

# HEXAPOD HERALD

Summer 2021

## Students search for Brood X cicadas in Georgia Mountains

By Michele Hatcher

Standing in the Chattahoochee National Forest recording the song of the Brood X periodical cicadas on her smartphone, Julia Berliner realized in that moment that the last time the insects emerged from forest soil, her phone did not exist.

"Seventeen years ago I was only 6 years old, and my brother who is 6'2" with a drivers' license was zero years old!" said the University of Georgia graduate student who is studying insect ecology in the UGA Entomology Department.

"It's hard to believe that every cicada I saw on the trip had been alive for about as long as he has been alive," she added.

Berliner, along with several UGA Entomology graduate students, recently took a short break from their research and studies and got back to the basics of what drew them to the discipline they love as they headed deep into the North Georgia forest to search for the freshly emerging red-eyed insects.

The enthusiastic group had been planning the trip for weeks. In fact, t-shirts were designed in honor of the rowdy cicada with the slogan, "Let Me Hear Y'all Make Some Noise!" Cameras, video equipment, tents, flashlights, water, food were unloaded as they were ready to witness and document everything about the 2021 Brood X emergence. And then the adventure began.

"I felt a sense of amazement! The fact that they take their own sweet time and 'hang out' underground as nymphs for so many years made watching them molt that much more of a treat," said Gabriela Cardona-Rivera, PhD student studying aquatic entomology.

"After working practically non-stop for the past few months, that trip was just what I needed to recharge and come back with more appreciation towards insects and more desire to continue my research," she said.

Sabrina Barbosa said it was the best time and place to be an entomology student since "this may be a once in a lifetime opportunity where I am at the right place at the right time."

"I felt like a child again, in awe of nature around me and this tiny insect and the journey they undergo. Entomology ignites my childhood curiosity, and this experience did just that," said Barbosa, PhD student studying in the Ross/Hunt fire ant lab.

Cicada nymphs do not emerge into adults until late at night so the students stayed up in the evenings, flashlights in hand, searching trees and plants hoping to find newly emerged white insects before their exoskeletons hardened. "On our second night, we were lucky enough to find one around midnight hanging on a fern. It was the best part of the trip," Barbosa said.

Horace Zeng, PhD student in entomology, photographed and videoed all aspects of the trip to north Georgia including the late night discovery which can be viewed at <https://youtu.be/njsvcKKTSGU>.

"I am so honored to witness this," Berliner softly exclaimed, watching a red-eyed white-bodied cicada pump its wings for the first time. Waking up in the mornings to the cicadas' mating love song, the students found it to be an "acquired taste."

"It is a one-toned screech that can only be attractive to them and maybe those who study them specifically," Cardona-Rivera said, describing the cicada song. "Yet, as part of the sounds in the forest, it contributes a tone to a beautiful symphony, and it will be missed once their season is over," she added.

As the end of the three-day trip came to a close, the students packed up their gear, collected their coveted specimens and declared it to be one of the best experiences of their young lives.

"I hope that wherever I am in 17 years, I won't be too far away not to visit the children of this generation of Brood X. It would be a pleasure to share this experience with someone who has never seen them before," Berliner promised.



Department of Entomology  
College of Agricultural & Environmental Sciences  
UNIVERSITY OF GEORGIA

## From the desk of S. Kristine Braman ...

Our UGA Entomology Department is so delighted to welcome back our Faculty, Staff and Students this Fall Semester. What a delight to see students in face to face (or at least mask to mask!) classes again. Vaccination and masks are strongly encouraged as we strive to keep ourselves and each other healthy and able to attend class, conduct research and extend our knowledge.

Our student numbers are up and at 197 we will soon pass the 200-enrollment benchmark for total student enrollment in our graduate and undergraduate majors. Please be sure to take a look at our student spotlights and snap shots in this issue. A quick look at our updated undergraduate web pages (thank you Dr. Blubaugh!) <https://ent.uga.edu/undergraduate.html> gives one a sense of why I am so excited about our programs, instructors, and current and future students!



Quinn Hankinson



Christopher Hardin



We welcome **Pedro Rodriguez**, **Quinn Hankinson** and **Christopher Hardin**, Research Professionals in the Snyder, Burke and Joseph labs. **Tearston Adams** has joined the Tifton business office as an Administrative Associate. We wished two of our long time Insect Zookeepers farewell as they graduated, and now welcome Olivia Katz and Beni Rodriguez who will join Maisy Durkin managing the Insect Zoo.

**30<sup>th</sup> Annual (VIRTUAL) Insectival!** One of the Entomology Department and the Botanical garden's largest and most well-known festivals—Insectival—will again be virtual this year. Participants will receive a virtual package full of information, activities, tours, crafts, puppet shows and the popular butterfly release from our favorite entomology experts. This virtual package is filled with fun for the



Tearston Adams

entire family. Join garden staff and partners as we celebrate our beloved six-legged neighbors. Insectival is sponsored by the State Botanical Garden of Georgia, UGA Lund Club, UGA Department of Entomology and Georgia Museum of Natural History. Website access begins Saturday, September 4 and ends Saturday, October 2. The fee for access to this wonderful event is only \$10.

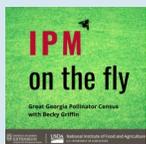
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The poster for the 30th Annual Insectival Virtual event features the State Botanical Garden of Georgia logo and the University of Georgia name. It includes the registration URL <https://t.uga.edu/7hP> and a price tag of \$10 for a virtual package. The event is described as one of the garden's largest and most well-known festivals, which will be virtual this year. It offers a virtual package with information, activities, tours, crafts, puppet shows, and a butterfly release. The event is sponsored by the State Botanical Garden of Georgia, UGA Lund Club, UGA Department of Entomology, and Georgia Museum of Natural History. Website access begins on Saturday, September 4 and ends on Saturday, October 2. The URL <https://t.uga.edu/7hP> is provided for more information. The poster also features images of a monarch butterfly, a grasshopper, and a caterpillar.



**IPM On The Fly** podcast launched in August with the big concept of having small conversations with experts about how integrated pest management (IPM) covers all aspects of life in the home, garden, farm and industry.

Do you have bugs in your life? Weeds? Then, this podcast is for you.

“We want to have conversations with experts that will speak to the everyday homeowner issues we face in our homes or in our gardens as well as provide integrated pest management solutions for our farmers and green industry folks,” explained Emily Cabrera, IPM Communications Coordinator at the University of Georgia Department of Entomology and creator of the podcast.

The light-lighted and informative conversations will hopefully demonstrate IPM is not some cookie-cutter approach with a defined parameter, but it is really about using all of the tools in the toolbox with prevention being the preferred too, Cabrera said.

“We hope podcast will encourage people to become systems thinkers. We also hope this program will make people laugh with us, because when it comes to insects and stubborn weeds trouble people get themselves into, it can sometimes be downright hilarious,” Cabrera said, with a grin.

And most importantly, Cabrera said the goal is to demystify IPM and show that “we’re all in this together.”

As Emily signs on each episode: The IPM On The Fly podcast is brought to you from the University of Georgia Extension IPM Program with funding from the USDA National Institute of Food and Agriculture. This podcast series will focus on integrated pest management across a wide variety of topics. Invited guests will talk with us in the studio, connect from a distance and take us out into the field where the action is happening to get the most current, science-based information to you, wherever you are.



*Emily Cabrera and Michele Hatcher interview Dan Suiter for the October episode of IPM On The Fly*

## Entomology grad students awarded CTEGD grants

Two students in the UGA Entomology Department have been awarded the National Institutes of Health T32 Training in Tropical and Emerging Global Diseases grant. This competitive grant is awarded to only 5 doctoral students and two postdoctoral students in UGA’s Center for Tropical and Emerging Diseases (CTEGD) each year. The grant covers stipend, health insurance, tuition, and fees for one year and is renewable for a second year.

**Benjamin Phipps** was awarded a PhD grant and is a student in the Michael Strand lab. **Ruby Harrison** was awarded one of only two postdoctoral grants. Harrison was also a PhD student in the Strand lab. Harrison’s research will focus on the interactions between the parasite *Trypanosoma cruzi*, the etiological agent of Chagas disease, and its Kissing Bug vector host.

CTEGD within UGA is home to perhaps the largest number of parasitology research laboratories in the US that collectively cover the full gamut of parasitic diseases. Every year protozoan and helminth parasitic diseases of humans are responsible for more than a million deaths, many millions more cases of severe morbidity and hundreds of millions of cases of subtle morbidity due to chronic infections.

The training in Tropical and Emerging Global Diseases program at UGA trains graduate students and postdoctoral scholars to become independent research scientists who study parasitic diseases in the context of global health. The research program combines cutting-edge bench and field science with perspectives on the global challenges and opportunities for the control and elimination of parasitic diseases.



Benjamin Phipps



Ruby Harrison

# Blubaugh selected Service-Learning Fellow at UGA



Dr. Carmen Blubaugh has big plans for her service learning class taught through the University of Georgia Entomology Department and her efforts have been recognized with her selection as a 2021-22 Service-Learning Fellow at UGA.

The University honor comes with a fellowship award of up to \$2500 to be used for developing her proposed project. She will have the opportunity to be matched with a mentor from previous Service-Learning Fellows cohorts based on areas of interest. The yearlong program consists of a retreat, monthly meetings and a Service-Learning Fellows Showcase at the end of the year where participants present their final projects.

“Service-learning is powerful and hard,” Blubaugh explained about her developing program. She spends time challenging her students to research and “deeply consider community needs” as they generate insect outreach projects with lasting impact.

For her fellowship project, the agroecologist/entomologist is developing a collaborative school-garden research network focused on insect food webs which is her research passion.

“We’re interested in how vermicompost applications influence communities of pests and beneficial insects, and we’ve recruited a group of teachers who are excited to try out pilot experiments together with their classes in raised

beds,” Blubaugh said.

Blubaugh’s students will be paired as mentors with classrooms of elementary students where they will implement research projects that creatively integrate garden-based experiments with state STEM education standards. The service-learning students will introduce common garden insects, create collections of pests and beneficial insects, compose lecture content on ecosystem services that insects provide and develop bug sampling activities to help students collect data.

Traditionally, this would be the end of the story. But, Blubaugh pushes the limits of tradition to give her students and the students they serve a first-hand view from which to learn.

“My service-learning students will work together to analyze and synthesize the data and present the results of our experiment to all our collaborating classrooms,” Blubaugh explained.

“Through this project, our students will experience food webs in real life, practice analytical skills and appreciate the benefits that biodiversity can bring first-hand,” she said.

Blubaugh said she is honored to be a part of the Fellows program and is looking forward to the mentoring potential offered to her.

“I’m excited to make friends with other faculty who share my commitment to service and hope to find some mentors and collaborators that can offer guidance and expand the scope and impact of my project,” she said of the program opportunities.

But for this young assistant professor, the passion for seeing the lightbulb of understanding go on for students is what it is all about.

“I work individually with each of my students to hatch a plan for a service project that leverages their unique talents, but they don’t escape from me without stepping outside their comfort zones to practice communication, resourcefulness, discipline and empathy. It’s rare that students at a giant R1 university have these opportunities in-class, but these intangible skills are everything for students once they move on from college,” Blubaugh said.

# WowCamp21 spends a day at UGA Bee Lab



**Future beekeepers spend the day learning all about bees and honey at the UGA Bee Lab!**

## Schmidt receives NRCS pollinator grant

**Dr. Jason Schmidt** received \$194,000 grant from the Natural Resource Conservation Service (NRCS) which helps support projects promoting strategies of habitat management for conservation of pollinators.

The project, “Building Native Pollinator Habitat for Southeast Blueberry Growers,” is a partnership with Georgia Blueberry growers and Woodard & Curran where the groups are helping coordinate and monitor pollinator communities and effects of habitat enhancement of pollinator recruitment.

“We have graduate student, Sarah Miranda Rezende, working on this project and she is currently wrapping up the first year of baseline data to estimate the community structure of pollinators in blueberry landscapes,” Schmidt said of the project’s progress so far.

Conservation of beneficial insects, particularly pollinators and predators of pest insects, have been identified as a major priority by the U.S. Department of Agriculture (USDA). Stakeholder, those being residential, civic entities, governments, and industry, also have increasing interest for the need for crucial information regarding best practices to protect these insects and their habitats. Use of native plants in tandem with established best management practices have been recommended as means to create and establish essential habitats for beneficial species.

“Our efforts will promote the concept of Integrated Pest and Pollinator Management (IPPM) to increase pollination and natural pest management services in blueberry landscapes, roadsides, and right-of-ways,” Schmidt said of the research.

He explained the long-term objective of the project is to equip producers and other stakeholders with the right tools to handle clientele requests concerning pollinator and natural pest habitat establishment, with the overarching goal to raise and promote IPPM awareness in the community, and support other on-going conservation efforts, such as large scale improvements in pollinator health in the landscape under the 2008 farm bill and improve natural pest management services for blueberry production.

Schmidt’s team also includes Dr. Bodie Pennisi, Professor, UGA Department of Horticulture; Keren Giovengo, UGA Public Service Representative, Ecoscapes Sustainable Land Use Program Manager; and Zackary Williams, County Extension Agent, Southeast District, Alma, GA.



Schmidt also received a \$37,000 National Renewal Energy Laboratory (NREL) grant to explore habitat options for solar pollinator habitats. He will be working in partnership with the Carter Foundation, SolAmerica and FreshEnergy.

“We are studying the establishment of recommended seed mixes for native flowers in solar arrays and monitoring corresponding communities of pollinators and natural enemies. Schmidt’s team includes Dr. Bodie Pennisi and Craig Dvien, Crop and Soil Science, UGA-Tifton, Emeritus.



## MS Student Spotlight



## Thomas "Sam" Dunn

I have been a student at UGA since January of 2019, where I began my MS in Entomology. I completed my undergraduate degree at Abraham Baldwin Agricultural College and graduated with a BS in Biology in December of 2018. I worked multiple jobs while studying at ABAC, including working as a farm hand and temporarily working as a pharmacy technician. In my final semesters at ABAC, I began working in David Riley's lab as a student worker in February of 2018. After working in an Entomology lab for 10 months, I began my MS degree under the direction of Donald Champagne in Athens, Georgia. I have always been interested in agricultural work; while growing up on my grandfather's farm I would often help with picking cotton and peanuts. Coming from a background in farming gives me a sense of fulfillment that the work I do may benefit the farms and the growers I grew up around.

My Master's research was centered on the diamondback moth (DBM), *Plutella xylostella*, which is a serious pest of brassica crops. These pests are known for their ability to rapidly develop insecticide resistance, and are particularly problematic in South Georgia and Florida. During my Master's, I used Georgia and Florida DBM colonies previously collected from insecticide resistant field populations to study diamide resistance in DBM. Diamides (IRAC Class 28) target the ryanodine receptor, a calcium channel which modulates the flow of  $Ca^{2+}$  ions from the sarcoplasmic reticulum. When bound to the ryanodine receptor, diamides cause the receptor to remain in the open conformation leading to a constant efflux of  $Ca^{2+}$  from the sarcoplasmic reticulum. This results in paralysis, constant muscular contractions, feeding cessation, and eventually death. Using these colonies, I was able to determine  $LC_{50}$  values for the diamide insecticides chlorantraniliprole and cyantraniliprole, as well as a spinosyn insecticide (IRAC Class 5), spinetoram. Interestingly, I found high levels of resistance to chlorantraniliprole in three of the four colonies, while finding much lower levels of resistance to cyantraniliprole and spinetoram in these same colonies. After determining levels of resistance to these insecticides, I identified a target site mutation of the DBM ryanodine receptor referred to as the G4946E. This mutation, which was first discovered in diamide resistant DBM populations from Asia, had never been identified in Georgia or Florida DBM populations, and has been shown to greatly reduce the efficacy of diamide insecticides, in particular chlorantraniliprole. Allele frequency estimates from these DBM colonies suggest a positive relationship between the levels of chlorantraniliprole resistance and the frequency of G4946E mutation. This is consistent with studies of other diamide insecticide resistant DBM populations.

After finishing my MS in July of 2021, I decided to continue this research in the Champagne lab and pursue my PhD. My PhD project will focus on collecting insecticide resistant DBM samples from the field. This will be done with the hopes of developing a diagnostic PCR assay to more readily identify target site mutations associated with insecticide resistance in the field. This information could then be used to inform growers of potential control failures with certain insecticides before they occur. In turn, this would save the growers time and money, and potentially slow the development of insecticide resistance in DBM populations.

Before working in Entomology, I did not realize that agriculture and science could be so intertwined. After briefly working as a pharmacy technician, I decided that line of work did not suit me, which left me looking for my next steps in my final year of my undergraduate degree. Thankfully, I was able to gain enough experience from working as a student worker in Dr. Riley's lab to become interested in Entomology. After starting my MS, I quickly realized how Entomology overlaps with many different fields. This only gave me a greater appreciation of this study, as it showed not only its importance in agriculture but in other fields as well. My appreciation for Dr. Champagne and Dr. Riley, who guided me during my MS in the fields of genetics and toxicology, respectively, cannot be understated. Without their help, I would not have made it this far into my education.



## PhD Student Spotlight



## Gabriela Cardona-Rivera

My name is Gabriela Andrea Cardona-Rivera, and I am a third year PhD Student in the Department of Entomology. I mainly work with aquatic insects and am developing a project with Dr. Darold Batzer observing the dynamics of Flood Pulses in different sections of the Coastal part of the Ogeechee River. Aquatic insects are great water quality indicators and understanding their community dynamics during a flood pulse can help us understand the interactions between the rivers and the floodplains. The floodplains can act as filters for certain nutrients that can be hazardous to river dwelling organisms if they are in large concentrations. Understanding and quantifying part of the benefits of floodplains to rivers and their nearby terrains can help with their conservation.

I was born and raised in Yauco, Puerto Rico and only now have moved to the mainland to continue my studies. Although Georgia is very different to where I come from, I have been lucky to meet and become friends with amazing individuals. I did not really know about entomology as a profession choice until my second year as a Biology Major at the University of Puerto Rico in Mayagüez Campus. Ever since Middle School I wanted to study Medicine. I had my heart set on it! I even joined Pre-Med organizations back in my undergraduate University where I participated in their outreach events and helped with their fundraisings with other organizations.

During my second year, I took Zoology-where I was introduced to the world of Insects. My TA taught the many different insects and the different characters that made them unique. After that, I went in and in a way made a space for me in the Entomology lab. I basically walked in, said I wanted to help, and ended up keeping the collection by cleaning off the mold on some of the specimens! The Professor coordinating the lab, Dr. Jaime Acosta, recommended me to take his Medical and Veterinary Entomology class. I felt like I was seeing a whole new world through this class and I could see myself making a career out of studying insects. I was a very eager participant in the class and the professor recommended me to Dr. Alonso Ramirez in University of Puerto Rico at Rio Piedras for a dragonfly census project. It was through this Dragonfly Project that I had my first experiences in fieldwork.

In the Dragonfly Project my research partners and I had to collect dragonflies and damselflies from all over the island. We once went to a location behind a residential area where we collected near cattle. They were far away so we did not think we could disturb them. We were wrong! As we continued collecting, the cows kept getting closer and closer. We had to quickly make our way back to our cars. Besides collecting with my partners, I also ventured out to collect with my family. I gave my grandmother a net (as she was the most eager to "catch stuff" with it!) and off we went. My mother would take the chance to take pictures, my younger brother would follow me asking me questions about the insects he saw, and my grandfather would be trying to keep up with my grandmother while telling her to slow down! This adventure continued for the remaining time in the Dragonfly Project.

I was also lucky enough to participate in two research opportunities, one in El Verde Field Station in Rio Grande, Puerto Rico, and another one in La Selva Field Station in Heredia, Costa Rica. *(continued on page 9)*



## PhD Student Spotlight continued from page 8



The experience in El Verde was directed by Dr. Alonso Ramirez and I looked at the life history of the damselfly *Telebasis vulnerata* and the predation of the eggs of this same damselfly by a caddisfly, *Phylloicus pulchrus*. I was able to meet amazing scientists and to collaborate with some of them and the students they mentored. One particular experience I remember was when I was to release the larvae, I had been keeping in the lab back to the stream and I poured the water they were in while saying “It’s been real!”.

In Costa Rica, I studied aquatic spiders (*Tetragnatha spp.*) with Dr. Darko Cotoras but mainly “observed” the mud in which I was constantly stuck because these spiders dwelled in swamps as well as rivers. I enjoyed hearing the howler monkeys in the morning once I knew what was howling in such a boisterous manner! Another memory from Costa Rica was when my research partner, my mentor and I were on our way to a river location, and they thought they could simply jump over a stream to the site they wanted. One minute they are cheering and playfully mocking me for not jumping, the next they are stuck knee-deep in the mud on the other side of the stream. I even have a picture to remind them of it! After that and the many occasions I veered them away from fer-de-lance snakes, my partner knew me for my phrase “Choose your battles, young grasshopper!”.

After these experiences, I continued taking classes about insects and participating in the Dragonfly Project. When it came time to look for Graduate Schools, I researched universities all over the US. Eventually, I emailed Dr. Batzer and started my journey of applying. During this time Hurricanes Irma and Maria had just struck Puerto Rico and everything seemed to be out of service. My house was without electricity for several months and most cellular towers were destroyed. Dr. Batzer was always very reassuring and understanding and helped me through my application. I had to travel to the capital to take the GRE because my city did not have any places to take it. We had to travel and park in a highway shoulder to access signal for me to check my email and communicate with the Graduate School. After learning that I had been accepted at UGA all that was left was for me to graduate. As it is with most graduation, there was limited seating. I thought I was only going to be able to see everyone after the event but, when I went to get my diploma, I saw that they had sneaked in with a big sign covered in plastic insects that said something along the lines of “Congratulations, Gaby!”. To this day I still cannot believe they were able to convince the security guard to let eight extra people in.

Now, three years later, I can say all the struggles were worth it. I found I could not pursue a career outside of nature and of insects. I told my family I was going to become an entomologist and, once they experienced my field days and saw how much I loved my work, they were completely supportive. I am very grateful to them and all the sacrifices they had to make for me to get here. My mother, and my grandparents helped me get everything settled to travel, my uncle and aunt drove me from Maryland to my new apartment in Georgia and helped me start from scratch here. Now I also have all the amazing people I have met in UGA and the rest of my family behind me. This Boricua, with all her loved ones backing her, can only continue to go forward!



# SNAPSHOTS



## Hexapod Herald Subscriptions

*Michele Hatcher—Editor*

The Hexapod Herald will be issued in **Spring, Summer** and **Winter** of each year. We ask that you share this issue with friends and neighbors, and anyone who is interested in UGA Entomology. Electronic subscription is preferred.

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Or Call 706-542-2816.

*The hum of bees is the voice  
of the garden.*

*Elizabeth Lawrence*

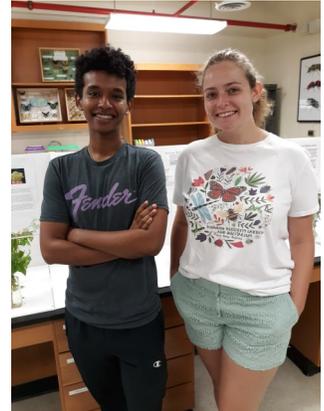


## Emma Grace and Kidus we will miss you!

The animals in the UGA Entomology Insect Zoo enjoyed the careful and creative attention of Emma Grace Crumbley and Kidus Yared as zookeepers for the past more than two years. Both Emma Grace and Kidus graduated from UGA in the Spring and have moved on to exciting new adventures.

**Kidus** is now a member of the newest class of future veterinarians at the **UGA School of Veterinary Medicine**. **Emma Grace** is now the **Butterfly and Horticulture Assistant for the Day Butterfly Center at Callaway Gardens** in Georgia.

We will miss you but wish you the best in these exciting endeavors!



## UGA Students judge 4H competition



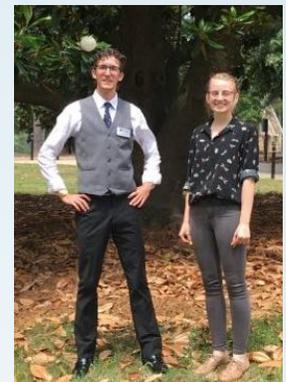
The University of Georgia's graduate students in Entomology are known for their outreach and recruitment efforts. One aspect of this is their serving as judges for the annual entomology presentations at 4-H District Competitions, held at the Rock Eagle 4-H Center every spring. This opportunity allows entomology students to evaluate middle and high school speakers, encourage their interests in entomology, and recruit them to attend UGA and major in entomology.

This year's judges were Gurjit Singh, Christiana Huss, Carissa Gilliland, and Nia Myers. They demon-

strated their commitment to the next generation of scientists by spending half a day at Rock Eagle, interacting with the 4-H'ers and their county Extension agents.

Several of our Department's graduates now work in Extension, putting into practice the skills they developed in graduate school here. Among these is Joshua Grant, former Lund Club President, who got his master's with Dr. Ash Sial in 2016 and now works as Crisp County's Ag and Natural Resources Extension agent.

Joshua took the opportunity to catch up on Department news when he co-judged 4-H presentations with Carissa Gilliland.



## Calendar Reminders

September 7— Labor Day — UGA Holiday

September 26— Virtual Insectival!

Oct. 31– Nov. 3 — ESA Annual Meeting, Denver, CO, In-person & Virtual

November 10— D.W. Brooks Lecture and Awards



## We don't mean to bug you but . . .



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Graduate student Miriam Edelkind-Vealey propels traps into the tree canopy to sample bees for her thesis work.  
UGA Entomology in Action