



The Glowworm

Some people talk to animals. Not many listen though. That's the problem.

~A. A. MILNE, Winnie-the-Pooh



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An Extension Newsletter of the Dept. of Biochemistry, Molecular Biology, Entomology, & Plant Pathology

April-June 2016

Beekeeping Camp has Hit its Stride!

We enjoyed our second Beekeeping Camp and experimented with a different pace and some different activities. We continued to meet our objective of a comprehensive introduction to beekeeping. One of camp's unexpected oversights was realizing the observation bee colony in the lobby was in dire need of cleaning. Dr. Harris and Heather Blackwell made time to bring this cornerstone Arthropod Zoo exhibit back into fine form and as usual it was a tremendous hit!



Bug & Plant Camp's 23th Season and 30th Camp was a Grand Success, by all Measures!

Registration started early and camp was full! Interestingly 63% of our Bug & Plant campers came from outside Mississippi representing California, Georgia, Illinois, Iowa, Michigan, Oregon, Tennessee and Texas. We were told by several campers' parents that the word is out, "If your son or daughter want to be an entomologist they need to go to Bug & Plant Camp at Mississippi State University, the Nation's Bug and Plant Camp." Go Dawgs!



Bee Beards Modeled at Beekeeping and Bug and Plant Camps by Directors!

There is no beard like a bee beard! Two of your camp directors demonstrated that bees are easy and fun to work with. Drs. Guyton and Harris donned bee beards before campers, faculty and staff during the Beekeeping and Bug & Plant Camps this summer. What will they do next? Join them at camp next year and see...



Leadership Development at its Best: Campers becoming Leaders and Instructors!

Breanna Lyle, Brady Dunaway, and Corran Hall acted on discussions that begun last year and presented a session on Arthropod Husbandry! Breanna is an Entomology Society of America (ESA) award winner and Coran Hall assisted with a teacher workshop at the ESA conference last year.



Matthew Thorn, now a graduate student in Dr. Riggins' lab, assisted with a walk in the woods elucidating insect-plant interactions. Matthew has won national awards including the ESA President's Outstanding Research Poster Award.



Sophia Di Piazza, Special Camp Lecturer for 2016, Received the 4-H Emerald Star Award for 4-H Entomology Field Day Project!

Sophia described her planning and conducting of a 4-H entomology field day for 5 counties in California! This involved enlisting several entomologists and entomology graduate students. She lined up guest speakers, raised funds for lunch, etc., planned activities, and publicized the event including presentations for 4-H clubs in surrounding counties. Her event was spectacularly organized. Her Insect Olympics included learning how insects move by comparing how fast cockroaches run compared to humans and



comparing how far grasshoppers can jump relative to their height with human comparisons. The entire day was packed with educational activities in which participants learned about insects. And finally a judging contest evaluated how much 4-Hers learned during the day.

For this she will receive the Emerald Star rank signifying her creativity, leadership and organizational skills. She has been recognition by and done a presentation for the world's oldest Extension Bug and Plant Camp thus becoming a national leader in entomology education and 4-H.

Check out her youtube: <https://www.youtube.com/watch?v=VJKgNPJpQ4o>

Audrey Harrison Joins Camp Staff to Lead Aquatic Entomology

Audrey Harrison, a 4 year camper, returns with a Masters in Aquatic Entomology to lead our Aquatic Entomology program. She is completing her doctorate in Aquatic Biology. It seems that dropping swimming from the camp agenda so many years ago and adding aquatic entomology has born fruit!

Audrey is also leading a coalition, the Mississippi Roadside Vegetation Action Group, that is working to make roadsides healthier for monarchs and other pollinators. The

research Guyton led on roadside management supported a reduced mowing regimen and provided the groundwork for the management plan on which Ms. Harrison's group is working.



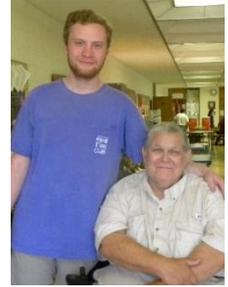
Team Mantid, the 2016 Camp Collecting Champions!

Camp taxonomist Breanna Lyle declared Team Mantid the 2016 Camp Collecting winners and Linnaean Games Champions. They were best at insect identification, number of species collected (160) and the number of orders collected (21). The team members were: Christopher Perry, Sophia Di Piazza Corran Hall, and Jordan Yawn.

Congratulations Team Mantid!

Bug and Plant Camper Phillip Kelly Stopped By During Camp

It is always great to have former campers return for visits. Phillip Kelly camped with us for several years and *is a graduate of our department*. He is currently a third year pharmacy student at the University Medical Center in Jackson. Phillips mother, and Camp Director Dr. Lelia Kelly mentioned that his fellow students are envious of the background in biochemistry that he received as an undergraduate in our department!



Silent Camp Heroes

Many people in our department and beyond understand just how important our camps are and tirelessly support them. Some of this year's heroes include the following.

Drs. Jeff Harris, Lelia Kelly and Mike Williams (camp directors); Jerome Goddard; Blake Layton; Richard Brown; John Riggins; John Schneider; Natrij Krishnan; Daniel Fleming, and Jonas King all play important roles as leaders, speakers and allowing campers to collect on their land and other... Several have been with us since the very beginning.

Dr. Jeff Dean our department head allowed us to use my old office, to stage the two camps and that made a huge difference! Most of our camp equipment (lights, sheets, collecting jars, spreading boards, nets, aquatic collecting equipment, igloos, ice chests, picnic supplies, etc.) is stored in my shop in Mayhew and we have historically staged camp from there. Before camp we sort and check out and wash the nets and other equipment in my shop. Many volunteers, staff and faculty have worked in my shop cutting spreading boards, making collecting jars, etc. for camp and we typically move equipment to camp and back to Mayhew as needed during camp.

We have an incredible support staff: Lois Connington who feeds the arthropods and works with Audrey Sheridan to keep the pollinator garden the showpiece it has become; Melanie Chesser who assisted with purchasing; Kathy Breland who helps with so many things including parking passes; and Sherry McMullin who handles the money and sells insect boxes and pins. This year we enjoyed having Dr. Lloyd Bennett and Tim Burress on Bug and Plant Camp staff. Dr. Bennett is a retired entomologist and Mr. Burress works with Dr. Lelia Kelly and is knowledgeable about plants and running festivals. Anna Chromiak had ramps installed this year that enables me to more easily get to the north lawn where many activities occur during both camps!



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Joe MacGown created the art for the Bug and Plant Camp t-shirts this year and allowed us to collect on his land.

We have students who have been with us for so many years camp would be much more difficult without them: Breanna and Deanna Lyle with almost a decade of involvement with many of our outreach programs, Heather Blackwell formerly a high school biology teacher and now a graduate student in our department studying under Dr. Jeff Harris.

Peggy Guyton has the third longest tenure on the Entomology Camp Staff after Mike Williams and myself and is the magician behind the blacklight curtains! She has taken over the insect cooking job; repairs nets and sheets; moves equipment including the generator; arranges for meals and keeps the "bottomless fruitbowl for anytime snacks" stocked; watches for allergies as the camp medical forms come in and keeps the staff alert to campers' special needs. She is often referred to as camp's mom. She even has a special email address bugcampmama@gmail.com.

Wow, what a June! Reflecting during its closing days, it has been a most enjoyable and packed month. Two camps followed by a speaking engagement in Arkansas delayed the publication of the April-June Gloworm.

Honey was likely the Original Sweetener – and it's Use and Harvest was Preserved in a Cave Painting

Honey seems to have been our original sweetener, and remains a favorite. We discussed bee's pollination services and how they communicate the location of the best nectar and pollen during camps. We also ate honey in a variety of foods, and in beekeeping camp we made items from wax produced by bees.



The World's earliest art includes an 8000 year old image on a cave wall of a woman collecting honey, and this is also the earliest sketch of bees! This Mesolithic cave painting dates to the middle stone age. The water color (on the right) by F. Benitez Mellado greatly clarifies the cave painting and it was surprisingly an image Drs. Harris and Guyton were thinking about for a camp logo, and so that happened!

What is New at the Extension Arthropod Zoo?

We have cow killers or velvet ants! These beautiful wasp looks like soft cuddly ants but looks are deceiving in this case. They are not ants and they are not cuddly. Notice the length of that wasp's stinger! Their sting rates a "3" on the Schmidt Sting Pain Index! To put that in perspective the much maligned fire ant is only a "1," a honeybee also comes in at "3" and the tarantula hawk and bullet ant that can make any person cry are at the extreme end of the scale with a "4." The length of the stinger in the photo should be enough to discourage you from handling these cow killers!



Photo by J. Guyton

Justin Schmidt at the University of Arizona, studying the evolution and purpose of stings, has developed a ranking system for stings, similar to the subjective Scoville scale for hot peppers. His descriptions range from humorous to excruciating.

Two, Two Striped Walking Sticks! This pair of two stripe walking sticks (*Anisomorpha buprestoides*) were very distracted and easy to photograph! When they feel threatened the so called devils darning needles or prairie alligator have the capacity to accurately squirt a strong smelling and irritating defensive chemical that discourages mice, beetles, birds and others. The spray can cause eye irritation that lasts for a few days. They are active until the fall and deposit their eggs in leaf litter or soil.



Photo by J. Guyton

A Hissing Cockroach Having Babbies! Hissing cockroaches are livebearers as this photo suggests. Females sometimes expose their ootheca but then draw it back inside their body where the numphs hatch. They typically produce 20 to 40 nymphs at a time. With a 3 to 5 year life span we might need more aquariums!

The MSU Extension Arthropod Zoo is in Facing Hard Times

Unfortunately, even as one of the most requested tours on campus, it was not an exciting enough Extension outreach effort to continue being funded. Fortunately Lois, our incredible zoo keeper, will work for another Extension program. We will soon begin charging for tours and assembling a team of volunteers to try to sustain it. And we are already looking for a company interested in endowing the zoo, and donations.



Photo by J. Guyton



Bagworms are Entertaining Faculty and Visitors, and no this is not Pinocchio!

We have an outgoing tarantula that often accompanies us as we greet visitors to the MSU Extension Arthropod Zoo and now we have a candidate vying to be our Arthropod Zoo mascot, the bagworm! Guyton never dreamed how much fun they could be! "I wish that I knew what I know now when I was younger." [Ooh La La, thanks Rod Stewart]

Breanna Lyle found one wandering down the west hallway in Clay Lyle and it was perfectly comfortable on Arthropod Zoo Director Guyton's nose!

Bug Club Activities

Activity 1. Praying Mantis Season Presents a Wonderful Opportunity for a Seasonal Pet

The book of common names for praying mantises in all likelihood would list Mantie as the most common nickname for a Mantis pet! Mantis is the common name for any insect in the order Mantodea, and that name "praying mantis" may be the all-time misnomer or oxymoron among insect names! Slipping and spelling it "preying" would reflect its carnivorous behavior and Mantodea in Greek and Latin means "prophet!"

We have had several in our zoo and even given them numbers: Mantie 1, Mantie 2... Such is the nature of their popularity. There are several species in the southeast so it is possible to have several different ones in your arthropod zoo. We had four different species last summer. You can always explain that your interest is in determining if there are noteworthy differences in the species. Incidentally, there are over 2000 species of which several hundred have been kept as pets.

You may have found an ootheca on a hike through the woods and if so the mantid nymphs may be emerging any day. Watching them pull themselves out of their cells in the ootheca is a wonderful glimpse into their drive for survival. They hang from the case until their exoskeleton hardens and their legs unfold before beginning to explore their strange new world. Soon the stronger will be eating those less genetically prepared for survival. Praying mantids go through gradual metamorphosis where the nymphs resemble the adults. Later in the summer and fall you will find full grown mantids. If you are fast and observant you could make a collection of their shed exoskeletons – but you will have to remove them before they eat them because they are nutritious!

Critter keepers are suitable habitats for mantids. You need to be mindful of the size of the mantids. You might need to cover the vent holes on the top with some organza fabric or sheer material to prevent the nymphs from escaping early in their growth. Twigs will provide support for them to climb and hunt prey.

Nymphs can be fed fruit flies (*Drosophila* sp.), aphids or other small insects. Fruit flies often hatch from eggs laid in ripe fruit including bananas. Once you see fruit flies in the kitchen find that banana or apple and put it in the cage. Fruit flies are available from science supply companies and come in vials with cotton plugs. You can chill the fruit flies in the refrigerator to slow them down and separate into the pill bottles where you have numphs. Push a cotton ball into each bottle and watch them grow! Make sure they do not run out of fruit flies. As they get bigger they can eat larger insects. I find aphids on goldenrod beside my shop and put 6 or 8 inches of goldenrod stem in the cage with the mantids. I often stick the stem in a vial of water to keep it fresh a little longer. As the nymphs begin to grow their carnivorous nature comes into play and they may need to be quarantined. Any kind of small container will work, for a while. Letting them eat a few of the weaker nymphs may not be a bad idea; it is the natural way... As they grow they can eat increasingly larger insects: flies, roaches, crickets, moths and other insects. They grow by shedding their skins, which they often eat. They are comfortable at room temperature.

Now, let's play with them. Careful observations will reveal the human-like trait of looking straight at you and turning their head to watch you. They groom themselves, hold food with their front legs, they stalk and capture prey.

Activity 2. A New Reason for Summer Cleaning and Chasing Bugs. May was Asthma Awareness Month and a good reason for Spring Cleaning, and Now It is Time for a Summer Cleaning!

Asthma is a chronic respiratory disease that can be life threatening. Over 20 million Americans, including approximately 3 in every class of 30 have asthma. There is no cure however it can be controlled with medical treatment and environmental triggers can be minimized. One of our activities for this quarter is minimizing those triggers with summer cleaning and spending quality time outdoors! And that is where reducing the bugs comes in.



Photo by J. Guyton

Avoiding the heat of summer, computers, television, smart phones, school and protective parents are among the reason we spend 90% of our time indoors – and indoor allergens and irritants are responsible for triggering asthma attacks. So, grab a net and head out to collect some insects before summer is over. Now while you are collecting be sure to examine dragonflies, Bess beetles and other insects for mites. I have seen beautiful red mites on dragonflies and brown ones on the Bess beetles. The honey bee in the photo has a red *Varroa destructor* mite on its thorax. You can see some of these mites with your naked eyes.

Some of the smaller dust mites (0.3mm) that triggers asthma, you will encounter indoors and they can be seen with a magnifying glass or microscope (40X works fine). Jeffery Miller, MD has a YouTube <https://youtu.be/vlsxTB9dHg> that will give you some idea of the activities occurring on the cover of your pillow or mattress or the dust on your shelves and their poop to which we are all allergic to some degree. In this video you can see adults, nymphs, eggs and fecal particles, their principal allergens. There are dust mite detection kits, but they are pricy! Get a good magnifying glass. The cause of asthma is unknown and there is no current cure, but asthma can be controlled. Indoor triggers include mold, pets, pet dander, secondhand smoke, dust particles and ozone in addition to the mites we have already introduced.



Photo by Stephen Ausmus

Protection can include better air filtration, insisting smokers (most common asthma trigger) do it outdoors, use allergen proof pillow and mattress covers and wash sheets and blankets weekly and keep pets out of the bedroom and off furniture. Cockroaches and their droppings are asthma triggers so control pests by reducing clutter on kitchen counters and keeping them and the floors clean is important. Mold can trigger attacks and a dehumidifier coupled with washing and drying hard surfaces will help as will replacing moldy ceiling tiles or carpet. There are microbes (beneficial bacteria), or probiotics, in an aerosol can that you can use to reduce these mites but you should discuss this with your physician before using.

Resources

What You Can Do To Prevent Asthma by Joe Hubbard and Jennah Durant, Environmental Protection Agency, IPM in the South May 20, 2016

Activity 3. County Extension Office Honey Collection. There are several reasons counties may benefit from maintaining a local honey collection.

When a beekeeper donates honey to the county collection you should note the season and year it was produced on the jar and the plants the bees were working. Of course the beekeepers name should be on the jar as well.

Conducting Honey Tastings with Bug Clubs and other events!

A good way to conduct a honey tasting is to give each participant the number of toothpicks that there are honeys to sample. *Make it perfectly clear that double dipping is not allowed.* Each participant will sample each honey in turn dipping their first toothpick in the first honey, twisting it back and forth all the way to their mouth and then discarding the toothpick into a provided bowl. They may repeat the process with each toothpick in a different honey. Provide them with an index card on which they can make notes about the honey's flavor. Consider sweetness, texture, floral essence and other measures. This will be somewhat subjective but you can usually come to agreement with a group's favorite honey.

The second reason to experiment with honey is as an allergy treatment.

Conventional wisdom is that honey is good for allergies since bees use pollen to make honey. A corollary is that the best honey for allergies is honey made from pollen collected by bees in the immediate area and during the season allergies are affecting the consumer. It sounds good but accepting this theory is an example of experimenter's bias or observer-expectancy.

The lesser known scientific research is surprising and enlightening. The plants most people are allergic to are not frequented by bees. Ragweed that is a serious fall allergin, for example, is not utilized by bees and most seasonal allergies are triggered by grasses, trees, and weeds, not those blooming flowers! It gets worse, or better, honey is made from nectar, not pollen. The National Honey Board reports only about 0.1 to 0.4% pollen in honey.

Now, you could experiment with locally produced honey and its usefulness for allergies, at the office. This would be an exciting Bug Club Activity! When friends and colleagues are suffering from allergies allow them to eat a spoon full and record their reactions over the next few hours. Keep accurate records of the date, honey, producer, what plants the bees were working if they know, the dose, the experimenter and outcome. You might even want to record their expectation, but don't remind them of the placebo effect. Expect about a third to benefit from the honey and placebo effect!

Now remember, if it works don't knock it. A big cathead biscuit slathered with honey that supports your local beekeepers or farmers is much tastier and more satisfying than most allergy medicines!

Resource: Honey Bunches of Lies Why eating local honey won't cure your allergies by Rachel E. Gross, Slate: http://www.slate.com/blogs/bad_astronomy/2016/07/05/juno_enters_jupiter_orbit.html

And, we may just decide to have a honey tasting contest.

We might do this at an Annual Extension Conference and declare a county winner and a favorite Mississippi honey flavor! Dr. Harris and I will let you know when, and if, we decide to do this and what the rules and criteria will be.

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