

Bugged

FROM
MSU DEPARTMENT
OF ENTOMOLOGY

SPRING 2017



Image: David Mota-Sanchez, MSU Entomology

FROM THE CHAIR

As some of our graduate students know, I like to randomly attend comprehensive exams and thesis defenses. This gives me a first-hand look at individual programs and an opportunity to interact with faculty in different departments, disciplines, institutions and countries. Also, I am very sure the students are entertained by my pithy questions! In fact, last week I took part in a graduate student's comprehensive exam with one committee member Skyping in from Malawi! This added immeasurably to the discussion and I'm sure, in this case, immeasurably to answering critical questions regarding mosquitos, malaria and human health. More on our student later.

Imbedded in the above scenario is the timely theme of diversity. It seems diversity is in the news

every day and that's a good thing despite some troubling undertones. Diversity has and will continue to lead to many entomological science-based discoveries, solving insect-related problems and creating the next outstanding generation of globally sensitive scientists, educators, industry leaders and decision-makers. We embrace it and promote it. In fact, in 2017 MSU Entomology boasts of having faculty members, students and staff originating from 23 countries.

We strive to attract the best and the brightest to address insect-related issues that have worldwide impacts. In addition, because of the global nature of insects, much of our work is done in collaboration with scientists distributed over six continents. Every MSU Entomology faculty member has this type of collaboration and philosophy embedded in their

program, not because it's nice, it's essential! Accessing diversity in all its forms and using it as a tool to address Michigan, American and global grand challenges is critical to human well-being and sustaining the planet.

Recently, some new terms have entered public discussion—"alternative facts, fake news and post-truth." This development is entertaining at one level, but more than disturbing at another. To be clear, we answer insect-related questions based on science, facts, and oh yeah, ethics are important as well. Major issues such as human diseases (e.g., malaria), food insecurity, economic development, human exposure to toxins, insecticide resistance, pest management, invasive species, landscape design and many other areas cannot be addressed without science, facts and ethics.

We use scientific methods to generate data for transforming into information, facts, technologies, systems and knowledge that benefits humankind. Sometimes our quest for facts results in more questions and admittedly, some gray areas. Even the gray areas are based on facts. I think we'll stick with facts.

Back to our graduate student working on mosquitos and



GUESS rallies MSU Entomology students to write annual progress reports.



malaria; she did a great job! She will eventually return to her home country Malawi as an excellent example of what diversity and a global perspective contribute to the next generation of scientists, educators and leaders. SpartansWill!

All the best,



Bill

Bill Ravlin,
Chairperson

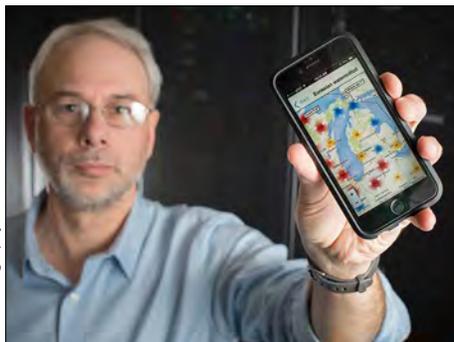
RESEARCH & PROJECTS



Deb McCullough

The Department is getting strong backing with **nearly \$1 million in grants to help prevent and control invasive species in Michigan**. The grants, which total \$3 million, are part of the Michigan Invasive Species Grant Program through the state's departments of Environmental Quality, Natural Resources and Agriculture and Rural Development. **Deb McCullough** and her team will work to improve detection and control methods for the hemlock woolly adelgid. McCullough also collaborates with Monique Sakalidis (Department of Plant, Soil and Microbial Sciences) in a second project refining Michigan-specific oak wilt control measures.

For his part, **Amos Ziegler**, coordinator of the [Midwest Invasive Species Information Network](#)



MSU Photography

Amos Ziegler with MISIN app.

([MISIN](#)), will receive funds for improving and expanding the network. This regional resource consists of more than 15,000 registered users, species identification resources for more than 350 invasive plants and animals, and smartphone technology for reporting observations in the field. See more details on these projects online at MSU Today: [MSU lands nearly \\$1 million in grants to fight invasive species](#).

PEOPLE

Karim Maredia has been named to the High Level African Panel on Emerging Technologies (High Level-APET). He is the only non-African scientist to serve on the panel, commissioned by African Union leaders to help their 55 countries take advantage of new, cutting-edge technologies in fields such as agriculture, medicine, energy and natural resources management. As director of WorldTAP, Maredia has extensive experience collaborating to build

capacity for new technologies across the developing world. The team will work to help African nations strengthen their legal and regulatory systems to manage and adopt emerging technologies with potential to impact the lives of over one billion people in the region.

Maredia identified several technologies pioneered by MSU researchers with the potential to address pressing needs of African communities. PhotosynQ, a web-based technology developed by MSU AgBioResearch scientist David Kramer, allows farmers in the field to scan and determine the health of their crops. Ammonia fiber expansion (AFEX), a process developed by MSU AgBioResearch engineer Bruce Dale, turns postharvest excess plant material into fuel and animal feed, both hold great potential for agricultural industries across the continent. Read the full story at: [MSU researcher named to African panel on emerging technologies](#).

Julia Brokaw and Jackie Alberts represented Entomology at Girls Math and Science Day on March 4. The event was hosted by MSU's Graduate Women in Science chapter. At their session, Brokaw and Alberts explained the differences between bees and various insects such as wasps, compared the life cycle of bumble bees to honey bees and discussed helping

(Continued on page 3.)



WorldTAP

Karim Maredia (left) visiting a farm with African collaborators. Maredia is founder and director of the WorldTAP program, a training, technology transfer, and capacity building program based at MSU. Read more about the work and programs of WorldTAP at: <http://worldtap.msu.edu>

NEW FACULTY ENTOMOLOGY WELCOMES TWO

Beginning January 2017, **Henry Chung** is a new assistant professor in the Department of Entomology, bringing expertise in understanding the molecular mechanisms underlying areas such as insecticide resistance. Chung's lab will research the molecular and physiological mechanisms of how insects adapt to different environments and chemicals including insecticides and pheromones. His team will also study how this adaptation can lead to reproductive isolation in some cases and forming new insect species.

Chung earned his PhD in genetics at the University of Melbourne (Australia), where he studied how the evolution of gene regulation and expression could lead to insecticide resistance. Most recently, he worked as a postdoctoral researcher with Sean B. Carroll at the University of Wisconsin, Madison investigating how ecological divergence in two sibling species of *Drosophila* fruit flies contributed to their reproductive isolation.

"The key is insect cuticular hydrocarbons (CHCs)," Chung said. Insect CHCs play dual roles in protecting the insect from dehydration as well as acting as pheromones. As insect species adapt to environments with different humidity levels, their CHCs evolve and this led to the formation of new species with different pheromonal systems.



Henry Chung

Marisol Quintanilla

Changes in CHC production in ecologically diverging populations may therefore be an important general contributor to insect speciation. This research was [published in the journal "Science" \(March 7, 2014\)](#).

Along with his research, Chung will teach "Insect Physiology and Molecular Biology." The course will cover broad topics in insect physiological systems and processes as well as emerging technologies in insect molecular biology such as CRISPR genome engineering. Chung hopes this updated course will provide students with the basics of insect physiology as well as knowledge of current trends and technology in molecular entomology that will be helpful in graduate research or applying for jobs

Also joining Entomology in January 2017, **Marisol Quintanilla** is the new applied nematologist. Quintanilla earned her master's and doctoral degrees at MSU with nematologist George Bird. After leaving MSU, she spent two years at Northern Marianas College

and then moved to the University of Hawaii. While in that role, she has collaborated with the University of Maryland with nematode identification and analysis of trials with Koon-Hui Wang and gained extensive experience in working with specialty crop growers. Most recently, she has studied nematode community structure, soil health and pest management in edible crops as part of her research and extension work.

Quintanilla plans to collaborate with faculty in finding applied solutions to plant parasitic nematode problems in the state's key crops. The developed management practices will aim to increase soil health and beneficial organism populations. Additionally, Quintanilla will research biorational and conventional products for nematode control and possibly test resistant varieties with other faculty. She will share the research-based results with growers and agricultural professionals through multiple extension methods. Mark Seamon, research coordinator for the Michigan Soybean Promotion Committee, said, "Many of Michigan's crops struggle with yield loss from nematodes. Minimizing that loss continues to be the goal of growers and industry. With nematologists George Bird and Fred Warner as a strong base, we are excited to add Marisol Quintanilla to MSU's research and extension capacity."

bees by not harming them. Since one of the best ways to help bees is to plant flowers, the girls made seed bombs, little balls of clay and compost containing wildflower seeds that can be thrown into backyards to help improve habitat for bees. The girls also touched and held live bumble bees.



Julia Brokaw (left)



Jackie Alberts (right)

2016 another banner year at MSU Entomology's Bug House

People continue to be enthusiastic about meeting the bugs at Entomology's Bug House, reports Gary Parsons, the program and facility director. Tours and events reached over 9,700 people in 2016!

- 60 different schools booked 106 hour-long tours, bringing 2,761 children to learn about bugs.
- 17 mini-tours of small family groups included 86 visitors.
- 828 MSU college students taking ISB 201 had a lab in the Bug House.
- 9 Monday night open houses brought in 1,178 visitors with a Facebook-posted event in February bringing in 663! Summer open houses in July and August brought in 89 and 86 visitors.
- Our Halloween open house enticed 200 visitors, and our end-of-the-year Holiday open house entertained another 68.
- Other special open houses included Be a Tourist in Your



- Own Town (637 visitors), Bring your Child to Work Day (145), MSU Science Festival (637) and Grandparents University (86).
- The Bug House also participated in Darwin Discovery day at the MSU Museum (610 visitors), Bug Day in the 4-H Children's Garden (120), SPOM Breslin Takeover (250), Halloween at the Broad Art Museum (500), Tollgate Fall Fair & Pumpkin Fest in Novi (1,200), and 3 local elementary science fairs (450).

Visitors weren't the only ones who benefitted:

- 6 Bug House guides who worked with 10 or more tours earned a combined \$3,590 in Bug House Fellowships. The

awardees will be announced at the Department Awards ceremony in April.

- Goliath, our awesome giant tarantula, arrived in July. He is as big as a dinner plate with 1-inch long fangs and still growing!
- A Teaching and Learning Environment (TLE) grant from MSU provided funds for a new laptop computer, giant TV screen and camera system for showing specimens up-close to an entire group and will allow for new creative educational programming for future visitors.
- New t-shirts with the original Bug House logo in various colors can be purchased through the Entomology Business office.

To make a [contribution to the Bug House, use our online form](#) or call Entomology for mailing instructions (517-355-4663).

AWARD-WINNING

DEPARTMENT

Congratulations to Jim Smith, one of two MSU faculty elected an AAAS Fellow for 2017 by the [American Association for the Advancement of Science](#).



Researchers receive this national recognition for their outstanding efforts to advance science or its applications. Smith, an entomologist and professor in the [Lyman Briggs College](#), was recognized for contributing to the field of entomology evolution and for developing novel evolution pedagogies, along with sustained high excellence as an undergraduate teacher and mentor.

George Bird was honored with the 2017 Michigan Potato Industry Commission's Distinguished Service Award at the Winter Potato Conference on Jan. 25.

Within the Department, we know that Entomology business manager **Linda Gallagher** and her staff are rock stars when it comes to managing grant proposals and budgets. Recently, MSU's research administration offices awarded Gallagher one of their Unit Research Administrator Spotlight Awards. She was nominated for her extensive knowledge as well as her positive, courteous attitude with others. Gallagher said, "Research administration is a significant and gratifying part of my job, but I couldn't do it all without the assistance of a great staff. So this award is really a recognition of our entire team!"

ALUMNI NEWS

Ralph J. Gorton is an adjunct curator of spiders for our MSU A. J. Cook Arthropod Research Collection. After reading about the Department's current connections with military veterans, Gorton wrote to share his own experience. "I entered graduate school, fresh out of 14 months with an infantry unit in Vietnam. I left Vietnam in May of 1970 as a Sergeant, and talked to then Department Chairperson Gordon Guyer about graduate school. He suggested I team up with another Army vet, retired Colonel Don Newson, who had just joined the faculty. What a great suggestion! Don was a very caring mentor who guided me into research on mosquito-borne encephalitis and became a lasting friend."

(Continued on page 6.)

When did you study at MSU?

I graduated with a PhD in entomology in 2008 with Doug Landis as my major professor. That led me to my current job as an associate professor of entomology at Ohio State University.

Why did you choose entomology?

I liked to collect insects as a kid and loved the outdoors. I had no idea there were jobs studying nature and insects until I was in college. I thought I would become a park ranger, and worked as a summer assistant at the Leelanau State Park during my undergraduate studies in resource ecology and management at the University of Michigan. My senior year I took John Whitter's Intro to the Study of Insects class and it really grabbed my attention, helping me see entomology as a possible career. I asked how to get into the field and he said, "Well, you go to graduate school."

After I graduated, I moved to Idaho and got a master's degree studying spider mite classical biological control in hops. I spent a couple years in Idaho as a lab research technician and that helped me realize I loved the academic setting more than I thought I would. I also realized I wanted to make my own decisions about projects and that meant returning to graduate school.

I knew Doug Landis had a large, successful program in landscape ecology and thought that would give me many opportunities. I contacted Doug, applied for a fellowship and was unsuccessful in securing funding, so I continued with my technician job. The next year, Doug and I worked together to find funding and I came to MSU in about 2004. My thesis studied

the newly introduced soybean aphid, the related predator communities and impacts of the surrounding landscape. It was an adventure as I collected data in Iowa, Minnesota, Wisconsin and Michigan.

Anyone with special impact on you and your career?

I came to MSU because I wanted a big university that would give me diverse experiences and training. Doug taught me so much about the full research process while I was a student and I continue to think "what would Doug do" all the time. I left his lab very well-prepared for my current position. I also learned from many different people through my multi-state project: Matt O'Neal (Iowa), Claudio Gratton (Wisconsin) and Wopke Van der Werf (Wageningen University). Doug also gave me lots of opportunities to gain experience in extension; and I was a teaching assistant for his biocontrol class.

My classes were diverse: ecological statistics, population genetics and insect larval taxonomy with Gary Parsons. I valued the Department's connection with the Ecology, Evolutionary Biology, and Behavior program.

Thoughts for current students?

They probably won't want to hear this, but I think it is important: You should always be writing a paper. Don't think about writing a paper as a finite task, rather something you'll accomplish over time. While you're doing your research, write your message and think about how you'll form the introduction. Doug focused on the importance of publishing and I do that with my own students. I try to write something every day and am usually writing several papers at one time.



Looking back, I realize that as students we worry about finding the perfect job or perfect fit or that there won't be a job. It's important to look at opportunities. When I was hired at OSU, my position was to focus on landscape ecology and agriculture—it was very broad, which was exciting. A rewarding part of being a scientist is building a lab and making the job your own to match your strengths. Departments want faculty to be successful, so they will work with you. We spend too much time stressing about what the next thing is. Instead, you should be writing! It will be the productivity in your CV that opens doors, not your stress level.

How does your work affect people's lives?

My program studies how design and management of urban green spaces influences its conservation value and ability to provide ecosystem services. We frequently interact with people because they are a dominant part of an urban ecosystem. We work where people live, whether we are focusing on wildflower plantings, urban farm ecology or beekeeping. People live and work in these neighborhoods, so you have a ready audience for information. Our extension information has to scale with people's experience from new gardeners to master gardeners.

Anna Fiedler (PhD, Landis) is the director of land conservation with the [Midcoast Conservancy](#) (Wiscasset, Maine), one of eight land trusts that comprises the 12 Rivers partnership. Fiedler and her 12 Rivers partners recently reexamined their conservation priorities through the lens of climate data. Their process is featured in “[Won’t you be my conservation neighbor?](#)” on the U.S. Fish and Wildlife Service’s Conserving the Nature of the Northeast blog.

Congratulations to **Nicole Quinn** (MS, Szendrei) for receiving the Asa Fitch Memorial Graduate Student Award recognizing the

research she conducted while in the MSU Vegetable Entomology Lab. The Entomological Society of America (ESA) gives this award to an outstanding master’s graduate student each year. Quinn is currently a PhD student at Virginia Tech working on brown marmorated stink bugs.

Fabian Menalled (Post-doc, Landis) recently completed three years of leading the eOrganic Community of Practice for eXtension. During his leadership, eOrganic conducted 65 webinars and conference broadcasts, published more than 90 peer-review articles and videos, and provided outreach support

for more than 22 research and Extension projects funded by USDA NIFA. Menalled is an associate professor in weed ecology and management at Montana State University.

Rob Morrison (PhD, Szendrei) recently won the Excellence in Early Career Award offered by the Eastern Branch of ESA. Morrison is now a research entomologist with the USDA-ARS Center for Grain and Animal Health Research in Manhattan, Kansas. His research program revolves around the behavioral and chemical ecology of stored product pests in order to increase the sustainability of post-harvest management.

EXTRAORDINARY IMPACT Hulcr CANR Outstanding Young Alumnus

MSU’s College of Agriculture and Natural Resources (CANR) has honored Jiri Hulcr with its Outstanding Young Alumnus Award. Hulcr obtained his bachelor’s degree in entomology in 2001 and his first PhD in entomology in 2008 from the University of South Bohemia, Czech Republic. He joined the Michigan State family in 2009 and completed a PhD in entomology. He continued his postdoctoral education at the University of Wisconsin, and then North Carolina State University. Currently, Hulcr is an assistant professor at the School of Forest Resources and Conservation at the University of Florida.

In his five years at the University of Florida, he has established national and international research and extension programs and written 38 of his 64 publications, garnered over \$2 million in federal funds including two NSF grants, presented his research findings throughout the world and mentored 26 graduate students, four postdoctorates and seven undergraduates. He has created an extension program that involves national and international laypersons, professionals and academics, and served the broader entomological community through editorship, grant and publication reviews, and the creation of cyber infrastructure.

His research group at the University of Florida studies the diversity and ecology of ambrosia



beetle/fungal relationships. The microbiome of ambrosia beetles has an importance greater than the beetles’ food source—it is important to the health of forests and their economy. Currently, two exotic beetle species and their fungi are devastating the southeastern U.S. forest ecosystem and threatening the avocado industry, a \$50 million industry in Florida alone. Hulcr’s research program has transformed the field

of symbiology from single-species investigation to multispecies, community-based studies. This work is accelerating the accumulation of knowledge of the potential threats to U.S. forests and agriculture.

Hulcr has written extension publications aimed toward those concerned with forestry and presented this information in many venues. His bark beetle identification course, “Bark Beetle Academy,” attracts diagnosticians and students from around the world, and he has taught this class in China and Cuba. In addition, he has engaged citizen scientists through his “Backyard Bark Beetles” class. School classes and homeowners have used his elegantly designed bottle traps to survey for exotic beetles. Additionally, he teaches several classes at the University of Florida, including Forest Health Management, Insect Symbioses and Molecular Forest Entomology.

FEATURED STUDENTS

Name:

Brenna Kizer

Hometown:

St. Louis, Missouri

Future plans: Pursue a PhD in genetics



BRENNA KIZER
UNDERGRAD STUDENT

Name: Keith Mason

Hometown: Flushing Meadows, New York (Yes, I'm a loyal Mets fan)

Previous education:

Two bachelor's and a master's from Florida State University



KEITH MASON
GRADUATE STUDENT

What is your major? Genomics and molecular genetics with a minor in entomology

Why add a minor in entomology to your major?

Genetics is applicable to every living thing, and some of the most intriguing examples of inheritance and genome organization can be found in the insect world, for example the mechanism behind honey bee sex determination.

Tell us about working at the Mackinac Island Bug House.

I spent last summer as an entomologist at the Original Mackinac Island Butterfly House and Insect World. Taking ENT 404: Fundamentals of Entomology gave me a solid foundation of knowledge for the job, but I learned so much more. I spent the summer learning about the impact humans and insects have on each other, and I came back to MSU with a new curiosity about the vital relationship we have with our six-legged friends!

Do you have advice for anyone interested in an entomology minor?

Meet with one of the entomology advisors, Chris DiFonzo or Walter Pett. Once they show you how fun an entomology minor can be, sign up for ENT 404!

What has been your best experience with entomology?

Collecting insects for my ENT 404 collection project has honestly been one of my favorite experiences. Going out into nature and looking for insects is such a fun way to get active and go places you never would have gone otherwise.

What is your favorite thing about MSU?

There are so many opportunities here that I can't imagine getting access to anywhere else. I've worked in a genetics lab and Ke Dong's entomology lab, which has given me experience in modern laboratory techniques that will be useful in my career. On top of that, I've been a part of multiple student organizations, and I'm going on a study abroad Sri Lanka led by Christina DiFonzo this summer.

What are you researching? My research focuses on the chemical ecology of an important economic pest of vineyards, the grape berry moth. I am working to understand how host plant characteristics, temperature and day length influence their pheromone communication, mating behavior and seasonal phenology. I hope to help refine current monitoring tools and improve prediction and control of this pest.

How do you balance grad school and being a research technician with the Isaacs Lab?

I love coffee, and I have my own office. Seriously, I really am a career student, and somewhat of a workaholic, two traits that have served me well. Having a supportive major professor and boss, all in the same person (Rufus Isaacs), is also crucial to my work/school balance.

What are some of the pros/cons to balancing both?

Without a doubt, being a technician before I started my PhD was a huge help. I was familiar with the university and the workings of the department. I had already worked in vineyards, so I knew the growers that I could work with and knew where good study sites would be. The downside of doing both is that it can be difficult to separate my work and student life, which makes scheduling time to work specifically on my research challenging at times.

What or who inspired your interest in entomology?

My interest began as an undergraduate when I was writing a paper on the evolution of symbioses. I came across Dan Janzen's work on the *Pseudomyrmex* species of ants that inhabit and protect bull's thorn acacias. These ants protect the acacias from herbivores in exchange for the domatia inside the thorns and access to food from extra-floral nectaries. After learning about this system, there was no turning back.

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MEET OUR SOCIAL SIDE

#SpartanInsects

Are you on social media? This spring, we are introducing use of the hashtag [#SpartanInsects](#) to identify messages tied to MSU Entomology. If your social message relates to some aspect of MSU Entomology, feel free to add to the message [#SpartanInsects](#).

Also watch for [#FieldDayFriday](#). Beginning in May, we will be encouraging students and faculty to post images with the hashtag to social media on Fridays showing views from their work in the field. Our idea is to offer a window into the challenges, fun and “aha” moments of field work. There is already use of [#FieldDayFriday](#) by other disciplines so we hope to capture some attention for the field of Entomology.

You can keep up and share with the MSU Department of Entomology through several social media accounts. The Department has a Twitter account, [@MSUEntomology](#). The Bug House has [@MSUBugHouse](#) on Twitter, and a Facebook page, which can be found by opening Facebook and searching for “[Michigan State University Bug House](#).” In addition, various faculty and labs have social media accounts drawing attention to their activities.

