



Bugged

MSU DEPARTMENT
OF ENTOMOLOGY

Photo: Bill Ravlin, MSU Entomology

FROM THE CHAIR

One of the best parts of my job is doing exit interviews with graduate students. It's not that I want them to go, but I'm excited to hear about their next adventure. My questions usually center on their plans, what we did well as a department, what we can improve on and the ongoing debate of what it means to be an entomologist. More often than not, our students have a job nailed down or at least a location in mind.

The question of what it means to be an entomologist is not so clear-cut. A decade or so ago, we and other departments of entomology had core courses driving topic areas that we felt were critical

to being an entomologist (think physiology, taxonomy, ecology, behavior). With these courses in mind, our students achieved fairly uniform learning outcomes and we knew the degree to which they mastered the material based on course grades.

Times have changed. There is more to learn with more skills needed. The view of what defines entomology and what will help our students be successful in highly competitive job markets is more diverse. Today, quantitative and computational tools such as statistics, math models and new computer languages are more important than ever. Understanding molecular biology and how it translates to insect physiology is critical for students

as it touches nearly every corner of entomology.

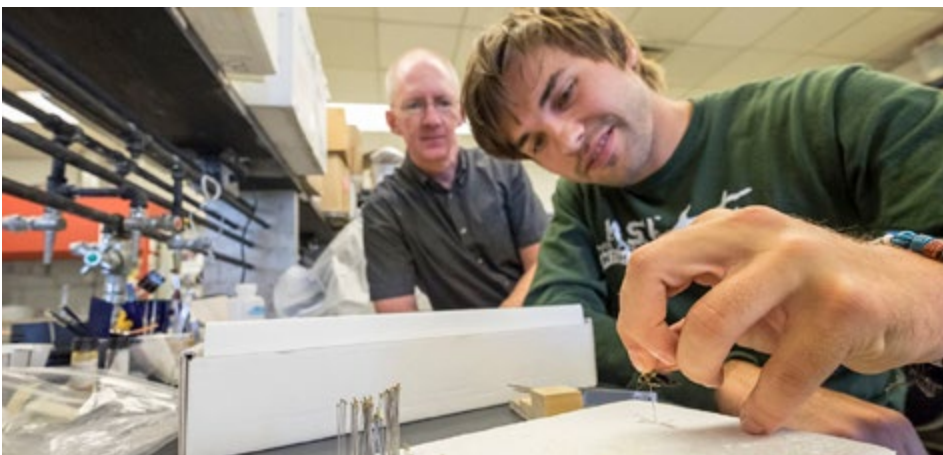
Many of the courses we've historically taught are still part of our thinking, i.e., taxonomic skills combined with basic biology, ecology and behavior. At the end of the day, we've evolved to rely on the interplay between students and their advisory committees to choose a path that appears to best serve career goals, passions and program needs.

I suspect—actually, I know—the discussion will continue. Regardless, our students are excelling after graduation, going on to advanced degrees or directly getting jobs in academia, extension, consulting, private industry, government, the military and private foundations. Some have even ventured outside the entomology umbrella to become lawyers, doctors and other kinds of professionals. Whether you're a core course proponent or flexible curriculum adherent, our graduates are doing well.

All the best,



Bill Ravlin,
Chairperson



MSU Photography

What should our students know when they graduate with a degree in entomology? What best prepares them for their future?

RESEARCH & PROJECTS

Lynnae Jess will collaborate with colleagues at Iowa State University to lead the USDA National Institute of Food and Agriculture's [North Central Integrated Pest Management \(IPM\) Center](#).



For the last 18 years, the North Central IPM Center was previously held at the University of Illinois, with Michigan State University providing co-direction.

The North Central IPM Center is one of four centers in the nation, serving 12 states, as part of the USDA's connection to production agriculture, research and extension programs and agricultural stakeholders throughout the United States. The IPM centers' projects strive to improve economic benefits of adopting IPM practices and to reduce potential risks to human health and the environment. The states in the region include Iowa, Nebraska, Kansas, Ohio, Minnesota, North Dakota, South Dakota, Missouri, Wisconsin, Illinois, Indiana and Michigan.



MSU AgBioResearch

Edible legumes are a key food crop and source of protein globally.

Barry Pittendrigh is lab director of the new [Feed the Future Legume Systems Research Innovation Lab](#),



uniting researchers from US universities with international collaborators to improve nutrition, sustainability and economic opportunities for legume farmers, especially women and youth, across the globe.

Funded through a \$13.6 million award from the [U.S. Agency for International Development](#) (USAID), the new lab will focus on profitable and environmentally sustainable systems for edible legumes such as common beans, cowpeas and pigeon peas while

investigating crop production systems that fortify soil fertility. Past iterations of the program under different names have also been led by MSU. This builds on a long history of partnership between MSU and USAID on scientific advancement of legumes that have benefited both Michigan farmers and smallholder farming communities abroad.

"MSU has over three decades of leadership in previous programs involving global legume research," said Pittendrigh, lab director and MSU Foundation Professor in the [Department of Entomology](#). "We're taking a multidisciplinary approach to solving the problems legume farmers face in the developing world, and will seek partners with the most cutting-edge, innovative ideas and techniques to address them."

Plants' defense against insects is a bouquet

Andrea Glassmire and colleagues have revealed how the mixture of chemical weapons deployed by plants keeps marauding insects off base better than a one-note defense. This insight goes beyond the ecological convention of studying a single chemical compound a plant is packing and offers new ways to approach agricultural pest management. The research was published in a recent [Ecology Letters](#).

Glassmire, now a post-doc in Will Wetzel's lab at MSU, found important relationships between plant defensive chemistry in the neotropical shrub, *Piper*

kelleyi, and insect pests. Plants defend against pests using a bouquet of chemical compounds. Ecology, however, has been biased towards studying effects of single compounds even though a feeding insect encounters a blend of plant compounds. The study found the type of defense bouquet matters, whether it contains the same compounds or a blend of different ones.

"If we can figure out the specific type of defense bouquet that is most effective at reducing insect feeding, then we can extrapolate these findings to agricultural systems to cut down on pesticide use," said Glassmire. "In the Wetzel lab, we are using a model crop system created by breeding commercial tomatoes with wild tomatoes to manipulate plant defense bouquets. This work may lead to new pest management in the future."

Glassmire collecting samples in Ecuador.



LEADING WITH EXCELLENCE ISAACS' WORK RECOGNIZED

Rufus Isaacs was recently recognized with two honors. The **Entomological Society of America** presented him with its Professional Award for Excellence in Integrated Pest Management (IPM) at its November annual meeting in Vancouver, Canada. This award recognized his research and extension efforts addressing insect pests threatening yields and quality of blueberries, grapes, raspberries and strawberries. In addition, his program is renowned for exploring pollination of fruit crops with an emphasis on wild bees and strategies to conserve them.

Isaacs also joined six other MSU researchers on the **Highly Cited Researchers List**, an annual compilation of the global leaders in scientific influence by Clarivate Analytics. The list, in its fifth year, acknowledges scientists from 21 different fields of study. Requirements for making the 2018 list included publication of multiple highly cited papers from 2006 to 2016 and ranking in the top 1 percent of citations in their fields.



MSU Photography

Rufus Isaacs with post-doc Philip Fanning working with spotted wing *Drosophila* under the lights.

Other MSU researchers listed include Sheng Yang He, Gregg Howe, Jianguo "Jack" Liu, John Ohlrogge, Phil Robertson and Jim Tiedje. The seven MSU researchers have appointments in either the colleges of Agriculture and Natural Resources, and Natural Science - or both. All have been supported in part by MSU AgBioResearch.

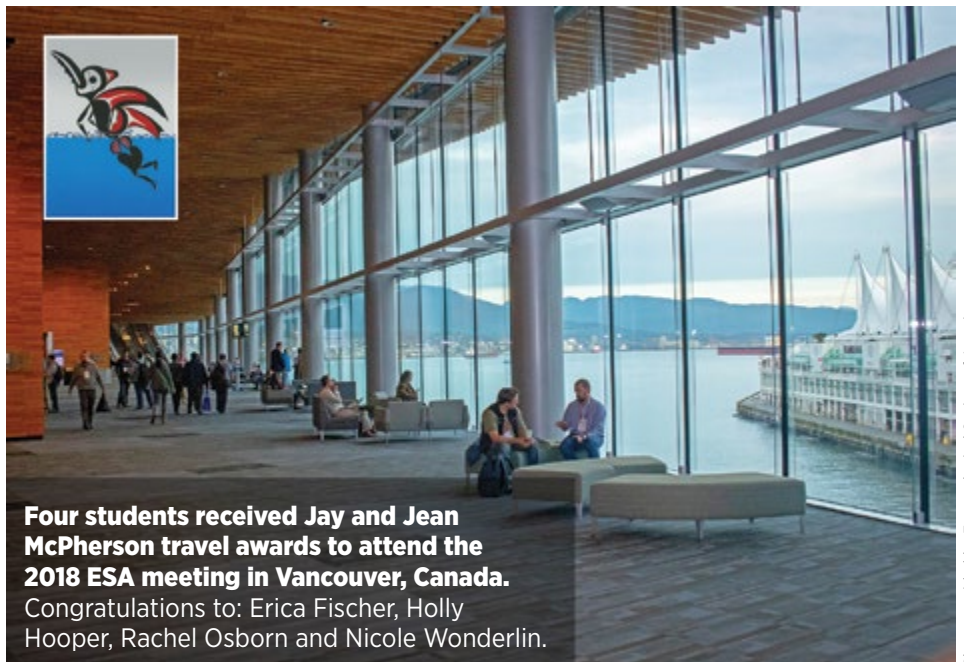
"This is a tremendous accomplishment for each of these

distinguished researchers and a reaffirmation of the importance of their work," said Doug Buhler, director of MSU AgBioResearch. "It also speaks highly of MSU as a consistent leader in plant, animal and environmental sciences, which have been foundational to our university since its inception."

More information is available at [Clarivate's](#) website.

AWARD-WINNING

John Stone, coordinator of MSU's Pesticide Safety Education Program, was recognized by the Michigan Association of Extension Educators (MAEA) this fall. MAEA awarded Stone its Outstanding Academic Specialist award, which honors specialists for their service to MSU Extension and its clientele. Along with coordinating pesticide safety education, he is an instructor for the MSU Ag Tech program at Muskegon Community College.



Four students received Jay and Jean McPherson travel awards to attend the 2018 ESA meeting in Vancouver, Canada.

Congratulations to: Erica Fischer, Holly Hooper, Rachel Osborn and Nicole Wonderlin.

Photo provided by Entomological Society of America

PEOPLE

Our [Graduate and Undergraduate Entomology Student Society](#) (GUESS) hosted the annual fall picnic on a lovely September evening. Good food, grilling, kids and babies, dogs and kicked back conversations all contributed to an enjoyable gathering. GUESS forms a social network for students to contribute to entomology-related concerns as well as to the community spirit of the Department. Thank you, GUESS, for your work in organizing the picnic.



Zsafia Szendrei

Past and current members of Zsafia Szendrei's vegetable entomology lab met for dinner during the ESA annual meeting.

Welcome to these new 2018 graduate students:

- Logan Appenfeller**, MS student with Zsafia Szendrei
- Erin Biggs**, MS student with Anthony Cognato
- Elizeth Cinto-Mejia**, PhD student with Will Wetzel
- Rob Curtiss**, PhD student with Larry Gut
- Sarah Dietrich**, MS student with Larry Gut
- Kayleigh Hauri**, MS student with Will Wetzel
- Max Helmberger**, PhD student with Matt Grieshop
- Ben Savage**, MS student with Matt Grieshop
- Joshua Snook**, MS student with Zsafia Szendrei and Will Wetzel
- Patrick Stillson**, MS student with Zsafia Szendrei
- Dan Turner**, PhD student with Will Wetzel
- Ali Zahorec**, PhD student with Doug Landis

Students graduating fall 2018:

- Jason Matlock**, PhD student with Matt Grieshop
- Ignatius Andika**, MS student with John Wise
- Jeff Shoemaker**, MS student with George Bird

Animations bridge language and knowledge barriers

Entomology's Barry Pittendrigh has a long-time collaboration with Julia Bello-Bravo (MSU Food Science and Human Nutrition) producing animated educational videos for the global community. [Scientific Animations Without Borders](#) (SAWBO) is their international network of expert scientists and animators who create animated videos on complex subjects in more than 100 local languages. Topics range from pest management to home finance.

Recently the U.S. Agency for International Development asked Pittendrigh and Bello-Bravo to develop resources to help farmers in Africa and India protect their crops from fall armyworm, an invasive pest devastating yields since reported in West Africa in 2016.

Pittendrigh, an MSU Foundation Professor in the Department of Entomology, said. "Approximately 50 percent of all calories consumed in sub-Saharan Africa come from maize, so this pest represents a problem for farmers across much of the continent. Helping people identify the pest in their field is the first step in helping them protect their crops and their communities."

The animation was completed in mid-August, with the SAWBO team now working to translate it into local languages. *(Condensed from an article by James Dau, AgBioResearch.)*

Picnic images: Joy Landis, MSU Entomology

FEATURED STUDENTS

ELISABETH DARLING

Undergraduate student

Hometown: Palos Verdes, California

Future plans: Earn masters in entomology and ultimately a career helping agriculture feed the world.



TOBY PETRICE

Graduate student

Home: West Virginia

Previous education: BS in Biology, Fairmont State University; MS in Entomology, West Virginia University.

Major professor: Forrest W. Ravlin

What is the best selling point about an entomology major? Pursuing entomology is such an underrated study. There are so many amazing career paths in agriculture, medicine, forestry and more to specialize in. Plus, most of the higher-level entomology classes are fairly small, which allows you to get to know your professors.

What inspired your interest in entomology? As a little kid I always loved chasing butterflies and bees. In my sophomore year of high school, I did a small afterschool research project on the feeding habits of praying mantis. When I presented my research, one of the attendees told me I should study bugs in college. I had no idea what I wanted to study, but I needed to find out more, which lead me to discover MSU's Entomology Department.

Best experience with entomology? I have had many! My first laboratory job was working for the Edward Walker Lab for [Michael Kaufman](#), which helped me culture my basic lab skills as well as experience rearing mosquito colonies. This summer I interned for a hop company called Yakima Chief Ranches where I got to experience real agriculture. Now I work for [Marisol Quintanilla](#) in the [Applied Nematology Lab](#). I am new to nematology but am having so much fun learning new skills.

What is your favorite insect? *Forcipomyia squamipennis*, a biting midge that pollinates the cocoa flower. Without these little guys, chocolate would be a lot harder to come across.

Do you have advice for anyone interested in an entomology major? Get involved early. This fall I am lucky to be able to attend the [Entomological Society of America's](#) annual meeting in Vancouver, Canada. Entomology majors and minors are encouraged to apply for funding to help out with costs, which made it possible for me to attend. It is a wonderful opportunity to network with other entomology professionals and learn about cool research going on across the country.

What are you researching? I am studying factors that affect the establishment of the egg parasitoid, *Oobius agrili* (Hymenoptera: Encyrtidae). *Oobius agrili* is native to China and is released in North America as a biological control agent against emerald ash borer. Emerald ash borer has killed hundreds of millions of ash trees since it was introduced into North America and threatens to extirpate numerous native ash species.

Why study entomology? Insects are not only important to agriculture and ecosystem health, but are also fascinating creatures. Their highly evolved and specialized morphology and behaviors make them intriguing subjects for study. No matter how much a person studies them, there is always something new to learn.

What is your favorite activity as part of your graduate studies? Field work. My field research takes place in Michigan forests where I am able to take in the joys of nature, except for mosquitos, while collecting data needed for my project.

What is your favorite thing about MSU? MSU has a beautiful campus that is well maintained, and unlike many other universities, the campus is mostly contiguous and includes several research properties.

What is your favorite insect? I have many favorite insects, but one of my favorites is antlion larvae. It is amazing how they are able to construct pitfall traps with side walls that slope perfectly to funnel insect prey to them as they wait patiently at the bottom of the trap. It is also exciting to watch them capture an unlucky victim.

What is your favorite way to spend your time outside of your studies? Some of my favorite activities include fly fishing, crafting bows for archery hunting and foraging for mushrooms and edible plants.

ALUMNI PROFILES: MOLLIE MCINTOSH

What led you to study entomology at MSU?

As an undergraduate at the University of Dayton, I was a biology major planning to go into athletic training or a related field of medicine. However, I discovered I faint at the sight of blood and chose to change my plans. My advisor suggested getting a variety of experiences to better determine my interests. At the time, I was taking an invertebrate zoology class and the class professor was excellent, so I asked him if I could work in his lab. It was a great experience as the professor worked in a variety of areas within aquatic ecology and first exposed me to aquatic insects. I worked for one of the lab's doctoral students, Eric Benbow, who is now an associate professor of entomology at MSU. Little did I know that Eric would later be a reference for my application to MSU.

Based on my experiences in this research lab, I decided to study environmental science and entered into a master's program at Indiana University. It soon became evident that I liked aquatic studies and aquatic insects were by far my favorite organisms. I remember being assigned to identify some beetles and they handed me a book, "The Aquatic Insects of North America," edited by Merritt, Cummins and Berg. It took me a week to identify one beetle. I recall looking at the photo of the authors on the back of the book and wondering who they were and how did they get jobs like that? It looked like great work to me.

When it became time to apply for doctoral studies, I contacted Rich Merritt at MSU. He didn't have an opening, but eventually I got an ISB teaching assistantship at MSU



"I love interacting with the students and value my time spent teaching." Mollie McIntosh (lower right).

and began studies with Rich. My doctoral project was assessing macroinvertebrate communities across an urbanization gradient in the Muskegon River watershed. Rich was an incredible mentor and advisor. Along with teaching academic skills, he demonstrated how to work in a department and with others in your field of science, how to network and be a good person in general.

Tell me about your work. I'm an associate professor at Xavier University in Cincinnati, Ohio. It's a small university with about 4,000-5,000 undergrads and no graduate program. Primarily, I teach, which was always a career goal for me. I squeeze as much aquatic and forensic entomology into my ecology and environmental science courses as is possible. I'm from Ohio, so I feel fortunate to have found an academic job where I can raise my children near my family.

What keeps you engaged in your work? I love interacting with the students and value my time spent teaching. I treat my undergraduate research program like a graduate program. I take students into the field, show them how to identify

aquatic insects and get them working with statistics. I tell them sitting at the microscope identifying aquatic insects is my yoga, my calming, happy place.

Any thoughts for current students?

I'd encourage them to be involved in more than just their research. Diversify yourself. I was very fortunate to get a variety of experiences beyond my own research at MSU. Rich involved me in his work with forensics and also with Buruli ulcer disease. My studies took me to Africa and other international destinations many times, which really broadened my horizons.

Any particular experiences or people stand out from your time at MSU?

I met my husband, David Hulefeld, through Bug Camp! I was a camp volunteer and invited my 8-year-old sister, who lived in Ohio, to attend camp. She was assigned David as her counselor. When I picked up my sister every day after camp, I also got to know David.

In the spring of 2018, I brought 12 of my Xavier undergraduate students to campus. We had a great time visiting with Eric Benbow and several other alums from the Merritt lab who work on campus. We stopped at the Bug House to see Gary Parsons, who was very helpful to me as a student when I had many aquatic insects to identify.

When I think about MSU, it puts a smile on my face. Everybody in Entomology was so wonderful to me. I had such a great experience. If anyone is thinking about careers at a smaller institution, I am happy to talk with Spartans about what it is like to be faculty at a smaller university.

The [Michigan State University Enviroweather](#) project team has hired **Keith Mason** as its coordinator. Mason succeeds **Beth Bishop**, who retired recently after serving in this role since 2007. Mason recently completed a PhD degree in entomology at MSU on the mating biology, chemical ecology and population dynamics of the grape berry moth, *Paralobesia viteana*, in Michigan juice and wine grape vineyards. He previously worked nearly 20 years as a research assistant in the Isaacs' entomology lab, where he coordinated several multi-state, on-farm research/extension projects in grapes and blueberries. In addition to his work in IPM, he also managed a nationwide pollination project. Mason has extensive experience working with and learning from growers and hopes to continue this interaction in his role with Enviroweather.

Nick Babcock (MS 2018, Benbow lab) started in September 2018 as the 4-H Livestock and Veterinary Science program educator with Michigan State University Extension. He will provide programming to youth across the state within the beef, sheep and swine project areas. Additionally, Babcock will plan the Veterinary Science Camp where youth from across the country will come to

Bugged newsletter

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Entomology alumnus Scott Shaw recognized with UW lifetime achievement award

Scott Shaw, a professor of entomology at the University of Wyoming (UW), was recently awarded a lifetime achievement award by the UW College of Agriculture and Natural Resources. Shaw reports Dr. Seuss' "The Cat in the Hat's" Thing One and Thing Two triggered his interest in netting insects at the age of 4. That love of collecting insects eventually led him to earn a BS in entomology at Michigan State University followed by an MS and PhD in entomology from the University of Maryland-College Park. Some of Shaw's accomplishments noted for recognition by a [UW news article](#):



- Discovered and named 190 insect species from 29 countries, including *Marshiella lettermani*, a Costa Rican insect he named after David Letterman.
- Mentored 21 graduate students.
- Established an undergraduate honors tropical ecology class to Yanayacu Biological Station in Ecuador where he has surveyed caterpillars and their associated parasitoid wasps and flies.
- Published more than 150 scientific publications about insects.
- Published "Planet of the Bugs: Evolution and the Rise of Insects" in 2014, which tells of the dominant insect species and how they shaped life on Earth. The publication has been translated into Korean, Japanese and Chinese, and an Arabic version is underway.

"I owe a debt of gratitude to Michigan State for offering a BS degree in entomology and I hope you keep doing it," Shaw wrote recently in an email. "Not many places still do that but it was certainly important to me."

MSU for a five-night, residential camp during the summer.

Logan Rowe (MS 2017, Isaacs lab) has been hired as a conservation associate/zoologist with [Michigan Natural Features Inventory](#) and [MSU Extension](#).

Duke Elsner retired Dec. 31 from over 30 years with MSU Extension as a small fruit and consumer horticulture educator. He was celebrated as an "entomologist, viticulture expert, pollinator pundit, agricultural soothsayer and bug man" at Rove Estate Vineyard & Winery on Nov. 30 by his colleagues and friends.



Courtney Larson (left, PhD-Benbow lab) and **Rebeca Gutierrez-Moreno** (right, Mota-Sanchez lab PhD 2017) joined **Marissa Schuh** (Landis lab MS 2016) in celebrating her Oct. 6 wedding to fellow Spartan Stan Karas.



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VALUED STAFF

EMPOWERING OUR RESEARCH

Whether they're called research technicians or technologists, lab or project managers, these staff are significant contributors to our research efforts. Thank you for organizing, managing and leading in our labs and in the field: **Jackie Albert** (Isaacs) * **Amber Bosch** (TNRC) * **Elizabeth D'Auria** (Landis) * **Oscar Castaneda** (Ziegler) * **Steven Crisp** (Ziegler) * **Royal Fader** (IR-4) * **Mike Haas** (Gut) * **Erica Hotchkiss** (Smitley) * **Sima Kumar** (IR-4) * **Laura Lamb** (TNRC) * **Lisa Latham** (IR-4) * **Christian Millan-Hernandez** (Szűcs) * **Paige Payter** (McCullough) * **Travis Perkins** (Ziegler) * **Claire Peterson** (Ziegler) * **Kristin Poley** (Quintanilla-Tornel) * **Andrew Tluczek** (McCullough) * **Robin Osborne** (McCullough) * **Steve Vantimmeren** (Isaacs) * **Luke Zehr** (Wetzel).



Christian Millan-Hernandez
with Marianna Szűcs.



Erica Hotchkiss



Jackie Albert



Luke Zehr, on right, with
Will Wetzel.