



# Department of Entomology Newsletter

## Events from 2018

### Insectary Building is Decommissioned

In 2015, the Board of Regents approved a \$52 million budget for a new project: the Advanced Teaching and Research Building (ATRB) at ISU. The 5-story building finished construction in the spring of 2018 and includes research labs, classrooms and many collaborative spaces. Over the summer, five Entomology faculty (**Drs. Sue Blodgett, Joel Coats, Aaron Gassmann, Erin Hodgson, and Matt O'Neal**) moved to the second floor. The Plant and Insect Diagnostic Clinic (PIDC) is also on the second floor. Yes, there are actually greenhouses on top of the building!

In late 2018, the rest of Insectary inhabitants moved to Science II, including Donald Lewis and the Pesticide Safety Education Program (Kristine Schaefer, Betsy Buffington, Mark Shour, and Kathy Wilson). The Insectary building was decommissioned and will be demolished in 2019.

If you are in Ames, stop by and check out the ATRB and Science II renovations!



*View of construction of ATRB from Science II. The building is located on the northwest corner of Pammel Dr. and Stange Rd., just east of the Insectary building.*

### Coats Receives C.V. Riley Award

**Dr. Joel Coats**, distinguished professor, was the 2018 recipient of the C. V. Riley Award in Madison, WI. The purpose of the C. V. Riley Award is to provide recognition to members of the North Central Branch of the Entomological Society of America who have made outstanding contributions to the science of entomology. Joel's research program includes (1) insect toxicology and (2) environmental toxicology and environmental chemistry of agrochemicals. His research in the insect toxicology area is focused primarily on natural products as insecticides and insect repellents (see page 4), including investigations of their spectrum of activity, mechanisms of action, metabolism, synthesis of bio-rational derivatives and analogs, and quantitative structure-activity relationships.



*2018 NCB-ESA President John Ruberson, Joel Coats, and 2018 ESA President Michael Parrella*

## Wintersteen is Women of Influence Honoree

In 2018, ISU President Wendy Wintersteen was selected as an honoree for the Women of Influence award. This is the 19th year the Business Record has honored inspiring and influential women who have considerable experience, wisdom, grace and intelligence. This year's seven honorees dedicate time, resources and effort to businesses and community organizations. They lead in top jobs at companies large and not-so-large. They plan headlining events and strategies that will transform Greater Des Moines and families. They have earned multiple degrees. They come from different backgrounds. They have overcome challenges and embraced opportunities. They are not simply influential because of what they do or have done, but also because of who they are.

Dr. Wintersteen was selected in a national search to become the first woman to lead ISU as president in 2018. During her tenure as dean of the College of Agriculture and Life Sciences, the college ranked in the top 10 in the world and experienced record growth to become the third-largest agricultural college in the nation.



*President Wendy Wintersteen*

She represents ISU on numerous state, national and international boards, among them the University Innovation Alliance, Cultivation Corridor, the Governor's STEM Advisory Council Executive Committee, the Business Education Alliance, and the Association of Public and Land-grant Universities Council of Presidents.

## Rowley Jumps Out of a Plane

*Kendall Sharp, Iowa State Daily, writes:* It's a bird. It's a plane. No, it's Wayne Rowley diving out of a plane! **Dr. Wayne Rowley**, professor emeritus, celebrated his 85th birthday early by skydiving in July. "That was one of the most exciting things I've ever done," Rowley said. "It was short term, of course. You get there, you meet these people and they tell you what you need to do. The instructors put a harness on you then you go up 13,500 feet." Rowley said he has done enough things and been enough places so he wasn't the least bit concerned. There were around 100 divers that day and they were all members of the Des Moines skydiving club. "When you come out of the plane, it's just wow," Rowley said. Rowley said when you jump out of the plane, you fall very fast for about two miles. When he moved his arms and legs, he was able to adjust his position with respect to the ground.

From the sky, Rowley said the airport on the ground looks 1,000 miles away. After getting to a certain altitude, you pull the rip cord, which Rowley said gives a jolt but not a terrible one. "We swooped and made loops and circles, it was



*Wayne Rowley. Photo by Mary Harvey.*

fantastic," Rowley said. "I'm glad I didn't do it 20 or 30 years ago because I would spend a hell of a lot of money skydiving. I would become a regular." When asked what his sons thought about his skydiving, Rowley said they thought he was crazy. "Maybe I am," Rowley said with a laugh.

## Hodgson Receives Extension and Two IPM Awards

**Dr. Erin Hodgson**, associate professor and extension entomologist, was the recipient of two ESA Awards in 2018. The first was for Distinguished Achievement in Extension, presented at the 2018 NCB-ESA Annual Meeting in Madison, WI. The second was at the National ESA Meeting in Vancouver, BC later that year. Erin was part of a 10-person regional team that received the ESA Plant-Insect Ecosystems IPM Team Award for their work on pyrethroid resistance to soy-

bean aphid. The team was a mixture of academic and industry entomologists, including Robert Koch, Bruce Potter, Ian MacRae, Phil Glogoza, Janet Knodel, **Adam Varenhorst** (Ph.D. 2014), John Gavloski, Melissa Siebert, Deane Jorgenson, and Christa Eilers-Kirk. Erin was also part of the North Central Soybean Entomology Research and Extension Team that was recognized for improving IPM for soybean aphid in the north central region. **Dr. Matt O'Neal** and 20 other co-recipients were presented the award in Baltimore, MD in March 2018.



2018 NCB-ESA President John Ruberson, Erin Hodgson, and 2018 ESA President Michael Parrella

## More Faculty News

**Dr. Marlin Rice**, affiliate professor, is now the Accelerated Technical Capability Lead, Integrated Field Sciences, Corteva Agriscience, Agriculture Division of DowDuPont.

**Dr. David Onstad**, affiliate professor, is the Vice President-Elect for the Plant-Insect Ecosystems Section of ESA. David is a Senior Research Scientist at Corteva Agriscience where he focuses on predicting evolution of resistance to insecticides and insecticidal traits in corn and soybean.

## Showers Featured in American Entomologist

Since 2014, **Dr. Marlin Rice**, affiliate professor, has a recurring segment, called *Legends*, in ESA's American Entomologist quarterly magazine. He interviews entomologists making significant impacts to insect science. In 2018, Marlin interviewed **Dr. William "Bill" B. Showers, Jr.**, professor emeritus. Bill was a research entomologist at the USDA-ARS Corn Insects Research Unit in Iowa (1970–1992). Showers was a pioneer in the study of insect migration, and routinely integrated basic and applied components. He provided much of the team leadership that was crucial in developing robust insect management strategies, including economic thresholds, for the European corn borer and black cutworm. He is nationally and internationally recognized for his research on the dispersal, diapause, mating strategies, population genetics, and landscape influences on the ecology and management of insect pests of corn. In recognition of his research accomplishments, he was four times awarded the USDA Certificate of Merit. He earned a B.S. (Entomology, 1957) from The University of Arizona, an M.S. (Entomology, 1966) from Louisiana State University, and a Ph.D. (Entomology and Plant Physiology, 1970) from ISU. To read Marlin's full interview with Bill, visit this link: <https://bit.ly/2H8LjcV>.



Bill Showers

## Next-Gen Repellent Combats Mosquitoes

Nearly 700 million people suffer from mosquito-borne diseases, such as malaria, West Nile, Zika and dengue fever, each year, resulting in more than 1 million deaths. Increasingly, many species of mosquitoes have become resistant to the pyrethroid-based insecticides. **Dr. Joel Coats** and members of his research lab discovered a new class of mosquito repellents based on naturally-occurring compounds effective in repelling mosquitoes with potentially fewer environmental side effects than existing repellents. Coats presented this research at the 256th National Meeting and Exposition of the American Chemical Society in 2018. Watch the press conference with Dr. Coats here: <https://bit.ly/2H6vGCL>.

Joel said, "Our new repellents are based on how nature already works. For example, citronella, a repellent that comes from lemongrass, contains naturally-occurring essential oils used for centuries to repel mosquitoes. But citronella doesn't last long and blows away easily. Our new, next-generation spatial repellents are variations of natural products that are longer-lasting and have greater repellency." Coats and graduate students, **James Klimavicz** and **Caleb Corona**, are synthesizing hundreds of compounds against mosquitoes. Sesquiterpenoids, which are found in many plants, are effective insect repellents, but these large molecules are difficult to isolate from plants and purify in the laboratory.

Because of the challenges of synthesizing sesquiterpenoids, Coats' team designed their repellents using smaller, less complex, easily obtainable molecules — monoterpenoids and phenylpropanoid alcohols with known, short-term repellent activities against insects. By modifying these compounds chemically, they produced new potential repellents with higher molecular weights, making them less volatile and longer-lasting. Klimavicz has synthesized more than 300 compounds, the most effective of which are alpha-terpinyl isovalerate, citronellyl cyclobutanecarboxylate and citronellyl 3,3-difluorocyclobutanecarboxylate.

To determine the compounds' effectiveness as repellents against mosquitoes, Corona tests them in a tubular chamber developed in the Coats laboratory. The chamber has filter papers at either end. One filter paper has nothing on it; the other has the synthesized repellent applied. Then mosquitoes — raised in the ISU medical entomology lab — are introduced into the chamber. Corona uses time-lapse photography and in-person monitoring over 2.5 hours to document whether the mosquitoes migrate away from the candidate repellents. The researchers are currently exploring computer tracking of mosquitoes using video footage to gain a better understanding of mosquito repellency and behavior when exposed to these compounds.

*Continued on page 5*



*James Klimavicz, Joel Coats, and Caleb Corona.*

## Lewis Celebrates 20-Year Student Exchange

Dr. Donald Lewis, professor and extension entomologist, has been facilitating a study abroad exchange for 20 years. The reciprocal travel exchange program is for students in horticulture, entomology, agronomy and allied sciences between ISU and the University of Costa Rica (UCR). The program has facilitated study abroad group travel for 10- to 12-day periods to farms and agricultural research centers in the host country annually since 1999. Over 140 ISU students have participated in ten Study Abroad trips to Costa Rica offered every other year through the Tropical Crops course, PLPM/ENT/HORT 511. Approximately 140 University of Costa Rica students have visited Iowa in the alternate years. In 1999, Donald worked with Mark Gleason (plant pathology, ISU) and Amy Wang (UCR), and more recently Barb Clawson (ISU Horticulture) and **Erin Hodgson**. The next trip to Costa Rica will be during spring break of 2019.



Donald Lewis evaluating Costa Rican coffee.

## Mitchell Wins Friend of Science Award



Ginny Mitchell

**Ginny Mitchell**, ISU Insect Zoo coordinator, has been selected as the 2018 Recipient of the Friend of Science (FOS) Award presented by the Iowa Science Teachers Section (ISTS) of the Iowa Academy of Science (IAS). The FOS Award recognizes those within the state who have made significant

contributions to ISTS and/or to Science Education at the local, regional or statewide level. She was recognized at the 2018 Fall Conference.

*Ginny Mitchell writes:* On a personal note, the award is a great accomplishment for me; it is an even greater accomplishment for the Insect Zoo. The importance and learning opportunities kids have with bugs is immeasurable. Everything from math, literacy, engineering and art can be taught using bugs. This is what the Insect Zoo is

about (read more on page 21), and of course getting everyone to love our bugs. The Insect Zoo is the true Friend of Science, and together we will continue making an impact and changing the way people think about our friends.

*Next-Gen Repellent, continued from page 4*

With this method, the researchers tested the repellents with *Culex pipiens*, the northern house mosquito, which is most closely linked to West Nile transmission in the Midwestern U.S.; *Aedes aegypti*, the yellow fever mosquito which is also known to transmit the Zika and dengue viruses; and *Anopheles gambiae*, which transmits malaria.

"We think the mechanism of our terpene-based repellents, which try to mimic what nature does, is different from that of the pyrethroids," which many mosquito species have become resistant to, Coats says. "We believe these 'next-gen' spatial repellents are new tools that could provide additional protection against mosquitoes in treated yards, parks, campgrounds, horse stables and livestock facilities. Our next step is to understand more precisely how the repellents biologically affect the mosquitoes."

## USDA-NIFA BRAG Grant Awarded to ISU

**Dr. Aaron Gassmann**, associate professor, and **Dr. Brad Coates**, USDA-ARS research geneticist and ISU affiliate professor, have been awarded a Biotechnology Risk Assessment Grant from the USDA's National Institute of Food and Agriculture (NIFA) to study resistance to Bt corn by western corn rootworm. Gassmann is the lead Principal Investigator and Coates is the co-Principal Investigator on the grant, which is titled, "Risk of Resistance to Cry34/35Ab1 by Western Corn Rootworm." The grant will provide stakeholders and members of the scientific community with information on the distribution of Bt-resistant rootworm populations in Iowa, the risk of resistance evolving in additional populations and regions, and the genetic basis of Bt resistance. Additionally, this project was designated as a USDA NIFA Center of Excellence.



*Western corn rootworm. Photo by Adam Sisson.*

## New IPM Center Comes to ISU

*Laura Jesse Iles writes:* The U.S. Department of Agriculture National Institute of Food and Agriculture awarded the regional North Central Integrated Pest Management Center to Michigan State University, with co-direction support coming from ISU. The North Central IPM Center, one of four centers in the nation, serves 12 states as part of the USDA's connection to production agriculture, research and extension programs, and agricultural stakeholders throughout the United States. The states in the region include Iowa, Nebraska, Kansas, Ohio, Minnesota, North Dakota, South Dakota, Missouri, Wisconsin, Illinois, Indiana, and Michigan.

We are excited ISU can continue to increase its regional role in promoting the use of Integrated Pest Management. The IPM Centers fund projects that strive to improve economic benefits of adopting IPM practices and to reduce potential risks to human health and the environment.

I will be serving as Co-Director of the North Central IPM Center and will continue directing the Plant and Insect Diagnostic Clinic (PIDC).

Speaking of the PIDC, it has been an exciting year for us as we have settled into ATRB. The PIDC is benefiting from being located in the same building with extension entomologists and plant pathologists.



*PIDC staff: Laura Jesse Iles, Ed Zaworksi, and Lina Rodriguez-Salamanca*

This year, we have processed almost 1,500 physical samples and consulted with an additional 1,700 lowans via phone and email. Clinic staff also provide education through presentations and hands-on workshops; typically, we will contact more than 2,000 people through these activities each year.

For more information on the PIDC, please visit: [clinic.ipm.iastate.edu](http://clinic.ipm.iastate.edu). Go to [www.ncipmc.org](http://www.ncipmc.org) for more details on the North Central IPM Center.

## Day of Insects Tradition Continues

*Nathan Brockman writes:* On March 24, 2018 the Reiman Gardens' event Day of Insects (DOI) celebrated its 10th anniversary. DOI is a day filled with presentations from professionals, academics, advocates, and enthusiasts covering a range of insect related topics. From young beginners to seasoned veterans, DOI has something for anyone interested in or involved with insects. Each presentation is 15 minutes long with a five minute period for questions. Presenters are primarily from the Midwest but some have come from as far away as Texas and California. Speaker selection is usually done by the DOI committee but each year two wild card slots are made available for individuals to request an opportunity to present. While presenters come from across the US, individuals representing ISU Department of Entomology; faculty, staff, students and alumni have given several of the DOI presentations.

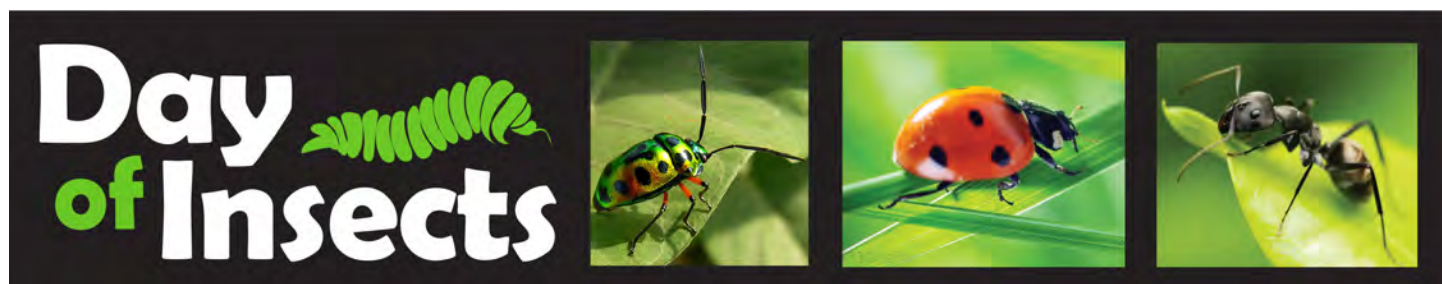
Over the last 10 years, DOI has grown significantly in the number of participants as well as offerings at the event itself. In 2012, an evening reception was added the Friday night before DOI to give people coming in town early something fun to do. The initial reception included food, trivia and behind the scene tour of the Christina Reiman Butterfly Wing, Butterfly Lab and the production greenhouses. In 2015, while the dinner and behind the scene tour stayed, trivia was replaced with a keynote speaker and that is the format still today. In 2017, Friday afternoon workshops were added. There are two workshop sections each with two different congruently run workshops. The addition of workshops came from the desire of DOI participants to have more time on certain topics. The two-hour work-



*Greg Courtney at DOI.*

shops allow for more knowledge sharing, hands on exercises, and questions on a topic that the standard DOI presentation allowed. Then finally in 2018, DOI received an upgrade to its breaks, both the morning and afternoon break received an additional 10 minutes. The amount of time spent on breaks may seem like a trivial item but it came about from feedback from attendees saying they just didn't have time to interact with all the interesting participants.

What started out simply as a way for a small group of people to share their passion for insects and the cool projects they were working on has grown into a very large event that many people look forward to each year. In 2019, DOI at Reiman Gardens will be held on March 30. As it gets closer to the event more details on the event and registration information can be found online at [www.reimangardens.com/collections/insects](http://www.reimangardens.com/collections/insects).



## Piermarini Gives the Dahm Lecture for 2018



*Paul Dahm*

Our 2018 Paul Dahm Memorial Lecturer was Dr. Peter Piermarini from The Ohio State University. He received his Ph.D. from the University of Florida, after which he was a postdoc at Yale and Cornell. He began at Ohio State as an Assistant Professor in 2011 and is now an Associate Professor.

His research is focused on physiological and toxicological effects of organic molecules on mosquitoes, in order to identify new target sites for insecticides or new mechanisms of action at those sites. His goal is to discover molecules that can have an impact at novel molecular and



*Peter Piermarini*

physiological targets in insects, especially vectors of disease pathogens. His lecture was titled, "Discovery of natural and 'unnatural' mosquitoicides with novel mechanisms of action."

**Dr. Paul Dahm** was a faculty member of Entomology at ISU for 34 years (1953 to 1987) in insecticide toxicology. He was conferred the Charles F. Curtiss Distinguished Professor of Agriculture in 1969, and served as Chairman of the Department of Entomology from 1975 to 1982.

## Gould Presents 29th Staniforth Lecture

Dr. Fred Gould, University Distinguished Professor and Reynolds Professor of Entomology at North Carolina State University presented the 29th Staniforth Memorial Lecture on April 3. His lecture was titled, "Will genetically engineered pests protect health, biodiversity, and crop production?"; where he provided a summary of theoretical, experimental, and practical issues being addressed by researchers attempting to genetically suppress or alter characteristics of insect pest populations.

Dr. Gould was elected to the National Academy of Sciences in 2011 and in 2004 won the Alexander von Humboldt Award for the most significant agricultural research over a 5-year period. He served the National Research Council of the National Academy of Sciences on several occasions.

The lecture honors Dr. David W. Staniforth, a weed scientist at ISU from 1947 to 1984. Dr. Staniforth was a pioneer in the field of weed science and his research helped to shape the effective weed control systems used by farmers today. His



*Left-to-right: Russ Jurenka, Mattea Allert, Aaron Gassmann, Ram Shrestha, Sue Blodgett, Fred Gould, and Coy St. Clair.*

experience spanned the development of modern herbicide technology, beginning with work on the mode of action of 2,4-D and continuing through refinements in weed control systems, including the development of weed control systems for conservation tillage.



## New Iowa Records with Class Collecting Trips

It was a good fall for collecting in **Dr. Greg Courtney's** Systematic Entomology course. The semester included several local outings and blacklight sessions. All provided nice opportunities for students to find specimens for their required collections and led to significant new records for taxa considered rare in the Midwest.

Blacklight sessions along the South Skunk River were noteworthy. On several nights in late August and early September, lights attracted adult spongillaflyies (Neuroptera: Sisyridae: *Climacia areolaris*). These unusual relatives of green and brown lacewings have larvae that are obligate inhabitants of freshwater sponges, and use specialized mouthparts to pierce and feed on individual cells of the sponge. Despite considerable past sampling, Courtney had never recorded the larvae, which made the collection of 10 adults during the fall of 2018 all the more surprising. Furthermore, spongillaflyies had never before been recorded from any river in central Iowa, with past records from the state being only a few specimens from extreme northeast Iowa.



*Climacia areolaris* adult from South Skunk River, Ames, Iowa. Photo by Greg Courtney.



Insect collecting trip to Pikes Peak State Park, NE Iowa. Left to right: Aaron Eckley, Alec Euken, Ashley Dean, Caleb Corona, Jerilyn-Jean Calaor, and Ellie Field.

Another highlight of the class was an overnight trip to northeast Iowa. The drive up included stops near Big Wall Lake and Union Hills Wildlife Management Area. A small pond near Big Wall Lake was particularly productive, providing students with several families of aquatic Heteroptera and Coleoptera. Among the latter: another purportedly "rare" taxon was collected, the burrowing water beetle (Noteridae: *Hydrocanthus iricolor*). Courtney discovered this population in 2017, which represents one of the few records for Iowa, and at least for a day, the northernmost record of the family in the Midwest.

By mid afternoon, the class arrived at the farm of MJ Hatfield, an ISU alum who had actually taken Systematic Entomology in 2007. MJ had graciously invited the group to set their "tent camp" in her back yard. Because MJ is an avid collector, she already had a black light and mercury vapor light set up in her yard. The class added a black light near the river, and another at a canoe launch about a half-mile away. The catch included lots of interesting Ephemeroptera, Coleoptera, Lepidoptera, and Trichoptera, yet one of the highlights was an earwig (Dermaptera: Spongiphoridae: *Marava arachidis*). This was another example of a species and genus recorded previously at only one Iowa location near Iowa City. The final day of the trip would provide even more surprises, including records of two species of meniscus midge (Diptera: Dixidae: Dixia) from Decorah, and more records of the beetle *Hydrocanthus* from a pond in Yellow River State Forest. On the trip back to Ames, the class made a quick stop at Pikes Peak State Park, a spot befitting a group photo and celebration of a successful field trip.



*Marava arachidis* adult from Upper Iowa River, Iowa. Photo by Greg Courtney.

## Courtney Completes Unique State List

Dr. Greg Courtney, professor and ISU Insect Collection curator, has field work reaching all corners of the U.S., usually by car. Nothing unusual about that. However, he has also seen the country from a slightly different perspective; namely, on two (self-powered) wheels and on foot. In fact, as of 2018, Greg has completed a marathon and long bike ride in all 50 states!

Greg finished his final “marathon” state on April 8, 2018 at Trap Pond Marathon, DE. He ran with his wife, Barb Wheelock...also completing her 50th state. Although their marathon journey began almost 20 years ago (Barb’s first was in 2000, Greg’s in 2002), they didn’t think seriously about running marathons in 50 states until much later. Along the way, they had several years with more than 5 marathons (e.g., Greg ran 9 in 2015!) and experienced some wonderful people and scenery. Among their favorite “destination” marathons, combined with insect collecting!, were Maui, HI; Mesa Falls, ID; Mount Desert Island, ME; Outer Banks, NC; Newport, OR; and Mad, VT.



*Greg Courtney combining cycling with his passion for photography, Perth-Albany-Perth 1200K, Australia.*

remainder seemed inevitable. Not surprisingly, a few of these rides were combined with trips that also included marathons. Most of Greg’s rides were 200K or longer, with his favorites actually much longer (e.g., Blue Mountain 1000K in Oregon & Washington, Cascades 1240K in Washington, and Shenandoah 1200K, which included parts of 5 states in the Appalachian Mountains).

Although a fair number of runners have completed marathons in 50 states (approximately 1,500 total, including 29 from Iowa), the number of cyclists to have completed RUSA rides in every state is substantially fewer (currently only 7, with Greg the 4th to accomplish the feat). Moreover, none of these “50-stater” cyclists are marathoners. Consequently, Greg is in a lonely (crazy?) club: the only person to have done 50 states in both marathons and long bike rides. It was indeed a different way to see the U.S.!



*Barb Wheelock, Greg Courtney, Jonathan Wendel, and Kathleen Wendel after Trap Pond Marathon in 2018.*

By the time Greg logged his “final” marathon, he had already finished his 50th state on the bike, having ridden a Randonneurs USA (RUSA) – sanctioned event of 100K or longer in every state. Greg’s final state on the bike was Hawaii, ridden in late December 2016. By the time RUSA established an (American Explorer) award for riding in different states, Greg had already ridden in more than 20 states, so knocking off the



*Greg Courtney and Barb Wheelock at the finish line of the Post Oak Marathon in Tulsa, OK, in 2015.*

## Mosquitoes of Iowa: New Nemesis and Old Foes

With continued support from the Iowa Department of Public Health and the Midwest Regional Center for Vector-Borne Disease, the Medical Entomology Lab under the direction of **Dr. Ryan Smith** has continued ISU's long-standing efforts to monitor mosquitoes in Iowa to better inform public health and mosquito control practices.

Since the introduction of Zika virus to the U.S. in 2016, a new focus of the program has been to determine if the invasive mosquitoes, *Aedes aegypti* and *A. albopictus*, could be found in Iowa. Both species have the potential to transmit Zika, as well as other mosquito-borne viruses, such as Chikungunya and dengue. After targeting 20 Iowa counties in 2017 and 12 in 2018, we detected *A. albopictus* (shown below) in three Iowa counties for both years of the study. Evidence suggests that these mosquitoes have likely established themselves in the state with the potential to spread into new locations. At present, there is no immediate risk for disease transmission by *A. albopictus* in Iowa, although these mosquitoes have been known to aggressively bite humans.



*Mosquito trap used for surveillance in Iowa.*

and public health agencies for mosquito control efforts to further reduce human diseases.

These mosquito surveillance programs have led to a flurry of activity over the last couple of years and have expanded our efforts and reach into several new locations in the state. With the introduction of *A. albopictus* and the increase in West Nile virus activity seen in 2018, both argue for the continued importance of the mosquito surveillance program in the future.



*Aedes albopictus. Photo by Susan Ellis.*

This year also saw a resurgence of West Nile virus, reaching 103 human cases in Iowa, the highest number since 2003. Transmitted by various *Culex* mosquitoes, West Nile virus has had a continual presence in the state since it was first introduced in 2002. Mosquitoes were collected and tested for West Nile virus in six counties in 2018. These data help to monitor mosquito infection rates, which were at all-time high levels in central Iowa. Monitoring provides early indicators of human health risk directly used by local

### **Lost wallet found after 30+ years!**

The exact date is lost to our collective memory but Mary Cochran's wallet was stolen sometime in the 1980s and never found. Until the summer of 2018! During a remodel in Science II, workers were in the men's bathroom above the ceiling when they found the wallet. Identification was still inside, but any cash was gone.

Mary was hired at ISU as a secretary, and held various positions in entomology, biology, and animal science. She worked at ISU from 1967 until 1998, and passed away in 2015.



*Mary Cochran*

## Anderson Receives Outstanding Member Award

**Todd Anderson** (former postdoc, Coats Lab) is the recipient of the 2018 Outstanding Regional Chapter Member Award from the Society of Environmental Toxicology and Chemistry. This award is presented annually to a regional chapter member who has been consistently contributing to the development or functioning of the Society at the Regional Chapter level. Dr. Anderson recently stepped down as Treasurer of the South Central Regional Chapter after serving for 17 years and stepped down as chair of the American Chemical Society Environmental Chemistry Division Awards Committee. Todd is the Chair of the Department of Environmental Toxicology and interim Director of the Institute of Environmental and Human Health at Texas Tech University.



*Todd Anderson*

## Ghidu on Board of Directors



*Lillie and Gerald Ghidiu*

**Gerald Ghidiu** (Ph.D. 1977, Economic Entomology with **Bud Guthrie** and **Ed Berry**), emeritus Extension Entomologist, Rutgers University, was elected to a 3-year term on the Board of Directors of the Cornell Cooperative Extension, Wayne County, NY last December. The Cornell Cooperative Extension system improves the lives and communities of Wayne County, NY through partnerships that put teaching, experience and knowledge to work. Some of their important foci are increasing sustainability of local agriculture, increasing agricultural productivity and consumer access to local products, improving food safety, and increasing nutrition education.

## Coyle is Now a Tiger

**David Coyle** (Ph.D. 2000) is a new Assistant Professor in the Department of Forestry and Environmental Conservation at Clemson University. Dave completed his M.S. in Entomology and Forestry with Drs. **Woody Hart** and the late Rick Hall. He received his B.A. at Luther College in 1997 and his Ph.D. at the University of Wisconsin in 2011, after which he was in a post-doctoral research position at the University of Georgia. In 2015, Dave began a regional forest health and invasive species outreach program with Southern Regional Extension Forestry. This program provided training and education about identification and management of insects, fungi, and plants to professionals across the 13-state southeastern region. Training methods included online materials, webinars, and in-person workshops. Dave brings this experience with him to Clemson, where he has a 100% Extension position in forest health and invasive species.



*David Coyle*

## Madriz Blogs for National Geographic

**Isaí Madriz** (Ph.D. 2017, Courtney Lab) was awarded the 2017-2018 Fulbright-National Geographic Storytelling Fellowship, a component of the Fulbright U.S. Student Program. This program provides opportunities for U.S. citizens to participate in an academic year of overseas travel and storytelling on a globally significant theme. This Fellowship is made possible through a partnership between the U.S. Department of State and the National Geographic Society.

Isaí blogs for National Geographic website and recently posted about a new game he created for educators. This free game challenges young minds to think about complex topics like climate change, conservation, endemism and bioindicators of environmental health.

Follow Isaí's entomological journey as a National Geographic Fellow by visiting his website, [www.isaimadriz.com](http://www.isaimadriz.com).



*Isaí Madriz collecting information for his new game. Photo by Anand Varma.*

## Gagné Confirms New Pest in Iowa

The summer of 2018 had unique weather challenges (e.g., cold April, hot May and wet June). The extreme variability did not slow down a new soybean pest in Iowa and several surrounding states. The soybean gall midge infested most of western Iowa and is a particularly devastating stem-feeding insect. **Erin Hodgson** and other field crop entomologists in the north central region are attempting to learn more about this



*Soybean gall midge female. Photo by Justin McMechan.*



*Soybean gall midge larvae. Photo by Erin Hodgson.*

pest. They worked with midge taxonomists, **Dr. Raymond Gagné** (USDA-ARS) and Dr. Jun'ichi Yukawa (Kyushu University in Japan), to provide a new description for soybean gall midge as *Resseliella maxima*. This species is not found anywhere else in the world. It's exciting news for taxonomists but not for midwestern farmers. Dr. Gagné is an ISU alum, receiving an M.S. degree in entomology in 1963.

## Featured Staff: Randall Cass

Just over one year ago, **Randall Cass** started his position as an Extension Entomologist for ISU focused on honey bees and native bees. He is the only extension staff member working exclusively on topics related to apiculture and bee health. The position was created to complement ongoing research by the ISU “Bee Team” through a USDA-NIFA grant investigating honey bee and native bee health in soybean and prairie landscapes. The ISU Bee Team includes **Dr. Amy Toth** (EEOB), **Dr. Matt O’Neal**, **Dr. Erin Hodgson**, post-doctoral scholar **Dr. Harmen Hendriksma**, research associate **David Stein**, and Ph.D. students **Ashley St. Clair** and **Ge Zhang**.

To improve extension and outreach related to bees, Cass has taken on a variety of projects over the past year to promote bee health awareness and recommend pollinator-friendly practices. This includes extension presentations,



*Bee Team checking honey bee hives.*

Association and ISU Extension and Outreach 4H, Cass also helped create educational materials for youth on both honey bees and native bees.

Cass supports the university’s bee research by assisting in the planning and implementation of experiments in the field. During the field season, the Bee Team maintains over 100 honey bee hives placed in different Iowa landscapes. The team inspects hives regularly, collecting data on colony health indicators, such as hive population, quantity of brood, and hive mass. For much of the field season, Cass managed the field team for the USDA/NIFA project, monitoring hives placed in soybean and prairie sites to establish the impacts of forage availability and insecticide treatments on hive health. The team also placed pan traps at each site to observe the diversity and abundance of native bee species and explore whether the presence of honey bee colonies could have a negative impact on native bee populations. Additionally, Cass assisted with inspections for another Bee Team project, funded by FFAR, measuring the benefits of prairie strips in soybean fields for honey bee colonies.

In the coming year, Cass hopes to build on the successes of 2018 by increasing extension efforts to a wider audience and continuing to support the field team in data collection. Prior to joining the team at ISU, Cass served as a program manager for Catholic Relief Services in Guatemala and El Salvador, implementing agricultural development projects and technical advising for small farmers and beekeepers.



*Randall Cass*

client surveys, informational materials, and collaboration with other departments, stakeholders, and organizations. He collaborated with the Monarch Consortium, Pheasants Forever, and multiple beekeeping organizations to coordinate field days and talks for relevant stakeholders. Cass also began a two-year survey to measure stakeholder interest in bee health and attitudes about pollinator-friendly land management practices. Working with the Iowa Honey Producers

## Fisher Featured as a Superhero

**Kelsey Fisher** was featured in a 4-part superhero poster series in the Curtiss building on ISU campus. Kelsey, a graduate research assistant working with **Dr. Steve Bradbury**, is tracking the movements of monarch butterflies. Fisher and three undergraduate interns, armed with radio signal receivers, placed themselves around the perimeter of a prairie approximately half the size of a football field. Before releasing a monarch butterfly in the center of the prairie, Fisher attached a transmitter—a device that emits radio signals—to the butterfly's thorax with super glue. The transmitter is the size of a sunflower seed. Together with its three-inch antenna, it weighed about half as much as the monarch.

Fisher's research will help the Iowa Monarch Conservation Consortium and the Iowa Department of Natural Resources create science-based guidelines for establishing and maintaining monarch habitat in Iowa's rural landscapes in concert with agriculture. Bradbury anticipates that increasing monarch butterfly habitat in rural Iowa will complement current state conservation programs and reap benefits for other pollinators and soil and water conservation.

### Monitoring Monarchs!

Kelsey Fisher, entomology, is using high-tech transmitters to study monarch butterfly movements and keep this iconic species part of Iowa's landscape.



## Strong Linnaean Game Team in 2018

The ISU Entomology Graduate Student Organization (EGSO) put together a strong team for the 2018 NCB-ESA Linnaean Games competition in Madison, WI. The competition is a quiz bowl focused on insect-related topics, ranging from history, taxonomy, current research, and ESA trivia.

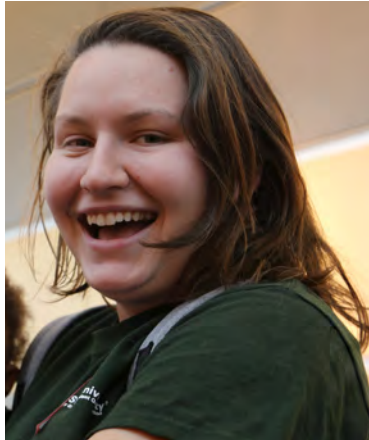
They practiced throughout the winter and even organized a competition against the faculty before the meeting (and won!). The team easily won the first round of competition. Unfortunately, they lost in the second round in a disputed loss. The team is practicing for the 2019 meeting in Cincinnati, OH and expect to do well in the competition.



2018 team members: Ashley St. Clair, Caleb Corona, Kelsey Fisher, Rebekah Reynolds, Joel Coats (coach), and Edmund Norris

## 2018 Graduations

**Teresa Blader** received her M.S. in Entomology with Drs. Rick Hellmich and Steve Bradbury in the spring of 2018. Her thesis was titled "Milkweed patch size effects of monarch butterfly oviposition within Iowa prairies and roadsides." Teresa now works in Rochester, MN.



*Teresa Blader*

**Eric Yu** received his M.S. in Entomology with Drs. Tom Sappington and Aaron Gassmann in the summer of 2018. His thesis was titled "Effects on larval density on dispersal and fecundity of western corn rootworm."



*Eric Yu*

**Jyothsna Ramesh Kumar** received her M.S. in Entomology with Dr. Ryan Smith in the fall of 2018. Her thesis was titled "Development of molecular methods to study hemocyte biology and functions in *Aedes aegypti*." Jyothsna is currently exploring opportunities for a Ph.D. degree in entomology.



*Jyothsna Ramesh Kumar*



*Edmund Norris' graduation cake!*

**Dr. Edmund Norris** received his Ph.D. in Entomology with Drs. Joel Coats and Lyric Bartholomay in the summer of 2018. His dissertation was titled "Characterizing the mode of action of plant essential oil terpenoids in multiple model insect species and exploring novel delivery mechanisms for insecticides." Edmund is currently a Postdoctoral Research Associate at University of Florida in Gainesville, FL.



*Paul Airs, Lyric Bartholomay, and Edmund Norris*



## EGSO Full of Philanthropy in 2018

It was a busy year for the Entomology Graduate Student Organization (EGSO). We elected new officers for 2018: **Ashley Dean** (Secretary), **Colin Wong** (Treasurer), **Abigail Kropf** (Graduate and Professional Student Senate representative and Vice President), and **Maura Hall** (President).

Graduate students hosted its annual faculty vs. student bowling event at the ISU Memorial Union. Pizza and snacks were served and several prizes were distributed, including: Best Dressed (**Donald Lewis**). Despite a valiant effort, the faculty once again defeated the students.

The group continued its outreach in 2018, beginning by organizing an activity called "To catch a pollinator" at Pollinator Fest in Reiman Gardens. Children of all ages were able to catch their own insects and identify them with the help of EGSO members.



*Caleb Corona leading kids at Pollinator Fest.*

The group finished up the year with its annual Insect Film Festival at Reiman Gardens. The film shown this year was *A Bug's Life*. The ISU Insect Zoo was in attendance to help excite visitors about different insects, while trained EGSO members gave tours of the Reiman Garden Butterfly Wing. Other members of EGSO manned the insect-themed games and crafts, and could be found helping young visitors dig for insects in the sand or make tie-dye butterflies. This event was once again a success! EGSO is looking forward to another year of fun and outreach in 2019!



*EGSO members at the Winter Gathering. Left to Right Top: Ellie Field, Erika Rodbell, Ashley Dean, Ivair Valmorbida, Maura Hall, Colin Wong, Rebekah Reynolds, Caleb Corona, Niranjana Krishnan, and Abigail Kropf. Left to Right Bottom: John McCulloch, Kelsey Fisher, Ge Zhang, and Xiaoyi Dou.*

## EGSO Sponsors Gillespie Seminar

Every year, EGSO decides on a speaker to invite for our weekly departmental seminar series. In the spring, we hosted Dr. Rosemary Gillespie of University of California-Berkeley. She is a professor in the Department of Environmental Science, Policy, and Management in Berkeley, CA. She seeks to understand evolutionary patterns and processes among populations and species. Her research focus is on islands, particularly remote hotspot islands of the Pacific. She gave a well-attended talk, titled, "Evolution of spiders on oceanic island. The venture of few and gain of many." Faculty and students were able to spend time with her after her talk at an EGSO-organized potluck and other social events.



*Maura Hall, Eric Yu, Teresa Blader, Rosemary Gillespie, Colin Wong, and Rebekah Reynolds.*

# Student Awards and Scholarships

The Wayne A. Rowley Scholarship in Entomology provides \$3,500 to students with preference given to applicants concentrating on medical entomology. **Rebekah Reynolds** was the 2018 recipient and is mentored by Dr. Ryan Smith. Rebekah was also awarded a National Science Foundation Graduate Research Fellowship. The NSF program supports outstanding graduate students in science, technology, engineering, and mathematics who are pursuing research-based master's and doctoral degrees.



*Rebekah Reynolds and Ryan Smith*

The Jean L. Laffoon Memorial Scholarship for \$1,000 was presented to **Ashley Dean**. This scholarship was established in 2012 in memory of Dr. Laffoon, who was a systematist in entomology from 1946–1973. Ashley also received the Caine-Bogle Family Graduate Fellowship (\$1,000) from the College of Agriculture and Life Sciences for students demonstrating academic and leadership qualities. She also got 3rd place for a student competition at the ASA-CSSA-CSA Annual meeting in Baltimore, MD. Her talk was in the Applied Soybean Research, M.S. Session, and titled, "Using soybean genetics to evaluate the value of soybean aphid management tactics." Ashley is co-advised by Drs. Matt O'Neal and Erin Hodgson.



*Ashley Dean*

The Jim Oleson Scholarship in Entomology, which provides \$2,000 to students who demonstrate academic promise and initiative, was awarded to **Ashley St. Clair**. She also received the Larry Pedigo Graduate Scholarship in Entomology. This scholarship of \$2,500, established to honor the many contributions of Dr. Larry Pedigo to the department and college, recognizes scholarly performance. Ashley received two grants from the Iowa Honey Producers Association to study overwintering management strategies in honey bees and to study stressors to queen health in agro-ecosystems. Ashley is co-advised by Drs. Matt O'Neal and Amy Toth.



*Ashley St. Clair in the field.*

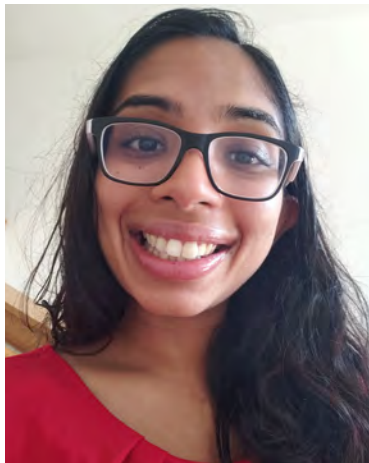
The Entomology Alumni Scholarship for undergraduates or graduates in entomology was presented to **Kelsey Fisher**. This \$2,000 scholarship was awarded based on promise for a career in entomology. Kelsey also received the 2018 ISU Leadership Award for the Graduate and Professional Student Senate (GPSS). She is advised by Dr. Steve Bradbury.



*Kelsey Fisher and Ryan Smith*

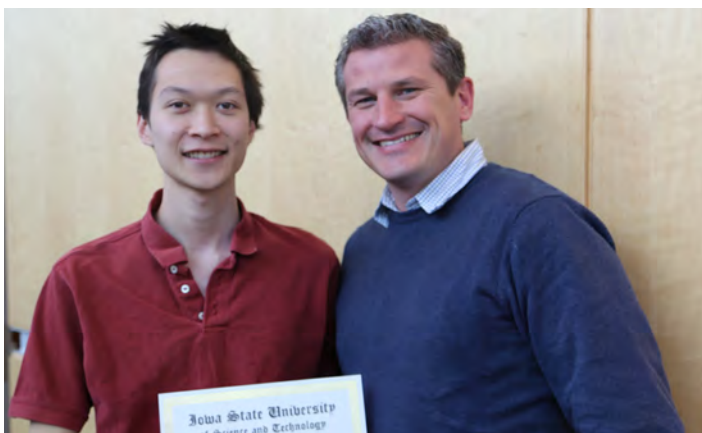
## More Student Awards and Scholarships

**Niranjana Krishnan** received a \$1,500 grant from Prairie Biotic Research, Inc. in March 2018. Her research proposal was titled, "Milkweed in prairie plots in agricultural landscapes: assessing risks of insecticide exposure to monarch butterfly larvae." She is also an ISU Graduate and Professional Student Senate executive member. Niranjana is advised by **Dr. Steve Bradbury**.



*Niranjana Krishnan*

**Colin Wong** was awarded the Henry and Sylvia Richardson Research Incentive Grant in December 2018. He is a Ph.D. student co-advised by **Dr. Joel Coats** and Dr. Richard Martin and currently works on the toxic mode of action of natural plant compounds. This grant will extend his current research and he proposes to use a new technique of microtransplantation to skip the problematic step of expressing the protein and inject fully assembled receptors from insect cells. This has been done once before using pea aphid. Colin will use the American cockroach to verify the use of the technique in insects and compare to previous results using heterologous expression. He hopes this research will bring together the toxicology and entomology portions of his dissertation at ISU.



*Colin Wong and Ryan Smith*

The 2018 ESA North Central Branch meeting was in March (Madison, WI). Many ISU students participated in the competitions, including five winning presentations:



1. **Ashley St. Clair** (2nd): Ph.D. P-IE Session I: Queen of the prairie: Can honey bee queen fecundity be rescued by prairie in a cultivated landscape? Ashley is co-advised by Drs. Matt O'Neal and Amy Toth.

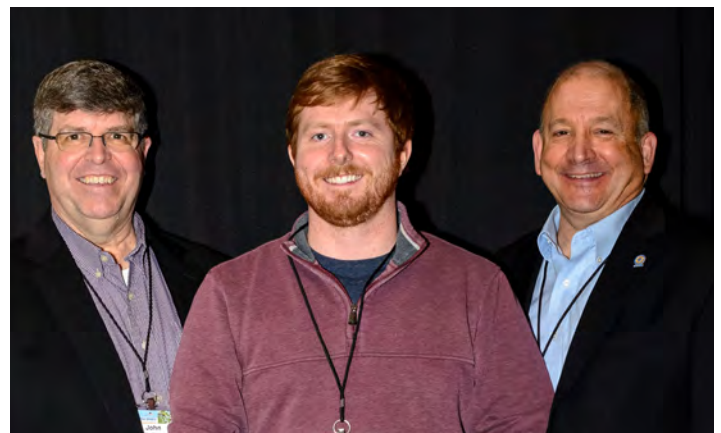
2. **Ashley Dean** (2nd): M.S. P-IE Session I: Using soybean genetics to evaluate the value of soybean aphid management tactics. Ashley is co-advised by Drs. Matt O'Neal and Erin Hodgson.

3. **Erika Rodbell** (3rd): M.S. P-IE Session II: Effect of crop rotation on soybean aphid. Erika is co-advised by Drs. Matt O'Neal and Erin Hodgson.

4. **Kelsey Fisher** (3rd) Ph.D. P-IE Session II: Where'd that caterpillar go? Frequency of larval movement and estimates of milkweed utilization by monarch caterpillars. Kelsey is advised by Dr. Steve Bradbury.

5. **Edmund Norris** (2nd): Ph.D. SEB-MUVE-PBT Session: Plant essential oils synergize pyrethroid insecticides against medically relevant mosquito species. Edmund is advised by Dr. Joel Coats.

The 2018 National ESA meeting was in Vancouver, BC, Canada. We had one presentation winner: **Edmund Norris** (1st): MUVE: Mosquitoes Session II: Exploring the localization of biodegradable nanoparticles in *Aedes aegypti*.



*2018 NCB-ESA President John Ruberson, Edmund Norris, and 2018 ESA President Michael Parrella*

# Opportunities to Contribute to Entomology

The Department of Entomology at Iowa State University is increasingly dependent upon the generosity of alumni and friends. To support the department, please fill out this section and return it with your check or money order (made out to The ISU Foundation) to the Department of Entomology, Iowa State University, 114 Science II, Ames, IA 50011. Alternatively, donations can be made online at [www.foundation.iastate.edu/ent](http://www.foundation.iastate.edu/ent).

My support this year is in the amount of \_\_\_\_\_

Please designate my gift to the area(s) in the amount(s) shown below:

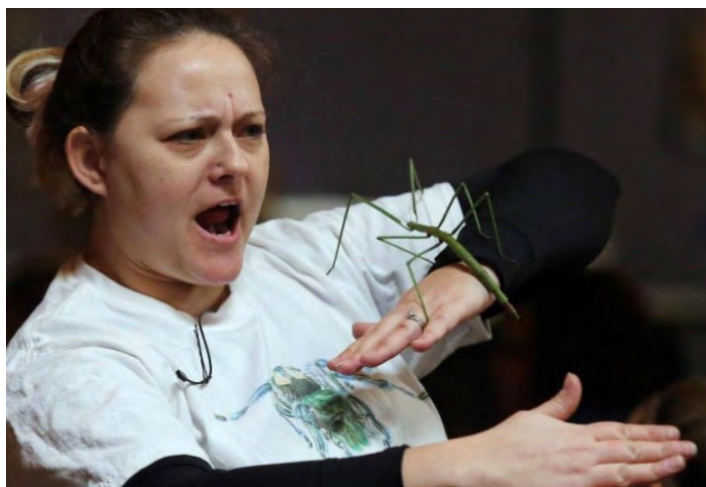
- Biosystematics Travel Fund for travel costs associated with biosystematics research
- BugGuide: an online resource for insect identification
- Entomology Alumni Scholarship for scholarships
- Entomology General Account
- Entomology Memorial Fund for various expenses, including graduate student travel
- Iowa State University Insect Zoo
- Harold "Tiny" Gunderson Memorial Lectureship for Extension
- Fred Clute Memorial Entomology Fund for general support for the Department of Entomology, including The Entomology Student Scholarship for Student Excellence
- Jean L. Laffoon Memorial Scholarship for graduate students in Entomology
- Jim Oleson Scholarship in Entomology for students who demonstrate academic promise
- Larry Pedigo Graduate Scholarship in Entomology for scholarly performance
- Henry and Sylvia Richardson Research Incentive Grant provides funding for graduate research experiences beyond their degree program
- Wayne A. Rowley Scholarship in Entomology for graduate and undergraduate scholarships, with preference given to those with an interest in medical entomology

For more information about these funds, please contact us at the departmental address above or call 515.294.7400. For more information about other gift designations, please contact Ray Klein via phone: 515.294.3303 or e-mail: [rklein@iastate.edu](mailto:rklein@iastate.edu).



## Another Bugtastic Year for the Insect Zoo

*Ginny Mitchell writes:* This year we reached over 31,000 Iowa youths! Since May of 2012 we have impacted over 175,000 Iowa youths, participated in 1,797 programs and displays in 89 of the 99 counties, and employed 23 student workers. As usual we started 2018 off with the Bald Eagle Appreciation Days in Keokuk, IA. This has become a 3-day Insect Zoo tradition.



Ginny at Bald Eagle Days, Keokuk, Iowa

We added several new beetle species to our line-up, including several *Dorcus* (stag) beetles. They are long lived and have some powerful mandibles which are used for wrestling for dominance. We hatched our first captive bred eggs from both the *D. titus* and *D. grantii* beetles! We now maintain 128 species of living arthropods.

The Insect Zoo space is expanding! With the completion of the new building across the way, we now have some more space! We are super excited to try our hand at rearing caddisflies for their cases. Hopefully we will have some beautiful jewelry to offer up next Christmas. We will also have a smaller space to keep those troublesome walkingsticks in. They just need so much humidity, which is hard to maintain in the large space where they are currently housed.

Our summer program, "The Song of Bugs" was a hit. I enjoyed writing my 2nd children's book titled "Unia." In this story, Unia is a cricket who has lost his song. He roams around listening to other animals who sing and finding out why they sing and he cannot. The kids followed him on his adventure, listening to the songs of arthropods such as the hissing baboon tarantula, and the soothing song of a mole cricket. Kids, parents and the librarians loved this story!



2018 Bug'n Day Out Bug Camp

We hosted a rocking Bug'n Day Out Bug Camp here on campus. The kids had so much fun and so did we! Summer 2019 we are offering a traveling bug camp to extension offices across the state! We are excited to see how it turns out.

The Insect Zoo has also added a new program. This "School Display" can accommodate up to 60 kids in a 1-hour program instead of 30 in 1-hour. We have been using this program since September and it has been a hit with both teachers and kids.

The Insect Zoo wouldn't be what it is today without the many ISU students who have left their mark. I would like to say thank you to all of the past students and to our current students, Emily Gamble, Beth Marquez, Ryan Pate, Avery Wickham and Emily Dirks. You are all genuine bug-lovers and I am proud of your contributions to the Insect Zoo. Until next year my bug-loving friends. #dontsmashthatbug #loveourbugs



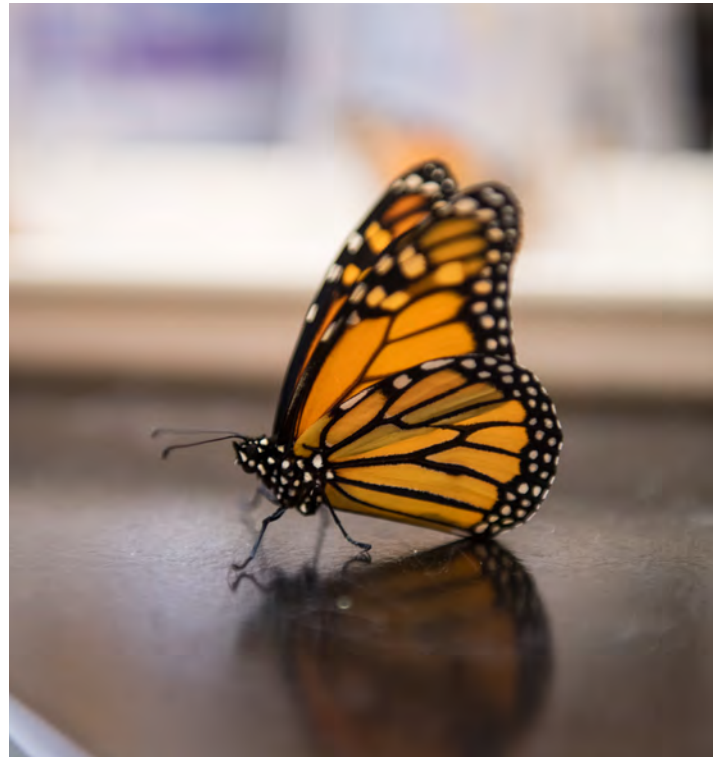
May Natural History Museum of the Tropics, Colorado Springs, CO

## Monarch Consortium Collects Leader Award

The Iowa Monarch Conservation Consortium was honored with a 2018 Iowa Secretary of Agriculture Leader Award for “Leadership in Collaboration” in support of monarch butterfly conservation. Staff and faculty from ISU, Iowa Department of Natural Resources, and the Iowa Department of Agriculture and Land Stewardship were jointly recognized.



Left-to-right: Mike Naig, Sue Blodgett, Steve Bradbury, Karen Kinkead, Stephanie Shepaherd, Jacquie Pohl, Dana Schweitzer, and Susan Kozak.



Cover photo of a monarch highlighted in the Iowa Soybean Review in February. Photo by Joe Murphy, Iowa Soybean Association.



The ISU Extension Entomology group met for professional development. Left-to-right: Donald Lewis, Erin Hodgson, Randall Cass, Kathy Wilson, Kristine Schaefer, Laura Iles, and Betsy Buffington.

### Keep in Touch!

We have more departmental news to share with our alumni and friends! Visit the ISU Entomology website, [www.ent.iastate.edu](http://www.ent.iastate.edu), to see our seminar schedule, research news, and social events. Also, find updates and hear about fun entomological news by “liking” us on our departmental Facebook page, [www.facebook.com/ISU.Entomology](http://www.facebook.com/ISU.Entomology).

Please let us know if you have information to share with Department of Entomology friends and alumni. Items could include job changes, honors and awards, and personal notes. Kindly direct information to the newsletter editor, Erin Hodgson, Iowa State University, Department of Entomology, 205 ATRB, Ames, IA 50011-1101 or via email: [ewh@iastate.edu](mailto:ewh@iastate.edu).

The ISU Department of Entomology Newsletter is for alumni and friends, and is produced by ISU Entomology faculty, staff, and students. This newsletter and previous issues are available online at [www.ent.iastate.edu/alumni](http://www.ent.iastate.edu/alumni).

## Selected Publications from 2018

- Clifton, EH, ST Jaronski, BS Coates, EW Hodgson, and AJ Gassmann. 2018. Effects of endophytic entomopathogenic fungi on soybean aphid and identification of *Metarhizium* isolates from agricultural fields. PLoS ONE. DOI: 10.1371/journal.pone.0194815.
- Courtney, GW and CL Hogue. 2018. A review of the net-winged midges (Diptera: Blephariceridae) of the West Indies, with description of a new species from Puerto Rico. Aquatic Insects. DOI: 10.1080/01650424.2018.1445868.
- Grant T, HR Parry, MP Zalucki, and SP Bradbury. 2018. Predicting monarch butterfly movement and egg laying with a spatially-explicit agent-based model: the role of monarch perceptual range and spatial memory. Ecological Modelling. DOI: 10.1016/j.ecolmodel.2018.02.011.
- Hansen, W, J Scholl, A Sorensen, KE Fisher, J Klassen, L Calle, G Kandlikar, N Kortessis, D Kucera, D Marias, D Narango, K O'Keeffe, W Recart, E Ridolfi, and M Shea. 2018. How do we ensure the future of our discipline is vibrant? Student reflections on careers and culture in ecology. Ecosphere. DOI: 10.1002/ecs2.2099.
- Hodgson, EW. 2018. Using immediate feedback to improve short-term learning in extension. Journal of Integrated Pest Management. DOI: 10.1093/jipm/pmy001.
- Koch, RL, EW Hodgson, JJ Knodel, AJ Varenhorst, and BD Potter. 2018. Management of insecticide-resistant soybean aphids in the Upper-Midwest. Journal of Integrated Pest Management DOI: 10.1093/jipm/pmy014.
- Krafsur, ES and I Maudlin. 2018. Tsetse fly evolution, genetics, and the trypanosomiasis - a review. Infection, Genetics and Evolution. DOI: 10.1016/j.meegid.2018.05.033.
- Madriz, RI, A Astorga, T Lindsay, and GW Courtney. 2018. A new species of *Neoderus* Alexander, 1927 (Diptera, Tanyderidae) from southern Chile, with a first description of a male and key to extant genera of the family. Aquatic Insects. DOI: 10.1080/01650424.2018.1456665.
- Martins, CC, A Ardila-Camacho, and GW Courtney. 2018. Neotropical Osmylidae larvae (Insects, Neuroptera): Description of habitats and morphology. Aquatic Insects. DOI: 10.1080/01650424.2018.1436181.
- Mason, CE, ME Rice, and 22 others. 2018. European corn borer: ecology, management and association with other pests. NCR327. Iowa State University Extension and Outreach, Ames, IA.
- Norris, EJ, JR Coats, AD Gross, and JM Clark, Eds. 2018. Advances in the Biorational Control of Medical and Veterinary Pests. American Chemical Society, Washington, DC. DOI: 10.1021/bk-2018-1289.
- Peterson, RKD, LG Higley, and LP Pedigo. Whatever happened to IPM? American Entomologist. DOI: 10.1093/ae/tmy049.
- Pocius, VM, JM Pleasants, DM Debinski, KG Bidne, RL Hellmich, SP Bradbury, and SL Blodgett. 2018. Monarch butterflies show differential utilization of nine midwestern milkweed species. Frontiers in Ecology and Evolution. DOI: 10.3389/fevo.2018.00169.
- Sappington, TW, LS Hesler, KC Allen, RG Luttrell, and SK Papiernik. 2018. Prevalence of sporadic insect pests of seedling corn, and factors affecting risk of infestation. Journal of Integrated Pest Management. DOI: 10.1093/jipm/pmx020.
- Sappington, TW. 2018. Migratory flight of insect pests within a year-round distribution: European corn borer as a case study. Journal of Integrative Agriculture. DOI: 10.1016/S2095-3119(18)61969-0.
- Seiber, JN, JR Coats, SO Duke, and AD Gross. 2018. Pest management with biopesticides. Frontiers of Agricultural Science and Engineering DOI: 10.15302/J-FASE-2018238.
- Shrestha, RB, MW Dunbar, BW French, and AJ Gassmann. 2018. Effects of field history on resistance to Bt maize by western corn rootworm, *Diabrotica virgifera virgifera* LeConte (Coleoptera: Chrysomelidae). PLoS ONE. DOI: 10.1371/journal.pone.0200156.

# Photos From the 2018 Winter Gathering



*Rick Hellmich and Donald Lewis*



*Sue Blodgett*



*Tammy Porter*



*Kelly Kyle and Matt O'Neal*



*Seth Applegate*



*Ge Zhang*



*Keith Bidne and Sue Blodgett*



*Sijun Liu*