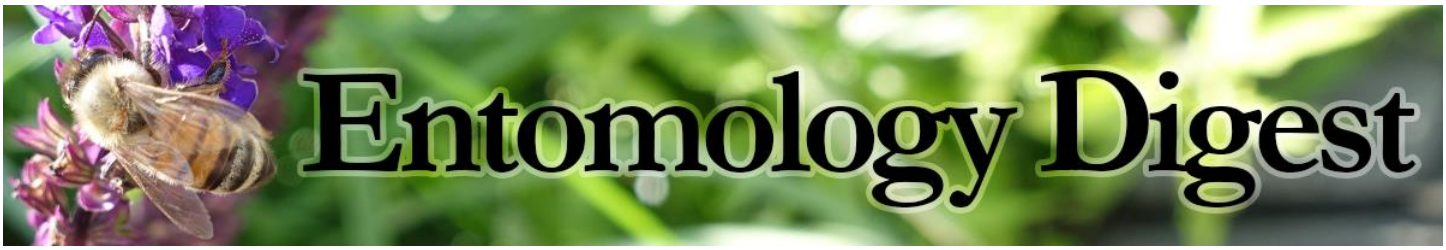


Entomology Digest – February, 2021

Letter from the Chair

Entomology Community and Friends of the Department, "*It's a Virtual World*"

The UW-Madison continues to monitor the progress of the SARS-CoV-2 pandemic and our collective action as a campus seems to remain successful in limiting new cases. We continue to see declines in our weekly positivity rates (<0.3%) from among 5,400 students, faculty and staff tested. Beginning in mid-February, new restrictions have taken effect to gain access to buildings on campus, and now all students, staff and faculty must have a negative test at least weekly. This has been accomplished using the new, Safer Badgers app (https://saferbadgers.wisc.edu/), which provides a real-time, QR code for entrance and access to UW facilities. Testing is based upon a new saliva test developed at the University of Illinois and coupled with real-time PCR assay. Our Chancellor Rebecca Blank still maintains a masking order for all indoor activities, together with density control measures and physical distancing.

Our academic and instructional lives continue largely in virtual formats. Although we are offering several in-person courses, nearly all our large enrollment courses remain as online instruction. Outreach and adult education (Extension) programs are similarly offered in virtual formats, and several key winter meetings have been organized and implemented successfully. In fact, many stakeholders have commented positively about the range of both national/international speakers offered in these programs. Everyone looks forward to the opportunity to return to pre-pandemic classrooms, programs and events, but new instructional and outreach formats have been revealed to all of us.

As we near the one-year mark of the pandemic, we have just completed some newer initiatives in the Department that had begun earlier in 2020. One of these initiatives included improved communications. Here we have updated and renovated several key messages and pages on the Entomology home page, to include a new land-acknowledgement statement, a long awaited and updated statement on diversity as well as a revised commentary on Department Mission and Values. Included here is a new Code of Conduct which lays out the standards that we expect everyone in the department to uphold, and the Guidelines for graduate students and advisors. Everyone in the Department of Entomology has the right to work in a safe environment free from discrimination, harassment, bullying, and violence. A new standing committee in the Department focusing on matters of Justice, Equity, Diversity and Inclusion helped to develop this new Code of Conduct and was led by our own Dr. Christelle Guedot (https://fruitcropentomology.russell.wisc.edu/).

We have also completed a Climate Survey within our own Department, as well as within the College of Agricultural and Life Sciences. Results of the survey will be used to inform plans to improve our climate and increase inclusion across the college. Results will help direct efforts to make our community as welcoming and productive as possible.

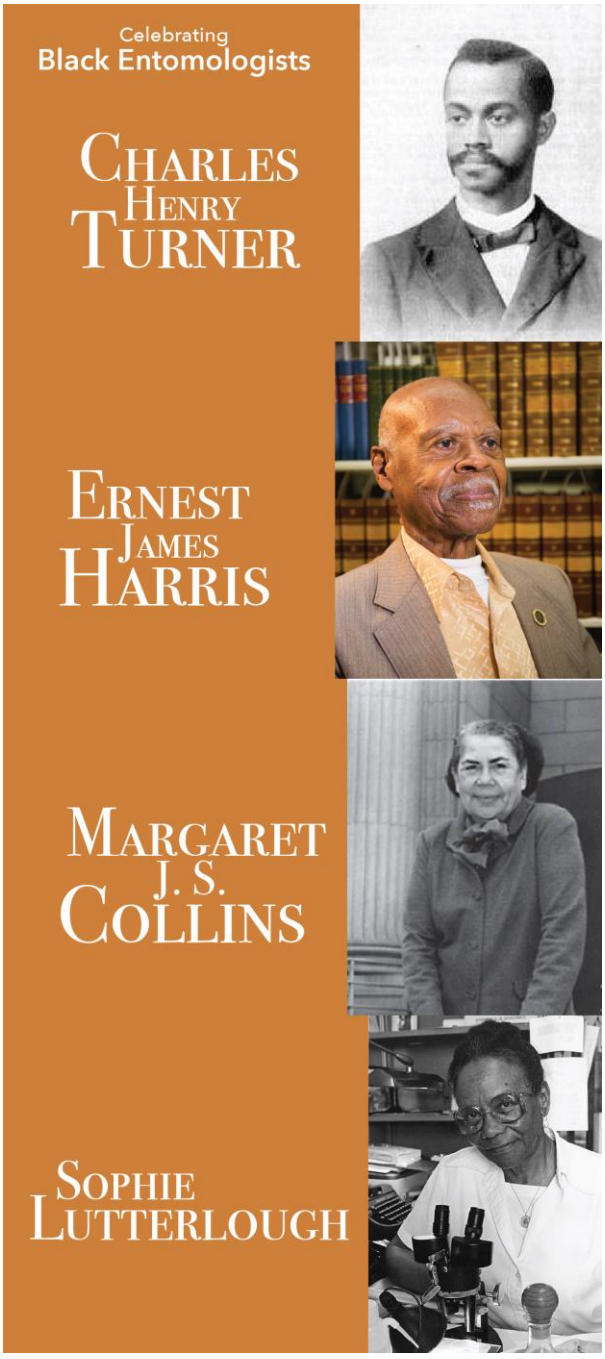
– *Russ Groves*

Upcoming Seminars and Events

Upcoming Friday seminars can be viewed on this page. Seminars are being held remotely via zoom until further notice.

Other seminars and events of note:

- Feb 20 10:00 AM – Virtual Science Saturday (hosted by the WID) – An outreach event emphasizing the contributions of Black scientists. Insect Ambassadors is submitting a video recognizing notable Black entomologists, both historical and contemporary. The video should be available on the Virtual Science Saturday web page when the event is live, and will recognize Charles Henry Turner, Sophie Lutterlough, Margaret J. S. Collins, and Ernest James Harris (American Entomologist obit).
- Feb 22-26 – Black in Entomology week. "Following in the new tradition of Black scientists creating inspiration and advocacy weeks (#BlackBirdersWeek, #BlackinMarineScience, #BlackinNeuro, and so many others), us Entomologists have decided it is our time. Whether you are a Black Entomologist, a Black student interested in Entomology, a hobbyist or novice Entomologist of color, or a bug-loving community member or friend, we invite you to join us in celebration with the following goals in mind: Foster Community, Create Funding Opportunities, Share Our Passion for All Things Insect, Inspire Each Other." Learn more: https://blackinento.com/.
- Feb 24 3:30 PM – Texas A&M is hosting a panel discussion on the contributions of Black entomologists to the field, featuring Dr. Jessica Ware, Dr. Alexandra Harmon-Threatt, Dr. Alvin Simmons, and Dr. Jared Ali. Register at this link.



Lab updates

Crall Lab

The Entomology Department is pleased to welcome its newest faculty member, Dr. James Crall. The Crall lab also welcomes **August Easton-Calabria** (graduate student), and **Matt Smith** (postdoc). Read the CALS profile on Dr. Crall here.

Groves Lab

Recent publications:

- Dogan, C., Hänniger, S., Heckel, D. G., Coutu, C., Hegedus, D. D., Crubaugh, L., Groves, R. L., Bayram, Ş., & Toprak, U. (2021). Two calcium-binding chaperones from the fat body of the Colorado potato beetle, Leptinotarsa decemlineata (Coleoptera: Chrysomelidae) involved in diapause. *Archives of Insect Biochemistry and Physiology*, *106*(1), 1–20. https://doi.org/10.1002/arch.21755
- Iglesias, L., Groves, R. L., Bradford, B., Harding, R. S., & Nault, B. A. (2020). Evaluating combinations of bioinsecticides and adjuvants for managing Thrips tabaci (Thysanoptera: Thripidae) in onion production systems. *Crop Protection*, *142*(December 2020), 105527. https://doi.org/10.1016/j.cropro.2020.105527
- Clements, J., Bradford, B. Z., Garcia, M., Piper, S., Huang, W., Zwolinska, A., Lamour, K., Hogenhout, S., & Groves, R. L. (2020). Candidatus (Ca.) phytoplasma asteris subgroups display distinct disease progression dynamics during the carrot growing season. *BioRxiv*, 1–14. https://doi.org/10.1101/2020.09.17.301150
- Clements, J., Garcia, M., Bradford, B., Crubaugh, L., Piper, S., Duerr, E., Zwolinska, A., Hogenhout, S., & Groves, R. L. (2020). Genetic Variation Among Geographically Disparate Isolates of Aster Yellows Phytoplasma in the Contiguous United States. *Journal of Economic Entomology*. https://doi.org/10.1093/jee/toz356
- Clements, J., Olson, J. M., Sanchez-Sedillo, B., Bradford, B., & Groves, R. L. (2020). Changes in emergence phenology, fatty acid composition, and xenobiotic-metabolizing enzyme expression is associated with increased insecticide resistance in the Colorado potato beetle. *Archives of Insect Biochemistry and Physiology*, *103*(3), 1–14. https://doi.org/10.1002/arch.21630
- Lagos-Kutz, D., Voegtlin, D. J., Onstad, D., Hogg, D., Ragsdale, D., Tilmon, K., Hodgson, E., Difonzo, C., Groves, R., Krupke, C., Laforest, J., Seiter, N. J., Duerr, E., Bradford, B., & Hartman, G. L. (2020). The Soybean Aphid Suction Trap Network: Sampling the Aerobiological "soup." *American Entomologist*, *66*(1), 48–55. https://doi.org/10.1093/ae/tmaa009

Guedot Lab

Recent publications:

- Jaffe B.D., Rink S., and Guédot C. Life history and damage by red-headed flea beetle (*Systena frontalis*) (Coleoptera: Chrysomelidae) on cranberry (*Vaccinium macrocarpon*). Journal of Insect Science. 21: 1-8. https://doi.org/10.1093/jisesa/ieab004

Lindroth Lab

Recent publications:

- Wooley, S.C., D.S. Smith, E.V. Lonsdorf, S.C. Brown, T.G. Whitham, S.M. Shuster, and R.L. Lindroth. 2020. Local adaptation and rapid evolution of aphids in response to genetic interactions with their cottonwood hosts. *Ecology and Evolution* 10: 10532-10542. https://doi.org/10.1002/ece3.6709
- Eisenring, M., S.B. Unsicker, and R.L. Lindroth. 2020. Spatial, genetic and biotic factors shape within-crown leaf trait variation and herbivore performance in a foundation tree species. *Functional Ecology*. https://doi.org/10.1111/1365-2435.13699
- Falk, M.A., J. Donaldson, M.T., Stevens, K.F. Raffa, and R.L. Lindroth. 2020. Phenological responses to prior-season defoliation and soil-nutrient availability vary among early- and late-flushing aspen (*Populus tremuloides*) genotypes. *Forest Ecology and Management* 458:117771. https://doi.org/10.1016/j.foreco.2019.117771
- Kruger, E.L., K.M. Keefover-Ring, L.M. Holeski, and R.L. Lindroth. 2020. To compete or defend: linking functional trait variation with life-history trade-offs in a foundation tree species. *Oecologia* 192:893–907. https://doi.org/10.1007/s00442-020-04622-y
- Bennett, A.E., K.F. Rubert-Nason, and R.L. Lindroth. 2020. Response of aspen genotypes to browsing damage is not influenced by soil community diversity. *Plant and Soil* 452:153–170. https://doi.org/10.1007/s11104-020-04466-8
- Lackus, N.D., A. Müller, T.D.U. Kröber, M. Reichelt, A. Schmidt, Y. Nakamura, C. Paetz, K. Luck, R.L. Lindroth, C.P. Constabel, S.B. Unsicker, J. Gershenzon, and T.G. Köllner. 2020. The occurrence of sulfated salicinoids in poplar and their formation by sulfotransferase. *Plant Physiology* 183:137-151. https://doi.org/10.1104/pp.19.01447
- Cope, O.L., R.L. Lindroth, A. Helm, K. Keefover-Ring, and E.L. Kruger. 2021. Trait plasticity and trade-offs shape intra-specific variation in competitive response in a foundation tree species. *New Phytologist* (in press). https://doi.org/10.1111/nph.17166

Paskewitz Lab

Graduate student **Martin Ventura** was selected to be a member of the inaugural cohort of Planetary Health Scholars through the Global Health Institute for his work on the use of insects as feed and food. In fall of 2020, Martin took on the role of teaching assistant for the first offering of a new class, Entomology 205 Our Planet Our Health (Dr. Paskewitz is the lead instructor). The course enrolled 147 students and focused on the links between ecosystem health and stability and human health and well-being. It's the foundational course for the new Global Health major at UW Madison, which is administered by the Department of Entomology and already has nearly 100 declared students.

Dr. **Bieneke Bron**, a leader in our Tick App program, has moved to Wageningen University in the Netherlands, her home country, to work on modeling transmission of Rift Valley fever by mosquitoes. She is also leading efforts to develop recommendations for building more resilient systems in advance of the next pandemic for the World Health Organization.

- Bron, Gebbiena M., Maria del P. Fernandez, Scott R. Larson, Adam Maus, Dave Gustafson, Jean I. Tsao, Maria A. Diuk-Wasser, Lyric C. Bartholomay, and Susan M. Paskewitz. "Context matters: contrasting behavioral and residential risk factors for Lyme disease between high-incidence states in the Northeastern and Midwestern United States." *Ticks and Tick-borne Diseases* 11, no. 6 (2020): 101515. https://doi.org/10.1016/j.ttbdis.2020.101515

Dr. **Xia Lee** was promoted to Research Scientist with the Midwest Center of Excellence for Vector-Borne Disease in 2020. Dr. Bron and Dr. Xia Lee collaborated on an evaluation of an inexpensive backyard tick control strategy. This work documented

significant risk of exposure to tickborne disease around homes in Wisconsin and a high level of efficacy for the granular insecticide applications.

- Bron, Gebbiena M., Xia Lee, and Susan M. Paskewitz. "Do-It-Yourself Tick Control: Granular Gamma-Cyhalothrin Reduces Ixodes scapularis (Acari: Ixodidae) Nymphs in Residential Backyards." *Journal of Medical Entomology* (2020). https://doi.org/10.1093/jme/tjaa212

Dr. **Ryan Larson**, Lieutenant Commander in the US Navy, completed his doctoral work on modeling the relative importance and changing distribution of two species of Peromyscus mice, the major reservoirs for Lyme disease. Ryan found that the deer mouse is a much more important reservoir in Northern Wisconsin because it is significantly more abundant than the white-footed mouse in that environment. He also found that the white-footed mouse range is expanding into the north, and his models predict that this is likely to have negative consequences in terms of tickborne disease risk. Ryan and his family moved to Lima Peru in December 2020, where he now leads the vector unit at NAMRU 6.

- R T Larson, G M Bron, X Lee, S M Paskewitz, High Proportion of Unfed Larval Blacklegged Ticks, *Ixodes scapularis* (Acari: Ixodidae), Collected From Modified Nest Boxes for Mice, *Journal of Medical Entomology*, 2021;, tjaa287, https://doi.org/10.1093/jme/tjaa287

Dr. **Jordan Mandli** (CBMS program, co-advised with Dr Jorge Osorio) also completed his doctoral work on testing and developing control methods that target the white footed mouse for deer (blacklegged) tick and tick-borne disease management. Part of his work was testing a product called tick tubes, which he found could reduce tick density in the succeeding year by up to 50-60%. He also developed a promising new approach for oral vaccination of mice, which would prevent infections in any ticks feeding on them. Jordan is currently a postdoctoral associate with the Midwest Center of Excellence for Vector-borne Disease and is working for the Minnesota Department of Health on vector-borne disease surveillance.

- Stauffer, Maxwell T., Jordan Mandli, Bobbi S. Pritt, William Stauffer, Lynne M. Sloan, Tela Zembsch, Xia Lee, and Susan M. Paskewitz. "Detection of zoonotic human pathogens from Ixodes scapularis in Wisconsin." *Journal of Vector Ecology* 45, no. 1 (2020): 142-144. https://doi.org/10.1111/jvec.12384

Ms. **Tela Zembsch** completed her master's work in Entomology on examining the frequency and distribution of co-infections of the Lyme disease spirochete and the parasite that causes human babesiosis in nymphal deer ticks in Wisconsin. She also examined infections with a wildlife pathogen, a *Babesia* parasite that infects white-tailed deer, which was a nice connection to her undergraduate degree if Forest and Wildlife Ecology. Tela recently took a job with New York public health at the Wadsworth Center in Albany, where her combination of field expertise and lab work made her "the perfect person" for the position.

MPH/Vet Med student **Nicole Kuha** successfully defended her capstone thesis, where she collaborated with the Wisconsin Department of Health Services to examine the impact of co-infections of babesiosis and Lyme disease on medical outcomes in human patients. She also participated in summer tick/small mammal collections and assessed the prevalence of pathogens in adult ticks.

In February 2021, graduate student **Haley Johnson** (CBMS program, co-advised with Dr. Lyric Bartholomay) was the winner of the student competition at the Michigan Mosquito Control Association for her work on strategies for reducing the risk of West Nile virus infection. Haley implemented a large-scale study to measure the impact of larval mosquito control on adult mosquito abundance in Milwaukee. Graduate student **Kristina Lopez** was an invited speaker at the same meeting and discussed her work on assessment of trunk-mounted ULV insecticide application for control of WNV vectors in Chicago.

Former Entomology undergraduate **Hannah Fenelon** is now in the MPH program at the University of Washington and has recently accepted an internship with the Washington Department of Health. Hannah co-authored a paper published in the Journal of Medical Entomology.

- Gebbiena M Bron, Hannah Fenelon, Susan M Paskewitz, Assessing Recognition of the Vector of Lyme Disease Using Resin-Embedded Specimens in a Lyme Endemic Area, *Journal of Medical Entomology*, 2020, https://doi.org/10.1093/jme/tjaa234

We heard from former Entomology undergraduate Lauren Melodosian that she has been accepted to Medical School. Go, Lauren!

Finally, we received a patent for our work on a novel mosquito repellent derived from a bacterium. Paskewitz, Susan M., and Mayur K. Kajla. "Insect, tick, and mite repellent derived from *Xenorhabdus budapestensis*." U.S. Patent 10,618,936, issued April 14, 2020. https://patents.google.com/patent/US10618936B2/en

Schoville Lab

Grant awards:

- Dr. Schoville is a co-PI on a National Science Foundation Rules of Life grant entitled: "Detecting and predicting the relative contributions of fecundity and survival to fitness in changing environments."

Recent publications:

- Weng, Y.-M., D.H. Kavanaugh, and S.D. Schoville. 2021. Drainage basins serve as multiple glacial refugia for alpine habitats in the Sierra Nevada Mountains. *Molecular Ecology* 30 (3): 826-843. https://doi.org/10.1111/mec.15762
- Marden, E. *et al.* 2020. Sharing and reporting benefits from biodiversity research. *Molecular Ecology*. https://doi.org/10.1111/mec.15702
- Luo, L., S.D. Schoville, Z. Tang, and J. Zhu. 2020. A comprehensive analysis comparing linear and generalized linear models in detecting adaptive SNPs. *Molecular Ecology Resources*. https://doi.org/10.1111/1755-0998.13298
- Cohen*, Z.P., K. Brevik, Y.H. Chen, D.J. Hawthorne, B. Weibel†, S.D. Schoville. 2021. Elevated rates of positive selection drive the evolution of pestiferousness in the Colorado potato beetle (*Leptinotarsa decemlineata*, Say). *Molecular Ecology* 30(1): 237-254. https://doi.org/10.1111/mec.15703
- Crossley*, M.S., K.D. Burke, S.D. Schoville, and V.C. Radeloff. 2021. Recent collapse of crop belts and declining diversity of US agriculture since 1840. *Global Change Biology* 27(1): 151-164. https://doi.org/10.1111/gcb.15396

Steffan Lab

Recent additions to the lab include **Brandon Gominho** (ARS lab technician) and **Ryan O'Connor** (UW lab assistant). Later this spring, there will be two forthcoming additions to the lab family: **Nolan Amon** (PhD student) as well as a baby boy (**Prarthana Dharampal** is due in April)!

There are three funded research projects currently: 1) importance and roles of bee-microbe symbioses in bee health; 2) pheromone-induced defenses in cranberries; 3) mass-propagation and deployment of native Wisconsin nematodes as bio-control agents.

A sample of recent discoveries and papers:

1. Our "Microbes make the meal" paper in *Ecological Entomology*: here we show that for some bee species, the presence of pollen-borne microbes in a fermenting pollen mass is critical to larval bee development—even survival (**Fig. 1**).

Fig 1. An egg of a mason bee (*Osmia*) inserted into a fermenting pollen mass.

2. A collaborative review paper, "(More than) Hitchhikers through the network," in *Current Opinion in Insect Science*: here we discuss the increasingly apparent phenomenon that flowers are hubs of microbial transmission, and that one of the most conspicuous types of symbioses on the planet, the bee-angiosperm mutualism, has a silent third partner—microbes.

3. A report on a virulent new bio-insecticide created using a blend of native Wisconsin nematodes, and recently shown that a major pest of US fruit crops, the spotted-wing drosophila can be controlled with these nematodes (*Journal of Economic Entomology; **Fig. 2***).

Fig 2. A Wisconsin native animal: *Oscheius onirici*, which has turned out to be a virulent bio-control agent for US cranberries.

4. Another broadly collaborative review paper (published in *Progress in Earth and Planetary Science*) reveals the mechanisms by which isotopic fractionation in animal consumers tends to "stack" stable isotopes in specific amino acid pools, while less so in others.

5. A manuscript currently in review ("Chemical ecology of a tripartite symbiosis") at *Science Advances*: here we report the discovery that entomopathogenic nematodes are among the top carnivores in their respective food-webs, largely due to the consumption of their bacterial symbiont, which they farm within the cadavers of insects.

6. Collaborations with scientists in the Pauli laboratory, showing the frequency and magnitude of microbe-mediated "trophic inflation" in vertebrates, in boreal squirrels and Andean condors (**Fig. 3**).

Fig 3. A flying squirrel with a mushroom in its mouth. We have shown that certain squirrel species are highly omnivorous, largely due to their taste for fungi. Photo courtesy Alexander Badyaev.

Trowbridge Lab

We are thrilled to welcome graduate student **Angela Waupochick** to the lab! Angela is pursuing a PhD in Forestry and is co-advised by Dr. Trowbridge and Dr. Hart (Colorado State University). Her project seeks to understand the impacts of black ash mortality by Emerald Ash Borer on the water cycle.

Angela recently joined the 2021 WISCIENCE STEM Public Service Fellows cohort under the community-engaged teaching and direct service pathway. *The goal of the WISCIENCE STEM Public Service Fellows Program is to support students from STEM disciplines to connect their scholarly work and professional identity to issues of public concern, develop a community of practice around public service in the sciences and ultimately act as a steward of their discipline, whether they remain within academia, or choose to enter another profession.* Angela's focus during this fellowship will be to create a forest outreach plan for the Menominee tribal community to better communicate the Forest Management Plan, forest management strategies and engage the tribal membership to have a more active role in the management process. Her ultimate goal is to use the program to strengthen the outreach plan (which is also a chapter of her dissertation) and gain experience that will be relevant post-graduation.

Angela also recently accepted a position on the HiTIDER (**Hi**story and **T**opography to **I**mprove **D**ecision-making for **E**stuary **R**estoration) Advisory Committee, where she will be involved in discussing desired outreach outputs and outcomes for regional and national estuary ecosystem research.

Congratulations, Angela!

We are also very excited to welcome Dr. **Mike Howe** to the lab! Dr. Howe defended his dissertation work in December of 2020 and is currently teaching Silviculture as Instructor of Record in the Forest and Wildlife Ecology Department. Starting in June, Dr. Howe will be leading an exciting collaborative research project between the Trowbridge and Hart Labs (Colorado State University) investigating the possible disturbance linkages between western spruce budworm and Douglas-fir beetle using a unique combination of mechanistic-based field studies, historical survey data, and statistical models. We're thrilled to have you on-board, Mike!

EGSA updates

EGSA had our first meeting of the semester on February 10th, where we welcomed two new graduate students. We discussed updates from all of the departmental committees, and talked about our vision for the role of EGSA. Coming up soon will be monthly virtual social activities for graduate students (like trivia or game night!) and monthly workshops on useful topics (like skill sharing, speed review of the insect orders, or how to sign up for health insurance).

During introductions, we included the following ice breaker: if you could have any arthropod ability besides for flight, what would it be? Here are some of our responses:

- Another pair of arms so I can hold my cat and eat snacks at the same time
- Better chemosensation
- Cute antennae
- The ability to walk on different surfaces like walls or the ceiling
- An exoskeleton, so my muscles don't get sore from sleeping on them weird
- The ability to see other light spectra

-Hanna McIntosh

Diversity, Equity, and Inclusion Committee Report

The DEI committee has been very busy this academic year. We hosted several town halls in the department during our regular colloquium time, conducted the departmental climate survey, and presented a summary of the survey results to the ento community. We will soon provide a written summary of the survey as well. We wanted to remind everyone that, in an effort to improve communication, the Department now uses a Google Drive called Entomology Share where you can see the agendas, minutes, and docs that each committees are working on during the year. **Make sure you sign in with your @wisc.edu email** The DEI committee has its own folder where you can find all the documents (including the document started by the students that guides our DEI activities) that we are working on as well as resources and notes taken during town halls.

We hope that this information as well as the town halls are valuable to all and we welcome feedback, suggestions, comments as we continue to work on DEI activities in the future. Feel free to direct those to Christelle Guédot at guedot@wisc.edu or Allee Hochmuth at abhochmuth@wisc.edu. We will soon have an document for people to provide comments anonymously.

Stay tuned and stay warm!

-Christelle Guédot and the entire DEI Committee.

Website updates

- The Department Resources page has been expanded, including a quick reference list of people responsible for various functions of the Department and its committees. Sections were added describing the mission and leaders of EGSA and Insect Ambassadors, and a section was added detailing how to access the departmental shared Google drive.
- A number of documents detailing departmental policies, procedures, and guidelines relevant to faculty, students, and staff have been added to the Entomology Share Google drive. Some of these are somewhat dated and are in the process of being revised and updated and will be replaced with newer versions as they are ratified by the faculty or relevant committees.

Bugs in the news

- Battling bugs help solve mysteries of weapon evolution. Scientists outfitted bugs with body armor and pitted them against each other in staged wrestling matches, all in the name of science. The findings shed light on how evolution has shaped the arsenal of weapons in the animal kingdom.
- Butterfly wing clap explains mystery of flight. The fluttery flight of butterflies has so far been somewhat of a mystery to researchers, given their unusually large and broad wings relative to their body size. Now researchers have studied the aerodynamics of butterflies in a wind tunnel. The results suggest that butterflies use a highly effective clap technique, therefore making use of their unique wings. This helps them rapidly take off when escaping predators.
- Combined bark beetle outbreaks and wildfire spell uncertain future for forests. Bark beetle outbreaks and wildfire alone are not a death sentence for Colorado's beloved forests — but when combined, their toll may become more permanent, shows new research.
- Ecological interactions as a driver of evolution. In a recent study, an international team of researchers including TUD botanist Prof. Stefan Wanke has investigated the origin of the mega-diversity of herbivorous insects. These account for a quarter of terrestrial diversity. The results of the study were recently published in the international journal Nature Communications. There the scientists show that the evolutionary success of insects may be linked to recurrent changes in host plants.
- Flowery diets help predatory insects help farmers keep pests in check. Predatory insects have been shown to live longer when they have access to nectar and pollen, according to a new study. Thus, flowers don't just benefit insects, they help farmers farm sustainably. Predatory insects are skilled pest controllers whose hunting reduces the need for agricultural pesticides.
- Genetically-modified mosquitoes key to stopping Zika virus spread. In 2016, the World Health Organization called the Zika virus epidemic a 'public health emergency of international concern' due to the virus causing birth defects for pregnant women in addition to neurological problems.
- Scientists discover how a group of caterpillars became poisonous. Genetic research using Smithsonian collections reveals the evolutionary path of six toxic butterfly species. The Atala butterfly and its five closest relatives in the genus Eumaeus like to display their toxicity. Their toxicity comes from what they eat as caterpillars: plants called cycads that have been around since before dinosaurs roamed the Earth and contain a potent liver toxin. New research tells the evolutionary tale of how these butterflies gained their toxin-laced defenses as well as the bold colors and behaviors that tell all would-be predators to steer clear.
- The business of bees. The economic value of insect pollination services is much higher than previously thought in the US. The economic value of insect pollinators was $34 billion in the U.S. in 2012, much higher than previously thought. The team also found that areas that are economically most reliant on insect pollinators are the same areas where pollinator habitat and forage quality are poor.
- Why plant diversity is so important for bee diversity. Delicate balance of energy efficiency and flower morphology are key to co-existence between honey bees and bumble bees. A study in southern England reveals why bumble bees and honey bees thrive despite foraging on the same flowers.