et nous avons hâte de lire votre opinion sur ces titres dans des numéros futurs. Merci!

Dans la rubrique des affaires de la société de ce numéro, vous trouverez une annonce pour un nouveau secrétaire. Après 5 ans en poste, Alec McClay a décidé de se retirer. Une immense reconnaissance à Alec pour son travail ardu et sa diligence dans ce poste, qui est un des plus importants dans la Société. Encore une fois, la Société cherche un bénévole préparé à dévouer de son temps et de son énergie pour assurer que les affaires de la Société roulent de façon efficace.

Dans la même section, vous trouverez des exemples concrets de membres qui investissent bénévolement de leur temps pour la Société, notamment les candidats pour l'élection de second vice-président et / ou conseiller. Encore une fois, ces individus méritent un énorme merci d'accepter de mettre leur nom en élection. Nous leur devons de voter et de sélectionner les candidats que nous considérons les plus appropriés. .... Et que les meilleures femmes gagnent!

# Entomological Society of Canada, 2015-2016

## Société d'entomologie du Canada, 2015-2016

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Chris Cutler (2017)  
Véronique Martel (2018)

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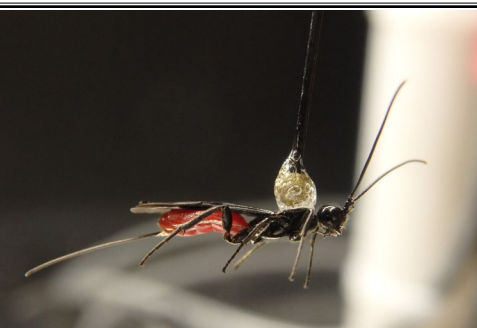
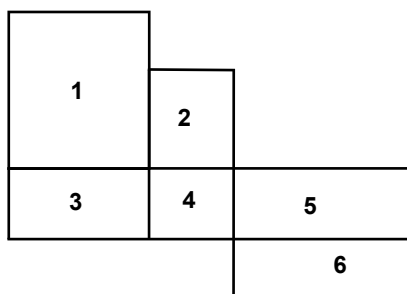
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Date of issue: June 2016 /  
juin 2016

ISSN: 0071-0741

### Front cover/Plate supérieur:

1. Graduate students collect at a light trap late at night (Vernon, BC). The bright lights are powered by the car's battery.  
Des étudiants gradués capturent des insectes dans un piège lumineux tard dans la nuit (Vernon, C.-B.). Les lumières vives sont alimentées par une batterie de voiture. [Photo : Ward Strong]
2. Predator versus parasitoid: *Rhinocoris annulatus* feeding on an ichneumonid (Delémont, Switzerland).  
Prédateur contre parasitoïde : *Rhinocoris annulatus* se nourrissant d'un ichneumon (Delémont, Suisse). [Photo : Tim Haye]
3. A spruce budworm (*Choristoneura fumiferana*) pupa on a balsam fir branch. The spruce budworm is a major native defoliator in Eastern Canada. Near Baie-Comeau, QC.  
Une chrysalide de tordeuse des bourgeons de l'épinette (*Choristoneura fumiferana*) sur une branche de sapin baumier. La tordeuse des bourgeons de l'épinette est un défoliateur indigène dans l'est du Canada. Près de Baie-Comeau, Qc. [Photo : Véronique Martel]
4. The longhorned beetle *Bellamira scalaris* preparing for takeoff in Denver, NS.  
Le longicorne *Bellamira scalaris* se préparant à s'envoler à Denver, NS. [Photo : Colin MacKay]
5. Cecropia moth, *Hyalophora cecropia*, just after molting to third instar.  
This lab-reared caterpillar is from the F2 generation of a gravid female collected in 2014 from Black Donald Lake near Calabogie, ON.  
Un saturnie cécropia, *Hyalophora cecropia*, après la mue vers le troisième stade. Cette chenille élevée en labo est de la génération F2 d'une femelle féconde capturée en 2014 au lac Black Donald près de Calabogie, Ont. [Photo : Andrea Brauner]
6. *Megachile* Latreille, 1802 (Megachilidae) leafcutter bees are important pollinators widely used in alfalfa growing areas. Their reproductive biology is quite interesting. This specimen was excavating its nest in an old wood retaining wall in our garden. Prince George, BC.  
*Megachile* Latreille, 1802 (Megachilidae). Les abeilles découpeuses sont d'importants pollinisateurs largement utilisés dans les aires de cultures de Luzerne. Leur biologie reproductive est plutôt intéressante. Ce spécimen creusait son nid dans un vieux mur de soutènement en bois dans notre jardin. Prince George, C.-B. [Photo : Staffan Lindgren]

### Back cover/Plate inférieur:

Female *Atanycolus* sp., a North American parasitoid of emerald ash borer, tethered to a flight mill in a laboratory at the Canadian Forest Service, Great Lakes Forestry Centre (Sault Ste. Marie, ON) to study factors affecting flight.

Une femelle *Atanycolus* sp., un parasitoïde nord-américain de l'agrire du frêne, attachée à un moulin de vol dans un laboratoire du Service canadien des forêts, au Centre de foresterie des Grands-Lacs (Sault-Ste-Marie, Ont.), afin d'étudier les facteurs qui affectent le vol. Photo : Justin Gaudon.