

HEXAPOD HERALD

Summer 2022

Fireflies Synch up in North Georgia

It was a perfect evening as night pulled down its curtain on the sun and dusk awakened the forest.

Standing in the new darkness of a 100-acre wood on a recent summer evening, a group of University of Georgia **entomology** graduate students witnessed magic in the air — literally — as thousands of fireflies of different species rose from the forest floor to flash their luminescent love songs to hopeful mates hiding below.

The group was invited by a local landowner and citizen entomologist to experience the masses of twinkling insects, some of which are rare species, an experiential learning encounter of the seemingly supernatural.

Amid the ancient chorus of night creatures ramping up for the evening, the young scientists were quiet in observation. But quickly, audible gasps added to the symphony of sounds and lights — an instinctive response to the enchanted forest around them, their collection nets forgotten for a moment.

The students' curiosity soon got the best of them and they began to ask questions of their host, Allen, who pointed out the different species, identified best by their pattern of light flashes. He grew up on this land. He knows his fireflies by name and knows where they live.

This diverse property he calls "Springwood" is a sanctuary for several firefly species. Habitat variety is crucial for the different populations, as individual firefly species are picky about where they thrive.

"I started my study of fireflies when I discovered the *Photuris frontalis* six years ago," Allen said of the species known as snappy sync, one of the few species of synchronous fireflies. These exceptional fireflies start low to the ground with a couple of off-beat flashes, followed by a dark pause, and then all of the beetles of the species flash together in unison, creating a fairytale-like trail throughout the forest floor.

Other species witnessed by the students were bush babies, big dippers, candle lantern, fast 5s and the rarest of all, *Photuris forresti*, better known as the loopy 5.

"It is hard to pick a favorite, but the rare loopy 5s have the most photogenic flash train and the coolest name," Allen said of the firefly population discovered last year on the far side of the pond on the property, attracted to the moist habitat they prefer.

"I am also quite fond of the bush baby hatch — the density of their numbers is thick enough to rival your childhood memories of being engulfed in lightning bugs," he reminisced.

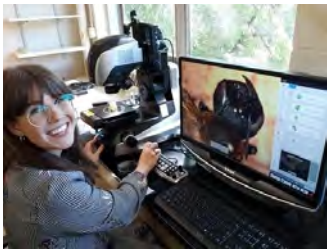
The students shook themselves out of a trance, remembering their nets and the opportunity to bag samples for their collections. Allen, along with UGA entomology Professor **Joe McHugh**, began to show the students how to identify the different species by their flashes. (continued page 3)



From the desk of S. Kristine Braman ...

Our Entomology Department at University of Georgia is delighted to welcome three new faculty to our Athens and Tifton Campuses this August.

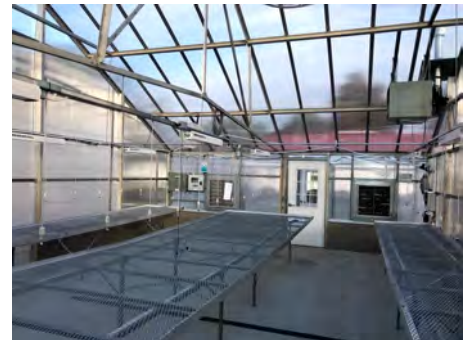
Dr. Allison Johnson, Public Service Assistant and Pesticide Safety Education Program Coordinator located in Athens, Dr. Kelly Carruthers, Academic Professional Associate and Academic Program Coordinator, also in Athens, and Dr. Apurba Barman, Assistant Professor in tree nut IPM will be located on our Tifton Campus.



Recent greenhouse renovations on our Tifton and Athens campuses have given us new facilities to work in that have been greatly needed. We are grateful for the support that made this possible. Recent greenhouse renovations on our Tifton and Athens campuses have given us new facilities to work in that have

been greatly needed. We are grateful for the support that made this possible.

32nd Annual Insectival! One of the Entomology Department and the Botanical garden's largest and most well-known festivals—Insectival—will be back as an in-person event this year. Participants enjoy hands on activities, tours, crafts, puppet shows and the popular butterfly release from our favorite



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entomology experts. This event is filled with fun for the 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. Hold that date September 17th, 9 am-1pm.

We are thrilled to be able to once again offer our Study Abroad course in Ecuador and the Galapagos. Don Champagne and Jennifer Berry took the first class in three years on this exciting experience.



From page 1

Armed with a little extra firefly identification knowledge and lots of enthusiasm, the students and McHugh spread out down the dirt road and into the woods, hoping for successful hunting.

Kelly Tims, an entomology doctoral student, was thrilled to participate in such a unique learning opportunity.

“Opportunities like this add so much joy to my educational experience. We’re in this department because we’re passionate about insects and knowledge, so being able to see insects in the field, observe a natural phenomenon, and talk to other like-minded folks about what we’ve seen really is what this is all about,” Tims said of the twilight expedition.

Once samples were collected and the flashes began to wind down for the night, Allen surprised the students with a boat ride across his pond to see the rarest of fireflies recently discovered and documented on his property — the loopy 5s.

This nighttime boat ride was the highlight of the trip for entomology master’s degree student **Tristen Dittman**.

“The coolest species was the loopy 5s — the ones that liked to hang out over the lake. Their flashes were very distinct, with one long flash upwards followed by three individual flashes. It was very cool to see something not found in many other places,” she marveled.

Tims agreed, her eyes lighting up.

“Climbing into canoes with new friends and paddling out into a dark, unknown pond where you are surrounded by frog songs and trees, all for a glimpse at the rare loopy 5 fireflies? Totally worth it,” she said.

As the evening came to a rewarding end, with jars and vials and memories collected, the group headed back to Athens reflecting on their experience.

“This trip really showed me the importance of citizen scientists observing their surroundings, being curious and reporting their findings. Allen told me he didn’t know anything about fireflies before, but now he is able to identify 11 species in his backyard. This information is invaluable to taxonomists like Dr. McHugh who are working to document and preserve the diversity that exists all around us,” Tims said.

“And the best way for this to happen is for us all to pitch in and contribute our curiosity to science,” she added.

All agreed.

It was a perfect evening. It was magic.



Landowner “Allen” (far left) invited UGA Entomology students to his home to witness synchronous fireflies and other firefly species. Pictured about are Dr. Joe McHugh, Sabrina Barbosa (Hunt/Ross lab), Tristen Dittman (Blaauw lab), Kelly Tims (Burke lab), Julia Berliner (Blubaugh lab), Amy Sparer (Blubaugh lab), Miriam Edelkind-Vealey (Braman lab) and Zia Williamson (Joseph lab).



Students study abroad in Ecuador & Galapagos

By Don Champagne



After a hiatus of three years, “Tropical Entomology in Ecuador and the Galapagos Islands” (ENTO 4850/4850L) made a successful comeback this Maymester. Don Champagne, ably assisted by Jennifer Berry, led twelve students drawn from Entomology, Animal Science, Plant Science, Biotechnology, and Ecology on a 2 ½ week adventure.

We began with a tour of Initian, an interactive museum located directly on the equator, where we learned about Ecuador’s indigenous cultures. We stopped

at Yunguilla, a town high in the Andes, where we experienced the excellent local traditional cuisine, before proceeding to the ecolodge at the Maquipucuna biological reserve, our base for the next eight days. Maquipucuna is a 14,000 acre privately owned biological reserve in the Andean cloud forest, noted for its remarkable biological diversity.



Our days began with a 6 AM guided birdwatching hike (students had to participate in at least 1 hike; I went every day and on the best day I logged 54 species). Each day included hikes to study different ecosystems,

such as hiking five kilometers up a mountain trail to observe the transition from secondary to primary forest, including night hikes with UV lights to observe nocturnally active insects and other animals, and to observe examples of bioluminescent fungi. Every night we set up a blacklight to sample diverse localities such as forest, clearings, and riversides. We sampled aquatic invertebrates in a nearby mountain stream. During these activities students worked on making a photo collection of 30 identified insect families in at least 12 orders, plus 4 non-insect arthropod orders. We also made day trips, to learn about coffee production, and to the town of Mindo to learn about chocolate production, visit a butterfly garden, and explore the forest canopy from zip lines.



After leaving Maquipucuna we spent a day in Quito where we toured the historic district, had a guided tour of the pre-colonial museum to learn more about indigenous cultures, and attended a traditional dance performance. **continued on page 5**

Study abroad continued



The following day we had an early flight to San Cristobal Island in the Galapagos. All of our activities in the Galapagos were accompanied by certified National Park guides, who are excellent naturalists and provided an abundance of information about the fauna and flora.

We visited the National Park interpretation center, hiked up Tijeretas Hill to enjoy the spectacular overlooks, stopped at Darwin Bay where some of us enjoyed a swim with a friendly sea lion, and visited a beach where we observed a dispute between bull sea lions contesting territory and annoying the marine iguanas.

We snorkeled at Kicker Rock, where we enjoyed huge schools of fish, hammerhead, blacktipped, and Galapagos reef sharks, and many Green sea



turtles.

After a choppy boat trip to Santa Cruz Island, we toured the Charles Darwin Research Station before proceeding west to Isabella Island, where we spent three days. Activities there included kayaking to observe Galapagos penguins (and some large bull sharks!), hiking up Sierra Negra volcano to see the 10 km wide caldera, a boat tour to a spectacular landscape called “the tunnels” to learn about blue-footed



boobies and other native birds, and snorkeling nearby where we again saw many sea turtles and played with more very inquisitive sea lions. Returning to Santa Cruz, we visited a ranch in the highlands that houses a large population of giant Galapagos tortoises in a natural setting. And with that we were done.

Thanks to our Ecuadorian partners who made sure everything ran smoothly, and our students who were without exception engaged and very collegial, this was a fantastic trip and an excellent way to “reboot” the course.

UGA releases parasitic wasp to control invasive fruit fly

By Emily Cabrera

In a quiet field of abandoned blueberries and shrubby brush in south Georgia, **Cera Jones** released hundreds of tiny parasitic wasps into the thicket and watched them fly away, following their natural instinct to search for a host to incubate their predatory progeny.

Jones manages the University of Georgia **Small Fruit Entomology Lab** under the direction of Associate Professor **Ash Sial**. This spring, the lab was one of a handful of select institutions in the nation to receive a permit for raising and releasing *Ganaspis brasiliensis*, a **parasitoid wasp of the most destructive insect pest in the small fruit industry**, the spotted wing drosophila (SWD), or *Drosophila suzukii*. Native to East Asia, this small vinegar fly is responsible for billions of dollars in annual crop losses around the globe.



Photo by Kent Daane

Female SWD lay their eggs in small fruits such as blackberries, blueberries, cherries, raspberries and strawberries just as the fruit reach their mouthwatering prime. Larvae hatch and begin feeding within the pulp, rendering the fruit completely unmarketable due to an almost zero tolerance for infested fruit for fresh market or frozen products.

Because SWD larvae feed inside fruit where it's hard for insecticides to reach, producers are encouraged to use extremely conservative management techniques, applying preventative insecticidal sprays that target adult flies once a week throughout the production season. This temporary and costly practice not only has non-target impacts, but insecticide resistance is growing, making chemical control altogether less effective.

So, researchers traveled to the fly's native origins to find naturally occurring predators that could be brought back to the U.S. as potential **biological control** agents in the battle against the devastating fruit fly.

After more than a decade of research in quarantine, *G. brasiliensis* finally received the green light from the U.S. Department of Agriculture (USDA) **Animal and Plant Health Inspection Service** as a safe, host-specific biocontrol of SWD.

Wasps were released in several locations in Bacon and Appling counties, where most of Georgia's blueberries are produced. Researchers will monitor their survival rates and efficacy as a biological control option for SWD throughout the year. (Photo by Cera Jones) "We had been waiting while this species was being studied in quarantine when, serendipitously, **Washington State University** researchers confirmed the discovery of the wasp in a field last year. Apparently, it had made its way to North America on its own and since USDA doesn't control the spread of non-native species once they've been identified as existing in a state, it made the approval process faster," said Jones.

Jones released over 1,300 wasps at three locations within Bacon and Appling counties, where most of the state's blueberries are produced, with supplemental releases continuing over the next few months. *continued page 7*

Parasitoid wasp from page 6

“Since Georgia is within the same latitude as its native range, we hope to see that this wasp can survive in our environment and will begin spreading to other areas beyond their release sites,” she said.

By leveraging the natural parasitic biology of this ancient nemesis, researchers hope that a reduction in SWD populations will subsequently minimize the amount of insecticides growers have to use to manage the pest.

“Even though this wasp is much smaller than the fly, they’re just as determined to deposit their eggs,” said **Corinne Stouthamer**, a UGA research scientist who specializes in parasitic wasps.

“Population suppression could also occur in fruits that normally would not be sprayed with insecticides, such as backyard fruit trees or wild berries that would otherwise act as a reservoir for the fly. In short, the wasps can reach where the insecticides can’t,” she emphasized.

Stouthamer explained that researchers are still learning exactly how these wasps hunt down their prey with such surgical precision. The wasps pinpoint the location of their unwitting hosts potentially by using larval odors or by feeling for vibrations of the crawling maggots beneath the surface of the fruit. Once a maggot has been detected, the female wasp inserts a needle-like ovipositor through the berry and injects a single egg into the fly larva. The wasp egg hatches and waits for the larva to pupate before finally devouring it. The wasp larva then uses the hard pupal casing that the now deceased SWD created as a protective shell, and continues to develop, eventually emerging as an adult wasp that will go on to repeat the predatory process.

Although it might sound like a scene from a sci-fi horror film, most insect pests are the target of at least one known parasitic wasp, making this primordial battle a fairly common occurrence.

“We have a lot of native *Ganaspis* wasps around that would like to use SWD as a host, but the fly’s powerful immune system response kills our native wasp species’ eggs inside the fly larvae. What makes *G. brasiliensis* so successful is that because it coevolved with SWD, the wasp developed unique traits that enable parasitism of the fly and only its close relatives, which means it is a specialist of SWD,” explained Stouthamer.

With parasitism levels of up to 76%, this tiny wasp may just be the most important SWD biocontrol agent currently known.

This is yet another stunning illustration of how basic scientific research combined with applied sciences may offer farmers practical, real-world solutions that impact the world.



SNAPSHOTS



MS Student Spotlight

Zia Williamson



My name is Zia Williamson and I'm a student co-advised by Shimat Joseph and Brett Blaauw, and started my M.S. in summer of 2021. I'm currently working on studying trunk boring beetles such as flatheaded borers and ambrosia beetles in specialty crops, and hope to explore these insects at the landscape level in relation to factors such as climate change and heat island effects, as well as investigating the role they may be playing in crop systems such as ornamentals, pecan, and tree fruit production. In the future, I hope to continue working in specialty crops, ultimately exploring other insect groups in these settings.

I grew up near Augusta, Georgia in the small town of Lincolnton. My parents own and operate a small landscaping and irrigation business, so I've always been surrounded by plants. I would spend my summers catching bees and various other insects on our flowers and bushes, and developed an immense respect and appreciation for them, as well as the other wildlife I encountered in my rural hometown. When it came to choosing what I wanted to major in as an undergraduate student at the University of Georgia, double majoring in entomology and horticulture just seemed logical. The UGA College of Agricultural and Environmental Sciences was more than welcoming, and I received a tour of the department from Dr. Marianne Shockley. She helped in making me (even more) excited about majoring in entomology, and always served as a welcome face and source of advice and encouragement for me.

During my undergraduate career, I worked in and explored research in the entomology, plant pathology, and horticulture departments at UGA. The first, and one of the most impactful, of those positions was serving as a fruit plant pathology research assistant under Dr. Phil Brannen of the UGA Plant Pathology department in the summer of 2018. I traveled the state that summer, all the way from North Georgia conducting wine grape downy mildew trials in commercial vineyards and the Mountain Horticultural Crops Research and Extension Center, to picking hundreds of pounds of peaches in middle Georgia to evaluate pesticide efficacy, to even working in blueberries testing soil for nematodes. While at the time it felt like I was more of a trucker than a researcher, I gained such valuable skills and experiences under a great mentor that took the time to make sure we always understood the systems and diseases we were working on at the time. While I had the chance to become familiar with things such as statistics and experimental design, I also felt much more confident in myself as a student, and realized I love extension work and interacting with growers.



Shortly after finishing up as a summer research assistant for Dr. Brannen, I started at the Georgia Museum of Natural History working on the LepNet project under Dr. Joe McHugh. I served as an intern in fall of 2018, and then as a student worker from spring of 2019 until my graduation in May of 2021. During my time working on the LepNet project, I entered the information from nearly 6000 butterflies and moths in the museum's collections, as well as incorporated new specimens into the collection. It was exciting seeing so many historic specimens, with the oldest specimen I worked with being an erebid moth collected in 1877! This served as my first real introduction into entomological research, and helped me to understand just how important record keeping and maintaining thorough biological collections is. It also served as the jumping off point for my interest in pinning and displaying insects, which is now one of my favorite hobbies.

I completed undergraduate research projects with several UGA Horticulture faculty, ranging from exploring soil supplements in poinsettia production to collecting data from growers and exploring hiring trends and perceptions in the green industry at an international level.

Through all of these experiences, I realized how interconnected all aspects of our agricultural systems and ecosystems in general are. Everything you do has results that manifest elsewhere. One of the things that I love so much about horticultural entomology is how I get to explore those causes and effects from so many angles. In the future, I hope to pursue my PhD in entomology and continue working in specialty crop systems.

When not in the field or lab, I enjoy drawing and traveling, as well as dragging my friends along to blacklight with me!



Sudeep Pandey

I am Sudeep Pandey, Ph.D. student at Srinivasan Lab in Griffin Campus. I joined the lab in Fall 2019 with my interest in plant-virus-vector tripartite interaction. My Ph.D. research is focused on cotton/melon aphid (*Aphis gossypii*) transmitted cotton leafroll dwarf virus (CLRDV), which was detected, only recently in the US. I am particularly interested in biological and molecular changes in host plants and vectors associated with CLRDV infection.

I was born and raised in a plain region of Nepal with lots of potential in agriculture. My parents maintained a family garden all year round. Our garden was full of seasonal fresh vegetables, fruits, and flowers. Then, I learned about plant cultivation, diseases, and insects. However, I never thought of agriculture to be my profession and career. I wanted to be an engineer like my father. During high school, I learned that the gardening practices include science and research. I completed high school with biology as a major. That brought me into agriculture college for undergraduate studies. The undergraduate education made me realize the gap in knowledge and practices required to solve the problem of plant diseases and pests in sustainable manner. I got several opportunities to visit different research fields and stations that triggered my interest in disease and pest biology and management. After graduation, I worked in an NGO where I learned from the experts in this field, scientist, and farmers. I decided to pursue my career as a researcher in agricultural disease and pests.

To broaden my knowledge, I moved to India for the MS degree in Plant Pathology, focusing on whitefly transmitted begomoviruses in legume crops. I was fascinated by the virus-vector interaction because of the integration two different disciplines, entomology (virus vector), and plant pathology. I got an opportunity to learn advanced lab techniques that helped in virus-vector studies. This experience helped me get a job opportunity in a private company where I used my learning to research and implement proper disease and pest management practices in large-scale farmers' fields. However, interest in virus-vector interactions attracted me to the Srinivasan lab in the Department of Entomology at UGA.

Within three years, at the Srinivasan lab, I have enhanced my knowledge of plant-virus-vector tripartite interaction and got an opportunity to learn several wet-lab and bioinformatic techniques. I know a few years of Ph.D. will not be enough to understand this system, so in the future, I want to stay working in academia in both research and teaching positions. I dream to have my own lab in future.

Along with science work, I have been an active member of student organizations. I served as a secretary of Nepalese Student Association (2021-22). Also, I am serving as a member of UGA Griffin Ambassador which is a very exciting position as we directly assist in several campus events (luncheons, new student orientation, graduation ceremony, and many more). I have also enjoyed volunteering opportunities such as Social Circle Primary Entomology Virtual Field Trips for PreK students, and judge in 4-H Entomology Competition at Rock Eagle. I am thankful to Department of Entomology and Griffin Campus for providing me with such delightful opportunities.

When I am not in the lab, I love playing and watching sports (Soccer, Cricket, getting used to American Football) and driving to new places.



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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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Welcome to our newest faculty member, **Dr. Lewis Bartlett**. Dr. Bartlett is an assistant research scientist who will be working jointly with UGA Entomology and the Odum School of Ecology on honey bee health.



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Sapelo trip nets new dragonfly finds

Once again, UGA Entomology Lund Club members traveled to Sapelo Island, GA to conduct a diversity survey of Odonata. This annual trip missed a couple of years due to the pandemic. Two “cool” finds this year were a Halloween Pennant (*Celithemis eponina*) caught using a long net; and a rare Marl Pennant (*Macrodiplax balteata*) which was released after modeling for photos since it is seldom observed in Georgia.



The goal of the Dragons and Damsels of Sapelo Project is to foster a better understanding of the diversity and biology of Odonata on the island. The hope is that the project will encourage others to better appreciate these insects.



Halloween Pennant



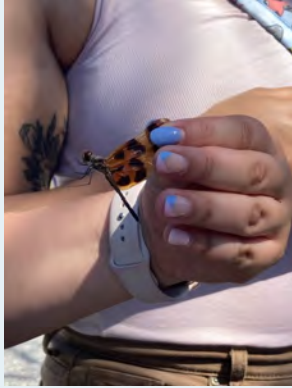
Calendar Reminders

September 5— Labor Day — UGA Holiday

September 17— Insectival!

Oct. 31— Nov. 3 — ESA Annual Meeting, Vancouver, Canada

November 8— D.W. Brooks Lecture and Awards



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