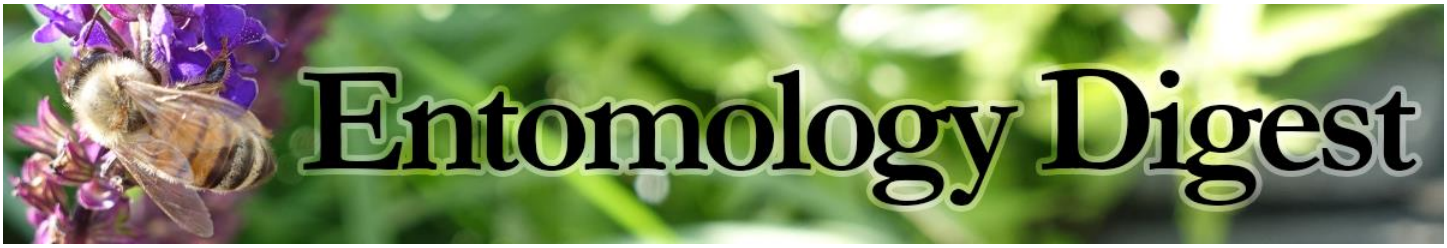


Entomology Digest – Fall 2023

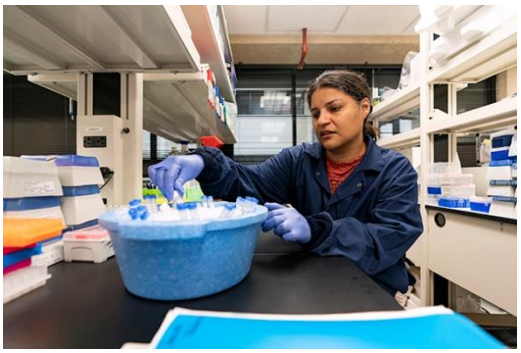
Letter from the Chair

The 2023 Wisconsin Insect Fest event was a great success and included a one-day afternoon/evening event on Saturday August 19th, 2023 at the Upham Woods Outdoor Learning Center near the Wisconsin Dells. Upham Woods is a 300+ acre UW/Extension-affiliated property along the Wisconsin River. A sincere thanks to our event organizers Dr. Dan Young and Mr. PJ Liesch who again organized another great program. The event drew over a hundred attendees from around Wisconsin and nearby states. The event featured a wide array of booths, talks, hands-on workshops, guided hikes, and a BioBlitz activity. To kick off the event, attendees had a chance to meet entomologists and visit booths for the Wisconsin Dragonfly Society, Xerces Society for Invertebrate Conservation, the Midwest Center of Excellence for Vector-Borne Disease, Marquette's Cook Lab featuring live honey bees and more. Insect Fest also featured an array of speakers from UW-Entomology, including **Dr. Dan Young**, **Michael Troutman**, **Jacki Whisenant**, **Eliza Pessereau**, **Dr. Karen Oberhauser**, **Patrick Dunn**, and **PJ Liesch**. Throughout Insect Fest, attendees had a chance to participate in the Bioblitz activity to survey insects at Upham Woods and the event wrapped up after dark with light sheeting for moths and other insects. This was the third ever Insect Fest event and was made possible through support of the Sam Graham Catalyst Fund.

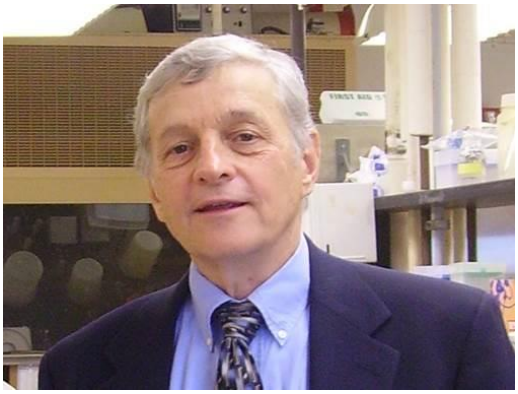
Recently, a $3M donation was made to the College of Agricultural and Life Sciences (CALS) from Kikkoman Foods, Inc., a world-renowned soy sauce company. This donation will support a number of CALS research projects, including the Wisconsin Integrated Cropping System Trial (WICST) and Grassland 2.0, which are both led by professors **Randy Jackson**, **Michael Bell**, Claudio Gratton, **Chris Kucharik**, **Matt Ruark**, **Erin Silva** and **Adena Rissman**. The Grassland 2.0 project advocates for restorative agriculture to promote "thriving, diverse communities; clean water, flood reduction, stable climate, and biodiversity." This work includes exploring how cropping systems such as soybeans, wheat, maize, alfalfa and grasslands can be configured on landscapes, all while providing opportunities for young and new farmers.

In mid-October 2023, we welcome Dr. Chinonyelum Linda Oforka and she will be appointed as an Instructional Faculty II in the Department and will contribute to instruction within Global Health undergraduate major and certificate. Dr. Oforka writes that she, "hunts insects of public health and economic importance such as black flies, mosquitoes, and certain stored-product pests." She investigates aspects of the biology, ecology, diversity, and control of insect vectors and pests to generate data and knowledge that will be useful in developing or informing control strategies. Linda is passionate about mentoring young people, volunteering, and community building, and wishes to help youths develop life skills such as assertiveness, leadership, career building, work-life balance, and intentional living. As an instructor in the Global Health curriculum, Linda will have the chance

to communicate her dream of, "a sustainable world free of diseases, hunger, illiteracy and poverty especially in developing nations".



In January 2024,we will also welcome Dr. Adela Oliva Chavez as a new Assistant Professor in the Department where she will investigate the molecular and cellular interactions between ticks, their hosts, and the pathogens they transmit. Her laboratory will study the effect of tick-borne pathogen transmission in the skin responses and will characterize how inflammatory and delayed wound healing aids in the establishment of infection in the skin. Her laboratory utilizes molecular, immunological, and microbiological techniques to define the role of extracellular vesicles in the modulation of host responses, how ticks regulate the content (proteins and miRNAs) within these extracellular, and what effect pathogens have on tick extracellular vesicle cargo. Additionally, her laboratory will investigate the role of epigenetics in tick biology by looking at the methylation of *Ixodes scapularis* DNA to determine epigenetic variations between tick populations in different regions of the US. By establishing the link between epigenetics and vector competence, we can develop novel approaches to reduce the capacity of ticks to vector pathogens. We look forward to Dr. Oliva Chavez's arrival and her research toward the development of novel tick management strategies.



With great sadness we report upon the passing of Dr. Tom German in late August. Tom was recruited to UW Madison in 1990 as professor and director of the Wisconsin Seed Potato Certification Program (WSPCP). In 1995, Tom was elected as chair of the Department of Plant Pathology (1995–1998), while he continued to serve as director of WSPCP. In recognition of his cross-disciplinary understanding and leadership in plant virus/insect interactions, German was appointed as a faculty member in the UW Department of Entomology in 2000 where he served as chair of the Department from 2002 to 2005. Importantly, Tom was first person in CALS to be elected chair in two different departments. In 2010, Tom retired from UW and was appointed professor emeritus and continued to conduct research and contribute to both Ento and PP's instructional mission until his passing. We will miss him immensely. He was a great friend to so many in both Departments.

- Russ Groves, Department Chair

Diversity, Equity, and Inclusion Update

The Department's committee on Diversity, Equity, and Inclusion has been busy exploring ways to foster the sense of community and belonging within the department. Efforts on this front have included organizing a new welcome retreat for incoming and 2nd year graduate students to the beautiful Kickapoo Valley for a really fun weekend of canoeing, camping, and conversation! We also proposed changes to our Colloquium series that will take effect this year, aimed at helping build connections, collaborations, and community within the department.

For this upcoming year the Committee will continue efforts on community building and belonging, but will also be identifying new priorities and efforts. These will include exploring options for supporting diversity and inclusion in grad student recruitment, as well as revisiting hiring practices

(for faculty and other positions) in light of recent legislative and legal changes. If you want to help provide input and/or shape the committee's priorities for the year, we encourage you all to join the committee's meetings, which will occur on the first Monday of each month, 9-10:30 am, during the fall semester! Reach out to interim chair **James Crall** (james.crall@wisc.edu) if you are interested or have any questions. We also encourage everyone to attend the Diversity Forum on November 14-15.

Insect Ambassadors

This summer, Insect Ambassadors organized a Community Science Series with the support of the Lakeshore Nature Preserve Student Engagement Grant. This series showcased seven different insect-related community science projects such as the Monarch Larva Monitoring Program, Bumblebee Brigade, and Firefly Atlas. We would like to thank the fabulous guest speakers from the Department of Entomology who provided their expertise during these events: Dr. Russ Groves, Jade Kochanski, and Michael Troutman, with another thank you to Anupreksha Jain for hosting an event! This series was extremely fun, and we are now surveying participants to improve our programming in the future. Learn more about Insect Ambassadors here.

- Celeste Huff & Eliza Pessereau

Lab updates

Bick Lab

The Bick Lab is in full swing! **Dr. Emily Bick** and new computer science M.S. student **Dev Mehrotra** spent the summer field testing the **Insect Eavesdropper,** a novel sensor that allows for eavesdropping on insect feeding sounds. So far, in the lab and field, we determined the sensor could 1) detect, 2) identify using Machine Learning, and 3) determine density of insects from their sounds. We are excited to be participating in the Antlion Pit Competition at the National Meeting of the Entomological Society of America. Moreover, Dr. Emily Bick was nominated as a finalist for a WARF Innovation award, recognizing the Insect Eavesdropper as one of the top six inventions disclosed to the Wisconsin Alumni Research Foundation.

We are excited by the addition of new entomology Ph.D. student **Helen Oker** (focusing on using spatial models to help farmers precisely target pests) and M.S. students **Fletcher Robbins** (looking to update 'pest weather maps' across the state) & **Lauren Glynn** (automating biodiversity quantification). Lauren's project closely follows a recent pre-print accepted for publication in eLife from the Bick Lab entitled *Automating an insect biodiversity metric using distributed optical sensors: an evaluation across Kansas, USA cropping systems.*

Crall Lab

The lab had a busy but exciting field season, including field work here in Wisconsin, as well as Colorado (and California). Local research here in Wisconsin included several projects on automated, computer-vision based monitoring to understand the behavior and ecology and pollinators in agroecosystems (including projects led by postdocs **Olivia Bernauer**, **Matt Smith**, and **Jeremy Hemberger**, and grad student **Anupreksha Jain**). In Colorado, grad students **Gigi Melone** and **August Easton-Calabria** both piloted projects on the effects of ash on pollinators and bumblebee thermal ecology, respectively.

Personnel. We have some new lab members to welcome this fall, including **Dr. Nicole DesJardins** (who will be joining the lab on a NSF Postdoc Fellowship), and **Rafael Salas**, who will be coming back to the lab to join as a full-time Research Specialist. We are also thrilled to welcome new undergraduate researchers **Shelbi Loebertman**, **Jamie Resis**, and **Noah Schrodt** to the lab! Shelbi will be working with August to try and understand the important of within-colony behavioral variation for stress resilience in bumblebees; Jamie will be working with Olivia on building easier to access and use resources for methods in pollination biology; and Noah will work with Anupreksha to explore how low levels of exposure to novel insecticides can affect foraging activity and learning in bumblebees.

Publications. We recently published a paper (in Proceedings of the Royal Society B, led by grad student August Easton-Calabria and with many lab member co-authors) on the role of colony size and social thermoregulation in mitigating stress in bumblebee colonies.

- Easton-Calabria August C., Thuma Jessie A., Cronin Kayleigh, Melone Gigi, Laskowski Madalyn, Smith Matthew A. Y., Pasadyn Cassandra L., de Bivort Benjamin L. and Crall James D. 2023. *Colony size buffers interactions between neonicotinoid exposure and cold stress in bumblebees.* Proc. R. Soc. B. https://doi.org/10.1098/rspb.2023.0555

Gratton Lab

The Gratton Lab welcomes two new students: **Sumikshya "Sumi" KC** (from Nepal) who as part of her MS will work on a new USDA project expanding our WiBee platform for use by growers. **Olivia Rooney** (most recently at Cornell University) will be working on the effects of cattle grazing on beneficial insects, including bees and dung beetles on the way to a MS/PhD. And a belated welcome to **Norah Swenson** (recent MS from UW Green Bay) who is working as a Research Intern on oak savannas, fire management and bumble bees in southern Wisconsin. Claudio is officially on sabbatical and he will be spending part of the Fall with colleagues at UC Davis. **Jeremy** is new dad! Baby girl Fiadh was born Sept. 8, 2023!

New publication:

- Hemberger, J., Bernauer, O.M., Gaines-Day, H.R., Gratton, C., 2023. Landscape-scale floral resource discontinuity decreases bumble bee occurrence and alters community composition. Ecological Applications, e2907. https://doi.org/10.1002/eap.2907

Guédot Lab

The Guédot Lab saw two of its members **Dr. Matt Hetherington** and **Dr. Hanna McIntosh** successfully defend their PhD dissertations and become PhDs, congrats to Matt and Hanna! Matt is now working in Shawn Steffan's lab and Hanna in Erin Silva's lab in the Department of Plant Pathology where they are doing very exciting work.

Christelle returned from her sabbatical in France at the Centre de Biologie et de Gestion de Populations (CBGP) where she studied the population genetics and movement of *Drosophila suzukii,* comparing gene flow between farms, between farms and their surrounding landscape, across parts of Wisconsin and along the path of possible migration from Georgia to Wisconsin. This work is being led by **Greg Gelembiuck** and in collaboration with colleagues at the CBGP and **Sean Schoville**.

Extension continues with another summer that is wrapping up. We will begin planning the program for the winter in collaboration with colleagues at MN, IA, and IL to continue our webinar series on fruit production for the Upper Midwest.

Publications:

- Amon N.D, Quezada M., Labarre D., and **Guédot C.** 2023. Pollination practices and grower perceptions of managed bumble bees (*Bombus* spp.) as pollinators of cranberry in Quebec and Wisconsin. *Renewable Agriculture and Food Systems* 38: e43, 1-11. https://doi.org/10.1017/S1742170523000352
- McIntosh H., **Guédot C.**, and Atucha A. 2023. Plastic mulches improve yield and reduce spotted-wing drosophila in primocane raspberry. *Scientia Horticulturae* 320: 112203. https://doi.org/10.1016/j.scienta.2023.112203

Schoville Lab

The Molecular Ecology lab welcomed **Zachary Farrand** as a new PhD student this fall. Zach completed a master's degree studying local adaptation in pikas, and now plans to work on adaptation to alpine environments in ground beetles. Two undergraduates, **Emelia Rogers** and **Carly Servais**, graduated in the summer and have now joined the lab as research technicians.

Upcoming events: First, the Center for Ecology and the Environment will host its Fall Symposium Event October 16-17, 3:30-6:00 at the Memorial Union, with a reception to follow. It features talks from new faculty on campus. **Please Register HERE:** https://forms.gle/EVRo5YdqxwFXFjBk7. Next, **Ebony Taylor** is planning an informal Bug Poetry Night for October, reach out to her if you are interested. Similarly, she will help organize the Darwin Day Art Competition (~ February 12th) - consider getting an early start! Ebony also reports that the bird feeders from James' course can also be used as a chipmunk feeder!

- **Schoville, S.D.**, Z. Farrand, D.H. Kavanaugh, B. Veire, and Y.-M. Weng. 2023. Environmental stress responses and adaptive evolution in the alpine ground beetle, *Nebria vandykei*. *Biol. J. Linnean Soc.* https://doi.org/10.1093/biolinnean/blad093

Paskewitz Lab

After a successful summer research season, the Paskewitz lab (with the Bartholomay lab) is welcoming several new students this fall semester. **Tom Richards**, doctoral candidate in Comparative Biomedical Sciences, joins us from Michigan. Tom has an MPH and previously worked in Wisconsin during the Zika public health crisis. His focus will be on the impact of small mammal communities on the efficacy of tick prevention methods. **Alli Smith**, MS candidate, will be working on mosquito control and resistance to insecticides in the context of tax-funded control districts in the Chicago area. Alli comes to us from the lab of Brian Allan, at UIUC. We also welcome **Rosemary Philip**, an MPH candidate who was a global health/biology student at UW Madison as an undergraduate. Rosemary worked with the MCE-VBD on field projects in Eau Claire, Wisconsin, this past summer. She will be working on evaluation strategies for educational efforts toward vector-bite prevention. **Karen Fuenzalida**, a Fulbright scholar from Chile, joined the lab in September. Karen has a DVM and is working towards her doctorate. She will also be working on small mammal communities and tick-borne disease, exploring how molecular methods can reveal the sources of blood and pathogens in nymphal blacklegged ticks.

We have a new data scientist on our team, **Dr. David Jansen**. David brings a wealth of valuable experiences, including analysis of animal behavior in and out of the lab, and is currently working on improving the data storage structure for the Tick App and advising team members on statistical questions. Current graduate students and staff (**Tela Zembsch**, **Brad Tucker**, **Andie Forsythe**, **Zack Sieb**, **Katie Susong**, **Dr. Xia Lee**) are guiding a number of undergraduate research projects this semester, including those of **Levi Vanegas**, **Magic Vang**, **Emily Oberle**, **Maddie Emerich**, and **Ari Halaska**.

Kristina Lopez very successfully defended her PhD in May. She also published this paper this summer, and there was some nice press on that article in Entomology Today (https://entomologytoday.org/2023/07/27/ultra-low-volume-truck-mosquito-sprays-reduce-west-nile-virus-risk/). Dr. Kristina Lopez is currently in residence in Chicago, where she works with Mosquito Abatement Districts on issues related to new products for mosquito control and insecticide resistance.

- Lopez K, Irwin P, Bron GM, Paskewitz S, Bartholomay L. Ultra-low volume (ULV) adulticide treatment impacts age structure of Culex species (Diptera: Culicidae) in a West Nile virus hotspot. J Med Entomol. 2023. https://doi.org/10.1093/jme/tjad088

Young Lab

Ann Marsh. Following her summer 2023 ENT 201 Lecturer appointment in the department, Ann is currently serving again as ENT 201 TA in a blended edition of ENT 201. Ann also continues preparation for her Ph.D. certification on her beloved staphylinids under the joint supervision of Drs. Schoville and Young.

Lordithon cinctus (Gravenhorst)

Jacki Whisenant. Mostly running back & forth between Madison and New York where they have been assisting with several curatorial projects at Cornell. Jacki is still working on the WIRC hallway mural and contributed to Insect Fest 2023, as well.

Zhihong Zhan. After completing his M.S. in the Young lab, returned to China where he is now working on his Ph.D. Before departing, he and Dan submitted 4 manuscripts, one of which has now been published:

- Zhan, Zhihong, K. Jing and **D. K. Young**. 2023. A new species of *Pseudopyrochroa* Pic, 1906 from Southwest China (Coleoptera: Pyrochroidae: Pyrochroinae) based on the last instar larva and adults, with natural history observations. https://doi.org/10.11646/zootaxa.5323.4.8

Pseudopyrochroa euryfoveata Zhan & Young

Dan Young. Instruction: Summer 2023 found me teaching our ENT 468 Capstone: Studies in Field Entomology. The course included an extended stay up at the Kemp Natural Resources Research Station on Tomahawk Lake with a "day trip" visit to Lake Superior. My current (fall semester) teaching schedule includes ENT 302: Introduction to Entomology, as always; my "FIG" course, ENT 375: Biodiversity and the Sixth Mass Extinction; and ENT 331: Taxonomy of Adult Insects. The spring rotation includes ENT 302 along with Advanced Taxonomy of Diptera (with a planned long weekend in the field back at Kemp and several collecting field trips to Hemlock Draw in the beautiful Baraboo Hills).

Dan Young and ENT 468 students at Kemp Station and Lake Superior in summer 2023

Outreach. Once again, I was on the planning committee and contributed along with many other faculty, staff and students to a very successful 2023 Insect Fest, this summer on 19 August at Upham Woods in the Dells area.

Research. Wisconsin-based summer 2023 fieldwork focused on another year of Malaise trap sampling at the Kemp Natural Resources Research Station.

Other research highlights are noted in the three manuscripts that have been submitted and are currently in the review process:

- Zhan, Z., and **D. K. Young**. Discovery and Description of the female of *Lucanus takeoi* Adachi (Coleoptera: Lucanidae) from Southwest China. (**5 manuscript pages, 1 plate, 2 figures**).
- Zhan, Z., K. Jing, and **D. K. Young**. Descriptions of the mature larva and adult female of *Pseudopyrochroa girardi* Young from Southwest China (Coleoptera: Pyrochroidae: Pyrochroinae), with natural history observations. (**10 manuscript pages, 5 plates, 12 figures**).

Malaise trap set up at Kemp

- Qi, G., **D. K. Young**, Z-H. Zhan, H-Y. Cheng, and Z. Pan. Revision of *Eupyrochroa* Blair, 1914 (Coleoptera: Pyrochroidae) based on morphological comparison and molecular phylogenetics. (**16 manuscript pages, 5 plates, 22 figures**).

Additionally, I am again authoring or co-authoring a number of familial chapters for the proposed new tome: Beetles of Canada and the United States:

- *Volume 1: Morphology, Classification, Family Key, Archostemata—Polyphaga (Scirtoidea– Nosodendroidea). CRC Press of the Taylor & Francis Group. Boca Raton, FL.*
  - **Young, D. K.** Family Cupedidae. (**8 manuscript pages, 1 plate.**)
  - Philips, T. K. and **D. K. Young**. Family Micromalthidae. (**8 manuscript pages, 1 plate.**)
- *Volume 2: Polyphaga (Dascilloidea–Curculionoidea). CRC Press of the Taylor & Francis Group. Boca Raton, FL.*
  - **Young, D. K.** and P. J. Johnson. Family Artematopodidae. (**7 manuscript pages, 1 plate.**)
  - **Young, D. K.** and P. J. Johnson. Family Brachypsectridae. (**5 manuscript pages, 1 plate.**)
  - Hájek, Jiří and **D. K. Young**. Family Callirhipidae. (**7 manuscript pages, 1 plate.**)
  - Keller, O. and **D. K. Young**. Family Prostomidae. (**4 manuscript pages, 1 plate.**)
  - Keller, O. and **D. K. Young.** Family Synchroidae. (**4 manuscript pages, 1 plate.**)
  - **Young, D. K.** and K. R. Hinson. Family Stenotrachelidae. (**11 manuscript pages, 2 plates.**)
  - **Young, D. K.** Family Pyrochroidae. (**17 manuscript pages, 3 plates.**)
  - **Young, D. K.** Family Ischaliidae. (**7 manuscript pages, 1 plate.**)

Bugs in the news

- Mosquitoes Are a Growing Public Health Threat, Reversing Years of Progress. Climate change and the rapid evolution of the insect have helped drive up malaria deaths and brought dengue and other mosquito-borne viruses to places that never had to worry about them. This story was also covered in a recent episode of The Daily podcast. – NYTimes.com
- Discovery in mosquitoes could lead to new strategy against dengue fever and other mosquito-borne vectors. Researchers from the Johns Hopkins Malaria Research Institute at the Johns Hopkins Bloomberg School of Public Health have made an important finding about *Aedes aegypti* mosquitoes -- one that could one day lead to better methods for reducing the mosquito-to-human transmission of dengue, yellow fever, Zika, and other harmful and sometimes deadly viruses. – ScienceDaily.com
- Proteins roll the dice to determine bee sex. To date it has been unclear exactly how the sex of a bee is determined. A research team from Heinrich Heine University Düsseldorf (HHU) comprising biologists and chemists has now identified a key gene and the molecular mechanism linked with it. In the current issue of the scientific journal *Science Advances*, they describe how this process is similar to a game involving two dice. – ScienceDaily.com
- Meadow Spittlebug's record-breaking diet also makes it top disease carrier for plants. New research fueled in part by citizen scientists reveals that the meadow spittlebug -- known for the foamy, spit-like urine released by its nymphs -- can feed on at least 1,300 species of host plants, more than twice the number of any other insect. The study, which is published in the journal *PLOS ONE*, could be especially important in the effort to stop the bug from spreading a type of bacterium that has caused the death of crops across the world, including olive trees in Italy, grapevines in California, citrus trees in South America, and almond trees in Spain. – ScienceDaily.com
- These robots helped explain how insects evolved two distinct strategies for flight. Robots built by engineers at the University of California San Diego helped achieve a major breakthrough in understanding how insect flight evolved, described in the Oct. 4, 2023 issue of the journal *Nature*. The study is a result of a six-year long collaboration between roboticists at UC San Diego and biophysicists at the Georgia Institute of Technology. – ScienceDaily.com
- Range of pesticides, including neonicotinoids, found in pollen of different bee species. New research paints a worrying picture for the different species of bees that provide multi-million-dollar pollination services each year. The work raises

concerns about the potential wide-spread exposure to multiple chemicals from two pesticide categories (fungicides and neonicotinoid insecticides) and indicates that different bee species may be exposed differently to pesticides -- meaning that assessments of pesticide risk to honey bees may not be easily extrapolated to other bees. – ScienceDaily.com

- New type of tiny wasp comes with mysterious, cloud-like structures at ends of antennae. Fossil researchers have discovered a novel genus and species of tiny wasp with a mysterious, bulbous structure at the end of each antenna. The female micro-wasp was described from 100-million-year-old Burmese amber in a study led by George Poinar Jr., who holds a courtesy appointment in the Oregon State University College of Science. – ScienceDaily.com
- Brain-altering parasite turns ants into zombies at dawn and dusk. It takes over the brains of ants, causing them to cling to the tops of blades of grass where they can be eaten by cattle and deer. The common liver fluke has an exceptional life cycle as it moves through snails, ants and grass-grazing herbivores. And now, researchers from the University of Copenhagen know a bit more about the workings of this tiny parasite. The new knowledge adds to our understanding of parasites, which could be the most widespread life form on Earth. – ScienceDaily.com
- Pollination by more than one bee species improves cherry harvest. To obtain the biggest cherry harvest, trees should be pollinated by both honey bees and mason bees. The orchards with honey bees and lots of mason bees could have cherries on up to 70 per cent of the blossoms. In orchards with only honey bees or only mason bees as pollinators the rate could be as low as 20 per cent, according to new research from the University of Gothenburg. – ScienceDaily.com