



Bohart Museum Society

Spring 2023

Newsletter

No. 94

In This Issue

Here we thought spring was coming but so far its been a wild ride, cold and rainy. We've had several really popular events so far this year and the campus open house, Picnic Day, is coming up. We'll be open most of that Saturday so please come and visit.

As you'll see in this newsletter there have been some major comings and goings of insect taxonomists and museum personnel. Hopefully things will settle down for the remainder of the year.

If you have any insect or spider related topics explored in the next newsletter please let me know.

-Lynn Kimsey



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SPOTLIGHT ON A SPECIES

Earwigs, Fact, Fiction and Fantasy

by Lynn Kimsey



European earwig. *Forficula auricularia*. Photo by Stephen Luk.

Earwigs are widely disliked (loathed?) across the United States. Yet they have a lot of interesting biologies. First off, where did the odd common name for these insects come from? The urban mythology is that the name earwig derives from the predilection of these insects to crawl into people's ear canals, and burrow into their brains or lay their eggs there. Despite this commonly held idea, there is no evidence that earwigs in fact do go into ears. It is more likely that the name derives from the Anglo Saxon "ear wicka", which refers to the presence of earwigs on seed heads, or "ears" of rye. The order name Dermaptera, derives from the Greek words *derma* (skin) and *pteron* (wing). This refers to the odd, leathery forewings in earwigs, which hide/protect the hindwings.

The pinchers or forceps at the end of an earwig's abdomen are modified cerci. They are used both offensively and defensively. Female forceps are generally straighter than males. They are used defensively in a scissor-like fashion and for capturing and holding insect prey. Male forceps tend to be longer and more curved. Males compete with each other over territories and will grapple with other males using their forceps to grasp and often injure or kill their rivals.

Even though there are quite a few on-line discussions about earwigs hurting people either by crawling into their ears or pinching them, neither is likely to happen. At one point we actually tried to get earwigs to pinch us. The net result was that if they did pinch it was very mild, and never broke the skin or even really left a mark.

This is an ancient group of insects is thought to have originated in the mid-Jurassic. Some of the earliest fossils have been collected in Inner Mongolia and England. These were basically proto-earwigs. Modern appearing earwig fossils have been found from the Oligocene, between 60 and 23 million years ago.



Forficula auricularia male (left) and female (right) forceps. Photo courtesy of Univ. of Wisconsin Div. of Horticulture, Madison .

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Museum News

Bobbi Wilson

Bobbi Wilson, age 9, was honored recently by the Yale School of Public Health. She's a budding entomologist who collected spotted lanternflies a harmful invasive pest. Her collection was added to the Peabody Museum of Natural History database and she received the title of "donor scientist". This was in response to one of her neighbors calling the police on her saying that "there's a little black woman walking, spraying stuff on the sidewalks and trees."

The Yolo County library group decided that they should also honor her enthusiasm by giving her an honorary Yolo County Library Card. After they contacted us at the Bohart Museum we also contributed, giving her a Bohart pin, t-shirt and Bohart sticker.

We hope she continues her love of insects and might consider coming to UC Davis for college.

Bobbi Wilson showing off her collection of spotted lantern flies.



Rehousing the Slide-Mounted Specimens

Thanks to a grant from the National Science Foundation that we received several years ago we can now rehouse all (hopefully) of the glass slide-mounted collection that was housed in the hardwood cubes shown below. The grant was to recurate the museum tardigrade collection, but it turned out that we had sufficient space in the cabinets to rehouse other collections of slide mounted specimens as well.

The old wooden cubes were apparently converted library card files. They have several design problems for storing glass slides. First, each tray is open on the bottom with just the edges of each channel and a metal rod holding the slides in place. Second, the slides had to be stored vertically. Vertical storage led to another problem, which was that if the slide label glue failed the labels would fall off and get lost. So, this meant that each slide had to be covered with a plastic sleeve.

The new custom designed steel slide cabinets solved all

of these problems as each cabinet holds either 10,872 or 15,675 slides, with a total capacity of about 150,000 slides!

Converting the slides from one storage cabinet to the other is pretty labor intensive. In addition to moving the stacks of slides from the vertical storage to the horizontal trays about half of the individual slides have to be removed from a plastic sleeve.

Ironically these plastic sleeves are no longer sold and other collections use them. When we advertised their availability we were immediately contacted by the U.S. National Museum and the Natural history Museum of London

The Bohart Museum has

world class collections of tardigrade water bears, mites, thrips, pseudoscorpions, scale insects and mealy bugs, all mounted on glass slides. The mite collection won't be moved into the steel cabinets because they are already stored horizontally in one hundred slide slide-boxes.

The tardigrade collection of about 26,000 specimens is already housed in the steel cabinets, so now it is a matter of emptying the wooden cubes of that component of the slide collection, which includes thrips, pseudoscorpions, scale insects and mealy bugs.



Old hardwood glass slide boxes (left), and Brittany Kohler removing trays from the new slide cabinet (right).

MUSEUM EVENTS

Biodiversity Museum Day



Christofer Brothers and his walking stick friends.

Biodiversity Museum Day this past February 18 was a big hit with the public. Eleven collections on campus opened their doors to the public, including the Arboretum, Bohart Museum of Entomology, Botanical Conservatory, California Raptor Center, Center for Plant Diversity, Department of Anthropology Museum, Earth and

Planetary Sciences Paleontology Collections, Marine Invertebrate Teaching Collection, Museum of Wildlife and Fish Biology, Nematode Collection and the Phaff Yeast Culture Collection.

The Bohart Museum had a lot of support from both campus and off-campus organizations. Martin Hauser from the California Department of Food and Agriculture, Plant Pests Branch, came to show off scorpions and other live insects as well as some display drawers. Phil Ward and his ant lab graduate students manned a table all about ants.

Overall we had lots of families participate and we estimated that over 3,000 visitors came to the campus for the event. We had at least 1,500 visitors to the Bohart Museum alone.

All Biodiversity Museum Day photos were taken by Kathy Keatley Garvey.



Jenna and Finn Jensen enjoying a hissing cockroach.



Children playing with the magnetic display.



Ward Lab students Jill Oberski, Zach Griebenow and Ziv Lieberman displaying ants.



Martin Hauser showing visitors how scorpions glow under ultraviolet light (on the left).



Continued from page 1.

in 1975 Langston and Powell recorded ten species of earwigs in the state and 11 intercepted in quarantine stations California. Today the same ten species are still here. The vast majority of them are adventive, with their origins in Eurasia, the Pacific Basin and northern Africa. Only *Vostox apicedentatus*, the toothed earwig, is considered to be native to the southwestern U.S. including California. *Labia minor* (small earwig), *Euborellia annulipes* (ring-legged earwig) and *Anisolabis maritima* (maritime earwig) are basically cosmopolitan and their countries of origin are unknown. They appear to have been transported around the world in early commerce by sailing vessels, perhaps as early as the 16th century. The other exotic earwigs include *Labidura riparia* (shore earwig) from Asia, *Marava arachidis* (chief earwig) from north Africa, *Chelisoches morio* (black earwig) from the Pacific islands, *Doru lineare* (lined earwig) from Latin America, *Forficula auricularia* (European earwig) from Europe, and *Euborellia cincticollis* (African earwig) from Africa. This species is unusual because adults can be fully winged, brachypterous or wingless depending on conditions. Ironically, although its called the shore earwig, *Labidura riparia* is found across southern California from Los Angeles through the Imperial Valley, to the Colorado River.

Because earwigs appear to be wingless it is generally assumed that they do not

fly. In reality most earwigs can and do fly but mostly at night, so they are rarely observed. The exception to this is the European earwig, *Forficula auricularia*.

This earwig engages in a behavior apparently unusual for earwigs, it hilltops. Hill-topping is a behavior where males and unmated females often fly considerable distances to mating sites on landmarks like mountain tops. Hill-topping is well known in a variety of butterflies, dragonflies, bees and even beetles. Imagine thousands of earwigs flying to the top of Mount Diablo every June!

In all of our work in the Imperial Dunes we only saw earwigs once on the dunes. In 2007 we saw literally thousands of European earwigs in and around the dunes and the city of El Centro. Many of them were flying. Curiously, before and after that trip we never saw another earwig on the dunes.

Earwigs are generally found in sheltered sites beneath rocks and boards, in refuse piles and cracks in the soil. They have a somewhat unusual biology for insects, especially so-called primitive orders like Dermaptera. Earwigs give parental care to their eggs. Females lay eggs in groups or

clusters and then guard them until they've hatched and are large enough to forage on their own. When



European earwig. Photo courtesy of Kathy Keatley Garvey.

they hatch the juveniles of the European earwig remain together and will share food brought by their mother.

Juvenile earwigs resemble small versions of the female, and they don't develop the sexually dimorphic forceps until the last molt. Male forceps are longer and often more highly curved than those of females.

In California earwigs are both herbivorous and predatory, and given the opportunity many will happily eat other insects. Most species feed on dead and decaying plant matter, but will also feed on tender young plants, like seedlings and sweet corn. European earwigs can cause considerable damage to seedlings and soft fruit, like strawberries. They will also feed on small, soft-bodied insects like aphids as well as insect eggs. The exception to this is the maritime earwig, which is only found along shorelines of bays and inlets along the coast. It feeds on crickets, amphipods and even other, smaller earwigs.

Controlling earwigs in and around homes is largely a question of eliminating refuge sites. Earwig refuges include dense ground cover near vegetable gardens, dense weeds, and compost and rubbish piles. When they come indoors the simplest way to get rid of them is a vacuum cleaner. This is another argument against the widespread use of mulch. Mulch and particularly damp mulch or other ground covers should never be spread up to a building foundation as it not only encourages earwig populations but also termites.



Forficula auricularia guarding its eggs in its nest. Nabokov from Wikipedia.



European earwig guarding her young. Photo Wageningen University.

Museum News

Bio Boot Camps

Bio Boot Camps 2023 application is launched! We started this camp program for pre-teens and teens in 2011 with the UC Davis Museum of Wildlife and Fish Biology and the Campus Recreation Youth Programs. This year the junior high camp is based at the museums at UC Davis, but they will spend a night at the Bodega Bay Field Station along the coast. The high school camp is a full, sleep-away camp and they will be in the Sierra at Sagehen Creek Field Station and in the valley at the Quail Ridge Field Station. Besides offering a great opportunity for nature-minded youth, the camps are a great way for UC Davis undergraduate and graduate students to hone their teaching skills as paid instructors.

Camp tuition had to be raised this year, because the cost of food and van rentals went up this year. Thankfully, the Bohart Museum Society offers partial, needs-based scholarships for those campers who need it.

If you want more information about the program, visit <https://bohart.ucdavis.edu/summer-camps> or <https://campusrecreation.ucdavis.edu/recreation/youth-programs/summer-camps>

Bio Boot Camp Coastal session for campers entering grades 7, 8 and 9 will be June 20-23 .

BBC 2.0 – for campers entering grades 10, 11 and 12 will be July 30-August 5. Applications are due soon.



BBC 2.0 in 2022 working on their group project at Sagehen Field Station in the Sierra Nevada.

Jakob Jess

Over the past decade we've had a series of high school student interns working in the museum from the Met High School in Sacramento. The Met is a college prep charter school that works one-on-one with students to partner with local organizations.

All of the Met students have been fantastic and have contributed their hard work and creativity to the museum. Noah Crockett, who was featured in one of our previous newsletters came to us from the Met and went on to get a degree at Cornell University.

Our most recent student, Jakob Jess, has been with us since 2021. Jakob has been a big help, particularly with our outreach programs. He has spent the last few months preparing our banners and other signage for Biodiversity Museum Day.

Jakob has also been heavily involved in



Jakob Jess working in the Bohart.

designing and creating a number of exhibits for the museum, including one on insect bitten tea and cochineal.

Jakob graduates from the Met this spring and he's applied to a number of universities for next year, including UC Davis, UC Berkeley and Cornell University.

More California Dog Face Butterfly



Fran Keller wearing the Bohart, showing off a bottle of Dogface Cabernet.

Fran Keller holding a bottle of Dogface Cabernet Sauvignon produced by Lone Buffalo Vineyards and Winery in Auburn, California. Sales of the wine are funding conservation efforts by the Placer Land Trust to protect the Dogface butterfly's native habitat.

Bumble Bee Contest



Lynn Kimsey awarding Ria de Grassi the Bohart Franklin's bumblebee coffee mug.

This is the second year we've held the first bumblebee of the year on campus contest. We modeled this after Art Shapiro's first cabbage white butterfly of the year contest. This year Ria de Grassi photographed the first one seen, which was in her garden January 1!

CHANGING THE GUARD

Steve Heydon Retired

Bohart Museum collection manager, Steve Heydon, officially retired from the university November 2022. He began working at the Bohart Museum in 1990.

Steve started his career as an undergraduate entomology student at UC Davis. After graduation he went on to the University of Illinois Champaign Urbana where he received his Ph.D.

After completing his Ph.D. he worked for a brief time at the Smithsonian Institution before coming to Davis.

Brennen Dyer, New Collection Manager



The new collection manager at the Bohart is Brennen Dyer. Brennen began working at the Bohart as a UC Davis undergraduate and then as a full-time collection assistant. He took over as collection manager from Steve Heydon in November 2022.

Brennen is an enthusiastic collector and took responsibility for doing much of the field collecting and trap maintenance in the San Francisco Bay Delta for our contract with the California Department of Water Resources.

Brennen Dyer in the Bohart.

Justin O. Schmidt 1947-2023



Justin Schmidt with bullet ant.

Justin Schmidt passed away this year of Parkinson's Disease. He is best known as the creator of the Schmidt sting pain index. He claimed to have been stung by the majority of stinging wasps and bees in the U.S. and developed the sting index to rate sting pain. His ratings ran from the mildest, level 1 to level 4, the most painful, with colorful descriptions for each level (below). Level 1 included the western paper wasp and digger bees. Level 2 included the honey bee and bald-faced hornet. Level 3 included the neotropical red paper wasp and a velvet ant. Finally, Level 4, which included a species of tarantula hawk and bullet ants.

In 2015 his Schmidt sting pain index led to him win an Ig Nobel Prize in

Physiology and Entomology. This study caught the attention of major media outlets around the world.

Justin initially worked at the Carl Hayden Bee Research Center in Tucson, Arizona, where he studied the physiology, ecology and behavior of honey bees. In 2006 he moved to full-time work at The Southwestern Biological Institute where he became research director and studied the chemical and behavioral defenses of various stinging wasps, ant and arachnids.

Schmidt Sting Index

Pain Level 1 —"light, ephemeral, almost fruity. A tiny spark has singed a single hair on your arm."

Pain Level 2 —"the debilitating pain of a migraine contained in the tip of your finger," or "hot and smoky, almost irreverent. Imagine W. C. Fields extinguishing a cigar on your tongue."

Pain Level 3 —"After eight unrelenting hours of drilling into that ingrown toenail, you find the drill wedged into the toe."

Pain Level 4—"pure, intense, brilliant pain...like walking over flaming charcoal with a three-inch nail embedded in your heel."

Paul A. Opler 1938-2023



Paul Opler in the field.

Paul Opler was best known for his work on butterflies and moths, including writing several Peterson Field Guides. He originally worked for the Federal Department for Endangered Species and later for the U.S. Geological Survey in Fort Collins, Colorado. After retirement he went on to work as a professor at Colorado State University.

Like so many entomologists of his generation he got a masters degree from San Jose State University, followed by a Ph.D. from UC Berkeley. He was then drafted by the U.S. Army where he studied mosquitoes and mosquito-borne disease.

ASK THE BUG DOCTOR

If you have an insect question, need advice, want an identification of something you've found, or would like to see an article in the newsletter on a particular topic let us know. Email us at bmuseum@ucdavis.edu.

Giant Lacewing in Arkansas



Polystoechotes punctata. Photo by Michael Skvarla, Penn State.

A giant lacewing, *Polystoechotes punctata*, was recently found on the wall of a Walmart store in Arkansas. This is the first record of this lacewing from the eastern U.S. since the 1950's. However, it may actually be a classic example of "if you don't look you don't find". As no one has surveyed the Ozark Mountains.

Coastal Lady Beetle Roost



Overwintering lady beetles. Photo by P.B. Kimsey.

An overwintering aggregation of lady beetles was observed for the first time in a grove of redwoods located in the Coastal Range of California in Napa County.

Giant Hornets in Washington



Washington State Dept. of Agriculture worker holding dead giant hornets from 2021. Photo by Elaine Thompson/Pool/AFP via Getty Images.

Despite extensive trapping efforts, with over 1,000 traps set in Washington State, no giant Asian hornets were found for the second year of trapping.

Yellow Fever Mosquito

The yellow fever mosquito, *Aedes aegypti*, has expanded throughout southern California, with populations found in the region of the San Fernando Valley and San Diego region. These mosquitoes are aggressive biters and bite primarily during the day. They are also small bodied and weak fliers, so they tend to bite lower parts of the body, particularly ankles.

Anal Catapult



Sharpshooter with droplet on anal stylus. Photo by Bhamia Lab., Georgia Tech.

Sharpshooter leafhoppers feed on xylem, which is 95% water and only 5% minerals and other nutrients. To feed effectively they need to remove excess water from the sap as fast as possible. Their guts are built to rapidly remove excess water. They also have a pointy anal appendage called the anal stylus. The stylus gathers a droplet of fluid, twists and catapults the droplet in a phenomenon known as superpropulsion.

Male Wasp "Stinging"



Male mason wasp stinging. Photo courtesy of Current Biology Sugiura.

Even though male wasps don't have stings, males in many species have genital capsules modified into sharp prongs. Studies of male mason wasps in the species *Anterhynchium gibbifrons* found that they use these pseudostingers to defend themselves from predators. The researchers found that frogs attempting to eat these male wasps spit them out in more than 30% of their attempts to swallow the wasps, as they were being repeatedly "stung". So there actually is a reason why the male genitalia of many wasps is so spike-like.



Drosophila melanogaster feeding on a banana. Photo courtesy of Sanjay Acharya, Wikipedia.

Male Drosophila Put Females to Sleep

It turns out that male *Drosophila* are known to transfer a "sex peptide" along with sperm when they mate. It was known that this makes the female less receptive to other males. But a new study discovered that this chemical also interferes with the female's biological clock, keeping them asleep at dawn when males are most active.



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**Don't miss
Picnic Day
April 15!**