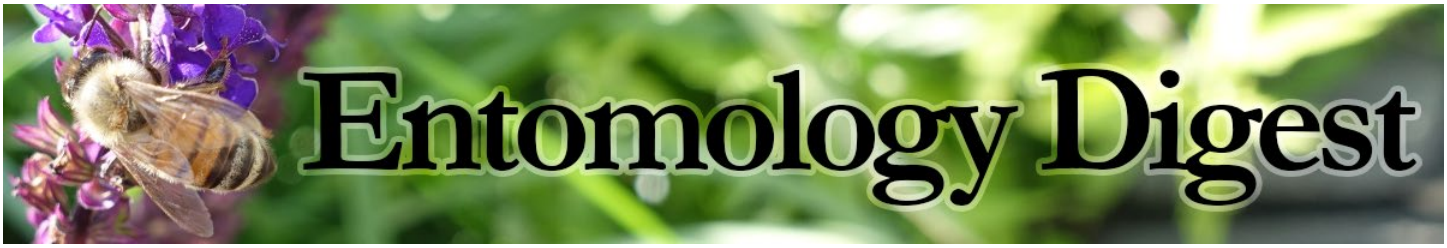

Entomology Digest – Summer 2022

Letter from the Chair

Entomology Community and Friends of the Department, "*New faces and Congratulations*"

We are fortunate to welcome **Dr. Emily Bick** as new Assistant Professor in Entomology and beginning this summer 2022. Dr. Bick is titled as a Precision Pest Ecologist & Field Crops Extension Entomologist, and her program will solidify a core competency in the Department which centers on agroecosystems ecology and applied pest management. Emily was recently a Postdoctoral Fellow at the University of Copenhagen working on two funded fellowships through 1) the Danish Innovation Fund and 2) the American Scandinavian Foundation. Dr. Bick holds degrees from Cornell University (B.S.) and the University of California, Davis (M.S., Ph.D.) in Entomology. Briefly, Emily describes her sciences as applied agroecology, with emphases in digital entomology (data science, modelling, machine learning, and sensor technology) and insect population dynamics. We look forward to Emily's arrival later this month! We continue to be in process of a recruitment for a new faculty to the Department for the Vector Biologist/Ecologist position, originally advertised in the Fall, 2021. This position will add significant strength in the area of medical and global health entomology.

Entomology is the administrative home to the new **Global Health** undergraduate major and certificate (https://guide.wisc.edu/undergraduate/agricultural-life-sciences/entomology/global-health-bs/). The Global Health undergraduate program continues to grow in popularity and enrollment. On Friday, May 13, the Global Health undergraduate program celebrated the graduation of their first cohort of Global Health majors (n=37) with families and friends at a ceremony in Ebling Hall (see image below right). **Dr. Jonathan Patz**, Director of the Global Health Institute, provided words of wisdom, and then each graduate walked across the stage to receive their diploma covers and congratulations. The ceremony was followed by a reception where a highlight of the afternoon was the appearance of **Bucky Badger** (many photos were taken). Thanks to the GH advising team, **Dr. Todd Courtenay**, **Devika Suri**, and **Megan Juneau**, for organizing this special day. The Global Health major at UW-Madison was inaugurated in 2020 and has grown rapidly, with over 300 students currently declared. The Certificate in Global Health also serves a large number of students (N=800) and continues to expand. Read more about this event and about the Global Health major here.

Dr. Christelle Guedot, Associate Professor and Extension Fruit Crops Entomologist in the Department, was recently selected to receive the 2022 Louise Hemstead Leadership Award, which was established in 2018 and is given annually to a CALS faculty or staff member. Organic

Valley announced the creation of this new college award named in honor of alumna Louise Hemstead, Meat and Animal Science BS'82, and acknowledging Hemstead's pioneering work in dairy science and dairy business.

Congratulations are also due to our Entomology undergraduates who graduated this spring to include **Ms. Skyler Eve Finucane**, **Ms. Megan Johnson** and **Ms. Willow Sky Lovecky**. The Entomology Department proudly recognizes three, newly minted graduates, to **Dr. Erin Lowe** (PhD, Gratton), **Dr. Yi-Ming Weng** (PhD, Schoville) and **Jackie Whisenant** (MS, Young). Read more about Erin and Yi-Ming's research here.

On Saturday, April 2nd, the Undergraduate Entomological Society (UES), in collaboration with Slow Food UW and the Mission to Improve Global Health Through Insects (MIGHTi), brought edible insects to the Madison community by putting on Swarm-to-Table, 2022 (team pictured above right). The event celebrated entomophagy, the practice of consuming insects, by raising awareness of and enthusiasm for the rich cultural and historical significance of insects as food and insect agriculture as a sustainable alternative to traditional farming practices. Read more about Swarm To Table here.

- Russ Groves, Department Chair

Entomology Graduate Student Association

Congratulations everyone for making it to the end of another academic year. I know there were a lot of bumps in the road, and the ongoing pandemic has made life and work more difficult for so many reasons. I think it's especially important to celebrate our successes and achievements, especially before many of us head into a busy field season. I hope everyone can take time to celebrate, relax, and enjoy summer!

Early this year we launched our first ever group of **Bug Buddies**, a mentoring program pairing larvae (undergraduates or first year-graduates) and pupae (older graduate students or post-docs). The goal of Bug Buddies is to provide mentoring, community, and belonging within the Entomology Department. Anyone who is an undergraduate, graduate student, or post-doc in Entomology or other labs studying insects can join. Our current Bug Buddies will continue their mentoring relationships for the rest of the year, but we will send out a new interest form in the fall for new people in the community.

We hosted Entomology's annual **Spring Picnic** in early May, and it was great to see so many people in the Russell Labs 'backyard' eating burgers, snacks, and cricket cookies! We're looking forward to gathering for more barbeques again soon. EGSA will be hosting a few off-campus events for graduate students, so keep an eye on your email!

Our **Insect Ambassadors** Coordinators **Ben Iuliano** and **Gigi Melone** have been busy leading outreach presentations and some exciting new projects. Anyone in the Entomology community is welcome to volunteer, no experience necessary. If you're interested but don't know where to get started, Ben and Gigi are happy to train you on how to give presentations, and you can tag along with them the first time to see how fun and easy it is! Check out this spreadsheet to see what's scheduled and to sign up to volunteer.

This summer Insect Ambassadors is partnering with Madison Metro to bring insect outreach to the streets with **Bus Stop Bugs**! Find posters with insect info around town. Stops with posters include: Gorham at Blair (Park), W Wash at Brittingham (Park), Monroe at Leonard (Edgewood), Speedway at Glenway (golf course), Atwood at Walter/ Atwood at Cottage Grove (park), Division at Oakridge (near lake), Jenifer at Paterson (near lake/park), Commercial at Packers (park), Northport at Warner

(park), Sheboygan at State Office, Mineral Point at Rosa (park). Thanks to Jacki Whisenant for designing these beautiful posters (see image, right)!

Moving out of the classroom and into a bar/restaurant near you, Insect Ambassadors is starting a summer presentation series full of learning and fun. Join Ben Iuliano on Monday June 20th at 6PM at Lucille (101 King St) for our first event: Super Smash Bros - Agriculture. Ben will be talking about the brawl between pests, predators, and parasitoids in our fields. The event is free and cocktails are half-off, so invite your friends! There's a few more events in the works, so keep an eye out.

Looking ahead to the fall, EGSA will be helping coordinate our new student orientation and is excited to meet new community members!

Don't forget that the **Snack Room** (Room 242) is still open in the summer, so stop by if you need some fuel for field work or your day in the lab! All proceeds go to supporting EGSA's programming. Don't worry if you don't have cash, you can also pay with Venmo (there is a QR code in the Snack Room on the bulletin board)!

- Hanna McIntosh, EGSA President

Diversity, Equity, and Inclusion update

The DEI committee was busy this past academic year and ended the year with the second departmental climate survey, results of which were shared with the community last week. We hosted retreats, town halls, and workshops during the year with the themes of setting priorities for DEI activities, student recruitment, meeting with CALS Chief Diversity Officer **Louis Macias**, and land acknowledgments (read more about the land acknowledgement workshop series here). The DEI committee has been in place for two years now, which means that some members will be rotating off and new members will be asked to join and serve on this great, vibrant, and engaged committee. If you are interested in having an impact on our DEI departmental commitments and to make a difference to improve our climate, please let **Christelle Guédot** know at guedot@wisc.edu. Thank you to all of our members over the last two years for their commitment to making our department a better place! Thank you all for a great two years and I hope to serve on this committee again soon.

- Christelle Guédot, outgoing chair of the DEI committee

Lab updates

Crall Lab

The Crall lab is excited to be kicking off field season, and to welcome two new lab members, **Rafael Carlo Salas** and **Sam Bjorklun** (Biological Interactions REU student), and to welcome back stellar undergraduates **Julia Wiessing** and **Madalyn Laskowski**! Madalyn also recently received a Holstrom Environmental Research Award for her research on the impacts of insecticides on social behavior in bumble bees.

James was recently awarded a Research Forward grant (titled "Precision Pollination: A Low-Cost, Scalable Device for Monitoring Pollinators and Pollination Services Using Deep Learning"), along with **Dr. Gratton** and **Dr. Josh San Miguel** (Dept. of Electrical and Computer Engineering).

Graduate student **Gigi Melone** was recently awarded a CIAS mini-grant for her research on thermal microenvironments and pollinators in agroforestry systems.

Lab members have also had a few papers published recently, including:

- Smith MAY, Easton-Calabria A, Zhang T, Zmyslony S, Thuma J, Cronin K, Pasadyn C, de Bivort BL, Crall JD (2022). Long-term tracking and quantification of individual behavior in bumble bee colonies. Artificial Life and Robotics 27: 401–406. Link
- OM Bernauer, JM Cook, SM Tierney. Division of foraging behaviour: Assessments of pollinator traits when visiting a model plant species. Animal Behaviour 188, 169-179. Link
- Hammer TJ, Easton-Calabria A, Moran NA (2022). Microbiome assembly and maintenance across the lifespan of bumble bee workers. bioRxiv. Link

James also had a recent perspective piece published in Science on the effects of glyphosate on bumble bees:

- Crall, JD (2022). Glyphosate impairs bee thermoregulation. Science 376(6597): 1051-1052. Link

Gratton Lab

The Gratton Lab has been developing a citizen-science program aimed at easily counting and reporting activity of pollinators on flowers through the state of Wisconsin and beyond. Our WiBee (wee-bee) app is a smartphone app designed for growers, gardeners, and nature enthusiasts to conduct simple, short pollinator surveys on flowers and blooming crops with little expertise. Tracking pollinator activity can help us understand more about the trends and relative abundance of Wisconsin's wild bees and help inform conservation efforts. Download the WiBee app from the App Store or Google Play or visit www.pollinators.wisc.edu/wibee to learn more. You can also check out the online data dashboard here.

Groves Lab

The Groves lab has been busy setting up a number of pesticide efficacy trials targeting major pests in vegetable crops including potato, onion, snap bean, cabbage, and sweet corn. Similar trials are conducted each year, and many are designed to demonstrate the effectiveness of new classes of "reduced-risk" insecticides which have lower environmental impacts and non-target effects than more traditional broad-spectrum insecticides. Some examples include sprayable biologicals such as heat-killed *Bacillus thuringiensis* (BT) bacteria by Certis Biologicals, and RNAi-based products such as the new dsRNA "Calantha" product by GreenLight Biosciences targeting Colorado Potato Beetle.

Ben Bradford has been continuing his work developing the CALS AgWeather suite of websites, which includes the main AgWeather site, the Vegetable Disease and Insect Forecasting Network (VDIFN), the Wisconsin Irrigation Scheduling Program (WISP), and the backend database server. At AgWeather you can browse maps and data for weather (air temperature and precipitation), solar insolation, potential evapotranspiration, degree days, pest and disease risk models, and more. The site also allows users to subscribe to daily email weather updates and forecasts for any sites (grid points) within the data coverage area (broadly the upper Midwest). At VDIFN you can use an interactive map to view pest and disease risk models computed from NOAA weather data, useful for understanding and anticipating the onset of certain damaging stages of common insect pests or the risk of developing certain plant diseases. WISP is a more niche software product but allows farmers to predict soil moisture and irrigation requirements based on some simple initial conditions and automatically updated daily weather data.

Guédot Lab

The Guédot Lab welcomed **Jarret Miles-Kroening** who started his MS degree in Horticulture in January and is co-advised by **Amaya Atucha** in Horticulture. Jarret is interested in promoting organic day-neutral strawberry production and he studies how mulches impact strawberry yield and fruit quality and the pollinators visiting strawberry flowers. The lab will soon welcome a new graduate student, **Fatma Besbes**, who comes from Tunisia and will start a PhD in Entomology this Fall. Fatma will be co-advised by **Leslie Holland** in Plant Pathology and will study the interactions between social wasps and cluster rot pathogens in grape.

This summer we have the great privilege to have a few Entomology undergrads work in our lab: **Morgan Weissner**, **Niko Schmitt**, and **Allison Lopina**, as well as **Rachel O'Neill Lewis**, and returning **Shuka Konishi**. Hard working and dedicated group of individuals, we are excited to have you all in the lab!

Our research continues in the field with lots of projects on fruit production. Some of our projects require us to grow lots of raspberry and strawberry and there will be plenty to go around if you are ready to come pick-your-own at the West Madison Agricultural Research Station. If interested keep an eye out for future email communications via the ento-community listserv.

Extension is in full swing with presentations to grower groups, in-season newsletter articles in our very own Wisconsin Fruit News, and wrapping up our webinar series on:

- Grape: "Pesticide selection and resistance management for your vineyard"
- Apple: "Advanced apple production and management series"
- Berry: "Advanced berry production systems".

All the presentations for these series were recorded, and you can view the recordings of each talk at the links provided above. For cranberry, we are starting to build materials for a future online course for cranberry production and management.

Finally, **Christelle** is heading off to her sabbatical in Montpellier, France this summer and will be there until May 2023. A bientôt!

Have a great and safe summer everyone!

Lindroth Lab

This spring our lab has seen a lot of personnel turnover, but for all the right reasons. Master's student **Nick Pomplun** successfully defended in May, and now is working as a field ecologist for Stantec (Cottage Grove, WI). Ph.D. student **Clay Morrow** also successfully defended in May, and will soon take a postdoc position with USDA (Madison, WI). Finally, after a busy season of interviews, postdoc **Mark Zierden** was offered, and accepted, a position as Assistant Professor of Chemistry at Lake Superior State University (Sault Ste. Marie, MI). He will be leaving in late summer.

New publications:

- Morrow, C.J., S.J. Jaeger, and R.L. Lindroth. 2022. Intraspecific variation in plant economic traits predicts trembling aspen resistance to a generalist insect herbivore. *Oecologia* 199:119–128. DOI: 10.1007/s00442-022-05158-z
- Eisenring, M., R.J. Best, M.R. Zierden, H.F. Cooper, M.A. Norstrem, T.G. Whitham, K. Grady, G.J. Allan, and R.L. Lindroth. 2022. Genetic divergence along a climate gradient shapes chemical plasticity of a foundation tree species to both changing climate and herbivore damage. Global Change Biology. DOI: 10.1111/gcb.16275

Awards: Professor **Rick Lindroth** received the Distinguished Faculty Postdoctoral Mentoring Award, granted by the UW-Madison Postdoc Association.

Paskewitz Lab

Dr. **Xia Lee** is joining the State of Wisconsin Department of Health Services as the new Public Health Entomologist. Congratulations, Xia!

New publications:

1. Beck A., Bjork J., Biggerstaff B., Eisen L., Eisen R., Foster E., Signs K., Tsao J., Kough E., Peterson M., Schiffman E., Muganda C., Osborn R., Wozniak R., Bron G., Phaneuf D., Smith D., Bartholomay L., Paskewitz S., Hinckley A., Knowledge, attitudes, and behaviors regarding tick-borne disease prevention in Lyme disease-endemic areas of the

Upper Midwest, United States. Ticks and Tickborne Disease. 13:101925. 2022. https://doi.org/10.1016/j.ttbdis.2022.101925

2. Larson S.R., Kruger E., Sabo AE., Jones P. and Paskewitz S.M. Meso- and micro-geographic factors shaping variation in *Ixodes scapularis* abundance in northern temperate forests. Ecosphere 13: e3932. 2022. http://dx.doi.org/10.1002/ecs2.3932

3. Foster E., Burtis J., Tsao J., Sidge J. Tsao J., Bjork J, Liu G., Neitzel D.F., Lee X., Paskewitz S., Caporale D., Eisen R.J. Inter-annual variation in prevalence of Borrelia burgdorferi sensu stricto and Anaplasma phagocytophilum in host-seeking Ixodes scapularis (Acari: Ixodidae) at long-term surveillance sites in the upper midwestern United States: Implications for public health practice. Ticks and Tick-borne Disease. 13: 101886. 2022. https://doi.org/10.1016/j.ttbdis.2021.101886

4. Susong K.M., Tucker B.J., Bron G.M., Irwin P., Kirsch J.M., Vimont D., Stone C., Paskewitz S.M., Bartholomay L.C. Snow-covered tires generate microhabitats that enhance overwintering survival of Aedes albopictus in the Midwest, USA. Environmental Entomology. 2022. https://doi.org/10.1093/ee/nvac023

Young Lab

Dan, **Jacki**, and **Craig** were recently in Scotland for the Annual Meetings of The Society for the Preservation of Natural History Collections (SPHNC): spnhc.org/resource_type/meetings/. Dan returned late last Friday night, Jacki is on her way back right now. Craig traveled on to London to visit friends and do some camping – back later this month.

Jacki also just defended her M.S. research thesis: "A Survey of the Tetratomidae of Wisconsin (Coleoptera: Tenebrionoidea)" (see images, below left). She also co-conducted an all-day scientific illustration workshop at the meetings in Edinburgh. Craig has been in TX setting up Malaise traps for the 2022 season. Dan will be providing some insect content for the Glacier's Edge Council (Boy Scouts of America) District Overnight and Day camps tomorrow up near Sauk City.

Dan and **PJ Liesch** are beginning to begin to develop a schedule for the 2022 Insect Fest up at Kemp Station from July 29-31 (and again coincidental with National Moth Week).

Ann is still working on her staphylinid Ph.D. research proposal.

Zhihong is in China working on his M.S. research, redefining the *Lucanus fortunei* species group of stag beetles (Coleoptera: Lucanidae). Zhihong is also working with me on rearing and associating Chinese pyrochroid larvae with adults to add to a wide-open research avenue (see images, right).

Bugs in the news

- Glyphosate affects brood care and thermoregulation in in bumblebees: colonies exposed to glyphosate are significantly affected in times of resource scarcity, according to recent research. Read the report in Science here, authored by Anja Weidenmüller et. al., and read the accompanying perspective piece written by our very own **James Crall** here.
- Bees are now legally considered fish in California under the state's endangered species law, an appeals court in Sacramento ruled Tuesday. The 1970 act explicitly protected "fish," which were initially defined as invertebrates. And because the act has protected snails and other invertebrates that live on land since, the court's ruling said it interpreted the legislation to also include bees. "Accordingly, a terrestrial invertebrate, like each of the four bumble bee species, may be listed as an endangered or threatened species under the Act," the 3rd district California Court of Appeals Associate Justice Ronald Robie wrote. – The Sacramento Bee
- A family of termites has been traversing the world's oceans for millions of years: A comprehensive family tree, based on DNA sequences, has revealed that drywood termites have made at least 40 oceanic journeys over the last 50 million years to reach far flung landmasses. – ScienceDaily.com
- Tired mosquitoes would rather catch up on sleep than bite you: Researchers with the University of Cincinnati found that mosquitoes whose slumber is disrupted are more interested in catching up on their sleep than looking for food the next day. The research demonstrates how vital this biological function is even among insects. - ScienceDaily.com
- Targeting mosquito spit to halt Yellow Fever, Dengue and Zika: A molecule in mosquito spit has been identified as a potential new target for vaccination against a range of diseases for which there is no protection or medicine. Researchers have discovered that the molecule, called sialokinin, makes it easier for a number of viruses to pass from mosquitoes to human, where they can then take hold. – ScienceDaily.com
- Antagonistic interactions of plant defense compounds: Tobacco hornworms neutralize different defense mechanisms of tobacco plants after ingestion. A combined defense of different chemical defense substances could result in a negative interaction and mutual detoxification, according to a new study on the wild tobacco species *Nicotiana attenuata* and one of its specialized herbivores. – ScienceDaily.com
- Satellites and drones can help save pollinators: Satellites and drones can provide key information to protect pollinators. A new study examines new ways of using these technologies to track the availability of flowers, and says this could be combined with behavioral studies to see the world through the eyes of insects. – ScienceDaily.com
- Despite dire warnings, monarch butterfly numbers are solid: New study shows warmer temperatures and increases during the summer are compensating for negative factors, stabilizing breeding trends. A new study found that growth in the summer population of monarchs has compensated for losses during the winter. Researchers did preach continued caution, as the study did show continuing declines in other species of butterflies. – ScienceDaily.com
- Tobacco hawkmoths always find the right odor: Nocturnal moths, such as tobacco hawkmoths (*Manduca sexta*), rely primarily on their sense of smell when foraging for flowers that contain nutrient-rich nectar or searching for a host plant on which they lay their eggs. Tobacco hawkmoths can distinguish crucial from irrelevant odors in a complex odorous mixture to locate food sources and host plants for laying their eggs. – ScienceDaily.com
- CRISPR now possible in cockroaches: Researchers have developed a CRISPR-Cas9 approach to enable gene editing in cockroaches, according to a new study. The simple and efficient technique, named 'direct parental' CRISPR (DIPA-CRISPR), involves the injection of materials into female adults where eggs are developing rather than into the embryos themselves. *[Time to form an anti-doping agency overseeing cockroach races? – Ed.]* – ScienceDaily.com