



December 2020 Vol. 40 (2)

# Boreus



Newsletter of the Entomological Society of British Columbia





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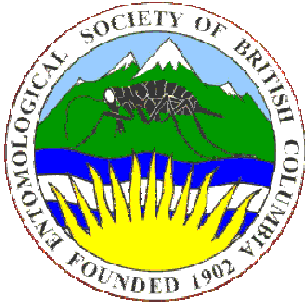
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## The Executive



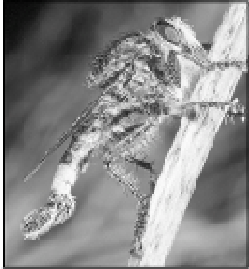
The Entomological Society of British Columbia is a scientific Society founded in 1902 for the advancement of entomological knowledge in the province.

<b>President</b>	Wim van Herk <b>Agriculture Canada, Agassiz</b>
<b>First Vice President</b>	Chandra Moffat <b>Agriculture Canada, Summerland</b>
<b>Second Vice President</b>	Lorraine Maclauchlan <b>B.C. Ministry Forests &amp; Range, Kamloops</b>
<b>Secretary</b>	Rob Higgins <b>Thompson Rivers University, Kamloops</b>
<b>Treasurer</b>	Marcus Clodius, <b>Agriculture Canada, Agassiz</b>
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<b>Editor (Boreus)</b>	Gabriella Zilahi-Balogh <b>Canadian Food Inspection Agency, Kelowna</b> Elton Ko <b>Simon Fraser University</b>
<b>Directors</b>	Joyce Leung (1 <sup>st</sup> ) <b>Semios, Vancouver</b> Dan Peach (2 <sup>nd</sup> ) <b>University of BC, Vancouver</b>
<b>Graduate Student Representative</b>	Asim Renyard <b>Simon Fraser University, Burnaby</b>
<b>Honorary Auditor</b>	
<b>Regional Director of National Society</b>	Brian Van Hezewijk <b>Canadian Forest Service, Victoria</b>
<b>Web Page Editor</b>	Brian Muselle <b>University of British Columbia – Okanagan, Kelowna</b>

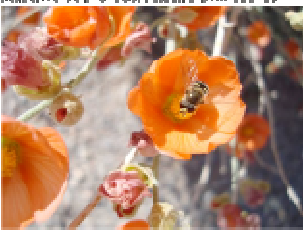


## Publications of ESBC

# Journal of the Entomological Society of British Columbia

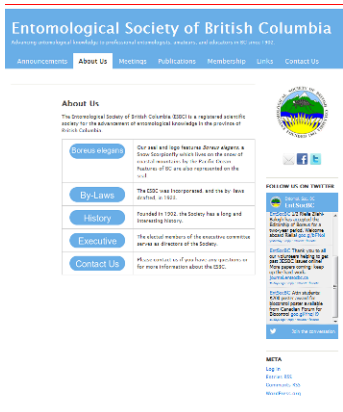
 <p><b>Journal of the Entomological Society of British Columbia</b></p> <p>ESBC</p>	<p>The Journal of the Entomological Society of BC is a peer reviewed, open-access journal. Manuscripts dealing with all facets of the study of arthropods will be considered for publication. Submissions may be from regions beyond British Columbia and the surrounding jurisdictions provided that content is applicable or of interest to a regional audience. Authors are invited to submit ideas for review and forum articles as well. Line drawings or photographs as candidates for the cover are also accepted.</p> <p>For more information please contact Dr. Kathy Bleiker, Editor-in-Chief at <a href="mailto:journal@entsocbc.ca">journal@entsocbc.ca</a>.</p> <p>The deadline for submissions to be included in the 2020 issue is 1 September, 2020. Please submit articles at the JESBC website: <a href="http://journal.entsocbc.ca/">http://journal.entsocbc.ca/</a>.</p>
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## Boreus

 <p><b>Boreus</b></p> <p>Newsletter of the Entomological Society of British Columbia</p>	<p><i>Boreus</i>, the Newsletter of the Society is published in June and December. It contains entomological news, comments, reports, reviews and notices of meetings and other events. While emphasizing the Society's affairs, <i>Boreus</i> provides members with a forum for their views and news of British Columbia entomology, as well as informal articles, notes regarding research projects, and anything else that may be of interest to entomologists.</p> <p>Please submit any entomological photograph, article, event or informational tidbit to the Editor!</p> <p>Please send correspondence concerning <i>Boreus</i> to Dr. Gabriella (Riella) Zilahi-Balogh at <a href="mailto:boreus@entsocbc.ca">boreus@entsocbc.ca</a>.</p> <p>The deadline for submissions to be included in the June issue is June 1, and the December issue is December 1. Submission dates are flexible. Submit before the end of the month.</p>
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## ESBC Website



**Entomological Society of British Columbia**  
Advancing entomological knowledge to professional entomologists, amateurs, and students in BC since 1917

Announcements | **About Us** | Meetings | Publications | Membership | Links | Contact Us

**About Us**  
The Entomological Society of British Columbia (ESBC) is a registered scientific society for the advancement of entomological knowledge in the province of British Columbia.

**Our core and long history:** British Columbia Entomologists Society focuses on the state of entomological knowledge in the province of British Columbia. Hundreds of BC entomologists are also represented on the web.

**By Laws**  
The ESBC was incorporated under the laws of British Columbia in 1917.

**History**  
Founded in 1917, the Society has a long and interesting history.

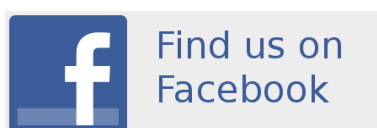
**Executive**  
The elected members of the executive committee serve as the officers of the Society.

**Contact Us**  
We can answer all your questions and provide you with more information about the ESBC.

**Main Webpage:** <http://entsocbc.ca>

Update your bookmarks, and save our new URL to your browser favorites. Our website provides all the information you need, in one place: ESBC announcements, meeting info, publications, contact information, and other useful links.


## Facebook



**Join us on Facebook:**  
<https://www.facebook.com/groups/13552445022/>

Keep in touch with students, colleagues, and friends! Stay up to date with the latest entomological happenings in BC, upcoming conferences, education and employment opportunities.

## Twitter



**Follow us on Twitter:** <https://twitter.com/EntSocBC>

Join the conversation and connect with thousands of other entomologists and insect enthusiasts from all over the world. Stay up to date with insect news, announcements, conferences and job opportunities.



## Membership

**Membership** of the Entomological Society of B.C. is available to anyone interested in entomology. Annual dues are:

- Regular Member (Canadian Resident):
  - **BEFORE** MARCH 30 = \$20.00 (CDN)
  - **AFTER** MARCH 30 = \$30.00 (CDN)
- Regular Member (International):
  - **BEFORE** MARCH 30 = \$30.00 (CDN)
  - **AFTER** MARCH 30 = \$40.00 (CDN)
- Student Member:
  - **BEFORE** MARCH 30 = \$10.00 (CDN)
  - **AFTER** MARCH 30 = \$15.00 (CDN)
- Honorary Members renew at no charge.

Join or renew your membership online via the Society's website <http://entsocbc.ca/membership/>.

**Inquiries** concerning membership and back issues should be sent to the Treasurer, Marcus Clodius Strong, E-mail: [treasurer@entsocbc.ca](mailto:treasurer@entsocbc.ca)

**Cover Sketch:** *Boreus elegans* (Mecoptera: Boreidae), one of the more conspicuous snow scorpionflies in B.C. Larvae and flightless adults live in, and feed on, moss and clubmoss. Adults appear in the fall and are active on snow on warm winter days. Cover sketch credit Ward Strong and Robert A. Cannings.

### Cover Photographs:

Greater Night-stalking Tiger Beetle ( <i>Omus dejeani</i> ), taken on Denman Island, B.C. Photograph by Jennifer Heron.	Helliwell Provincial Park, May 2012. Photograph by Jennifer Heron
Photographs taken in the Peace Region, BC. Photographs by Jennifer Heron	



# Entomological Society of British Columbia

## ANNUAL GENERAL MEETING - OCTOBER 26, 2020

### Virtual Conference

### PROGRAM 2020

#### Monday, October 26 - *THEME: Model Your Ento-Swag Monday*

9:00 Welcome

9:15 **Asim Renyard**, Gerhard Gries. *To the beat of their own drum: The role of vibratory communication in Western carpenter ants.* (PhD student, SFU)

9:30 **Andreas Fischer**, Xiang Hao Goh, Jamie-Lynne Varney, Adam Blake, Stephen Takács, Gerhard Gries. *Multimodal and multifunctional signaling? Web reduction courtship behavior in a North American population of the false black widow spider.* (PhD student, SFU)

9:45 **Sajjan Grover**, Prince Zogli, Scott Sattler, Joe Louis. *Phytohormones-driven molecular battle between sorghum and sugarcane aphids.* (PhD student, U Nebraska-Lincoln)

10:00 **Debra Wertman**, Allan Carroll. *Insights into the evolution of bark beetle–fungus mutualisms: The alder bark beetle and its association with a *Neonectria* canker pathogen.* (PhD student, UBC)

10:15 Break

10:30 **Kyu Baik Ha**, Juli Carillo. *The impact of elevated CO<sub>2</sub> on plant defense and plant-insect interactions.* (PhD student, UBC)

10:45 **Elana Varner**, Kayla Mark, Hanna Jackson, Kendal Singleton, Sarah Johnson, Regine Gries, Gerhard Gries. *Do spring queen bumble bees sense, and*



*behaviorally respond to house mouse odorants as nest site location cues?* (PhD student, SFU)

11:00 **Jennifer Lipka**, Katelyn Hengel, Matthew Mitchell, Kate Smith, Juli Carrillo. *Introduced and native bumble bee species respond differently to floral resources, land cover and trace lead (Pb) concentration along a gradient of urbanization.* (MSc student, UBC)

11:15 **Jaime Chalissery**, Regine Gries, Gerhard Gries. *We go together! – Groups of European fire ants, *Myrmica rubra*, distinguish between pheromone blends, and follow pheromone trails for longer distances than individual ants.* (MSc student, SFU)

11:30 – 12:00 Lunch

12:00 **Jessica Fraser**. *Bringing light pollution into biocontrol research.* (MSc student, Université Laval)

12:15 **Aaron Thien**, Todd Kabaluk, Jenny Cory. *Pre-application of *Metarhizium* and *Enterra Natural Fertilizer* for wireworm control.* (MPM student, SFU)

12:30 **Emily Lemke**, Wim van Herk, Haley Catton, Scott Meers, Kevin Wanner, Rodney Cooper, Jacqueline Serrano, Arash Rashed, Jocelyn Smith, Regine Gries, Santosh Alamsetti, Gerhard Gries. *Efficacy of synthetic *Limonius sex* pheromone on trap captures of four *Limonius* spp. (Coleoptera: Elateridae) in various locations across North America.* (MPM student, SFU and AAFC)

12:45 **Earley Nathan**, Jordan Bannerman, Robert Lalonde. *Is the community composition within galls static? Local variability in parasitoid diversity in the Okanagan *Diplolepis variabilis* (Hymenoptera: Cynipidae) gall system.* (MSc student, UBC Okanagan)

1:00 **Audrey McPherson**, Steve Perlman, Paul Abram. *Prevalence of *Wolbachia* and RNA viruses in spotted wing *Drosophila*.* (MSc student, UVic & AAFC)

1:15 Break

1:30 **Berenice Romero**, Chrystel Olivier, Tyler Wist, Sean Prager. *Evaluating aster leafhopper performance and preference on a variety of crop and non-crop host plants.* (PhD student, U Sask)





1:45 **Emmanuel Hung**, Jordan Stewart, Adam Blake, Dan Peach. *Larval escape response induced by UV and visible light in Aedes aegypti and Culex pipiens mosquitoes.* (MPM student, SFU)

2:00 **Kendal Singleton**, Adam Blake, Wim van Herk, Gerhard Gries. *Spectral sensitivity of North American pest click beetle species (Coleoptera: Elateridae).* (MPM student, SFU and AAFC)

2:15 **Matt Tsuruda**, Martina Clausen, Claire Kremen, Juli Carrillo. *Impact of semi-natural habitat restoration in agro-ecosystems on pest and beneficial insect biodiversity.* (MSc student, UBC)

2:30 Conclude

7:00 Evening Social: [Model Your Ento-Swag Monday](#)

## Tuesday, October 27 - *THEME: Show-and-Tell Tuesday*

9:00 Welcome

9:05 **Claire Gooding**, Asim Renyard, Steph Cooper, Santosh Kumar Alamsetti, Regine Gries, Gerhard Gries. *Western carpenter ants, Camponotus modoc, use floral odorants as long range foraging cues.* (Undergraduate student, SFU)

9:20 **Kris Cu**, Tyler Nelson, Chandra Moffat. *Clearwing Moths: Investigating their diversity in BC and the implications of Apple Clearwing Moth biocontrol.* (Undergraduate student, SFU and AAFC)

9:35 **Jade Sherwood**, Paul Abram, Jenny Zhang. *The perpetual scent of doom: Fear-induced avoidance behavior from a natural enemy.* (Undergraduate student, UFV and AAFC)

9:50 **Kiersten Vestergaard**, David Ensing, Chandra Moffat. *Spotted knapweed (Centaurea stoebe ssp. micranthos): Does the addition of multiple agents improve control of an invasive weed population?* (Undergraduate student, SFU and AAFC)

10:05 Break

10:20 **Chandra Moffat**, David Ensing, Tyler Nelson, Robert Bouchier, Rosemarie De Clerck-Floate, Val Miller, Susan Turner. *Contemporary ecology of historical weed*



*biological control programs: Reevaluating spotted knapweed biocontrol in BC.*  
(Submitted, AAFC)

10:35 **Steve Perlman**, V Martinson, R. Gawryluk, B. Gowen, C. Curtis, J. Jaenike. *A tale of two symbionts: Hidden players in a Drosophila-nematode interaction.* (Submitted, UVIC)

10:50 **Pierre Girod**, Lukas Seehausen, Alexandre Aebi, Ted Turlings, Tim Haye, Marc Kenis. *Update on the classical biological control of Drosophila suzukii in Europe.* (Submitted, UBC-PIEE lab)

11:05 **Paul Abram**, Michelle Franklin, Chandra Moffat, Mairi Robertson, Matt Buffington, Tracy Hueppelsheuser. *Parasitism of spotted wing Drosophila after being reunited with its larval parasitoids from Asia: Evidence for spatiotemporal refuges from parasitism.* (Submitted, AAFC)

11:20 **Mairi Robertson**, Tyler Nelson, Jodie Wiltse, Kiersten Vestergaard, Chandra Moffat. *Biological control of the invasive pest Drosophila suzukii (SWD).* (Submitted, AAFC)

11:35 – 12:00 Lunch

12:00 **Tyler Nelson**, Kristoferson Cu, Brigitte Rozema, Howard Thistlewood, Susanna Acheampong, Chandra Moffat. *The diversity of insect fauna reared from non-crop hosts of Drosophila suzukii (Matsumura) (Diptera: Drosophilidae) in the Okanagan Valley, British Columbia.* (Submitted, AAFC)

12:15 **Michelle Franklin**, Tracy Hueppelsheuser, Paul Abram. *Establishment of the invasive Strawberry Blossom Weevil, Anthonomus rubi, in British Columbia: A new threat to berry production in British Columbia, Canada.* (Submitted, AAFC)

12:30 **Tracy Hueppelheuser**, Shannon Derkson. *Japanese Beetle (Popillia japonica) incursion in British Columbia: On the road to eradication.* (Submitted, British Columbia Ministry of Agriculture)

12:45 Break



1:00 **BC Entomologist's Plenary Lecture – Dr. Jessica Ware** *Odonata and Blattodea systematics: from UBC to the AMNH*

1:45 **Student Award Presentations**

2:00 **ESBC Annual General Meeting**

3:00 **Afternoon Social:** *Show-and-Tell Tuesday*



ENTOMOLOGICAL SOCIETY  
OF  
BRITISH COLUMBIA



**ESBC 2020 BC Entomologists' Plenary Speaker**

**Dr. Jessica Ware (American Museum of Natural History)**



*Odonata and Blattodea systematics: from UBC to the AMNH*

**Tuesday Oct 27<sup>th</sup> 1 pm PST**

Jessica L. Ware (she/her) is an evolutionary biologist. She studies insect evolution, in particular the evolution of dragonflies, damselflies, cockroaches & termites. Jessica received her BSc in Zoology from the University of British Columbia in 2001 and a PhD from Rutgers University in 2008. She undertook an NSF Postdoctoral Fellowship at the American Museum of Natural History in 2008-

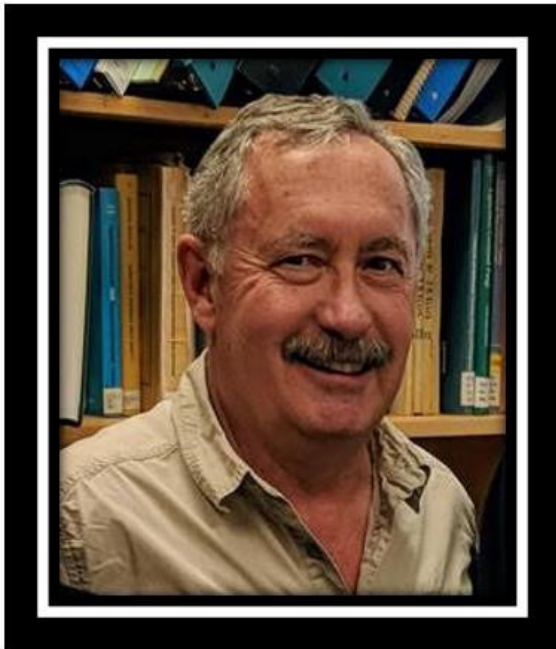


2010 before becoming a tenured professor at Rutgers University in 2010. She began as an Assistant Curator of Invertebrate Zoology at the American Museum of Natural History in 2020, where she is in charge of the nonHolometabolous Insect collections. In June 2020, she co-founded Entomologists of Colour, [entopoc.org](http://entopoc.org), an advocacy group working to diversify entomological sciences.

### ***Lee Humble Memorial Symposium***

*Tribute to a passionate entomologist who uncovered pathways, and stemmed the tide of the global movement of invasive forest pests*

**Wednesday Oct 28<sup>th</sup> 9:55 am PST**



Please join us to honour our friend and colleague Dr. Leland (Lee) Humble, who passed away on August 4<sup>th</sup>, 2020. Lee had a life-long love of insects and earned his BSc and PhD at the University of Victoria in 1987. After several summers conducting research in the Canadian Arctic, he worked for 35 years as a Research Scientist with the Canadian Forest Service at the Pacific Forestry Centre in Victoria. Lee was a well-respected expert in entomology in Canada and around the world. His work focused on non-indigenous forest pests and halting their spread. Lee's knowledge and enthusiasm for insects inspired the many students he mentored to pursue their careers in entomology. Friends and colleagues from around the world will miss Lee's expertise and passion for entomology and appreciate the many contributions that he made to science.



## Wednesday, October 28

- 9:55 **Welcome – Tammy McMullan**, ESBC Past President
- 10:00 **Meghan Noseworthy, Eric Allen**, *Pacific Forestry Centre, Natural Resource Canada, Victoria, BC*
- 10:20 **Gabriella Zilahi-Balogh**, *Canadian Food Inspection Agency, Kelowna, BC*
- 10:30 **Marcel Dawson**, *Canadian Food Inspection Agency, Gatineau, QC*
- 10:40 **Wendy Absil, Diana Mooij**, *Canadian Food Inspection Agency, Nepean, ON / CFIA, Guelph, ON*
- 10:50 **Break**
- 11:15 **Christian MacQuarrie**, *Great Lakes Forestry Centre, Natural Resource Canada, Sault Ste. Marie, ON*
- 11:25 **Jeremy deWaard**, *University of Guelph, Guelph, ON*
- 11:40 **Jon Sweeney**, *Atlantic Forestry Centre, Natural Resource Canada, Fredericton, NB*
- 11:50 **Bob Ragaglia**, *United States Forest Service, Washington DC*
- 12:00 **Lunch**
- 12:50 **Mark Whitmore**, *Cornell University, Ithaca, NY*
- 1:00 **Greg Wolff**, *Canadian Food Inspection Agency, Ottawa, ON*
- 1:10 **Shane Sela**, *Canadian Food Inspection Agency, Victoria, BC*
- 1:20 **Tod Ramsfield**, *Northern Forestry Centre, Natural Resource Canada, Edmonton, AB*
- 1:35 **Troy Kimoto**, *Canadian Food Inspection Agency, Burnaby BC*
- 1:55 **Closing remarks**



# Entomological Society of British Columbia

## Annual General Meeting Minutes

### October 27, Tuesday, 2-2:55 pm

*2:00 pm called to order online via Zoom*

Chair: Tammy McMullan, President

Present: 51 members at beginning of meeting, 44 by the end of Exec reports.

1. Agenda. No changes. Tammy move to accept agenda, Asim seconded. Carried.
2. Minutes from previous AGM, October 2019. No changes and no discussion. Tammy move to accept notes as written. Asim seconded. Carried.
3. Executive Reports
  - a. Graduate Student Representative, Asim Reynard (see report).
  - b. Regional Director, Brian van Hezewijk (see report). Brian encourages all ESBC members to consider also becoming members of the Entomological Society of Canada.
  - c. Boreus Newsletter, Gabriella Zilahi-Balogh and Elton Ko. Thanks for Elton Ko for help as co-editor. A reminder to all members Boreus is always looking for your articles and photographs. Students: summaries of your work especially as you near graduation is welcomed.
  - d. Website Editor, Brian Muselle. Brian is always very responsive with web updates. The executive appreciates his good work.
  - e. Journal Editor, Kathy Bleiker (see report).
  - f. Treasurer, Ward Strong (see report).
  - g. President, Tammy McMullan (see report).

Tammy McMullan moved to accept the reports as presented. Dan Peach seconded. Carried. No further discussion.

4. Elections: Slate of candidates have been elected, votes occurred electronically. 49 members voted.
  - a. New Executive for ESBC in 2020-21 are:
    - i. President: Wim van Herk
    - ii. First Vice President: Chandra Moffat
    - iii. Second Vice President: Lorraine Maclauchlan
    - iv. Secretary: Rob Higgins
    - v. Treasurer: Markus Clodius
    - vi. Director, First year: Joyce Leung
    - vii. Director, Second year: Dan Peach

5. Recognition of Service: A big thank you to all past executive members, and Equality & Inclusion and Outreach Committee members for their service to the Society.



## 6. New Business

- a. Acknowledgement of passing of members, Drs. Lee Humble, and Margriet Dogterom. Both have contributed significantly to entomology in BC and beyond and will be greatly missed.
- b. Equality, Diversity and Inclusion Committee: has been formed and planning underway. Update coming soon.
- c. Outreach Committee: has several great ideas for sharing the passion for entomology.

The Executive thanks these two committee for their work so far. If there are any questions or if members wish to become involved, contact Dan Peach (Director) or Asim Reynard (Grad Student Rep).

7. Transfer of Presidency: from Tammy to Wim.
8. Adjourn 2:55 pm. Chandra so moves. Tammy seconded.

**Position:** Student Director

**Period under report:**

April 20, 2020 – Oct 25, 2020

**Summary of activities during report period:**

The past few months have been a strange time, with all of us facing new challenges and difficulties during the Covid-19 pandemic. However, I am glad to say that some of my work as the student director has still been able to move forward. The status of things I am working on for the ESBC are outlined below:

Overall, most of my work has been dedicated to help prepare for our virtual conference and AGM. I am very pleased with some of the new ideas we've had this year that I think will greatly streamline our conferences in future years. For the conference my work was mostly on generating graphics for advertisements, brainstorming fun virtual social ideas and theme days with Chandra, helping out with generating the program and serving as a moderator.

In addition, I have run our T-shirt design contest, which had 7 beautiful designs submitted. From there I have sent out our order for new T-shirts and they should be in the mail on the way to Tracy.

Last meeting, I outlined a few items I would be working on which are as follows (in red). I've provided an update for each item underneath:

### **1. Generate a more extensive list contacts to advertise our AGM.**

The goal of this list is to advertise our conferences and other events to the entomological community beyond our membership. I started a list of new contacts and have had several members of the conference organizing team add to it. It may useful to generate a subscriber list that people consent to that we can contact people with. This way we will avoid missing anyone that has not renewed their membership prior to our annual meeting.

### **2. Outreach and ED&I committees**

Lately, there has not been much activity with the outreach committee. It may be worth discussing what the executive would like to committee to work on and set some



concrete goals to have completed. Perhaps even setting a goal of the committee coming up with some recommendations to the society.

For the ED&I committee, I have recruited two new members to both the outreach and ED&I committees. Chandra and I held our first ED&I meeting as co-chairs. I am pleased to report that we now have 7 members on this committee. During the meeting we discussed several items to increase the equity, diversity and inclusiveness of our society. We organized ourselves into several small working groups to tackle various items and will be bringing forth these items as they are completed. Now that the summer field season is over for most of us, I imagine work on this committee will start to accelerate a bit more.

**Recommendations or action items for the attention of the ESC Board of Directors:**

Should we come up with some action items for the outreach committee to work on?

Respectfully submitted

Asim Renyard

Student Director

Submitted Oct 25, 2020

**Position:**

Regional Director – Brian Van Hezewijk

**Period under report:**

[22 Apr 2020 – 24 Oct 2020]

**Summary of activities during report period:**

ESC Board of Directors Special Meeting, Jul 15, 2020

- Formation of a Committee on Equity, Diversity & Inclusion

ESC Sharing Circle, Aug 31, 2020

- Facilitated by Jake Freeman, AAFC
- Well attended by nearly all board members

ESC Board of Directors Meeting Oct 14, 2020

- JAM 2021: Niagara Falls, JAM 2022: Vancouver, JAM 2023: Saskatoon

AGM of the ESC Oct 20, 2020

- Virtual meeting
- Bill Riel elected as the new President, Felix Sperling is the new First Vice President and Ward Strong elected as the new Treasurer and will be assuming those responsibilities in January
- Officially elected the new Director of Diversity and Inclusion (Christine Noronha) as well as a Student & Early Professional Directo

**Recommendations: None**





Respectfully submitted

Brian Van Hezewijk  
Regional Director  
24 Oct 2020

**Position:**

Editor JESBC

**Period under report:**

October 26, 2020

**Summary of activities during report period:**

2020 Volume looks like:

- 4 articles, 1 note, and 2 natural history observations
- 2 articles in review or re-review and likely won't make 2020
- Several papers are available now on the website (early view online)
- Note that we do early view online, so don't wait to submit papers – submit now and they'll be available online and cite able soon!

**Recommendations or action items for the attention of the ESC Board of Directors:**

Respectfully submitted,  
Kathy Bleiker  
Editor, Journal of the Entomological Society of British Columbia  
26 October 2020

**ESBC TREASURER'S REPORT: Oct 24, 2020**

The ESBC is on very solid financial footing with \$95,117.85 in our bank account and \$136,007.59 in net assets.

Income: Membership fee income is strong; only 30 of 2019 registrants did not re-register. Most of these were people who signed up only to get the lower membership rate to the 2019 AGM meeting. JESBC page charges were from a mix of 2019 and 2020 papers.

Expenses: Expenses have been very low this year, partly as a result of lower AGM costs due to holding a virtual meeting in 2020. Journal publishing costs are primarily for typesetting; the Journal had a positive net income this year.



Balance Sheet: Assets are predicated on the expectation of a minimum GIC return (.55% compounded daily), but these GIC's have historically delivered close to, or at, the maximum return of 16% overall. Given the poor performance of investments due to the Covid-19 pandemic, returns may be closer to the minimum for GICs 4 and 5, which come due December 14 2020 and Feb 08 2021 respectively.

GIC's: We have 4 GIC's of \$10,000 each, coming due in 2020, 21, 22, and 23:

GIC	Name	Matures	Invested	Return (max)	Return (min)
4	BMO Growth GIC	14-Dec-20	\$10,000.00	\$11,600.00	\$10,222.44
6	BMO Growth GIC	08-Feb-21	\$10,000.00	\$11,600.00	\$10,222.44
7	BMO Growth GIC	12-Oct-22	\$10,000.00	\$12,800.00	\$10,222.44
8	BMO Growth GIC	11-Apr-23	\$10,000.00	\$12,800.00	\$10,222.44

Membership: We stand at 156 members, of which 26 are in arrears (not yet paid for 2020). The term of Grant McMillan, our non-member Director, will soon expire, at which point he will become a non-member subscriber. Membership includes 38 student members and 8 Honorary Members. With 131 paid-up members, we have room for one or two more honorary members (which can make up 10% of the membership).

Cash on hand: We have over \$95,000 in cash in our bank account. Though we have struck a committee to find ways to spend this money, none has been spent in the 2 years since receiving it (from the ESA/ESC/ESBC JAM in Vancouver, 2018). I propose that we invest a large portion of this in GICs so that it is earning an income rather than 0% interest in the bank account. I also propose that we use part of the remainder to increase our scholarships and bursaries to students.

This is my last report as Treasurer of the ESBC. I have enjoyed my many years as Treasurer and various Executive positions, this has been an enriching experience and I cherish the many friendships I've made through the ESBC. Thank you all for your support during these times, and I wish you and the ESBC the best in the future. I'm very pleased to say that the Treasurer position will be passed to the capable hands of Markus Clodius. The ESBC is in good shape in terms of membership, a strong Executive, and solid finances.

Respectfully submitted,

Ward Strong, Treasure



## Entomological Society of British Columbia

### Income and Expense Statement

Period: January 1, 2020 to October 24, 2020

#### REVENUES

<b>Membership fees</b>		\$2,590.55
<b>Merchandise Sales</b>		\$80.00
<b>GIC Maturity Deposit</b>		\$0.00
<b>Misc Revenues</b>		\$407.09
<b>AGM:</b>		\$2,024.42
<i>Registration</i>	\$2,024.42	
<i>Shared revenues, 2018</i>	\$0.00	
<b>Journal:</b>		\$2,714.80
<i>Page charges</i>	\$2,714.80	
<i>Misc Journal Revenue</i>	\$0.00	
<b>TOTAL INCOME:</b>		<b>\$7,816.86</b>

#### EXPENSES

<b>Bank fees</b>		\$12.00
<b>Website</b>		\$0.00
<b>Merchandise Expenses</b>		\$0.00
<b>GIC Purchase</b>		\$0.00
<b>Misc Expenses</b>		\$250.00
<b>Transfers from Paypal account to bank</b>		\$0.00
<b>AGM:</b>		\$0.00
<i>Facilities</i>	\$0.00	
<i>Catering</i>	\$0.00	
<i>Awards</i>	\$0.00	
<i>Misc AGM Expenses</i>	\$0.00	
<b>Journal:</b>		\$2,514.85
<i>Publishing</i>	\$2,514.85	
<i>Distribution</i>	\$0.00	
<i>Typesetting and archiving</i>	\$0.00	
<b>TOTAL EXPENSES:</b>		<b>\$2,776.85</b>

**NET INCOME**

**\$5,040.01**



## Entomological Society of British Columbia

### Statement of Financial Position

As of: 2020-Oct-24

<b>ASSETS</b>			
BMO Chequing Account			95,117.85
Accounts Receivable			0.00
GIC's (minimum return)			40,889.74
	Min return*	Max return**	
GIC 4: Dec 14, 2020	10,222.44	11,600.00	
GIC 6: Feb 08, 2021	10,222.44	11,600.00	
GIC 7: 12 Oct 2022	10,222.44	11,600.00	
GIC 8: 11 Apr 2023	10,222.44	11,600.00	
<b>Total Assets</b>			<b>\$136,007.59</b>

<b>LIABILITIES</b>	
Accounts Payable	0.00
<b>Total Liabilities</b>	<b>\$0.00</b>

**NET ASSETS** **\$136,007.59**

**LIQUID ASSETS** **\$95,117.85**

\*Total Assets based on Minimum GIC return.

\*\*Potential maximum value at maturity


**Position: President, Tammy McMullan**

Period under report: [April 23, 2020 – October 24, 2020]

Summary of activities during report period:

So much has changed since my last President's Report. With Covid-19 Pandemic, most outreach activities were cancelled, and the few activities that did proceed were virtual.

To celebrate National Insect Appreciation Day (NAIAD) on June 8<sup>th</sup>, the ESBC Executive decided that the ESBC should reach out to elementary school teachers and let them know that the ESBC would donate a limited number of copies of the recently published book 'The Bug Girl: A True Story' by Sophia Spencer and Margaret McNamara to schools. After a discussion with the Outreach Committee, I wrote a letter to the President of BC Teacher's Federation and requested that our offer of a limited number of free books be passed onto elementary school teachers. I did not receive a reply back from the BCTF, probably due to Covid-19. Tracy suggested that I contact Ag in the Classroom. Ag in the Classroom wanted to vet the book before they recommended it to teachers. I purchased a copy of the book and Tracy delivered it to Ag in the Classroom. I personally haven't heard anything further from them, but Tracy said they were planning to use the book as part of their curriculum. The next President should follow up on this item.

The Outreach Committee has been busy with a number of tasks. The Committee has recommended updating the ESBC website. They are looking into the cost associated with hiring a consultant to do this. The Outreach Committee also recommended giving small grants to teachers to purchase items for entomology related activities.

As a follow up to Asim Renyard's request at the Spring Executive meeting, an Equity, Diversity and Inclusion Committee was created. The committee members are Asim Renyard, Dan Peach, Catherine Scott, Chandra Moffat, Judy Myers, Steph Cooper and Sam Meraj. I thank Asim for his foresight, as the committee was invaluable in composing the ESBC response to the #BlackLivesMatter tweet. The ESBC should continue to develop plans that will make the study of entomology more equitable for all.

The ESBC has adopted a Code of Conduct for meetings. Our Code of Conduct is adapted from the ESA Code of Conduct. Developing an ESBC Code of Conduct was timely, due to the virtual AGM/Symposium this year and the JAMA with the ESA/ESC in 2022.

Thank you to all the members of the Executive who have stepped up to respond to emails received by the ESBC. There have definitely been a lot of emails about "Murder Hornets" this year. We are fortunate that there hasn't been a confirmed sighting in BC this year. I would like to thank Chandra and Wim for proof-reading items before they were sent out to the membership and for stepping up to write carefully composed



letters in response to a number of issues. As I am not on social media, I would have been in the dark about many of the social justice movements that have occurred this year without Chandra and Wim. My thanks to Dan for taking on the task of managing the technical side of the Zoom meeting. I would like to recognize all the contributions of all the members of the Executive who are leaving the Executive this year. Grant MacMillan's second term as Director is ending this year. Thank you for 4 years of hard work. Tracy Hueppelheuser has been the Secretary of the ESBC for 8 years and a Director for 3 years prior to that. Tracy and Ward have been the backbone of this society for a long time. Ward Strong is also leaving the Executive of the ESBC to move onto new challenges. He currently is the longest serving Executive Member of the society (first elected in 1994/1995), and as Treasurer has ensured that the ESBC has a sound financial footing. He will be greatly missed. Thank you to all members of the Executive and Committees for your contributions to the ESBC.

**Recommendations or action items for the attention of the ESBC Executive:** Follow up on the donation of copies of the book, *The Bug Girl: A True Story to Ag in the Classroom*.

Respectfully submitted Tammy McMullan, President, 24 October 2020



*Polistes dominula*. Photo by Adam Blake



## Student Winners

### ESBC Graduate Student Scholarship



Nathan Earley

Kendal Singleton

### Dan Johnson Award in Insect Ecology



Adam Blake



## Oral Presentations, PhD

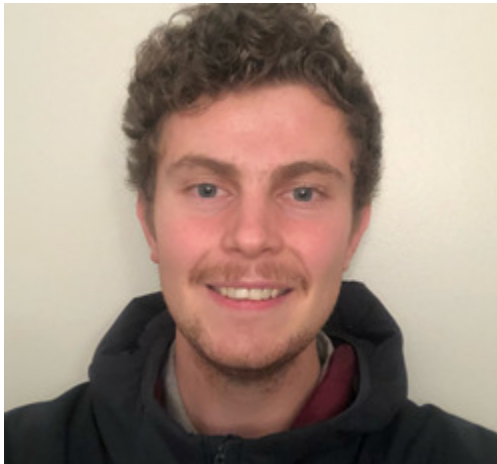


1<sup>st</sup>: Asim Reynard



2<sup>nd</sup>: Elana Varner

## Oral Presentations, MSc/MPM



1<sup>st</sup>: Nathan Earley



2<sup>nd</sup>: Jaime Chalissery





## Oral Presentations, Undergraduate



Jade Sherwood

## Graduate Students Graduating

Defended or planning to defend? Why not present your work in the Boreus? This is an excellent opportunity for graduate students to share their research. Send submissions to [boreus@esbc.ca](mailto:boreus@esbc.ca).

### Adam Blake, PhD

Title - Polarized light - host location and selection cue in phytophagous insects?

Supervisors - Dr. Gerhard Gries, Simon Fraser University  
Dr. Sherryl Bisgrove, Simon Fraser University  
Dr. Paul Abram, Agriculture and Agri-food Canada

Supervisors - Dr. Gerhard Gries, Simon Fraser University  
Dr. Iñigo Novales Flamarique, Simon Fraser University  
Dr. Almut Kelber, Lund University

Abstract - Insect herbivores exploit plant cues to discern host and non-host plants. Studies of visual plant cues have focused on color despite the inherent polarization



sensitivity of insect photoreceptors and the information carried by polarization of foliar reflectance, most notably the degree of linear polarization (DoLP; 0-100%). The DoLP of foliar reflection was hypothesized to be a host plant cue for insects but was never experimentally tested. I investigated the use of these polarization cues by the cabbage white butterfly, *Pieris rapae* (Pieridae). This butterfly has a complex visual system with several different polarization-sensitive photoreceptors, as characterized with electrophysiology and histology. I applied photo polarimetry revealing large differences in the DoLP of leaf-reflected light among plant species generally and between host and non-host plants of *P. rapae* specifically. As polarized light cues are directionally dependent, I also tested, and modelled, the effect of approach trajectory on the polarization of plant-reflected light and the resulting attractiveness to *P. rapae*, showing that certain approach trajectories are optimal for discriminating among plants based on these cues. I then demonstrated that *P. rapae* exploit the DoLP of foliar reflections to discriminate among plants. In experiments with paired digital plant images that allowed for independent control of polarization, color and intensity, *P. rapae* females preferred images of the host plant cabbage with a low DoLP (31%) to images of the non-host plant potato with a high DoLP (50%). These results indicated that the DoLP had a greater effect on foraging decisions than the differential color, intensity or shape of the two plant images. To investigate potential neurological mechanisms, I designed behavioral bioassays presenting choices between images that differed in color, intensity and/or DoLP. The combined results of these bioassays suggest that several photoreceptor classes are involved and that *P. rapae* females process and interpret polarization reflections in a way different from that described for other polarization-sensitive taxa. My work has focused on *P. rapae* and its host plants but there is every reason to believe that the DoLP of foliar reflection is an essential plant cue that may commonly be exploited by foraging insect herbivores.

Official completion date – Defended December 16, 2020

### **Warren Wong, MPM**

Title - ATTRACTION OF BROWN MARMORATED STINK BUGS, *Halyomorpha halys*, TO BLOOMING SUNFLOWER SEMIOCHEMICALS

Supervisors - Dr. Gerhard Gries, Simon Fraser University  
 Dr. Sherryl Bisgrove, Simon Fraser University  
 Dr. Paul Abram, Agriculture and Agri-food Canada

Abstract - I tested whether the brown marmorated stink bug (BMSB), *Halyomorpha halys*, discriminates among phenological stages of sunflower, *Helianthus annuus*. When BMSB females in a still-air laboratory experiment were offered a choice of potted sunflowers at distinct phenological stages (vegetative, pre-bloom, bloom, seeding),



most females settled onto blooming plants. In moving air olfactometer experiments, testing each plant stage versus one another, for attraction of BMSB females, blooming sunflowers overall were most attractive. Analyzing the headspace odorants of each plant stage revealed a marked increase of odorant abundance as plants transitioned from pre-bloom to bloom. Thirteen blooming-stage odorants elicited responses from female BMSB antennae. A synthetic blend of antennally-active odorants attracted BMSB females in laboratory olfactometer experiments, and in field settings enhanced the attractiveness of BMSB pheromone as a trap lure, particularly in spring. Sunflower semiochemicals coupled with synthetic BMSB pheromone could be developed to improve efforts to monitor and control BMSB populations.

Official completion date – Defended December 14, 2020

### **Yonathan Uriel, MPM**

Title - Genetic flexibility in the green peach aphid, (*Myzus persicae*): Defensive polyphenism in response to parasitoid pressure and the assembly of a new draft genome

Supervisors - Dr. Gerhard Gries, Simon Fraser University  
 Dr. Paul Abram, Agriculture and Agri-food Canada  
 Dr. Jim Mattsson, Simon Fraser University  
 Dr. Nansheng Chen, Simon Fraser University

Abstract - The green peach aphid, *Myzus persicae* Sulzer (Hemiptera: Aphididae), is a small, soft-bodied insect that feeds on plant sap using piercing-sucking mouthparts. In addition to damaging plants through feeding, *M. persicae* is capable of transmitting plant viruses between hosts; all told, this insect poses a serious threat to a wide variety of both greenhouse and field crops.

*Myzus persicae* reproduces primarily asexually, forming large, clonal colonies on host plants. Individuals within these clonal lines, despite sharing the same genotype, can exhibit a variety of phenotypes. These phenotypes arise due to transgenerational polyphenism, where adult aphids send hormonal signals to developing embryos in response to environmental stress, triggering a change in gene expression within those



embryos. This allows aphid colonies to react to environmental stressors and produce resistant phenotypes within a single generation. This epigenetic flexibility hampers control efforts – *M. persicae* colonies have been shown to adapt to pesticides, predators, pathogens, and parasitoids using these mechanisms. Parasitoid resistance is of special concern to biological control efforts; parasitoid wasps within the family Braconidae are commonly used in commercial agriculture, and are often the most effective biological control agents for aphid control. In order to better understand how *M. persicae* adapts to parasitoid pressure, I designed a multi-generational experiment using a classical experimental evolution framework, where single genetic lines of *M. persicae* were exposed to the parasitoid *Aphidius colemani* over multiple, consecutive generations. I measured various physiological and life-history aspects of my aphids at each generation. The results of this experiment show no evidence that *M. persicae* adapts to parasitoid pressure over time, and hint at the importance of aphid colony density in transgenerational stress responses.

In recent years, genomic analysis has become an increasingly useful tool for investigating aphid polyphenism. The breadth and depth of this analysis is limited by the quality of available reference genomes. Currently, there exists little genomic data for *M. persicae*. With this in mind, I generated a new draft genome assembly from the lab colony I used to conduct my parasitoid resistance experiments. In collaboration with the University of Arizona, I generated a set of PacBio HiFi long-reads, and assembled these reads using a custom workflow. This resulted in a high-quality draft assembly, that I hope will contribute to aphid genomic studies in the future.

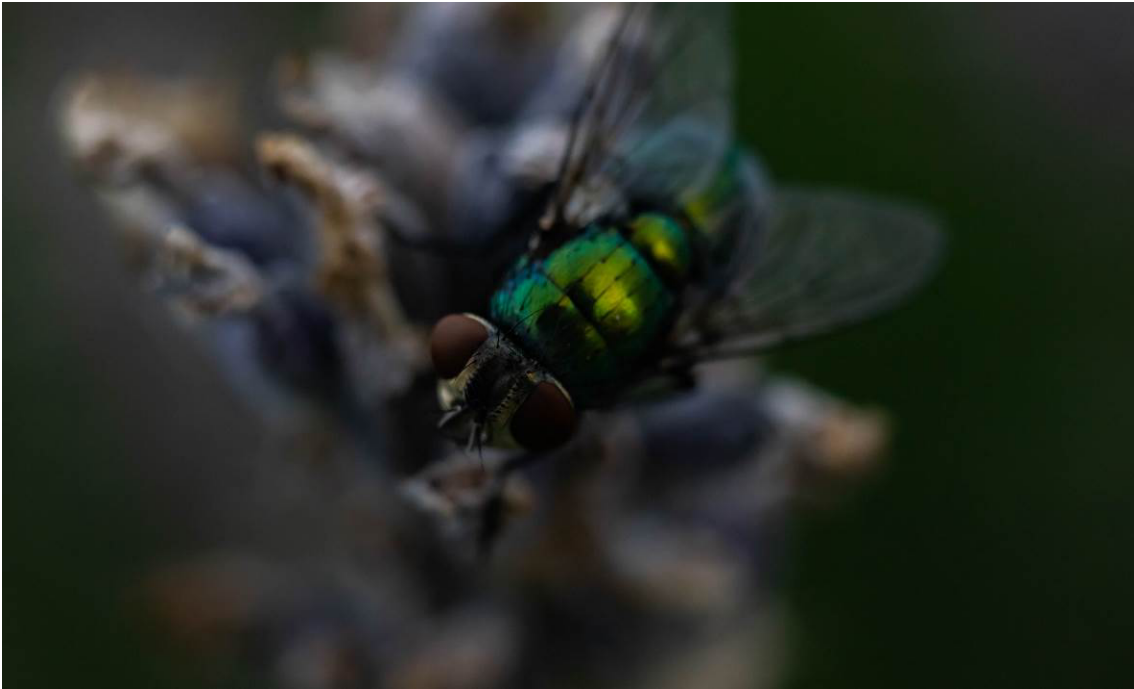
Official completion date – Defended August 14, 2020



*Bombus* sp. Photo by James Pickett



*Lactrodectus hesperus* subadult female. Photo: Andreas Fischer



*Calliphora* sp. Photo by James Pickett



*Syrphus* sp. Photo by Adam Blake



*Lactrodectus hesperus* female. Photo: Andreas Fischer



*Camponotus modoc*. Photo by: Asim Reynard



## Entomology Educational Opportunities in Canada

The Entomological Society of Canada publishes a Directory of **Entomological Education in Canada**. Available at: <https://esc-sec.ca/student/student-awards/>

### Entomological Society of Canada Student Awards

Details of Awards at <https://esc-sec.ca/student/student-awards/> . Deadline for all awards is **March 1** of each year. Look on website for eligibility for each award.

- Entomological Society of Canada Danks Scholarships
- Entomological Society of Canada Graduate Research Travel Scholarships
- Entomological Society of Canada Postgraduate Awards
- Entomological Society of Canada John H. Borden Scholarship
- Entomological Society of Canada Dr Lloyd M Dosdall Memorial Scholarship
- Biological Survey of Canada Scholarship
- Keith Kevan Scholarship
- Entomological Society of Canada Ed Becker Conference Travel Awards

### Employment Opportunities

#### Leader, Applied Forest Ecology

J.D. Irving Woodlands Division

Application deadline: None listed

Details: <https://careers.jdirving.com/jobs/leader-applied-forest-ecology-17891>

#### Research Scientists – Growing Agricultural Innovation

Agriculture and Agri-Food Canada - Science and Technology Branch

Approximately 90 positions across Canada

Application deadline: August 8, 2021

Details: <https://emploisfp-psjobs.cfp-psc.gc.ca/psrs-srfp/applicant/page1800?toggleLanguage=en&poster=1206690>

#### Forest Technician

Omineca Forest Resource Services Ltd

2 positions

Application deadline: December 30, 2020

Details: <https://www.jobbank.gc.ca/jobsearch/jobposting/33485287>





## Educational Opportunities in Canada

details on ESC website <https://esc-sec.ca/opportunities/>

### Graduate Research Opportunities

#### **MSc or PhD positions**

Behavioral Ecology & Evolutionary Physiology of *Nicrophorus* Beetles

Bonier Lab, Queen's University, Biology Department

Application deadline: January 15, 2021.

Start date: May or Sept 2021

Details: <https://esc-sec.ca/wp-content/uploads/2020/11/Nicrophorus-grad-ad.pdf>

#### **MSc position**

Mitigation and management of Cry1F resistance in European corn borer in Canada

School of Environmental Sciences, University of Guelph

Application deadline: Applications accepted until position filled

Start date: Anticipated April 2021

Details: [https://esc-sec.ca/wp-content/uploads/2020/10/Grad\\_Assistantship\\_ECB\\_Phenology\\_MSc.pdf](https://esc-sec.ca/wp-content/uploads/2020/10/Grad_Assistantship_ECB_Phenology_MSc.pdf)

#### **PhD opportunities in the UK**

<https://www.findaphd.com/phds/biological-and-medical-sciences/?10gc00&PG=3&Keywords=insect>

#### **MSc opportunities in the UK**

<https://www.findamasters.com/masters-degrees/biological-sciences/?1001&Keywords=insecthttps://www.educations.com/search/masters-degrees?q=insectPost-doctoral>

## Student Awards – administered by Entomological Society of America

There are numerous awards. Check them out for eligibility.

<http://www.entsoc.org/about/awards-honors>



## DNA Barcoding Website:

There is a new blog exclusively on the topic of DNA barcoding with the aim to have newsworthy information posted a few times per week. The blog is lead by Dirk Steinke, Lead Scientist Barcoding of Marine Life Biodiversity Institute of Ontario University of Guelph, Ontario, EMail: [dsteinke@uoguelph.ca](mailto:dsteinke@uoguelph.ca) and blog website <http://dna-barcoding.blogspot.ca/>

## Entomological Society of Canada

Blog Available at <http://esc-sec.ca/blog/>

December 2019 Bulletin available online at:  
<http://esc-sec.ca/publications/bulletin/>

## Entomology in the News

### The Capacity for Limb Regeneration During Metamorphosis is Broadly Conserved in the Coccinellidae

J P Michaud, Oldrich Nedved, Mohamed Bayoumy, Ahmed Abdelwahab, Jorge Torres, Swati Saxena, Omkar, Terezinha M de Santos-Cividanes, Samane Sakaki, Arash Rasekh ... [Show more](#)

*Annals of the Entomological Society of America*, XXIXI.2020,1-9

#### Abstract

A standardized laboratory procedure tested the limb regeneration abilities of 18 populations (16 species) of lady beetles which were then scored, relative to unoperated



controls, based on survival, the proportion regenerating the limb completely or partially, and the magnitude of developmental costs (delayed development, reduced body size) associated with limb ablation. Newly molted fourth instar larvae each had a single foreleg amputated at the base of the femur. All species except *Propylea dissecta* (Mulsant) showed some complete limb regeneration, with limb regeneration index (LRI) scores ranging from 0.025 to 0.905 out of a possible 1.00 (mean = 0.598). *Eriopsis connexa* Germar, an aphidophagous neotropical species, scored the highest. Widely distributed species that dominate agricultural habitats all scored above 0.75, and the only herbivore, *Henosepilachna argus* (Geoffroy), scored second from lowest. Prolonged pupal development was the most common cost, occurring in nine species, and correlating negatively with regeneration. Taxonomic distance between species correlated with regeneration, but explained <5% of variation; principal component analysis indicated that the LRI was the main factor distinguishing species. We infer that this capacity is conserved, not because of any adaptive advantage conferred, but because the genes responsible are normally activated during pupal development to generate the adult body plan and reconstitute appendages with direct correspondence to larval progenitors. However, good regeneration capacity was associated with the ecological success of the species. In general, broad geographic distribution, guild dominance, polyphagy, interspecific competitiveness, phenotypic flexibility, and invasiveness were characteristics generally shared by species with high levels of regeneration.



## Sharpening the Precision of Pest Management Decisions: Assessing Variability Inherent in Catch Number and Absolute Density Estimates Derived from Pheromone-Baited Traps Monitoring Insects Moving Randomly

James R Miller

*Journal of Economic Entomology*, Volume 113, Issue 5, October 2020, Pages 2052–2060,  
<https://doi.org/10.1093/jee/toaa152>

### Abstract

During a trapping study interval, each target insect is either caught or not caught. Therefore, the current analysis treats trapping as a binomial process. Data from a binomial calculator, along with computer simulations of random walkers, documented that the inherent variance associated with estimates of absolute population density generated by a single catch number in a pheromone-baited monitoring trap becomes very high when catch probability averaged across the trap's sampling area falls below 0.02, as is the case for most insect trapping systems operating in the open field. The imprecision associated with interpretations of single catch numbers renders many current pest management decisions risky and unsatisfactory. Here we reinforce how single-trap, multiple-release experiments can and should be used to measure catch probability, plume reach, and trap sampling area. When catch probability lies in the danger zone below 0.02, steps are suggested for how multiple traps might be deployed to raise composite catch probability to a level where estimates of absolute pest density become reliable. Heat transfer is offered as an appropriate conceptual model for the mechanics of trapping. A call is made for a radical rethinking in the designs of insect monitoring traps in light of their significant current deficits highlighted by this study.



## Reproductive Traits of *Ontsira mellipes* (Hymenoptera: Braconidae), a North American Parasitoid, as a Novel Biological Control Agent for Exotic *Anoplophora glabripennis* (Coleoptera: Cerambycidae)

[Xingeng Wang](#), [Ellen M Aparicio](#)

*Journal of Economic Entomology*, Volume 113, Issue 5, October 2020, Pages 2112–2119,  
<https://doi.org/10.1093/jee/toaa160>

### Abstract

*Ontsira mellipes* Ashmead is a gregarious larval ectoparasitoid of woodboring cerambycids that is native to North America but can readily attack the exotic Asian longhorned beetle, *Anoplophora glabripennis* (Motschulsky). To evaluate the potential of the parasitoid as a novel association control agent for the pest beetle, this study investigated some key reproductive traits of the parasitoid, including egg maturation dynamics, and host size preference and suitability in association with the beetle. Results showed that female wasps emerged with a substantial portion (38%) of their lifetime complement of mature eggs and matured eggs rapidly, reaching a peak 4–6 d post-eclosion. The number of mature eggs was positively related to the female wasp's body size. Oviposition prompted production of more mature eggs by young female wasps. The parasitoid did not show a significant preference for large over small hosts in a choice test. Host size did not affect the parasitoid's offspring survival, developmental time, or sex ratio. However, clutch size increased with increasing host size. Female wasps that developed from large hosts had larger body size and consequently a higher mature egg load than those reared from small hosts. Neither longevity nor the total number of parasitized hosts over a female's lifetime was affected by the female's size, but the total number of offspring produced per female increased with the female's size. These results have important implications for improving rearing and field-release strategies as well as understanding the ecological mechanisms underlying host size selection in gregarious parasitoids.



# The North Okanagan Naturalists' Club

Presents

## THE JAMES GRANT AWARD OF \$400

TO: \_\_\_\_\_

FOR: THE BEST GRADUATE MASTERS DEGREE PAPER

AT: The Annual General Meeting of the Entomological Society of British Columbia

James Grant was born in Trinity Valley, near Lumby, on May 25th, 1920. He went to school in the North Okanagan and became a farmer and logger before enlisting in the Canadian Army in 1941. He served in the Signal Corps in Europe until 1946.

On his return to Canada he was employed by the Federal Forest Entomology Laboratory in Vernon. His work took him throughout the Province and enabled him to increase his expertise in ornithology, Entomology and botany.

In 1970, he was appointed Field Studies Coordinator for the Vernon School District (22) and remained there until his retirement in 1978. His dedication and extensive knowledge of natural history

made him a mentor and inspiration to many naturalists and students in the Okanagan area, until his death in 1986. Grant was a founding member of the North Okanagan Naturalists' Club. He published at least thirty articles on birds and their biology and operated a hospital for injured hawks and owls from his home in Lavington.

Following his death, the "James Grant Memorial Fund" was established to contribute to the preservation of natural habitat through acquisition of property and for educational purposes, to continue the work he fostered throughout his life. This Entomological Award is presented in his memory by the North Okanagan Naturalists Club.



DATED: \_\_\_\_\_

\_\_\_\_\_  
PRESIDENT



## Some International Entomological Societies

Royal Entomological Society [www.royensoc.co.uk/](http://www.royensoc.co.uk/)

Entomological Society of Southern Africa [www.entsocsa.co.za/](http://www.entsocsa.co.za/)

Egyptian Entomological Society [www.ees.eg.net/](http://www.ees.eg.net/)

Australian Entomological Society <http://www.austentsoc.org.au/>

Xerces Society for Invertebrate Conservation [www.xerces.org](http://www.xerces.org)

Japan Coleopterists Society <http://www.mus-nh.city.osaka.jp/shiyake/j-coleopt-soc.html>

Chilean Society of Entomology <http://www2.udec.cl/~insectos/>

Butterfly Conservation <http://butterfly-conservation.org/>

Croatian Entomological Society <http://www.agr.unizg.hr/hed/index.htm>

European Association of Coleopterology <http://www.ub.edu/aec/>

Dutch Butterfly Conservation <http://www.vlinderstichting.nl/>

Butterfly Conservation of the Republic of China <http://butterfly.kingnet.com.tw/>



*Megalotomus quinquespinosus*. Photo by Adam Blake





## Supporting Butterfly Conservation through Collaboration: The BC Butterfly Atlas

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The BC Butterfly Atlas is a community-based citizen science project aimed at increasing our knowledge of the status and distribution of butterflies in British Columbia.

### Project Description

Beginning in 2012, the BC Butterfly Atlas will harness the efforts of both professional biologists and citizen naturalists to document the distribution and abundance of butterflies in British Columbia. Gathering butterfly records from across BC will help identify which species are truly rare and which are more common, provide a snapshot of butterfly populations to which past and future surveys can be compared, and inform efforts to conserve butterflies and their habitats. Results will be collated into a single database and be made available on maps on the project website. The project also aims to educate and engage the public about the importance of biodiversity and increase involvement in butterfly conservation in BC.

### Project Objectives

The BC Butterfly Atlas has the following objectives:

- Increase public interest in butterflies and involvement in butterfly watching;
- Share information on the distribution, abundance, and habitat relationships of butterflies in British Columbia;
- Educate British Columbians on the importance of conservation of butterflies and their habitat; and
- Develop resources and partnerships to improve conservation of butterflies and their habitats.

### Background

Mapping biodiversity is a growing stewardship activity around the world, and the information collected is invaluable for the conservation of species and their habitat. Following on the recent success of the BC Breeding Bird Atlas<sup>1</sup> and butterfly atlassing projects in other jurisdictions (e.g., Butterflies of the New Millennium (UK)<sup>2</sup>, Maritimes Butterfly Atlas<sup>3</sup>, and atlases in several US states), we are initiating a citizen-based survey and atlassing program for butterflies in British Columbia. Despite their important ecological role and value as habitat indicators, butterflies in BC lack adequate information on their distribution, abundance, and habitat relationships needed for effective conservation. An atlassing project would seek to fill this information gap while increasing public awareness and support for butterfly conservation.

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<sup>1</sup> <http://www.birdatlas.bc.ca>

<sup>2</sup> <http://www.butterfly-conservation.org>

<sup>3</sup> <http://www.accdc.com/butterflyatlas.html>



Obituary printed from Bulletin Entomological Society of Canada

## In memory / En souvenir de

**L**eland Medley Humble passed away peacefully at home on 4 August 2020 with his family by his side. Lee was born 3 November 1951 in Dawson Creek, British Columbia, and was raised in Nelson, a beautiful town nestled in the Selkirk Mountains in eastern BC. Here, where nature was at his doorstep, Lee developed an appreciation of the outdoors at an early age. Following high school, he worked as a heavy equipment operator for the Canadian Pacific Railroad; trains remained a passion for Lee for the rest of his life. Lee attended Selkirk College in Nelson and completed his undergraduate training in biology at the University of Victoria in 1977. It was here that he started his life-long fascination with insects and, under the guidance of Richard Ring, completed his PhD on insect cold tolerance with his dissertation on “Life histories



M. Noseworthy

**Leland Medley Humble**  
(3 November 1951 – 4 August 2020)

and overwintering strategies of some arctic sawflies and their hymenopterous parasitoids”. His graduate research took him to the Canadian high Arctic for several summers. He had many stories to tell of his adventures in the north: remote camps, exciting flights in small planes, encounters with large animals and memorable interactions with locals and other researchers.

These were busy years for Lee; at the same time as being a full time PhD student, he was the father of a young family and had a job with Dave Gillespie at Agriculture Canada studying parasites and hyperparasites of the European winter moth, *Operophtera brumata* L. In 1985 a position for a forest entomologist came open at the Pacific Forestry Centre with the Canadian Forest Service in Victoria. John Borden, then a professor at Simon Fraser University, inspired by a research talk that he heard Lee give, encouraged him to apply for the job. So began a 35-year career of scientific discovery, collaboration and fun; Lee often remarked at his good fortune to be paid for enjoying his hobby! Lee was hired to provide entomology support to the federal Forest Insect Disease Survey (FIDS), specifically for the BC & Yukon Region. This involved rearing and identifying forest insects collected in the annual surveys, overseeing the insectary and Pacific Forestry Centre Arthropod (PFCA) collection and providing general diagnostic services; and pursuing research interests in what time remained. One of these areas of research examined the biodiversity of arthropod communities in the tree canopies of temperate rain forests; work with Neville Winchester and Richard Ring and as a component of the Montane Alternative Silviculture Systems (MASS) project.

Lee was an active participant in the British Columbia Plant Protection Advisory Council (BCP-PAC) and, in addition to chairing the forest pest committee and serving on the Regional Emergency Action Coordination Team (REACT), he was actively involved in the science and politics of gypsy moth control. He provided advice regarding the European gypsy moth, *Lymantria dispar dispar* L. and the Asian gypsy moth, *L. dispar asiatica*, *L. dispar japonica*, *L. umbrosa*, *L. albescens*, and *L. postalba*, found in North America, associated with cargo ships in 1991. Lee helped develop a DNA-based diagnostic test to differentiate the European from the Asian sub-species and in the process set up a high security quarantine room at the Pacific Forestry Centre. In the early 1990s, his Asian gypsy moth work took him to the Russian Far East where he worked on an international collaboration addressing moth attraction to light at shipping ports. This led to adventures



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in the forests of Siberia and opened his eyes to the significance of the international movement of forest pests.

A few years later, in 1996, two important events dramatically affected Lee's career: the FIDS program was ended and the Asian longhorned beetle, *Anoplophora glabripennis* (Motschulsky), was found in Brooklyn, New York. Lee now focused most of his time on alien invasive species; identifying established alien species, developing surveillance and diagnostic tools, studying pest movement pathways and finding practical mitigation opportunities.

He kept his research relevant to real issues by working closely with the Canadian Food Inspection Agency (CFIA), the US Animal and Plant Health Inspection Service (APHIS), and the US Forest Service as well as international organizations such as the International Union of Forest Research Organizations (IUFRO), the International Forestry Quarantine Research Group (IFQRG) and the North American Plant Protection Organization (NAPPO). Lee carried out joint research projects on forest insect detection systems in China with scientists at the Chinese Academy of Forestry and was recognized as an associate research scientist at the Jilin Provincial Academy of Forestry Science. His expertise in insect rearing techniques provided key data to support the development and refinement of the international wood packaging standard, ISPM 15. Lee also continued his work on preventing the introduction and establishment of Asian gypsy moth by providing his scientific expertise during discussions with Asian countries impacted by the implementation of the North American phytosanitary standard – Guidelines for Regulating the Movement of Vessels from Areas Infested with the Asian Gypsy Moth (NAPPO RSPM 33).

Lee worked throughout his career on locating and identifying predators of hemlock woolly adelgid, *Adelges tsugae* Annand. In the early 2000s he identified *Laracobius nigrinus* Fender as a biological control agent for use in eastern North America and more recently he located and collected hemlock woolly adelgid for further work on new biocontrol agents with graduate students and colleagues in Canada and the USA.

Lee was also keenly interested in the curation of insect collections and contributed to and modernized the collection at the Pacific Forestry Centre. In addition to the physical collection, he helped build DNA reference libraries for many groups of insects including bark and woodborers and contributed through his own collections and those of his PhD student, Jeremy deWaard, to the Barcode of Life project with Paul Hebert.

In the final major project of his career, Lee circled back to some of the skills he learned in graduate school, thermotolerance of insects. But this time, instead of cold, he built a device to very precisely measure the high temperatures required to kill insects. This elegant piece of equipment, now known as the Humble Water Bath, hand-crafted by Lee, is a critical tool that will be used to change global trade regulations in years to come.

Lee Humble was a great teacher and mentor. He was an adjunct professor at the University of British Columbia and served on the Master's and PhD committees of numerous graduate students including Ashley Lamb, Gabriella M. Zilahi-Balogh, Jeremy deWaard, Susanne Kuhnholz, Cynthia Broberg, Stacey Wilkerson, Sepideh Massoumi-Alamouti and Eveline Stokkink. He also mentored many students through the co-op program, many of whom came back year after year and were so inspired that they became entomologists themselves. His true classroom, however, was in the forest where he knew plants and insects and how they interacted. He was always looking for ecological connections, formulating theories and planning new experiments. Those who were lucky enough to work with him in the field experienced Lee in his element.

Lee was the recipient of many well deserved awards including the Commemorative Medal for the 125th Anniversary of the Confederation of Canada, for service to Canada (1992), the Canadian Forest Service Merit Award for Team Achievement (1999), Natural Resources Canada



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(NRCan) Department Merit Award (1999), the Head of the Public Service Award for Excellence in Policy (1999), Outstanding Foreign Expert Award from Jilin Province, PR China (2001), Ontario Federal Council, Leadership through Collaboration Award (2004), the Canadian Forest Service Achievement Award (2012), Lifetime Achievement Award, Professional Pest Management Association of British Columbia (2012), NRCan Departmental Achievement Award (2013).

In addition to his passion for entomology, Lee was a skilled woodworker, photographer and wildlife enthusiast. Many specialized pieces of lab equipment were meticulously designed and crafted out of wood, plastic or metal by him. He was brimming with novel ideas, full of knowledge of entomology, botany, ecology, forestry, and had an unstoppable enthusiasm for science. He was a true renaissance scientist.

Lee Humble was an exceptional scientist who inspired his colleagues with his passion for science and made significant contributions to forestry and entomology. John Borden, his mentor and long-time colleague and friend, fittingly said, "An invasive insect lurking in British Columbia's forests will not regret the passing of Lee Humble but all of us who knew him certainly will".

Meghan Noseworthy and Eric Allen  
Pacific Forestry Service, Victoria



E. Allen

Lee at the microscope.



## Kelowna Museum request

Linda Digby of the Kelowna Museum Society is requesting help acquiring insect specimens for the natural history museum. Their interest is the south Okanagan region. They are seeking donations of identified, labelled specimens and photographs from members or students. Contact Linda directly at the museum, [www.kelownamuseums.ca](http://www.kelownamuseums.ca).

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