

Bugged

MSU DEPARTMENT
OF ENTOMOLOGY



Photo: F.W. Ravlin, MSU Entomology

FROM THE CHAIR

Every summer for several years, I've been treated to watching great golden digger wasps (*Sphex ichneumoneus*) making their living across the street from the Natural Science Building. Digger wasps are terrific animals with brilliant color, highly programmed behavior, and in my opinion, "pleasant personalities." You'd never know they're there until you see them busily excavating and provisioning nests with katydids.

One of the most interesting aspects of digger wasps is their repetitive behavior; moving in and out of a nest, carrying small rocks, soil and other bits only to fly away and return with a paralyzed katydid to lay in a very precise way in front of their nesting hole. The katydid is always positioned at the "proper angle" so that after a quick check of the nest, the wasp can drag the katydid by the antennae into the hole making an excellent meal for a developing digger wasp larva.



A great golden digger wasp stands at the entrance hole of its nest.

These wasps are harmless, not aggressive, and seem only to be marginally interested in my presence. However, someone obviously felt threatened by the wasps and made an insecticide application around six to 10 nests. Needless to say, I was and am disappointed and dismayed.

The reason for telling this tale is to encourage entomologists to take every opportunity to help others understand the importance of insects, to help them identify the good guys from the "less good guys," enlist them in spreading the good word, and who knows, even influence decisionmakers. This is particularly important with:

- » Recent studies showing the decline in multiple insect species. ([Toward a world that values insects](#), *Science*)
- » Increases in vector borne diseases. ([Challenge: Public health, as related to vector-borne diseases](#), *A Grand Challenge Agenda for Entomology*)



The wasp detects a katydid nearby.

- » Challenges to developing and sustaining a global food supply. ([Challenge: Feed the World](#), *A Grand Challenge Agenda for Entomology*)
- » Threats posed by invasive species. ([Challenge: Invasive species – global trade, biodiversity and climate change](#), *A Grand Challenge Agenda for Entomology*)
- » The need to conserve and where possible, manage ecosystem services such as pollinators. ([MSU Extension pollinators and pollination](#))

The MSU digger wasps suffered a setback, but I expect them to be back next year same time, same place.



Bill

Bill Ravlin,
Chairperson



The wasp has captured a katydid, aligned it with the entrance of its nest and begins drawing it in.

All wasp images by F.W. Ravlin

RESEARCH & PROJECTS



Eric Benbow and Jen Pechal are leading a team awarded \$2.5 million by the National Science Foundation to study the infectious disease Buruli ulcer. Researchers are unsure how humans contract Buruli ulcer, but there is a hypothesis on how on the pathogen is able to thrive in certain environments, particularly in tropical regions. The novel weapon hypothesis suggests that some invasive species are dominant in new ecosystems because they contain compounds that allow them to persist in the environment at the expense of native species. Lead principal investigator (PI) Benbow said, “We know very little about how this pathogen moves around in the environment. Additionally, we need to understand more about how *Mycobacterium ulcerans* interacts with other microbes and pathogens. This work can help us uncover basic information about how diseases become emergent and spread.”

Co-PI Pechal’s expertise includes using genomic and computational

tools to explore the effects microbes and insects have on human and animal health. “The team is interested in examining the interaction between disease-causing organisms and the environment, including fish, invertebrates and biofilms that grow on aquatic plants,” Pechal said. “We can learn a lot from taking samples from the watershed in an area where the disease is present, especially spots where there is a lot of human activity.” Read the full story at MSUToday: [MSU entomologists receive \\$2.5 million grant to study infectious disease.](#)

Applications and nominations invited for MSU Entomology chairperson

We seek candidates who have the ability to embody and convey the land-grant mission of teaching, research, extension and outreach to multiple audiences; provide effective leadership and management of multidisciplinary programs; promote diversity, equity and inclusion; be a strong advocate for the Department; and provide leadership for the continuing development of outstanding regional, national and international programs. Review of the applications will begin Sept. 3, 2019, and the search will remain open until the position is filled. Please see details online: bit.ly/MSUento-chair



Photo courtesy of Fresh Energy

A new executive decision by Michigan Governor Gretchen Whitmer allows solar arrays on lands in a farmland preservation program if pollinator-friendly guidelines are used.

The pollinator protection practices were developed by Rufus Isaacs and his students based on a decade of their research on how to establish pollinator habitat, and were central to determining how to allow development of solar energy on farmland while also supporting pollinators.

Michigan’s Farmland and Open Space Preservation Program preserves farmland and open space through agreements that restrict development. Tax incentives within the program encourage participation. Previously, participating landowners were allowed to lease land for wind turbines and oil and gas exploration. However, solar arrays require more space and were perceived to be too disruptive to benefit preservation. The practices laid out in the new guidelines mean the land will better serve the pollinators that need habitat to provide the nectar, pollen, and nesting sites that are essential to their survival.

The new policy has potential to greatly increase the acreage of Michigan land designed for better pollinator habitat.



Courtesy image

Karim Maredia is an institutional lead for Michigan State University on a five-year, \$30 million grant from the U.S. Agency for International Development to establish an Egyptian Center of Excellence for Agriculture. This multi-institutional project is led by Cornell University and Cairo University. MSU will oversee the center’s Exchanges, Training and Scholarships, which trains Egyptian faculty and students in both Egypt and the U.S.

SPARTAN STRONG TWO POSTDOCS AWARDED USDA NIFA FELLOWSHIPS

Andrea Glassmire and **Kelsey Graham** have been selected for 2019 fellowships by the National Institute of Food and Agriculture (NIFA). The program aims to develop the next generation of research, education and extension professionals who will lead agriculture into the future by solving current and future societal challenges. This year, MSU secured an impressive seven of the 71 awards granted.

Glassmire will delve deeper into an accepted principle of sustainable pest management: increasing plant biodiversity on farms will decrease pest problems. She is studying the role of diversity in plant odors and the influence of combinations of odors emitted by neighboring plants. Glassmire hypothesizes these blends of odors influence plant and insect interactions from the start, when insects are searching out favorable plants. Whether the insect is a pest or natural enemy, better understanding the influence of crop odor diversity on which insects will visit or colonize plants can improve pest management strategies.

As part of assistant professor Will Wetzels lab, Glassmire will work with multiple tomato varieties with differing odor profiles to determine their effect on tobacco hornworm behavior and its natural enemies. She will organize wind tunnel, lab and field experiments to examine host preferences of colonizing hornworms and natural enemies by manipulating monocultures and polycultures of tomato varieties based on their chemical dissimilarity. "Our results should indicate the specific combination of odor cues emitted by diverse crop neighborhoods that are important for host-plant detection," said Glassmire. "The idea is to help growers create odor diversity in their field that will prevent insect pests from finding crop plants, dissuade insect pests from colonizing crop plants once found, or attract the natural enemies of insect pests."



Courtesy photos

A. Glassmire

K. Graham

Graham's research addresses a concern about pollinator plantings: Are they an oasis or a possible pesticide trap for bees? Her study will occur in wildflower plantings intended to support and attract pollinators of blueberries. Wild bees are particularly efficient at moving pollen, which is one reason why more blueberry growers are trying to attract wild bees to their farms with wildflower plantings. Such plantings have been shown to increase wild bee diversity and abundance and increase crop yield. However, the proximity of pollinator plantings to any pesticide sprays could put bees at risk of pesticide exposure, mainly due to drift.

Based in the lab of professor Rufus Isaacs, Graham will analyze bee collected pollen and flowers for pesticides residues, comparing sites with and without pollinator plantings. She will also sample for wild bees to see which species are most attracted to these habitat enhancements. Her efforts will include testing strategies growers can use to decrease pesticide residues in pollinator plantings, such as using drift reduction technology or changing placement of the plantings. "We know very little about pesticide exposure in wild bees," said Graham. "I'm eager to help fill this knowledge gap and work towards solutions for reducing risks to bees through sustainable agriculture practices."



Amanda Lorenz-Reeves, MSU Entomology

Leah Bauer led the entomology portion of a **BioBlitz** on May 19 at [Corey Marsh Ecological Research Center](#) in Laingsburg, Michigan. A **BioBlitz** is citizen science event that attempts to survey as many species as possible in a given location during a short period of time. MSU Entomology undergraduate students **Minali Bhatt** and **Brenna Jeffs** along with undergraduate advisor **Amanda Lorenz-Reeves** set out insect traps, sorted and identified samples. Samples are being processed this summer.

At left, Minali Bhatt checks a trap with Leah Bauer.

CELEBRATING EXCELLENCE: DONORS AND AWARD RECIPIENTS HONORED



The 2019 awards reception brought together happy recipients with family, friends and the donors who make awards possible. On April 25, we celebrated hard work, determination and generosity as embodied by our award recipients and donors. View more images in [our website 2019 Awards Ceremony photo gallery](#).

Department of Entomology 2019 Distinguished Alumnus Award

MSU Entomology chairperson Bill Ravlin congratulates our distinguished alumna **Gloria DeGrandi-Hoffman**. She is the research leader and center director for the USDA-ARS Carl Hayden Bee Research Center in Tucson, Arizona.



Department awards

- » **Anne Johnson**, Outstanding Undergraduate Student Award.
- » **Holly Hooper**, Outstanding M.S. Student Award.
- » **Margie Lund**, Outstanding Ph.D. Student Award.
- » **Emilie Cole**, Outstanding Graduate Student in Extension Award.
- » **Erica Fischer**, Eugenia McDaniel Award.
- » **Jen Riebow**, Outstanding Staff Award.

Bug House fellows

- » **John Kole, Margie Lund, Allison Zahorec** for outstanding assistance in the Bug House.

J.E. and Jean M. McPherson Graduate Student Travel Award

- » Awarded to attend the NCB-ESA or annual ESA meetings: **Logan Appenfeller, Erica Fischer, Holly Hooper, Rachel Osborn, Joshua Snook, Patrick Stillson, Nicole Wonderlin**.

Graduate fellowship awards

- » **Courtney Larson**, Gordon E. Guyer Endowed Fellowship in Aquatic Entomology.
- » **Joseph Receveur**, Merritt Endowed Fellowship in Entomology.
- » **Nicole Wonderlin**, Roger and Barbara Hoopingarner Endowed Graduate Fellowship in Entomology.
- » **Gabriela Quinlan**, Rhodes (Gene) Thompson Endowed Fellowship.
- » **Rachel Osborn** and **Nicole Wonderlin**, Robert R. Dreisbach Endowed Memorial Fellowship.
- » **Ben Savage**, Paul Wooley Endowed Fellowship.

Research proposal awards

- » **Joseph Receveur**, PhD Hutson Endowment Research Proposal Award.
- » **Zinan Wang**, PhD Hutson Endowment Research Proposal Award.
- » **Patrick Stillson**, MS Hutson Endowment Research Proposal Award.
- » **Logan Appenfeller**, MS Hutson Endowment Research Proposal Award.

Thank you, donors!

- » Gordon and Mary Guyer
- » Roger and Barbara Hoopingarner
- » Ray and Bernice Hutson
- » Larry and Beverly Olsen
- » Richard and Pamela Merritt
- » Mark and Kathleen Scriber
- » J.E. and Jean M. McPherson



**MEGAN
ANDREWS**
FEATURED
UNDERGRAD
STUDENT



Hometown: I was born in Northampton, England, but I moved to Ann Arbor in 2009 and that's home now.

Future plans: Graduate school.

Tell us about Bug Club. Bug Club is a great opportunity to not only meet other Entomology students but also learn more about insects. My favorite part is being able to handle insects and spiders that I would not be able to handle in my day-to-day life. Bug Club has helped reduce my fear of spiders, which has been very beneficial.

What is the best selling point about an entomology major? You learn so much; entomology is a very broad subject and MSU has such a wide variety of classes. I feel like in many majors, class topics are quickly narrowed down, but in entomology there is are many elective options. It really lets you focus on what you are specifically interested in.

What inspired your interest in entomology? My job as a research assistant in the [Larry Gut](#) Lab is the reason I am an entomology major. I started that job only knowing I wanted to study biology and I quickly learned how interesting and underrated insects are. Juan Huang and Chris Adams showed me how important agricultural entomology is to the economy. I quickly learned that entomology isn't only about insects, but how they impact our daily lives.

Best experience with entomology? My research assistant position in the Gut Lab. I have learned so much about how science works and how entomology impacts our lives.

Favorite activity outside of your studies? I enjoy painting and drawing.

What is your favorite insect? My current favorite is an orchid mantis. They are so beautiful and have amazing behavior.

Advice for those interested in an entomology major? Get a summer job in entomology! There are plenty of labs who are hiring and it will give you a real experience with what you can do with the major.



**MAX
HELMBERGER**
FEATURED
GRADUATE
STUDENT

Hometown: I grew up outside a town of 500 in northern Minnesota in an off-the-grid log cabin on a dirt road.

Undergrad education: BS Biology, University of Minnesota-Duluth; MS Entomology, Cornell University

What inspired your interest in entomology? When I was five years old, my parents would have told you I would become an architect or entomologist. Growing up in the middle of the woods an only child left me with few entertainment options. I would turn over rocks and look at worms, centipedes and isopods.

What are you researching? The interactions of microplastics with soil invertebrates. The field of microplastics in soil is so new that there's lots of ground work to be laid, so I'm developing analytical methods. My advisor, [Matt Grieshop](#), and I are deliberately using the word "interactions" rather than "effects of." The effects work is being done well by others. I'm exploring the ecology rather than toxicology. Microplastics are considered environmental pollutants, but soil organisms may be just as able to affect them as microplastics are able to affect soil organisms.

You've been creative with clay animation and games to explain soil and insect ecology. My early clay animation videos were with an extension outreach assistantship at Cornell. I taught myself animation based on a 2-hour course I took as a child. My shortest video on [Asian longhorned beetle](#) took 35 hours to produce. At MSU, I plan to make one on microplastics and soil. The card game is "Life for the Loam," which teaches the role of soil organisms in maintaining healthy soil. My long-term goal is to develop that into a web app game.

What do you like best about being a grad student? I like being in charge of my own schedule and workload, holding myself accountable.

Favorite activity outside of your studies? Collectible card games like Magic: The Gathering, and creative writing. I've written over 200,000 words of a fantasy novel.

See Max's clay animation on his YouTube channel: bit.ly/max-helmberger

A bumble bee study led by Rufus Isaacs and team found more than half of the species studied have declined by more than 50%. The researchers compared current distributions of bumble bee species across Michigan to information gleaned from museum specimens collected back to the 1880s. The research, "[Narrow pollen diets are associated with declining Midwestern bumble](#)

[bee species](#)," was published in *Ecology*. "Species that declined collected pollen from fewer species of plants and seem to have a narrower range of plants they visit for pollen," Postdoc **Thomas Wood** said. "In contrast, the stable species visit a much wider variety of plants. This suggests that picky eaters are less able to switch if a favorite plant isn't available."



Thomas Wood, MSU Entomology

TREASURES OF COOK'S COLLECTION THE BEGINNING

Curators of MSU Entomology's arthropod research collection have located fragile specimens preserved by the collection's founder at the turn of the 19th century. The A.J. Cook Arthropod Research Collection began as a collection meant for instruction in 1867 before the Department was even formed. Since then, more than 1.5 million specimens have been amassed, curated and cared for by a series of professors, managers and students. The specimens now serve as data to researchers and diagnosticians throughout the world for taxonomic and ecological studies. Although many of the original specimens have been dispersed among hundreds of modern cabinets and drawers, a few cohesive collections of insects from the turn of the 19th century still exist.

As can happen in museums with large collections, manager Gary Parsons recently "discovered" two drawers of dried and pinned caterpillars dating between 1881 and 1916. These specimens were originally prepared by cutting a hole at the back end of the caterpillars, squeezing out the internal organs and then blowing up the empty exoskeletons with air pressure from a pipette bulb. The "blown" caterpillars were then cooked in a small oven made of a tin can and light bulb. The fragile, dried specimens were glued to bits of wheat straw through which the pin was placed.



A tray of caterpillars of various species collected and curated between 1881-1916.

This was the standard method at the time of preparing caterpillars for display with pinned adult specimens. Today, we mostly preserve caterpillars in alcohol, which minimizes damage and allows for easy study. Most of these old specimens were still readily identifiable to genus and species, and a few specimens represented species not in the main collection.

Learn more about the history of [The A.J. Cook Arthropod Research Collection](https://www.canr.msu.edu/ent/research/arthropod_research_collection/) at our website: https://www.canr.msu.edu/ent/research/arthropod_research_collection/



This unidentifiable caterpillar is one of the few that are directly associated with professor Albert J. Cook, the founder of that first teaching collection. He collected the caterpillar in 1891 near the Michigan Agricultural College campus.

Written by Anthony Cognato and Gary Parsons, MSU Entomology

Anthony Cognato, MSU Entomology

Rachel Osborn, MSU Entomology

Dave Smitley and a team of authors have completed a 2019 update of “[Protecting and enhancing pollinators in urban landscapes for the US North Central Region.](#)” First published in 2016, the publication has been used as a template for developing similar pollinator publications in other regions of the country.

It features:

- » Detailed recommendations for selecting annuals, perennials, shrubs and trees that support pollinators including butterflies.
- » Unique to this publication, best management practices for managing devastating exotic pests, or troublesome outbreaks of native pests, while minimizing impacts on pollinators.
- » A detailed phenological table that tells when the most common trees and shrubs bloom so that sprays can be avoided until they are done blooming.
- » A list of 89 references for those that would like to read more on this subject.

New to the updated 2019 version:

- » Biological control and highly selective new products that can



be used for pest management while protecting pollinators. » Potential impact of mosquito and nuisance insect sprays on pollinators.

- » Impact of fungicides and bactericides on pollinators, and a link to a comprehensive list of fungicides and their potential impact on pollinators.

This resource is a 32-page PDF and will answer nearly every question that gardeners, landscapers and tree care professionals may have about protecting pollinators.

The author team includes: **David Smitley**, MSU Entomology; Diane Brown, Rebecca Finneran and **Erwin “Duke” Elsner**, MSU Extension; **Joy N. Landis**, MSU Entomology/IPM; Paula M. Shrewsbury, University of Maryland Entomology; **Daniel A. Herms**, The Davey Tree Expert Company; and Cristi L Palmer, IR-4 Project Rutgers University.

PEOPLE

Karim Maredia has been named a senior global scholar and the director of agriculture and natural resources international programs in the MSU College of Agriculture and Natural Resources.



In this new role, Maredia will lead the launch of a global scholars program designed to provide faculty members with opportunities, guidance and mentoring in international teaching, research and outreach. He will also help to identify global scholars who will work to address significant challenges facing agriculture and natural resources, including food security and resource sustainability.

Allison (Ali) Zahorec of the Landis lab attended the 2019 Soil Ecology Society meeting in Toledo, Ohio, and won an honorable mention for her poster titled: “Influences of Bioenergy Cropping System Identity and Management on Microarthropod Communities.”

Remembering Stuart Gage, professor emeritus

It is with great sadness that we announce the death of Stuart Gage on June 19, 2019. Gage was one of the great thinkers of our time, a fabulous innovator, scholar, teacher and friend. He will be greatly missed. After receiving his PhD from MSU, he spent three years in Saskatoon with Agriculture Canada studying population dynamics of grasshoppers. He then returned to MSU where he authored dozens of scientific papers and coauthored the books *Flow of Life in the Atmosphere* and *Ecoacoustics: The Ecological Role of Sound*.



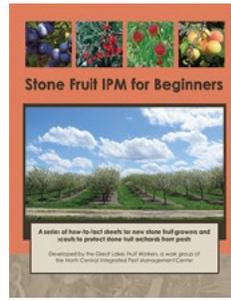
Bill Ravlin, MSU Entomology

Gage mentored students and fellow colleagues who are now also innovators in their fields throughout the country and around the world. While at MSU, he taught the honors class Earth System Science and taught and did research in Australia, New Zealand, India, China and Africa. He received the MSU Distinguished Faculty Award and was the director of the Remote Environmental Laboratory where he and his colleagues conducted research on acoustic ecology with a focus on biodiversity and health of the environment. His digital acoustic library houses more than two million recordings from over 20 soundscape projects. – *Bill Ravlin, MSU Entomology*

Julianna Wilson organized a team of authors to develop a series of how-to fact sheets, collectively called *Stone Fruit IPM for Beginners*. The series is written for new growers and scouts of stone fruit and is available online.

The series provides examples of IPM practices used in commercial stone fruit production and outlines the necessary tools and skills needed to successfully grow stone fruits. Using the calendar of stone fruit growth stages and scouting guidelines, growers can get a snapshot of key pest and disease concerns over the course of the season. Additionally, IPM tactics such as how to use pheromones to disrupt insect reproduction, optimizing the timing of control measures using weather-based models, and using pesticides effectively while reducing harm to non-targets are included in the guide.

The series can be downloaded as a single PDF file or as individual fact sheets. Included are two scouting calendars, one for cherry and plum, the other for peach



and nectarine. These are convenient tools to help learn the common insect and disease issues likely to arise in these crops, when they are most likely to be a problem, and what tactics can be used to provide early detection and prevention.

To download the series, visit: <http://bit.ly/stone-fruit-ipm>

“The Stone Fruit IPM for Beginners” series was produced by members of the Great Lakes Fruit Workers in cooperation with Michigan State University Extension and Cornell Cooperative Extension. The work was supported by the USDA National Institute of Food and Agriculture, Crop Protection and Pest Management Program through the North Central IPM Center (2014-70006-22486).



Larry Gut, George Bird, Greg Bird and Mike Reinke posed with Sparty after winning the 2019 George Stachwick Extension Cup at CANR’s annual Golfing for Scholarships event. The Stachwick Cup is for foursomes with one or more MSU Extension staff members or Extension retirees. Three of these four team members are affiliated with MSU Extension. Their score was 63 or 9 under par.

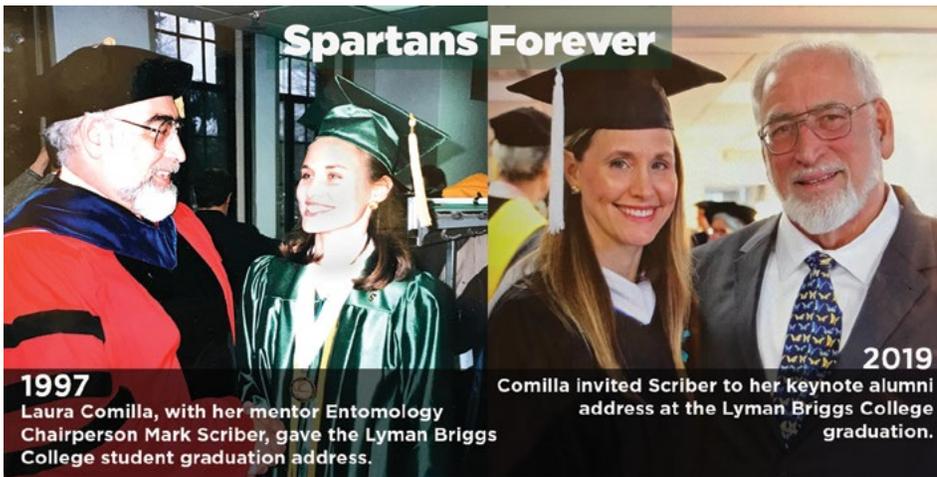


Have you seen our insect of the week on Instagram?

@msuentomology

Follow us on Instagram to learn more about each of these insects and read the pun-tastic captions written by our summer communications student assistant, Cait Henne. Images by F.W. Ravlin.





Taking time to mentor a student or know a professor makes a difference. Congratulations to our alum **Laura Comilla**, a leader at LTS Health working for change and transformation in 200+ labs—from HIV testing labs in rural Kenya to advanced genomic labs at leading cancer centers.



At the Spring 2019 MSU Graduation ceremony, **Margie Lund** (PhD), associate professor **Zsafia Szendrei** and **Sara Hermann** (PhD) had front row seats. Find them in the crowd below in an image taken by Sara's husband Jared Ali.



ALUMNI NEWS

Margie Lund (PhD 2019, Zsendrei) is an Extension vegetable specialist at Cornell University.

Holly Hooper (MS 2019, Grieshop) now works as the biological research director at the Kalamazoo Nature Center.

In April, **Dan Gibson** (MS 2018, Landis) accepted a position as an ecologist with Jensen Ecology, a growing restoration consulting and contracting company in Madison, Wisconsin.

Jessica Kansman (BS 2015) is earning a PhD at the University of Missouri and was recently awarded a NIFA Pre-Doctoral Fellowship. The title of her proposal is "Indirect effects of drought on the biological control of aphids by parasitic wasps."

Mike Reinke (PhD 2012, Gut) has joined MSU Extension as an integrated pest management educator based in Berrien County, Michigan.

Congratulations to **Michael Killewald** and **Anne Johnson** who earned their bachelors degrees this spring. Johnson will study spotted lanternfly in forest systems with Kelli Hoover. Killewald heads to the University of Manitoba to study with MSU Entomology alumni **Jason Gibbs** and **Alejandro Costamagna**.

Bugged newsletter

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THIS SUMMER

WE'RE IN THE FIELD, WE'RE IN THE LAB, WHERE ARE YOU?

We love to hear from our alumni and friends. Tag us on social media or email your news to: entnews@msu.edu



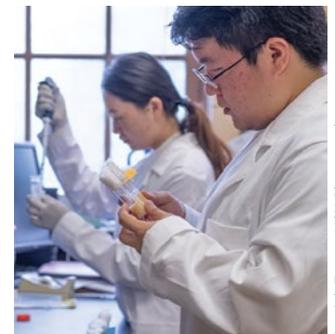
Jordan Noble, Be Noble Photography

In the field with nematologist Marisol Quintanilla's team.



Marianna Szűcs, MSU Entomology

Marianna Szűcs' lab releasing biocontrol Samurai wasps.



Derrick Turner, MSU Photography

The view in Henry Chung's molecular entomology lab.