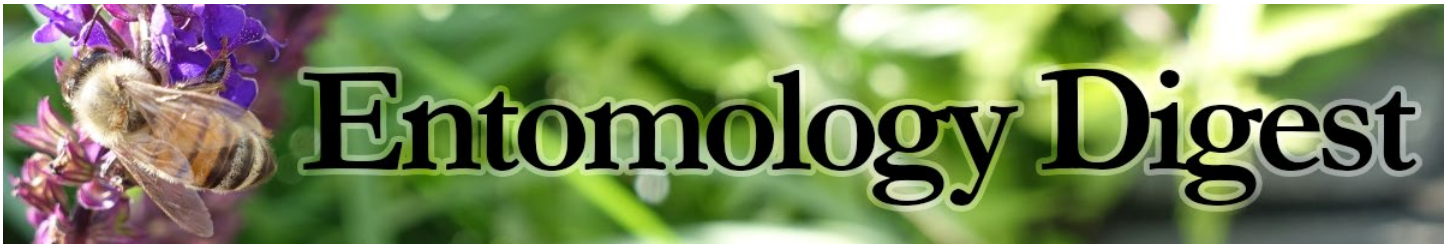


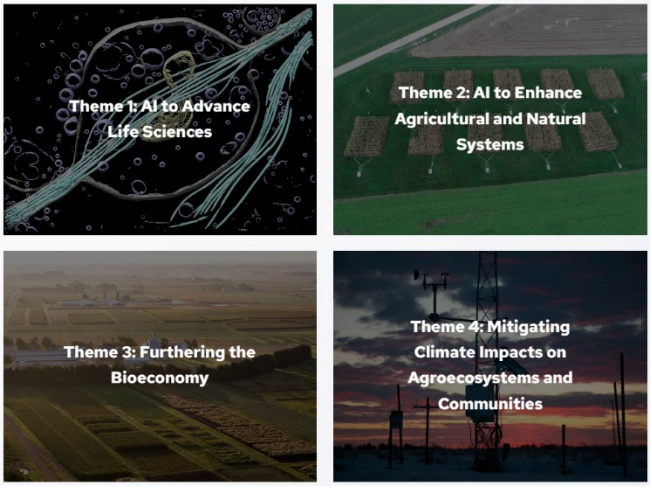
Entomology Digest – Fall 2024

Letter from the Chair

Entomology Community and Friends of the Department,

College of Agricultural and Life Sciences – RISE hiring opportunities. Announced by Chancellor Jennifer L. Mnookin in 2024, the Wisconsin Research, Innovation and Scholarly Excellence (RISE) Initiative is a multifaceted effort focused on faculty hiring, research infrastructure, interdisciplinary collaboration and student opportunity. This new campus investment is designed to help address significant, complex challenges of particular importance to Wisconsin and the world. New hires under the RISE initiative are intended to build research excellence while expanding instructional and educational capacity and impact. In order to achieve these goals, there is a strong emphasis on collaboration within RISE.

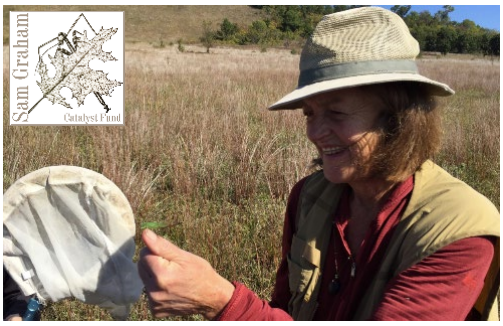
In the Spring of 2024, CALS solicited proposals from academic departments for RISE positions in RISE-'Artificial Intelligence (AI)' and RISE- Environment, Adaptation, Resilience, Technology, and Humanity (EARTH). These proposals were reviewed and grouped into thematic areas by CALS which have served as the cornerstone of cluster hires recently advertised among four thematic areas.



The RISE Initiative identifies new funding for positions that are matched with positions in the same RISE topic area funded through the college's existing budget. Members of our department are part of the search and screen processes for two of the four initiatives. **Dr. James Crall** and **Dr. Claudio Gratton** participate in Theme 2 (Artificial Intelligence to enhance agricultural and natural systems) and Theme 4 (Mitigating climate impacts on agroecosystems and communities), respectively. Outcomes of these searches are intended to identify 2-3 faculty members in each thematic area who will work collaboratively as 'clusters' to address key challenges facing humans, society and the environment.

Soon to be enacted will be a search for scholars in a new RISE area described as THRIVE. RISE-THRIVE will strategically focus investments to improve the so-called human 'healthspan', building on our existing strengths and generating research into critical new treatments for diseases ranging from Parkinson's to cancer. The department's investment in the Midwest Center of Excellence for Vector-Borne Disease together with new faculty hires investigating disease dynamics, disease ecology and pathogen-host interactions strategically position entomology for investment from this soon-to-be announced THRIVE initiative.

Undergraduate Entomology Society. The Undergraduate Entomology Society (UES), led by President **Ari Maurer**, continues to be a very active group with nearly engaged 30 members. Events this spring, summer and fall have included insect collecting trips to Colorado (pictured, left) and



also to the home and farm of our departmental friend, **Ms. Gigi La Budde**. In mid-July, a group of UES members (insect-collecting enthusiasts) traveled to central Colorado to explore the landscape for beetles to be included in their Ento 701, Advanced Taxonomy of Coleoptera (**Dr. Dan Young**) collections. In April, 2024, The UES made a trip to Spring Green, Wisconsin for another insect collection event with Ms. Gigi La Budde where they were guided by thorough dry sand prairies, oak savannas, and streamside to explore for aquatic insects (pictured, left). Though the sight of an assemblage of this size, wielding nets and a kill jars, may send some folks running, this trip had no shortage of laughs and, of course, insects! A sincere thank you to the expertise and generosity of Gigi La Budde and the Sam Graham Catalyst Fund for making this trip possible. The department greatly appreciates Gigi's generosity and time spent.

More recently, the UES hosted a new and signature fall event entitled **Bug Ball** (see poster and event photo, right). An evening of appreciation of the creepy, crawly and cute things that go 'bump' in the night. The UES hosted Bug Ball on Thursday, November 21, from 7:00 – 11:00 p.m. in Tripp Commons at Union South. This year's firefly theme included a DJ-accompanied floor of dancing, snacks and desserts, insect-inspired mocktail bar, a photographer, table games and stickers. The dress code was appropriately formal attire, to include bug costumes. Bug Ball was intended as a night of fun, entertainment and buzz-worthy memories for all who participated.

Entomology Graduate Student Association / Entomology DEI Committee – Fall Welcome Event. Entomology graduate students and faculty assembled for an end of summer welcome event (picture below left). Specifically, 1st and 2nd year students, together with new graduate students to the Department, planned for a weekend event of camping, canoeing and camaraderie. The department's DEI Committee together with the EGSA hosted this second annual event on the afternoon of Friday, August 23 and lasting through Sunday, August 25. The group camped for 2 nights at Wildcat Mountain State Park, and enjoyed an all-day canoe trip on Saturday, August 24 on the Kickapoo River. A sincere thanks to the DEI Committee and **Ms. Emily Laabs**, Graduate Student Academic Advising Manager, for time spent to organize and participate in this year's event. *– Russ Groves*

Insect Ambassadors

We are pumped to share that Insect Ambassadors presented **20 times** this Fall semester, including at Wisconsin Science Festival and many Dane County schools! Big thanks to outgoing coordinators **Emma Terris** and **Victoria Salerno** for setting up many of the events, and kudos to our 16 volunteers who helped make them a success❣️ Follow these shenanigans on Instagram @insectambassadors.

You too could share insect science and love with our community by signing up for 2025 events on this spreadsheet: tinyurl.com/IA-signup. **Anybody who volunteers three or more times gets a free T-shirt designed by Celeste!** The shirt and a tote are also available for purchase at insectambassadors.myspreadshop.com. Thank you for all your support, and Happy Holidays! *- Anupreksha and Emilie*

Lab updates

Insect Diagnostic Lab

Caseload at the UW Insect Diagnostic Lab is quiet this time of the year, which is always appreciated as it allows me to reflect upon the last year while doing annual reporting. As a whole, 2024 was another busy year at the diagnostic lab with case numbers being similar to the last few years (roughly 2,500 ID requests per year). Some of the most notable insect & arthropod stories for 2024 were the collapse of spongy moth populations in some areas, the sudden and widespread appearance of the invasive elm zigzag sawfly last summer, and not one, but four live scorpions spotted in the state this year—including two reports of stings!

In other regards, 2024 was the busiest year I've ever had at the diagnostic lab. With the emergence of our periodical cicadas last spring, the period from April to July is mostly a blur to me. The cicadas seemed to catch everyone's attention, and the media frenzy led to around 100 media interviews in just a few months this spring. Nonetheless, it was amazing to finally get a chance to observe the cicadas with my own eyes. Ironically, I came to the department to start my graduate work in 2007 (17 years ago) but missed the periodical cicadas that year. The periodical cicadas were a blast while they were out, although I'm a bit glad they won't be out again for 17 years (2041)! I also owe a huge thanks to the many members in the department who helped make our Cicadapalooza event in Lake Geneva a big success back in June.

Speaking of outreach events, it's that time of the year to start thinking about **Wisconsin Insect Fest**. Keep an eye out for upcoming announcements about planning for 2025. *- PJ Liesch*

Chavez Lab

The Chavez lab welcomes **Dr. Tean Zaheer**. Tean (DVM, M.Phil., PhD.) is a Veterinarian, specialized in parasitology. She has been working on the epidemiology and control of ticks (by application of nanomaterials). Tean has worked on novel combinations that are effective in halting the major life cycle stages of *Hyalomma* ticks, having public health importance. She has also worked on potential eco-toxic and genotoxic impacts of using nanomaterials on the off-targets. Her hobbies are: online learning through MOOCs, calligraphy and sightseeing.

Stephanie Guzman Valencia passed her preliminary exam and moves to dissertator status. Congratulations!

Publications

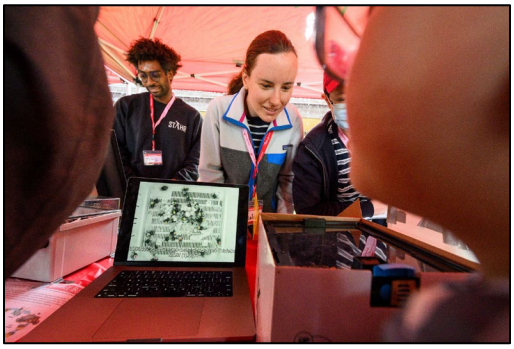
- Leal-Galvan B, Kumar D, Karim S, Saelao P, Thomas DB, Oliva Chavez A. A glimpse into the world of microRNAs and their putative roles in hard ticks. Front Cell Dev Biol. 2024 Sep 23;12:1460705. doi: 10.3389/fcell.2024.1460705.
- Gonzalez J, Harvey C, Ribeiro-Silva CS, Galvan-Leal B, Persinger KA, Olafson PU, Johnson TL, Oliva Chavez A. Evaluation of tick salivary and midgut extracellular vesicles as anti-tick vaccines in White-tailed deer (*Odocoileus virginianus*). Ticks and Tick borne diseases. *in press*.

Crall Lab

The lab welcomes **new lab members** ***Dr. Andrzej Affek*** (Visiting Associate Professor, Polish Academy of Sciences), ***Acacia Tang*** (who transitioned from a staff position into a PhD program in iBio), **Shelby Loebertman** (current undergraduate research who will joining the lab as a technician in Spring) and undergraduate researcher ***Bruce Wei*** (who will be working with Anupreksha Jain). And **congrats** to ***Dr. Olivia Bernauer*** (now at the University of Wisconsin-Eau Claire) and ***Dr. Matt Smith*** (now at the Illinois Institute of Technology), former postdocs in the lab, for starting their new faculty positions (and completing their first semesters!)!

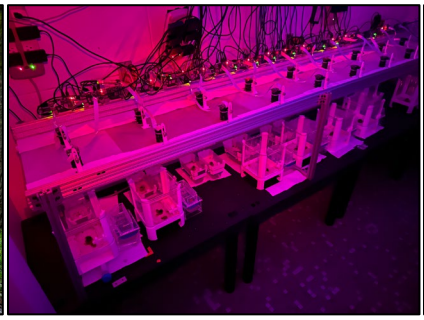
Olivia Bernauer talking with Dr. Shane Campbell-Staton, host of Human Footprint

Nicole DesJardins demonstrating her field experiments at the Arboretum



Nicole DesJardins and Matt Smith at Cicadapalooza

James at Cicadapalooza



Bumblebee colony rearing and tracking experiments

Videos of Dr. Affek's summer experiments https://youtu.be/ietlOazNlGI

Congrats also to the many lab members that presented at many conferences (including the International Congress of Entomology in Japan and the Entomological Society of America) and outreach events (including Cicadapalooza and Insect Ambassadors). We also had a busy year of field work and research, including in sites throughout Wisconsin, nearby on campus, as well as out California! We were also excited to have a film crew from PBS's Human Footprint visit the lab and get some footage of the lives of bees!

Recent publications and preprints:

- Bernauer, O. M., Jain, A., de Bivort, B., Holbrook, N. M., Myers, S. S., Ziska, L. H., & Crall, J. D. (2024). Elevated atmospheric CO2 has small, species-specific effects on pollen chemistry and plant growth across flowering plant species. Scientific Reports, 14(1), 13760.
- Easton-Calabria, A. C., & Crall, J. D. (2024). The BumbleBox: An open-source platform for quantifying behavior in bumblebee colonies. bioRxiv, 2024-11.
- Mehrotra, D., Still, L., Agrawal, V., Gibson, K., Crall, J., & Bick, E. N. (2024). Eavesdropping on Herbivores: Using contact microphones to quantify Plant-Insect Interactions. bioRxiv, 2024-09.

Gratton Lab

Celeste Mezera (Huff) successfully defended her MS thesis on Dec. 11. Earlier in the fall, she received second place for my 10-minute student presentation at the annual ESA meeting in Phoenix.

Hannah Gaines-Day received a Special Recognition award from the Wisconsin Honey Producers' Association for her outreach and research with Wisconsin beekeepers.

Claudio and colleagues published a paper on Agroecological innovation: Gratton, C., Strauser, J., Jordan, N., Jackson, R.D., 2024. Agroecological innovation to scale livestock agriculture for positive economic, environmental, and social outcomes. Environ. Res.: Food Syst. 1, 013001. https://doi.org/10.1088/2976-601X/ad382f

Claudio and colleague **Brian Spiesman** (Kansas State University, and former UW post-doc alum!) received an NSF grant to develop a research hub for automated bee identification, data sharing, and citizen science using computer vision based on the BeeMachine platform: https://beemachine.ai.

Guédot Lab

The Guédot Lab welcomed a new graduate student **Sophie Perry**, who started in September and is getting a MS degree in the Agroecology program. Sophie studies the seasonal phenology of and feeding damage from hemp borers and how borer feeding may increase the concentration of secondary defense compounds in hemp.

Elizabeth Hrycyna was elected Treasurer of the EGSA for the 2024-2025 term and is responsible for handling the EGSA funds. She has also continued to be an Insect Ambassador and regularly volunteers for events set up through the ambassador program, sharing insect knowledge with people of all ages. Elizabeth received a mini-grant from the Center for Integrated Agricultural Studies over the summer and attended a leadership workshop run by CIAS and the Aldo Leopold Foundation. This semester Elizabeth founded and led a peer-review writing workshop every other Wednesday from 12-3PM, and she will continue this workshop into Spring 2025.

Emilie Parkanzky started her position as Insect Ambassador Co-Coordinator this October where she plans education programs for the public. This semester the program has planned events for schools, libraries, science fairs, and the Wisconsin Science Festival. Emilie received an NC-SARE Graduate Student Grant for her work on an attract and kill management program for Japanese Beetle.

Fatma Besbes actively contributed to scientific engagement through diverse events. She participated in Science Night at Madinah Academy, inspiring curiosity about insects through interactive activities among young learners and their families. We are excited to welcome **Damian Rodriguez**, a Bioscience Youth Apprenticeship high school fellow, who will work on graduate student projects. Our entire lab participated in the Women in Science and Engineering (WISE) faculty dinner, graduate student poster session, and lab tour showcasing the diversity of research done at the university to undergraduate students.

Publications

- Hetheringon M.C., Weissner M.*, and **Guédot, C.** 2024. Enantiospecific attraction of *Lygus lineolaris* Palisot de Beauvois (Hemiptera: Miridae) to a ubiquitous floral volatile in the field. *Journal of Environmental Entomology.*
- Feng S., DeGrey S.P., **Guédot C.,** Schoville S.D., Pool J.E. 2024. Genomic Diversity Illuminates the Species History and Environmental Adaptation of *Drosophila suzukii. Genome Biology and Evolution* 16(9). https://doi.org/10.1093/gbe/evae195
- Jaffe B.D., Smith D.S., Amon N.D., Kamiyama M.T., Rink S.*, van Zoeren J., **Guédot C.** 2024. Missing the biodiversity for the bee: Natural land management strategies impact functional invertebrate diversity in commercial cranberry production. *Agricultural and Forest Entomology.* DOI: 10.1111/afe.12661
- Hetheringon M.C., Fox M.*, Johnson M.*, Lopina A.*, Mechelke E.*, Weissner M.*, **Guédot, C.** 2024. Alfalfa perimeter strips reduce *Lygus lineolaris* populations in June-bearing strawberry fields. *Journal of Pest Science.* https://doi.org/10.1007/s10340-024-01795-w

Paskewitz Lab

The Paskewitz lab congratulates **Zackary Sieb**, who successfully defended his thesis on December 10th!. Zack's thesis is entitled “Evaluating services offered by pest management professionals for effectiveness in suppression of nymphal blacklegged ticks in Wisconsin backyards.” Zack was supported by the CDC-funded Midwest Center of Excellence for Vector-Borne Diseases. He presented portions of this work at the national ESA conference and was invited to present at the Indiana Mosquito Control Association meeting in the spring. Great work, Zack!

We also want to congratulate **Ali Ross**, a graduate student working on insecticide resistance in the larvae of *Culex* spp. Ali won first place (of 11 students) in the recent student competition at the Illinois Mosquito and Vector Control Association meetings in Springfield.

We published a new paper on extreme resistance to an insect growth regulator commonly used for control of mosquito larvae with our former student and postdoc, **Dr. Kristina Lopez**.

- Lopez K., Harbison, J., Clifton M., Irwin P., Erkapic A., Holub R., Blanco C., Paskewitz S. Bartholomay L. Extreme resistance to S-methoprene in field-collected *Culex pipiens* (Diptera: Culicidae) across the Chicago, IL region. Scientific Reports 14:18001. 2024

Schoville Lab

Graduations: During the summer term, **Ebony Taylor** and **Emma Terris** (co-advisee with the Groves lab) completed their master's degrees. Congratulations!

Sean Schoville was officially promoted to Full Professor.

The lab received two new grants, one from the National Science Foundation to study ground beetle convergent evolution: “Testing for repeated evolution in a radiation of alpine beetles,” and the other from the USDA National Institute of Food and Agriculture Agency to study insecticide resistance evolution in Colorado potato beetle: "Spatiotemporal modeling for precision pest management of insecticide resistance."

Among the recently published papers, two are the work of former PhD students*:

- Schat*, J., D.H. Kavanaugh, J. Whisenant, G. Anderegg†, H. Xiao†, and S.D. Schoville. 2024. Functional traits and habitat use: investigating community assembly in a montane community (Carabidae: Nebria). Ecosphere 15(8): e4975.

- Weng*, Y.-M., D.H. Kavanaugh, and S.D. Schoville. 2024. Evidence for admixture and rapid evolution during glacial climate change in an alpine specialist. Molecular Biology and Evolution 41(7): msae130.

Two others represent collaborations with Entomology faculty:

- Feng, S., S.P. DeGrey, C. Guédot, S.D. Schoville, and J.E. Pool. 2024. Genomic diversity illuminates the species history and environmental adaptation of Drosophila suzukii. Genome Biology and Evolution 16(9): evae195.
- Schoville, S.D., R.L. Burke, D. Dong, H.S. Ginsberg, L. Maestas, S.M. Paskewitz, and J.I. Tsao. 2024. Genome resequencing reveals population divergence and local adaptation of blacklegged ticks in the United States. Molecular Ecology 33(15): e17460.

Young Lab

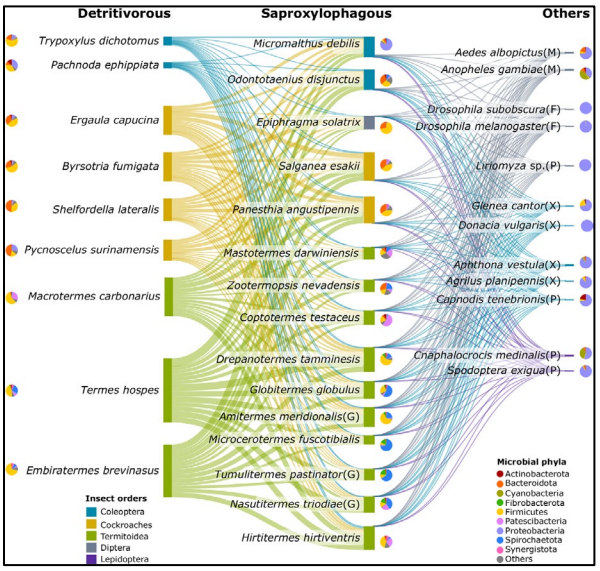
Ann Marsh. Ann remains an ENT 201 TA in a blended edition of ENT 201. She also continues her Ph.D. research on her beloved staphylinids under the joint supervision of Drs. Schoville and Young. She just finished the 1st draft of her 1st chapter with the completion of the WI species in the tribe Vatesini (no, the image above is not one of them)!

***Lordithon anticus* (Horn)**

Dan Young. **Instruction.** My fall, 2024 semester teaching schedule has included ENT 302: ***Introduction to Entomology***, as always; my "FIG" course, ENT 375: ***Biodiversity and the Sixth Mass Extinction***; and ENT 375/701: ***Advanced Taxonomy of Coleoptera***. The coming spring rotation includes ENT 302 along with ENT 432: ***Taxonomy and Bionomics of Immature Insects*** (with a planned long weekend in the field back at Kemp Research Station and several collecting field trips to Hemlock Draw in the beautiful Baraboo Hills). I plan to teach our entomology ***Capstone*** course (ENT468: ***Studies in Field Entomology***) as an 8-week summer 2025 class with a 10-day trip to the far northern part of Wisconsin. Kemp will serve as our "base camp" with expected jaunts away – including to Lake Superior.

Outreach. As the Director of the WIRC, I have overseen educational and public service roles of the collection, including public collections tours, family visits, and maintaining biodiversity resources for outreach programs, including Insect Ambassadors, Insect Fest (which morphed into ***Cicadapalooza*** this past summer at Lake Geneva), and Natural Resources Foundation field trips.

Research. Wisconsin-based summer 2024/2025 fieldwork continues to focus on some sampling at Hemlock Draw (Baraboo Hills – ongoing since 1995!) and Malaise trap and general sampling at the Kemp Natural Resources Research Station.

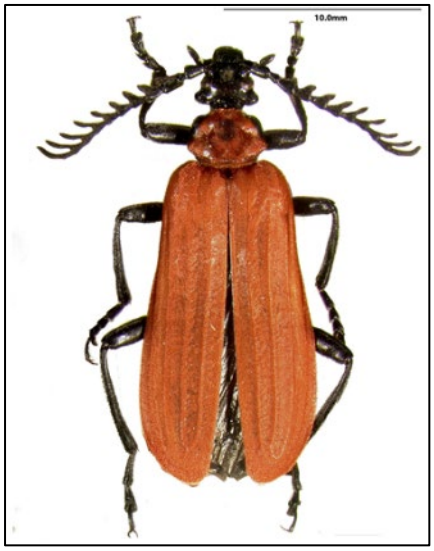


Honors. UW-Madison Fall, 2024 Honored Instructor: Honored Instructor Awards Program, University Housing.

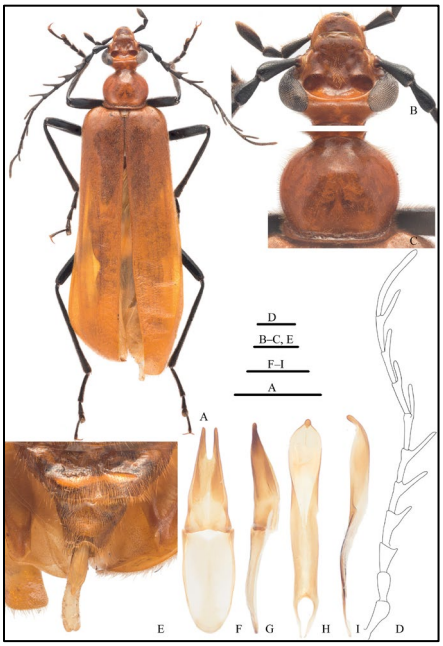
Invited Research/Outreach Presentations:

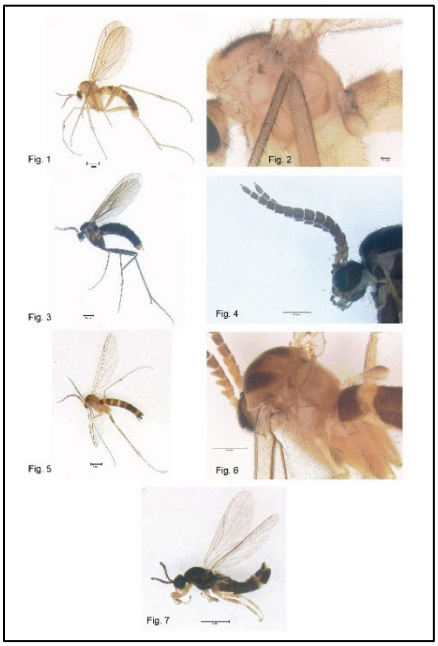
- I'll be an invited speaker at the Wisconsin Lakes and Rivers Convention, Stevens Point, WI; 26-28 March 2025, presenting: **"*Taxonomy, Natural History and Conservation of Wisconsin Fireflies*."**
- An invited, 3-day workshop on the ***Taxonomy and Natural History of Coleoptera*** on my August 2025 calendar up at the Cable Natural History Museum in Cable, WI (Bayfield Co., NE of Hayward).

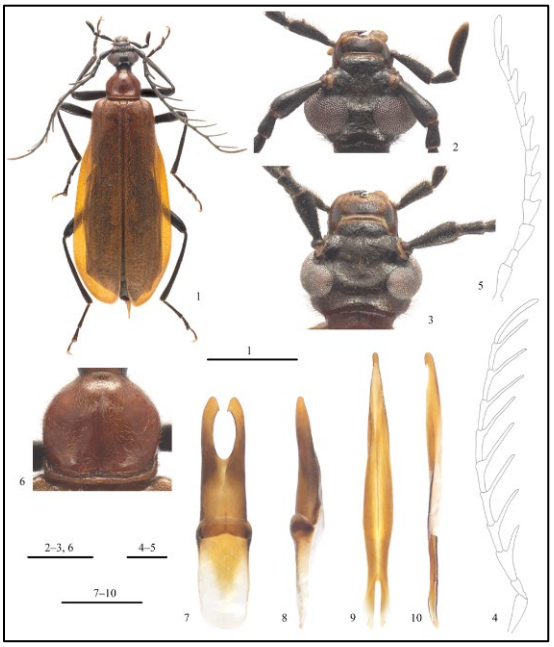
2024 Research Publications:



- Beza-Beza, C.F., Wiegmann, B.M., Ware, J.A., Petersen, M., Gunter, N., Cole, M.E., Schwarz, M., Bertone, M.A., **Young, D**., & Mikaelyan, A. **2024**. Chewing through challenges: Exploring the evolutionary pathways to wood-feeding in insects. Bio Essays, e2300241, 11 pp. https://doi.org/10.1002/bies.202300241 (image, prev. page)
- Qi, G., **D. K. Young**, Z-H. Zhan, H-Y. Cheng, and Z. Pan. **2024**. Revision of *Eupyrochroa* Blair, 1914 (Coleoptera: Pyrochroidae) based on morphological comparison and molecular phylogenetics. Zootaxa 5406 (2): 238–252. https://doi.org/10.11646/zootaxa.5406.2.2. http://zoobank.org/urn:lsid:zoobank.org:pub:CFD54527-371D-420B-8C3E-560D6B8B43B8238. See image, above right.
- Gao Q., **Young, D.K**., Pan Z. **2024**. *Oblatopyrochroa bellula*, an enigmatic new genus and species of Pyrochroinae (Coleoptera, Pyrochroidae) from Xizang, China. ZooKeys 1191: 369–377. https://doi.org/10.3897/zookeys.1191.118653. See image, below left.
- **Young, D. K**. New Wisconsin state records for *Symmerus* (Diptera: Ditomyiidae) and *Synneuron* (Diptera: Canthyloscelidae). The Great Lakes Entomologist (14 pages + 2 plates) ***accepted***. See image, below center.
- Gao, Q., Xin-Mei Yang, **D. K. Young**, and Zhao Pan. A new species of *Pseudodendroides* Blair, 1914 (Coleoptera: Pyrochroidae: Pyrochroinae) from China, with a key to the species. ZooKeys ***accepted***. See image, below right.







Bugs in the news

- Spotted lanternflies - invasive insects that first landed in the United States a decade ago - are emerging earlier and staying active later each year, according to an analysis of citizen-science data by researchers at New York University. This longer life cycle and shift in activity may be driven in part by cities and their warmer climates.
- Lifesaver for wild bees: The importance of quarries. A research team at the University of Göttingen, Germany's Nature And Biodiversity Conservation Union in Rhede, and the Thünen Institute in Braunschweig has investigated the importance of limestone quarries for wild bee conservation. Diverse landscapes with good

connectivity between quarries and calcareous grasslands proved to be particularly valuable. Calcareous grasslands -- meaning grasslands on chalk or limestone soils -- are exceptionally rich in plant and animal species, making them valuable ecosystems. Quarries with a lot of shrub encroachment, on the other hand, had a lower species diversity. Endangered bee species were more common in large quarries. The results of the study were published in the *Journal of Applied Ecology*.

- Natural 'biopesticide' against malaria mosquitoes successful in early field tests. An experimental bacteria-derived biopesticide is highly effective in killing malaria-carrying mosquitoes, including those that have developed resistance to chemical pesticides, according to initial field tests led by researchers at the Johns Hopkins Bloomberg School of Public Health.
- Can plastic-eating bugs help with our microplastic problem? Previous research found that insects can ingest and absorb pure, unrefined microplastics -- but only under unrealistic, food-scarce situations. Zoologists have now tested mealworms in a more realistic scenario, feeding them ground-up face masks -- a common plastic product -- mixed with bran, a tastier option. After 30 days, the research team found the mealworms ate about half the microplastics available, about 150 particles per insect, and gained weight. They excreted a small fraction of the microplastics consumed, about four to six particles per milligram of waste, absorbing the rest. Eating microplastics did not appear to affect the insects' survival and growth.
- New gene drive reverses insecticide resistance in pests... then disappears. Geneticists have developed a gene drive-based solution to the widespread problem of insecticide resistance. In an effort to protect valuable crops, the researchers at UC San Diego created an 'e-Drive' that reverses insecticide resistance and then disappears from the insect population.
- Desert ants use the polarity of the geomagnetic field for navigation. Desert ants of the *Cataglyphis nodus* species use the Earth's magnetic field for spatial orientation, but rely on a different component of the field than other insects. The survey suggests that the ants also use a different mechanism for magnetoreception than most insects studied to date, including the famous monarch butterflies. The researchers suspect that magnetoreception in desert ants is based on a mechanism involving tiny particles of the iron oxide mineral magnetite or other magnetic particles.
- A microRNA solves an evolutionary mystery of butterfly and moth wing coloration. Over the past two decades, scientists discovered that the majority of melanic wing color variants are controlled by a single genomic region surrounding the protein-coding gene 'cortex'. It was assumed, then, that cortex was the melanic color switch. A team of international researchers has now discovered that cortex does not affect melanic coloration. Instead, a previously ignored microRNA (miRNA), is the actual color switch.
- Not the usual suspects: Novel genetic basis of pest resistance to biotech crops. Researchers used genomics to investigate the genetic changes causing resistance to transgenic crops in field populations of the corn earworm, also known as cotton bollworm or *Helicoverpa zea*. They discovered that in this voracious pest, field-evolved resistance was not associated with any of the 20 genes previously implicated in resistance to the pest-killing proteins in transgenic crops.
- Gardens prevent pollinators from starving when farmland nectar is scarce. Gardens offer a steady and reliable source of nectar all year round, helping to keep pollinators fed when farmland sources are limited, researchers have discovered. This consistency means that even small patches of gardens in rural areas can sustain pollinators, particularly in early spring and late summer when nectar is scarce.
- From Catwoman to Han Solo, newly discovered wasps named after famous thieves. Twenty-two new species of gall wasps have been identified and named for the first time, thanks to new research led by a Penn State College of Agricultural Sciences graduate student, nearly doubling the number of known species in this genus of wasps.

All stories and summaries sourced from ScienceDaily.com.