MICHIGAN STATE UNIVERSITY | Entomology

Bugged

FROM

MSU DEPARTMENT OF ENTOMOLOGY

Summer 2015

Image: Dave Cappaert, MSU, Bugwood.org

FROM THE CHAIR

I recently visited the Kellogg Biological Station (KBS) and spent a great afternoon with KBS Director Kay Gross and colleagues. I became aware of the NSF Long-Term Ecological Research (LTER) program where MSU Entomology faculty members and students played important roles in LTER's early development (Stu Gage) and continue to play lead roles today (Doug Landis). I was impressed by how KBS has been and is now a significant part of Entomology's history and, I expect, future.

During the 1960s and 70s, a tremendous amount of cereal leaf research took place in and around KBS and this led to initial concepts of agroecosystem management, agroecology, integrated pest management, population dynamic modeling, landscape ecology and the use of systems science in biology. Notably, these concepts and associated programs were a platform for interdisciplinary research, teaching and Extension programs that crosscut so much of what we do today.

Examples abound throughout MSU's most recent generation of entomologists. **Zsofia Szendrei** (now an associate professor!) teaches a course in tritrophic

Matt Grieshop at Clarksville Research Center.

interactions. **Anthony Cognato** (now a full professor!) uses morphological and molecular characters to reveal the diversity and understand the distribution, biology and evolution of local, national and international forest pests. **Jared Ali** researches how plant volatiles play key roles in attracting and repelling herbivores, parasitoids and predators and more. **Eric Benbow** (newly an associate professor!) and **Jen Pechal** are focused on the interaction of insects and microbial communities. **Matt Grieshop** now leads the Clarksville Research Center with its decidedly interdisciplinary focus on fruit and organic management systems. And recently, **Peter White** joined the Department and brings an interdisciplinary perspective through his work on biodiversity, evolution and teaching.

Institutional barriers were and are being broken to address unique questions found only at the intersection of disciplines. This creates funding opportunities, solves problems, answers ecological questions and generates knowledge that would not otherwise occur without an interdisciplinary perspective.

As usual, enjoy being *Bugged*!

All the best,

Bill Ravlin, chairperson

RESEARCH & PROJECTS

New research by Zachary Huang and collaborators has revealed that Varroa mites, the most serious threat to honey bees worldwide, are infiltrating hives by smelling like bees. The Michigan State University-led study appeared recently in Biology Letters and shows being able to smell like their host reduces the chance the parasite is located and killed. The parasites were originally found on Asian honey bees. The invasive species, however, revealed their versatil-

State News

Zachary Huang

ity when they began infesting and killing European honey bees. Huang notes, "The mites from Asian honey bees, or the original host, are more efficient in mimicking both Asian and European honey bees. This remarkable adaptability may explain their relatively recent host shift from Asian to European honey bees." Read more at MSU Today: A Smelling Bee?

Ke Dong was awarded a $1.2 million grant from the National Institute of General Medical Sciences (NIGMS) to identify pyrethroid-responsive olfactory receptors in fruit flies and mosquitoes and to evaluate the role of these olfactory receptors in pyrethroid repellency. Insects, including disease vectors, rely on their olfactory system to locate food, find mates and avoid danger. In 2014, Dong and her lab discovered fruit flies and mosquitoes can smell and avoid pyrethroid insecticides. Remarkably, some of the compounds in this class of insecticides were as potent as DEET in repellency. Furthermore, they found these pyrethroids appear to activate specific olfactory neurons by directly interacting with olfactory receptors. Dong and co-PI Yuzhe Du hope findings from this new project will set a new paradigm for understanding pyrethroid modes of action in mosquito control where pyrethroid repellency is expected to be a critical component. In addition, results may provide a new high throughput platform for screening new mosquito repellents for reducing disease transmission by insect vectors.

MSU undergraduate students in the RISE program (Residential Initiative on the Study of the Environment) have taken the lead on three new projects to show how pollinators and pollinator education can be integrated into campus life. MSU entomologists **Walter Pett, Meghan Milbrath, Zachary Huang** and **Gabriel Ording** provide support to the students for their projects:

- Rooftop bees at Bailey Hall. Two hives were placed on the residential hall roof for viewing by residents and visitors to the Bailey Greenhouse and Urban Farm, serving as a reminder of the importance of pollinators in food production systems.
- Butterfly gardens outside Bailey Hall. The garden provides a space for Monarch butterflies and a visual demonstration on how a pollinator garden can be installed anywhere. The plants were chosen with Monarch butterflies in mind, but will support other butterflies and pollinators.
- Cedar River walkway green space. The path along the Red Cedar River is a high traffic area, a perfect place for education about pollinators and ecosystem health. Students designed a "Truly Green Space" in this area, choosing native plants that attract pollinators to restore an area near Bailey Hall.

The fourth annual Bee-Palooza organized by MSU entomologists attracted hundreds despite stormy weather. The event, for people excited to learn about bees and what they can do to help them, continues to grow in popularity with attendance this year topping 400 participants. The event's theme was "Give Bees a Chance – Plant More Flowers," because the second most frequently asked question after, "What's going on with the bees?" is, "What can I do to help?" The Michigan Beekeepers Association provided honey sticks and coloring books on honey bee biology. Koppert Biologicals provided the bumble bees for the Bumble Bee station.

Dave Smitley was a reviewer for the recently released report, "Growing Bee-Friendly Garden Plants: Profiles in Innovation," published by Friends of the Earth and the Pesticide Research

Miller and Adams book now available

"Trapping of Small Organisms Moving Randomly – Principles and Applications to Pest Monitoring and Management" by

Chris Adams, Jim Miller and Jeffrey Schenker

Jim Miller, Chris Adams, Jeff Schenker and Paul Weston is now being sold at Amazon.com. The book highlights logical and important connections between trapping and foraging ecology. In the past, lack of quick and inexpensive methods to estimate actual number of pest individuals per acre has blocked pest managers from making optimal decisions about whether or not to apply pesticides. Without such information, pest management decisions are based only on relative pest density using experience-based indices.

Institute. The publication features wholesale nurseries, retailers and institutions working with their consumers to protect bees. In particular, many nurseries are taking a proactive, precautionary stance on neonicotinoid use. Smitley worked closely with the authors to share how difficult it is for greenhouse and nursery growers to produce high quality plants free of pests that also do not have pesticide residues toxic to bees.

PEOPLE

CANR Dean Fred Poston presented the 2015 Gary Simmons Memorial lecture this spring. The lecture is hosted by the members of the MSU Graduate and Undergraduate Entomological Student Society (GUESS). Poston's talk, "A Path Planned but Not Followed," was an autobiographical look at the decisions and sometimes-distracting circumstances that led him through his successful career. Visit the Department's website for a video recording under the News tab. Gary Simmons was a forest entomologist and biostatistician in the Department. Simmons always placed students first among his priorities and was the major professor of 13 MS and six PhD candidates. He passed away at the age of 47 in January 1991.

The Department is pleased to announce three faculty promotions: Anthony Cognato (full professor), Zsofia Szendrei (associate professor with tenure) and Eric Benbow (associate professor with tenure).

Bill Ravlin

Dean Poston joins entomology students in discussing their research.

Deb McCullough has been invited to join the Forestry Research Advisory Council (FRAC). The Council provides advice to the U.S. Secretary of Agriculture about national and regional research planning projects. Other responsibilities include making recommendations about the coordination of forestry research within federal and state agencies, forestry schools and forest industries. FRAC also advises the U.S. Forest Service's Research and Development program, the world's largest forestry research organization.

Chris DiFonzo again led 14 students in a study abroad class, "Tropical Agricultural Systems in Sri Lanka." Leaders in Sri Lanka tell her that while other universities have come and gone, MSU's course is the one that has returned year after year. MSU is a national leader in international study and offers 275 programs in over 60 countries on all seven continents.

Jason Gibbs

Entomology's Bug House participated in the Be a Tourist in Your Own Town on May 30. Despite lousy weather and competing high school graduation events, the Bug House had 1,486 visitors during the six hour event – the highest attendance ever for a one-day event. A big thanks to those dedicated students and staff who helped out, including Gary Parsons, Courtney Weatherbee, Nicole Quinn, Amanda Lorenz, Ian Paulsen and Jason Gibbs.

Rich Merritt, university distinguished professor emeritus, has been asked to give one of the plenary talks at a symposium, "Biomonitoring: Lessons from the Past, Challenges for the Future." The symposium is part of the opening session of 13th European

A. Cognato

Z. Szendrei

E. Benbow

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ALUMNI PROFILES: Jan Nyrop

Jan Nyrop has been a senior associate dean in Cornell University's College of Agriculture and Life Sciences. This summer, he is transitioning to director of the Cornell University Agricultural Experiment Station.

When did you graduate from MSU? I earned a master's in entomology in 1979 and worked simultaneously on a master's in systems engineering and a PhD in entomology completed in 1982.

Why did you choose entomology? I choose entomology because insects fascinated me and I could do work that I felt would benefit society. I received a BS in wildlife ecology from the University of Maine. Gary Simmons was a professor there and became my mentor. He taught an introductory statistics course that got me interested in quantitative sciences. I took other math and modeling courses after that and it provided a framework for my entomology studies. Eventually, I ended up at MSU as did Gary. He guided me in both of my entomology degrees. Jeff Granett, also at Maine when I was an undergraduate, was another influence. Jeff and Gary pushed me academically and this encouragement was very influential. I felt especially fortunate that my committee at MSU included Dean Haynes, Stuart Gage and Tom Edens, all excellent mentors. I also had many meaningful discussions with Rich Merritt.

How did entomology contribute to what you do today? I continue to do some research and teach a course on invasive species in a global world with Ann Hajek, so on one level I am still an entomologist. Now in my career I have other opportunities to grow intellectually that are less discipline oriented. I feel that my education at MSU really prepared me well, not just for a career in entomology, but for the college administration I do now. Entomology at MSU is very special because it is an interdisciplinary hub of biologists, economists, engineers and more. MSU Entomology really embraced a systems perspective. This provided me with a paradigm for looking at issues and understanding the world that really helped as I moved from thinking and working on my research within a department structure to thinking about the whole college. Now I ask, how can programs across the college function as a system to positively impact peoples' lives and how can we continue to evolve that system to improve what we do?

Any advice for students? I chose to begin college with studying wildlife ecology because I pursued the things I liked. If I have a message for young people, that would be it. First and foremost, you need to enjoy what you do, which I have. Obviously you also need to earn a living, but if you enjoy what you do, you will excel, and the financial gain will come.

Best memories as an entomology student? I met my wife and got married while at MSU. We had a wonderful community of students who did things outside of work. It's a unique time of your life when you are a grad student. You have an incredible freedom to pursue what it is you're passionate about and you are unlikely to ever experience it again. My wife and I developed a passion for cycling and it remains – we just biked the Texas Hill country. Those years at MSU also included the 1979 basketball NCAA championship win. That was huge.

How does your work impact people's lives? When I was working as an entomologist, my motivation was to improve crop protection and make it more sustainable. I was influenced by IPM (Integrated Pest Management) programs at MSU and their development. I approached my research from an engineering perspective. Here's a problem, let's research it and find a solution and make things better. I liked fundamental questions, but they were always influenced by how we could improve or better manage growing a crop. Then when I began to have opportunities with leadership roles, I was motivated by taking the particular unit – department, college, experiment station – and doing things that will benefit people on a lot of levels. How can we keep the organization as strong as it can be in resources, people and constituencies? If you firmly believe in the organization, you have to think about how to make it stronger, which is measured in many ways including scholarship, student education and direct societal impacts.

Photo courtesy Cornell University

Ecological Federation (EEF) and the 25th Italian Society of Ecology (S.It.E.) joint conference, "Ecology at the Interface," at the European Ecological Congress in Rome, Italy on Sept. 21, 2015. The title of his talk is "The Living Stream: A Functional Approach."

In May, Larry Olsen led a group of nine Extension Epsilon Sigma Phi members on a professional development trip to Peru. The team spent several days in the community where Olsen works visiting schools, exploring an Inca museum and pre-Inca city, and participating in potato harvest at a demonstration farm plot. Monica Hufnagel (MS student of Zsofia Szendrei) coordinated much of the harvesting and data gathering in cooperation with a senior college student from the Central University of Peru. Good results are coming from the plot to introduce new and improved varieties to local growers that yield more and taste better than the traditional varieties grown.

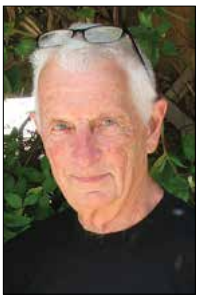
Marie Ruemenapp, MSUE

At left, Peace Corps volunteer and MSU graduate student Jessica Vega discusses potato variety plots with Larry Olsen. At right is Dr. Noemi Zuniga Lopez, the local Peruvian extension educator who has coordinated the plots and data gathering, and Ramiro Casas, the local grower cooperator.

AWARD-WINNING DEPARTMENT

Adam Ingrao has been awarded a prestigious NSF Graduate Student Fellowship covering salary and tuition for three years. Ingrao is working on a doctoral project studying arthropod predators and their chemical ecology in asparagus fields with Zsofia Szendrei. The NSF awarded the fellowships to 2,000 individuals from among 16,500 applicants in 2015. Ingrao is one of 19 NSF Graduate Research Fellows from Michigan State University for 2015 - the largest class of fellows for MSU since the program began in 1952.

The Entomological Society of America selected Jessica Kansman for a Plant-Insect Ecosystems (PI-E) Section's Undergraduate Student Achievement Awards. The award recognizes undergraduate students demonstrating significant achievements through research, teaching or outreach in entomology. As many as four awards may be presented annually. Kansman is part of the Szendrei vegetable entomology lab.



George Bird has been recognized as a 2015 NCR-SARE Hero. The honor is presented by North Central Region Sustainable Agriculture Research and Education (NCR-SARE) for those offering outstanding leadership, vision, contribution and impact in the field of sustainable agriculture in the north central region.

The Entomology Department held its annual spring picnic and awards ceremony hosted by the Graduate and Undergraduate Entomology Student Society (GUESS). Students and staff enjoyed a fun evening at Lake Lansing with delicious food and award presentations. Congratulations to the following people:

- **Bernice DeMarco** (Cognato Lab) - Robert Driesbach Award for outstanding achievement in a total PhD Program
- **Brad Baughman** and **Joseph Tourtois** (both Grieshop Lab) - Paul Wooley Award for outstanding achievement in a total MS Program
- **Emily May** (Isaacs Lab) - Gordon Guyer Award for outstanding achievement in Extension

Celebrating outstanding students at the GUESS-hosted departmental picnic.

FEATURED UNDERGRADUATE STUDENT

Name: Katie Demeuse
Hometown: Caledonia, Michigan
Future study or career plans: Pursue a master's degree studying vector biology.

Why study entomology? There's so many topics you can research, and bugs are everywhere, and they're always going to be there, so that's good job security!

What or who inspired your interest in entomology? I started working in the Szendrei Vegetable Entomology Lab and the people in the lab were so enthusiastic about what they were learning and researching, that they converted me from a Fisheries and Wildlife major to an Entomology major.

What has been your best experience with entomology? Working in two different entomology labs has been my best experiences. By working in these labs, I was able to see how research is done and how my love of insects could translate into a career.

What do you wish other people understood about entomology? I wish other people understood that entomologists don't just "play with bugs all day." Sure, there's a little of that, but the research that is being done in places like MSU is so important.

Was there ever a time when you didn't like insects? Growing up, I was never really afraid of insects. Spiders, on the other hand, did tend to scare me away. Thankfully, I mostly grew out of that!

Although you work with insects, is there any particular insect or arthropod you do not like and why? As far as arthropods, I don't care for centipedes.

What is your opinion on entomophagy (eating insects) as practiced in other world cultures? I think insects are a great protein source! I have yet to try an insect dish, but would love a chance to try it.

FEATURED GRADUATE STUDENT

Name: Adam Ingrao
Hometown: Yucaipa, CA
Major professor: Zsofia Szendrei

What are you researching? My research is developing biological control strategies for pests in Michigan asparagus. In particular, I am interested in how we can use volatile chemical cues of asparagus induced by herbivore feeding to recruit natural enemies into fields from border habitats.

Future career plans: After graduating, I hope to work in the private sector where I will continue researching sustainable pest management solutions for agricultural producers.

Why study entomology? The vast majority of the earth's species are insects. They have survived major extinction events and some are so perfectly adapted that their morphology hasn't changed in hundreds of millions of years. What better way to understand our planet than to study one of its most successful organisms.

Who inspired your interest in entomology? Biological control pioneer Charles Valentine Riley. I grew up in the citrus-rich communities of southern California where his work in controlling cottony cushion scale through importing and releasing Vedalia beetles saved the California citrus industry from total collapse in the late 1800s. I often reminisce how the Vedalia beetles I grew up seeing were the progeny of those his teams originally brought over from Australia.

What has been your best experience with entomology? Coming to MSU's Department of Entomology! Our faculty and resources are incredible and I feel like the education I am getting here is second to none.

What do you wish other people understood about entomology? That it's not just about insects! Entomologists are some of the most well-rounded scientists because we study organisms that inhabit nearly every system on the planet.

- **Amanda Lorenz** (Ording group) - Eugenia McDaniel Award for excellence, dedication and accomplishment in teaching
- **Courtney Larson** (Benbow Lab) - Gordon Guyer Endowed Fellowship in Aquatic Entomology
- **Courtney Weatherbee** (Benbow Lab) - Bug House Volunteer of the Year
- **Adam Ingrao** (Szendrei Lab) - Rhodes (Gene) Thompson Memorial Fellowship
- Hutson Endowment Research Proposal awards: **Courtney Larson** (PhD - Benbow), **Kristin Deroshia** (MS - Grieshop), **Nicole Quinn** (MS - Szendrei)

Rachel Osborn, a doctoral student with Anthony Cognato, has received the 2015 Coleopterists Society's Graduate Student Research Enhancement Award for her research on *xyleborine ambrosia* beetles and their associated fungi. These funds, in part, supported her first trip to Ecuador to collect specimens and culture their fungi. Also, she will create a molecular phylogeny for the beetles and fungi to help explore patterns of coevolution. These preliminary data will be used as the basis for future National Science Foundation proposals.

We are proud to note the MSU Team won the North Central Branch Linnaean Games competition. They will compete next at the national ESA meeting in Minneapolis, Minnesota, this fall. The ESA Linnaean Games are a question-and-answer, college bowl-style competition on entomological facts played between university-sponsored student teams. Our team included **Steven Nichols** (Cognato Lab), **Kristin Deroshia** (Grieshop Lab), **Marissa Schuh** (Landis Lab) and **Dan Hulbert** (Smith Lab) and is coached by Matt Grieshop.

Congratulations to our May graduation undergraduate students: (left to right) **Katie Demeuse, Rose Borror** and **Jessica Kansman** with undergraduate advisors Walt Pett and Chris DiFonzo.

ALUMNI NEWS

David Epstein (PhD Gut lab, academic faculty) is a senior entomologist with the USDA-ARS Office of Pest Management Policy. He played a key role as an author in developing the nation's new strategy on pollinator health, which was announced this spring by President Obama.

Emily May (MS Isaacs Lab) graduated this spring and is relocating to Vermont.

Bernice DeMarco (PhD Cognato Lab) graduated this spring and will continue to contribute to the MSU Entomology Museum as adjunct curator and to Entomology's Outreach Program.

Megan Woltz (PhD Landis Lab) will be an assistant professor of biology at Lindenwood University starting this August. The position is primarily teaching and advising and also involves conducting research with undergraduates. Woltz reports she plans to examine local and landscape factors influencing arthropod-mediated ecosystem services in urban gardens in St. Louis, Missouri, and how to enhance those services for community gardeners.

Mary Gardiner (PhD Landis Lab), associate professor at The Ohio State University, has published the book "Good Garden Bugs," available through Amazon.com.

2015 Linnaean Team: Coach Grieshop, S. Nichols, K. Deroshia, M. Schuh, D. Hulbert.

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INTERNATIONAL IMPACTS: Cognato collaborations help stop balsa pest

Anthony Cognato's Holistic Insect Systematics Laboratory has built significant collaborations and training for identifying new species in Ecuador. In May, the lab travelled to Ecuador to meet with collaborators and students from the Universidad Técnica Estatal de Quevedo (UTEQ) for two weeks. Nine students were trained in bark and ambrosia (scolytine) beetle biology, taxonomy, identification and collecting techniques. Collecting expeditions were taken to remote forested sites in the mountains of western Ecuador to assess local beetle and ambrosia fungal diversity. Over 100 scolytine species were collected, many representing new species. Students were also able to field-culture ambrosia fungus necessary for Rachel Osborn's PhD dissertation. In previous work, the Cognato group helped identify an undescribed species of ***xyleborine ambrosia*** beetle, which was likely contributing to the death of balsa through transmission of a pathogen fungus. Together with Ecuadorian colleagues, they analyzed bionomic data for the new species, ***Coptoborus ochromactonus***, and reported recommendations for its control. That work laid the foundation to ultimately protecting one of Ecuador's important commodities and a global industrial resource.