SPOTLIGHT ON A SPECIES

Jerusalem Crickets
By Lynn Kimsey

The heaviest bodied insect in California, and probably the rest of western North America, is undoubtedly the Jerusalem cricket. These large insects belong to the genera *Ammopelmatus* and *Stenopelmatus*. *Ammopelmatus* is the genus of species found in the western U.S. and Mexico. It contains 20 described species. There are currently 19 species of *Stenopelmatus*; which occur in Central America. Unlike other crickets, Jerusalem crickets have really enlarged heads to accommodate their very large jaw muscles. They use their equally large jaws for feeding on tubers, roots and other plant material in the soil. Although Jerusalem crickets are thought to feed on plant material, they are also predatory, using their large jaws to overcome and dismember other insects. These crickets burrow in the soil and are sometimes found beneath logs, boards and other surface covers. They are active at night when they may be encountered on the soil surface.

This insect is so distinctive it has names in a wide variety of languages. The Latin name *Ammopelmatus* means sand (*Ammos*) foot (*pelmatos*). English speaking Americans refer to them as Jerusalem crickets or potato bugs. In Spanish they are called *niña de la tierra* and *cara de niño*, which refer to the large, smooth baby like head. The Navajo have several names, also referring to the insect’s large head, including *Ch’osh bitsiits’ii in lichi’i* (red skull bug) and *Wóó tsíts’íi’in/Yaa’ tsíts’íini* (skull insect).

The origin of the name “Jerusalem cricket” is unclear. One theory is that the name came from the cricket’s habit of feeding on Jerusalem artichokes. Another theory is that somehow we seem to have gone straight from winter to spring in a matter of a week or so. Everything is blooming and butterflies are out really early in the season. I’m hoping this is a sign of this being a new year and closer to back to normal than we’ve seen for a long time.

The museum is starting to get visitors again and we are going to be starting outreach programs shortly. The petting zoo has gotten very lonely without visitors to handle them.

*Picnic Day, the annual campus celebration, is returning after 2 years of video celebration. Please join us celebrating April 23!*  

-Lynn Kimsey
Patterson Donation

Bill Patterson holding a drawer of some of the swallowtail butterflies he has donated to the Bohart Museum.

This month Bill Patterson, long time butterfly collector and Bohart Museum Society member gave the museum a fantastic gift, a donation of $1 million to the Bohart Museum endowment. These funds are intended to help maintain the collection into the future.

Biodiversity Museum Day

Biodiversity Museum Day on the UC Davis campus was a great success. We were unable to hold the event last year due to COVID. This year we still had to be careful about the safety of our staff and visitors, so we held the event at the UC Davis Conference Center, with sign-up tours of the Bohart Museum and other campus collections.

Even with limited advertising we had over 1300 visitors attend the event, Kudos to our staff, volunteers, and the UC Davis Entomology Club for all of their work at this event. Everyone had a great time.

Auerbach Butterfly Donation

Early in March we were contacted by former graduate student Kathy Schick and Jackie Fulmer about a very large collection of butterfly memorabilia accumulated over the decades by Dr. Stevanne Auerbach in Berkeley. The family had decided that her collection needed a new home. This collection was designated by the Guinness Book of Records in 2017 as the largest butterfly themed collection of memorabilia. The entire collection filled 70 Bankers Boxes in a storage facility. Brennen Dyer and Steve Heydon picked up 35 boxes of materials ranging from books to vases, all with butterfly motifs; totalling nearly 1,000 items, including books, key fobs, toys, bird houses and many other different items.
## More Museum News

### Butterfly Girl

Some of the butterfly themed items from the Auerbach collection have particular attraction for kids. Piper Berks got to try out a butterfly costume that was part of the donation.

Piper Berks trying out a butterfly costume that was part of the Auerbach donation. Photo by Rasilind Berks.

### Eric Grissell and the Director’s Fund!

The Bohart Museum is excited to announce the creation of the “Bohart Museum Director’s Fund”! This fund, established by significant gift from entomology alum, Eric Grissell, was created to ensure the ongoing role of a museum director within the Department of Entomology and Nematology.

Eric Grissell earned his PhD in entomology from UC Davis and worked with Richard Bohart as an undergraduate student and later became his research assistant. Some of his fondest memories of UC Davis involve professor Bohart and the museum.

The Bohart Museum has grown from an original collection of two small, wooden boxes containing about 200 insects to housing one of the most extensive collections of insects in North America. The Bohart Museum proudly features more than seven million specimens in 18,000 drawers.

“IT is important that the Bohart Museum has a secure director, or chair, so that it will continue to function as a teaching and research source in the future,” Grissell said. “Museums are valuable resources for securing and maintaining information about our ecosystems, but they tend to become ignored when it comes to considerations for funding. A permanent director would provide some assurance that the Bohart will continue to be valued into the future.”

We are thrilled by the creation of the “Bohart Museum Director’s Fund” and hopes Eric’s gift will inspire others to contribute to help the museum maintain its ever growing insect collections and expand its educational programs for the campus and the public.

To contribute to the Bohart Director’s Museum Fund or give to the Museum’s Current Use Support Fund please contact Abigail McCullough at 916-214-6263 or ammccullough@ucdavis.edu.

To view full length article on the creation of the Bohart Director’s Fund please visit caes.ucdavis.edu/news/uc-davis-alum-donates-gift-bohart-museum-it-celebrates-its-75th-anniversary.

### Upcoming Events

Now that things are more or less returning to normal the museum is participating in a number of events coming up that should be a lot of fun—

**April:**
- Picnic Day, Saturday April 23
- Take our Children to Work Day, April 28

**May:**
- Davis Loopalooza, May 2
- California Honey Festival, May 7

**June:**
- American Arachnology Conference
- Dogface butterfly 50th Anniversary Celebration, July 16
- Bio Bootcamp Group 1 (junior high), July 25-29

**August:**
- Bio Bootcamp Group (High School), July 31-August 6

### Museum Visitors

Carol and Ron McPeak from Vancouver Washington visited the museum during the first week of March. He studies scarabs, particularly in the subfamilies Melolonthinae and Dynastinae. He spent several days going through the museum collection of small dynastine scarabs and identifying material in our collection of *Cyclocephala*.

McPeak (right) is a research associate of the San Diego Museum of Natural History and the California State Collection of Arthropods, and he’s donated most of his very large collection of Scarabaeidae to that museum.

Ron McPeak at work in the Bohart. Photo by L. Kimsey.
the name came from a misinterpretation of the Navajo name by Spanish priests to describe the insect’s resemblance to a cross?! Better yet is the explanation that “Jerusalem” was supposedly used as an expletive in the 1800’s, and upon finding one of these insects under a log one would be startled and say “Jerusalem”.

Stoffolano and Wright* proposed that various Hopi carved figures (katsinthithu) and dancers (katsina) are actually representations of Jerusalem crickets. These figurines and the costumes worn in dances all emphasize a large bald, dome-like pale colored mask, with small black eyes.

A common myth about these insects is that they are poisonous. In reality they are not poisonous and are actually important food for a variety of birds and mammals, not to mention humans. They can give a painful bite with their powerful jaws, but you have to work really hard to get bitten. Some of these crickets also emit a foul smell when disturbed.

As you’d expect in a heavy bodied insect that can’t fly and walks slowly, Jerusalem cricket species tend to be quite localized in areas with loose sandy soil or sand deposits. A number of species are restricted to dunes systems. The Kelso Jerusalem cricket, *Ammopelmatus kelsoensis* only occurs on the Kelso dunes. *Ammopelmatus muwu* is only found in the Point Conception dunes. *Ammopelmatus cahuilaensis* is found in the Coachella Valley, but particularly in the Algodones Dunes. Sadly, many of these dunes systems are at risk due to off-road vehicles and development.

Jerusalem crickets also differ from true crickets in the way they communicate, or sing. True crickets stridulate by rubbing their wing bases together. They “hear” stridulation using a small tympanum located near the base of each foretibia. Jerusalem crickets do things quite differently – they drum. Rather than rubbing two structures together these crickets strike the substrate with their abdomens. They can produce two different types of drumming, bursts and trills. Bursts are a series of individual drums, generally at one speed. Trills are groups of drums separated by clear intervals. Just as field crickets have species specific songs, Jerusalem crickets species can be recognized by their drumming. There is minimal variation in drumming within a population, and each sex drums differently. Jerusalem crickets “hear” the drumming using mechanoreceptors on their legs. In other words they feel the drumming.

Jerusalem crickets apparently do have what appear to be stridulatory structures on what’s left of their wings but there doesn’t seem to be any evidence that they use them.

Males and females both drum to attract the opposite sex when receptive. Courtship in these crickets is pretty vigorous and resembles a wrestling match. Males eventually deposit a sperm packet in the female, after which the she may kill and eat him. That’s certainly one way to guarantee paternity. Fertilized eggs are laid in clusters soon after mating. Hatchlings resemble tiny adults and can take up to two years to reach adulthood.

Jerusalem crickets are large bulky animals and are used as an important source of protein by a wide variety of animals including humans. Bats, foxes, coyotes and owls all feed on these crickets. During the winter in the Central Valley barn owl pellets are filled with the jaws of these crickets.

Collecting After Retirement!
By Glen Forister

Since I retired in 2005, my goal has been to return to my love of insects as I was diverted into horticulture SRA work at UCD in 1980. My objective was to learn what was around me and sharpen my identification and keying skills. I stayed near Roseville for several years then started going farther away every year within a three hour drive from home until I now have visited a lot of mountains, trails, meadows, creeks, and backroads.

I knew I was missing lots of insects with primarily daytime collecting so did some black-lighting but that was always difficult because being alone at night out there isn’t very safe and I didn’t have any friends except my son who accompany me in this ridiculous activity. Then over 3 years ago, I discovered that 20 watt black-lights over a bucket full of antifreeze opened up a whole new world of insects for me and for 3 summers I ran 2 or 3 sets of UV traps paired with Lindgren traps every week from 2 to 4 days depending on weather.

Locations were my Roseville home, a property in Loomis near Folsom Lake, and a property east of Colfax on top of a ridge.

I wondered how different the insect diversity was between those locations so I kept records of what I caught. That meant I had to know what the insects were. There were some I did not know, nor could I figure that out from the keys so I took advantage of BugGuide.net and learned a lot by posting images there and had a lot of fun doing that. The end result involved 433 different insect identifications as of last fall. Summarized in the Venn Diagram below by location (for example, all three locations share 59 sp, Colfax and Roseville share only 8 sp.).

My definition of species in the above discussion is any insect identified to an id which is different from any other insect, whether or not my designation is right or not and even if it has only been identified to generic level and given a number different than another in that genus.

It has been obvious that I had a good sample of the common insects. But, it surprised me how many “species” I had collected that were represented by just 1 to 5 specimens. Of the 433 species that I collected: 27% of the species I captured were represented by a single specimen, 12% by 2 specimens, 8% by 3 specimens, and 7% by 4 specimens. For a total of 54% of the species represented by 4 or fewer specimens.

I probably wouldn’t gather more of those rare species without a change of tactics, unless of course those species were just at a low density and no method of collecting would gather any more than what I have seen.

So, when I learned of a different trap design (called a V-FIT or a V Flight Intercept Trap) other than a Malaise trap, I built two to be used at Colfax and Loomis this year and up my intensity of UV trapping in my yard in 2022. I don’t think this is a well known trap and it costs a lot less and is less noticeable and more durable than a Malaise trap. It was suggested to me by Dr. William B. Warner (https://unsm-ento.unl.edu/workers/WWarner.htm) after he identified to genus a Clown Beetle I posted to BugGuide. He was uncertain what species it was so I sent him most of my Clown Beetle specimens to look at and he is investigating if what I posted is a new species or not. Anyway, my posting of it to BugGuide.net did put it on BugGuide’s range map for Paromalus being in CA which was my purpose for posting it.

Dr. Warner’s plans for this trap are on page 15 of this: https://scarabsnewsletter.com/scarabs_83.pdf. This is the trap I made being tested in my backyard. Obviously, I don’t have room to keep it up for long here.

I gave Dr. Steve Heydon at the Bohart Museum additional information about building this trap and I’m sure he would send it to you, or you can contact me and I’ll be happy to share.

I have also cooperated with my son Dr. Matt Forister (Great Basin Bug Lab) identifying and counting insects for his research efforts which has given me the opportunity to see insects from many states that I have never visited.

Well, time to prepare for this summer which is almost here. I thank the people at the Bohart Museum who have always answered any question I have had and I enjoy their newsletter immensely.
During this past summer, I continued with my usual seasonal travels throughout the western US in pursuit of collecting regional insects of both personal and Bohart Museum interest. In anticipation of some normalcy regarding the emergence of many species, primarily butterflies, previously encountered in the past, the drought had indeed produced one of those "worst case scenarios" via a dramatic absence of many spring and summer species. As one would expect during a severe drought, the normal spring bloom of both annuals and most perennials would fail and it did.

To begin, day trips in and around Kern County including adjacent mountain, desert, and coastal environs yielded few to nearly an abject absence of many species. I have witnessed droughts in the past in Kern, but nothing in the magnitude of this 2021 event. The southern Sierra (Green Horns) along with both Kern River drainages were a bust, followed by desert sites (Kelso Valley), Tehachapi Mountains, Mt. Pinos area, and adjacent Coast Ranges (Santa Margarita).

Along the eastern slope of the Sierra Nevada north to Bridgeport, conditions were not as severe during May with the appearance of small numbers of the usual spring species concurrent with a less than favorable bloom of both annuals and perennials. However, by June all had changed dramatically with a notable absence or near absence of otherwise common summer species at most of those sites visited (Bishop Creek/Whitney Portal).

Traveling the 395 corridor north of Lake Tahoe between day trips, conditions in the north were not much better than those occurring further south. The eastern Cascades were an equivalent disaster all the way north into the Ochocos (side trip) and Wallowas of NE Oregon. Many previously visited sites (John Day River) showed a similar pattern of few to no species of interest.

Surprisingly, many "green meadows" supporting marginal blooms, roadsides, and points of opportunity were either devoid or marginally supportive of small numbers of normally abundant species.

To add to the woes of the drought, this summer's conflagration of wild fires in many prime areas added to the disaster. It will be interesting to monitor the "recovery" of fire ravaged areas with respect to re-colonization focusing on the succession of species as areas regenerate.

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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 Asian Spiders**

A very large orb weaver called the Joro spider (*Trichonephila clavata*), native to East Asia, was first found in Georgia in 2013. Since arriving in Georgia it has spread throughout the state and appears to be in the process of spreading up and down the East Coast. These are brightly colored large orb weavers with a leg span of up to 5 inches! Their webs appear golden and may be several meters in diameter. These spiders are spectacular but essentially harmless.

**Brown-Tailed Moth**

The brown-tailed moth, *Euproctis chrysorrhoea* (family Erebidae), is another invasive from Eurasia. It was introduced into the U.S. in the 1890’s. Eventually this moth was found from eastern Connecticut to New Brunswick. However, in the late 1900’s the population collapsed, possibly due to the introduction of a parasitic fly to control spongy moth. It is now expanding again in coastal Maine.

There are two problems with this moth. The caterpillar’s hairs are toxic to humans, due to chemical and mechanical irritation. They cause a poison oak like rash that may last several weeks. Even the separated hairs can remain toxic for several moths. The caterpillars can become quite abundant, defoliating deciduous trees, particularly pear and apple trees feeding in groups, much like spongy moths.

February is now officially brown-tailed moth month in Maine.

**Countering Beehive Thefts**

During almond pollination season in California about 1.5 million honeybee colonies are needed to pollinate the almond orchards. This is about 75 billion bees. Beekeepers bring their colonies into the state from as far away as the Midwest. Because of the need for honeybee pollination, beekeepers this year were paid up to $230 per hive to rent them for almond pollination. This results in colonies being stolen during almond season. This year over 1,000 beehives were stolen, with the largest theft from Mendocino Co. These thefts can put beekeepers out of business. As a consequence, beekeepers are now fitting their hive boxes with GPS trackers, security cameras and even a clear liquid that is visible under UV light.

Yet another invasive species, the oystershell scale or *Lepidosaphes ulmi*, is causing major problems in Colorado aspen forests. The females hard scales have a oystershell shaped cover. These small insects feed on the sap of a wide diversity of woody shrubs and trees. They can become so abundant on the bark that the color of the trunk appears differently. Large numbers of these scales can lead to the death of a branch or even kill the entire tree. This is what is happening in Colorado’s aspen forests.

The geographic origin of the oystershell scale is unknown. It is now found in nearly every temperate region globally.

**Western Monarchs**

The populations of monarchs overwintering in California appear to have rebounded. A year ago only several thousand were counted in an annual count done by the Xerxes Society. This year the number was close to 250,000. This was a substantial increase in numbers but short of the millions once observed in the state.
Bohart Museum Society
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Picnic Day is coming!
April 23rd