



Bohart Museum Society

Summer 2021

Newsletter

No. 87

In This Issue

Because this is our 75th anniversary it seemed appropriate to devote part of the newsletter to the history of the Bohart Museum.

Later this summer or early fall we will be sending out invitations to our members for a special open house/party. We hope to be open by then. In any case we will post our official reopening on the Bohart Museum website absolutely as soon as we find out.

So many random things have happened this year, including COVID and a relentless drought, that it is hard to cover everything. We hope you are all well and taking care. See you soon!

-Lynn Kimsey



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SPOTLIGHT ON A SPECIES

History of the Bohart Museum

By Lynn Kimsey



Baldo Villegas giving a tour in the museum in Briggs Hall. Photo by ML Siri.

The Bohart Museum of Entomology is celebrating its 75th anniversary this year, so it seems appropriate to do a story on the history of the museum as part of our celebration.

The Bohart Museum collection was “founded” you might say in 1942 and was based on the contents of two Schmidt boxes, one containing bees and the other flies; perhaps 200 specimens, which were assembled for teaching purposes. At the time the Entomology Department was housed in the old Botany Building, located near Putah Creek. Today this building is called TB9. The insect collection was established with a staff collection manager between 1946 and 1956. The department moved twice more after this site. In the 1960’s the Entomology Department moved to Robbins Hall, as did the collection. Then in 1971 Entomology moved into the newly constructed Briggs Hall, and the collection received its own space on the third floor. At the time of the move, the collection held roughly 500,000 specimens.

In Briggs Hall there was no budget for the collection, so the collection manager, Bob Schuster, built cabinets out of plywood. The cabinets were painted according to the insect order they housed: Hymenoptera cabinets were red, Diptera purple, Coleoptera brown, Lepidoptera yellow, alcohol preserved specimens green and minor orders orange. There was also little money for glass-topped drawers, so much of the collection was pinned onto 5x7 inch cardboard flats, on drawer-sized cardboard trays.

The museum started doing tours through the collection for K-6 school groups. They were mostly led by Robert O. Schuster and Baldomero Villegas, a graduate student studying under Prof. Richard M. Bohart.

To get the museum recognized as a campus institution, a group in the entomology department pushed to have the museum named in honor of Prof. Bohart. In 1983 the museum was officially dedicated by Chancellor James H. Meyer as the R. M. Bohart



Arthur T McClay (left), Robert O Schuster (center) and Steven L Heydon (right).

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MUSEUM NEWS

People

We have three new folks working in the museum this summer, Amberly Hackman, Steven Hobbs and Severyn Korneyev.

Amberly Hackman is an undergraduate here at UC Davis, majoring in Entomology with a minor in Global Disease Biology. She started as a volunteer in the museum and is now working full time over the summer. She is helping us curate the Huston specimens from west Texas.

Steven Hobbs is a transfer student from Folsom

Amberly Hackman.
Photo by LS Kimsey.



City College. He started at UCD in fall 2020, sadly the beginning of the COVID year and is majoring in biochemistry.

Severyn is a dipterist and he's working as a postdoctoral researcher here at UCD in collaboration with the Bohart and the California Department of Food & Agriculture in Sacramento, funded by a USDA fruit fly grant.

He comes to us from the Ukraine. He received his PhD from the Schmalhausen Institute of Zoology NAS of Ukraine for his work on the fruitfly

Steven Hobbs.
Photo by LS Kimsey.



genus *Tephritis*. He was then awarded a Fullbright Fellowship to continue his work on *Tephritis* at Michigan State University before coming to California. Aside from his work on fruit flies he spends one day a week sorting and identifying our unsorted Diptera, particularly Syrphidae and Platystomatidae.

Severyn Korneyev.
Photo by LS Kimsey.



Spider Wasp Collection

Over this past Memorial Day weekend we went to Brookings, Oregon to retrieve Marius Wasbauer's huge pompilid spider wasp collection. We rented a 20-foot U-Haul truck to bring the collection down to Davis.

The collection was housed in eighteen 24-drawer insect cabinets and 180 glass topped drawers. It contained of an estimated 50,000 specimens of aculeate wasps, 95% of which were spider wasps. Each cabinet had to be emptied of

drawers and carried downstairs to the front of the house. Then each cabinet was loaded onto the truck and refilled with the correct drawers.

It turned out to be a very long but productive 3-day weekend.



Brennen Dyer and Bob Kimsey moving specimen cabinets downstairs.
Photo by LS Kimsey.



Unloading the spider wasp collection at UC Davis. Bob and Lynn Kimsey in the truck. Becky and Mike Whitney on the left. Brennen Dyer on the right. Photo by SL Heydon.

What is to Become of the Monarchy? Not the House of Windsor—the House of *Danaus plexippus*

By Art Shapiro



Close-up of monarch egg. Photo courtesy of Kathy Garvey (see page 6 for more).

Public and media concern for the fate of the Monarch is at an all-time high. Although I am not and never have claimed to be a “Monarch expert,” I am being contacted almost daily. The reason for this, in a nutshell, is that my long-term monitoring project, which embraces some 150 butterfly species at ten sites across California, generated the longest run of Monarch population data during the breeding season on the West Coast. While the Monarch is not a focal species in my research program, I do have opinions about its situation—which I always qualify as mere opinions, not “proven facts.” I wish everyone who voices public opinions on the Monarch would be equally candid.

At any rate, much of what is passing for conventional wisdom about the Monarch in my humble opinion is bunk.

There is no “milkweed shortage.” The idea that Monarch declines are being driven by a lack of host plant originated in the Midwest and originated with the anti-GMO crowd, who are always looking for ways to blame the end of the world on Monsanto. Supposedly, the introduction of genetically-engineered “Roundup-ready” crops freed farmers to blanket the countryside with herbicides, killing off the milkweeds. So we are all supposed to plant milkweed to try to replace the losses. The problem is that there is absolutely no convincing evidence that there is any shortage of

milkweed. Indeed, in the Midwest, where the problem was supposed to be most acute, Monarch breeding populations virtually doubled in one year—what were they breeding on, press releases? Here in California the weather was exceptionally favorable for milkweed for three consecutive years before severe drought impeded growth this year. Despite an abundance of milkweed there was virtually no detectable breeding—I’m in the field over 200 days a year and I have not seen a wild Monarch larva on my transect in three and a half years. It doesn’t matter how much milkweed there is if there are no butterflies to use it! Planting milkweed is harmless enough and it makes people feel they are doing something helpful—even if it isn’t.

It’s worth mentioning that a few years before the “milkweed shortage” story emerged, GMOs were being blamed for Monarch declines via a totally different mechanism. Corn was engineered to produce BT toxin, a bacterial anti-caterpillar agent, which obviated the need to spray for Lepidopteran pests. Supposedly, windborne pollen containing BT toxin was being wafted over milkweed, contaminating the foliage and rendering it toxic to Monarch larvae. A pox on Monsanto! Except that scenario was thoroughly debunked. Now, supposedly, there’s no milkweed left to be contaminated...

Tropical milkweed is not a villain. Tropical Milkweed, *Asclepias curassavica*, has been grown in California gardens for over a century and was never accused of being evil until very recently, when the native-plant lobby, which views non-native plants the way anti-immigration activists view human immigrants, decided it had to be responsible for Monarch declines. It is the usual host of the Monarch throughout the American tropics and subtropics, and of the South

American Monarch, *Danaus erippus*, in temperate Argentina where I know it well. Tropical milkweed does not go winter-dormant unless there is a hard freeze (which is likely to kill it!), so, unlike native species, it is potentially available for Monarchs to breed on in winter. Except Monarchs aren’t supposed to breed in winter, and until about 10-15 years ago, they didn’t. The Monarchs that overwinter in clusters on trees near the coast are in what is called “reproductive diapause.” The females are not ovulating, and the males are not courting. This dormant condition is under hormonal control and, like migration, is regulated by the interaction of daylength (photoperiod) and temperature. Similar phenomena occur in all kinds of organisms that display reproductive seasonality in mid-latitudes—birds, fruit trees, garden flowers, butterflies. In general, warm nights require longer nights (shorter days) to induce winter-type physiology. The tropical milkweed haters claim that the availability of the plants is actually responsible for the fact that increasing percentages of Monarchs are failing to enter diapause and are actually breeding in winter. But the plants never caused such phenomena before! It seems much more likely—and potentially testable! - that climate change (nocturnal warming

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Tropical milkweed, *Asclepias curassavica*. Photo by Jee & Rani Nature Photography, Wikipedia.

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RM Bohart receiving a 21-net salute during the museum dedication in his honor.

Museum of Entomology in honor of Prof. Bohart. He was given a 21-net salute at the end of the dedication.

In 1994 the museum received a large National Science Foundation facilities grant. Chancellor Larry Vanderhoef offered the museum new space in a newly constructed building as the campus match for the grant. In 1994, after spending a year packing the collection materials, the Bohart Museum moved into a 5,000 sq. ft. room in the middle of the Academic Surge Building. The grant enabled us to purchase a mobile shelving system that could accommodate 18,000 glass-topped drawers.

Additional NSF grants made it possible to modernize and upgrade the Bohart collections. We rehouse the scale insect, mite and tardigrade slide collections, moving them from vertical storage in 100-slide polystyrene, cardboard and wood slide boxes into steel storage cabinets each with a 30,000-slide capacity. We also replaced the scanning electron microscope (SEM) that once filled an entire room in Briggs Hall and was decommissioned when the museum moved into the Academic Surge Building, with a digital desktop SEM. In 2008 a collaborative grant with the UC Davis Museum of Wildlife and Fish Biology made it possible to rehouse the alcohol preserved collection from painted plywood trays in plywood cabinets into stainless steel trays in steel flammable storage cabinets, as well as standardizing jars and vials. Needless to say, this made the campus fire marshal very happy.

In 2020 the Bohart Museum Society funded a tardigrade water bear sculpture to go in front of the Academic Surge Building. The sculpture, by Solomon Bassoff, was dedicated in honor of Robert Schuster who built a large part of the museum collections and particularly the tardigrade collection.

Between 1994 and today the collection has grown from 1 million to nearly 8 million specimens. The museum incorporates about 30,000 new specimens annually. Bohart now houses seventh largest insect collection in North America, second only to the California Academy of Sciences in the western half of North America. Collection specimen holdings now include pinned, alcohol stored, insects on dried plant material and glass slide-mounted specimens in seven phyla, including arthropods, tardigrade water bears, velvet worms, leeches, land snails, flatworms, horsehair and lung worms.

There have only been a small number of full-time museum personnel and a large number of volunteers. Since the museum was founded there have only been two directors, Richard M. Bohart (1956 to 1987) and Lynn S. Kimsey (1989 to present), who was one of Bohart's last graduate students. Only three Collection Managers have taken care of the collection, Arthur T. McClay (1946 to 1966), Robert O. Schuster (1966 to 1988) and Steven L. Heydon (1991 to today).

Today the museum has a four-way mission, support of basic research, supporting campus teaching programs; providing public educational outreach programs, and providing insect, spider and mite information. Museum staff have been involved in a number of biodiversity surveys in California (Algodones Dunes, Imperial Co., Tolowa Dunes, Humboldt Co., Monvero Dunes, Fresno Co., California Channel Islands, and Carrizo Plain, SLO Co.), and internationally (Sulawesi,

Indonesia, Mindanao, Philippines, Cuzco highlands Peru, Chile, Nicaragua and Panama). In addition, more than 2,000 new insect species have been described from the museum collection holdings, including *Neopalpa donaldtrumpi*!

We do a lot of educational support for campus classes and K-12 school groups, with specimens, live insects and exhibit materials. In normal, non-COVID times we take programs to nearly 40 schools, state and county fairs, libraries and other sites, and average 13,000 visitors to the museum annually. Huell Howser of California's Gold fame visited the Bohart twice. We offer summer Bio Boot Camps with coastal and mountain sessions for students grades 7-9 and 10-12.

The Bohart Museum's information activities include the several websites. We work with folks who think they are infested with skin parasites. The museum also has 78 different information pages on common insect, ticks and other beasts found in and around the home.

In the future the museum will need more space. The collection currently contains 17,000 drawers of pinned specimens, leaving space for only 1,000 more. We are anticipating the donation of several large collections in the next couple of years. We're hoping for a campus museum building!



View inside the museum compactor range.

MORE MUSEUM NEWS

In Memorium

Marian H. Frazier

Dec. 15, 1922-Apr. 17, 2021



Norm and Marian Frazier.

Norm and Marian Frazier were long-time supporters of the Bohart Museum. We miss them both very much. Norm donated his large collection of cicadellid leafhoppers to the Bohart.

Marian Frazier's early years were spent in the Sacaton area outside of Phoenix, AZ. At the age of 9, she and her parents moved to Shafter, CA. After graduating from Shafter High School in 1939, she attended her beloved Pomona College and received a B.S. degree in Biology in 1943. Following college and a stint clerking for the local rationing board during WWII, she made her way to Berkeley, CA where she was employed at UC Berkeley in the Nematology Department. It was there that mutual friends introduced her to her future husband, Norman Walter Frazier.

Marian and Norm were married in October, 1946 at her parents' home and they spent their first year near Visalia, CA where Norm was working at a UC research station. They returned to

Berkeley where they settled and raised two daughters. Norm was with the Entomology Department at UC Berkeley until his retirement. Marian was primarily a homemaker, but she also worked for UC Berkeley during the 1960's. A highlight for the family was a year's sabbatical in England during 1955-56.

Two years after her husband's retirement in 1974, they moved to Davis. Marian became involved in the Sacramento Braille Transcribers, and was a member for over 30 years, serving as President between 1995-1997.

She and Norm were members of the Davis Community Church, the Bohart Museum, the Senior Center, and were Friends of the Davis Arboretum. A resident of the University Retirement Community since 2000, Marian was known for her lovely and abundant rose garden. It gave her great pleasure to share the blooms with friends and with patients in the Skilled Nursing and Special Care Units. Marian loved nothing better than tending to her family, particularly spending time with her grandchildren, but a close second was having a cat or a dog on her lap!

Marian Frazier was preceded in death by her husband of 54 years, Norman. She is survived by two daughters, Jean Graving and her husband, Jon, and Barbara Holderreed and her husband, Glenn, and two grandchildren, Stephanie Nicholson and her husband, Mac and Michael Holderreed of Auburn, AL. She is also survived by one great-grandson, 3-month old Silas Nicholson.



Donation

Michael Huston Collection



Michael and Mary Ann Huston and their donation to the Bohart. Photo by Lynn Kimsey.

This spring Michael Huston and his wife Mary Ann stopped by the museum where they dropped off insects he'd collected over many years as part of field classes where he and his students collected insects at blacklights in west Texas. Until his retirement, Dr. Huston taught at Texas State University, in San Marcos, where he studied biodiversity and plant ecology. The vast majority of specimens were unmounted moths in the plastic containers imaged above. We estimate that the collection contains between 30,000 and 40,000 specimens all told.

Brood X Cicadas

Pastry chef, Sarah Dwyer of Chouquette Chocolates in Maryland is taking advantage of cicada Brood X to sell novelty candies, made of chocolate coated, air-fried cicadas. Tabatha Yang brought some into the museum for us to try. Apparently the candies are flying off the shelves...



Cicada Brood X



Brood X cicada. Photo courtesy of Emily Bzdyk.

Populations of these periodic species simultaneously emerge from the ground to become adults as a population only once every 13 or 17 years.

The other remarkable thing about these insects is that we only see the adults for a very brief period. The immature stages, or nymphs, live for 13 or 17 years underground and invisible, slowly feeding on xylem in the roots of deciduous trees.

When the adults emerge the males aggregate forming noisy choruses to attract the females. Once mated the females lay their eggs in the stems of woody plants and the cycle begins again.

The current spectacular emergence of the so-called cicada Brood X is only the most recent cicada event. In the eastern half of the United States there are both 13 and 17-year cicadas. All seven species of periodic cicadas belong to the genus *Magicicada*. For some unknown reason, no periodic cicadas exist west of the Rocky Mountains or elsewhere in the world.

★ Monarch Permits ★

In 2021 the State of California announced that any work with monarch butterflies in California will require a scientific collecting permit from the California Department of Fish & Wildlife. This permit requirement applies to any activities involving handling monarchs. This means that teachers can no longer use monarchs in the classroom without a permit.

More Monarchs

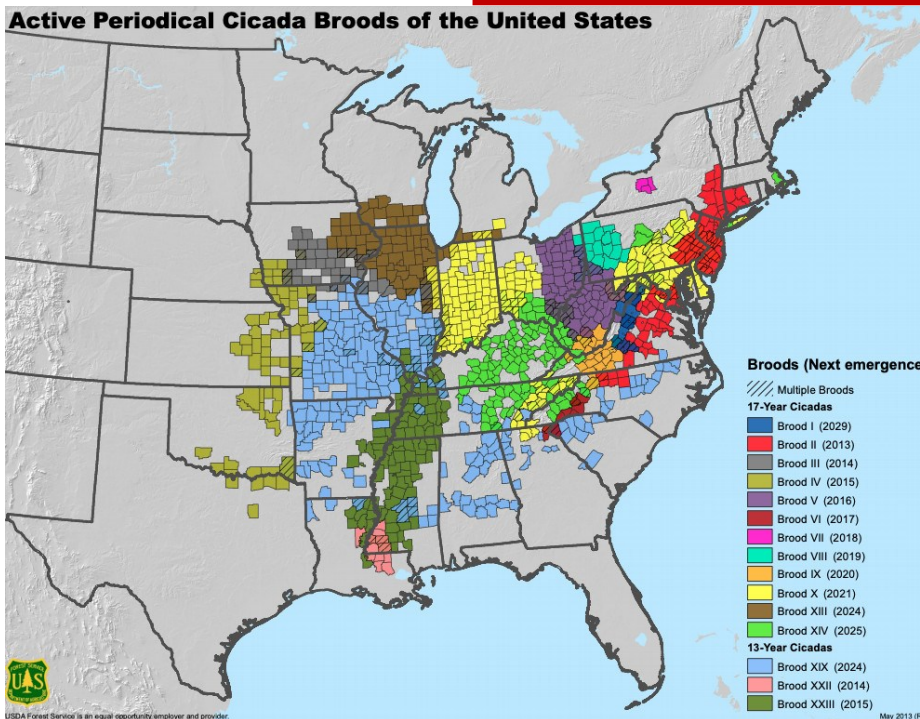
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is very well-documented) is driving winter breeding. The plants allow it to happen, but they don't cause it to happen. The one problem with winter breeding concerns buildup of infective pathogens (known as OE) on garden plants that are used again and again for breeding in the absence of alternatives. (OE doesn't usually kill, but it weakens the animal so it may not emerge successfully from the pupa and expand its wings fully.) Historically, Monarchs moved around constantly and rarely bred on the same individual plant twice in one year, so there was no such problem. The tropical milkweed haters want you to rip the plants out. If you like them, and many of us do, it makes much better sense to cut them back periodically, which induces fresh, uncontaminated new growth (and reblooming) and also helps control infestations of the Oleander Aphid.

There are other Monarch myths being promoted, but rather than continue debunking, I want to make a very important point: because it is "charismatic" the Monarch has become the poster child for insect and pollinator declines, but in fact *most of the lowland California butterfly fauna is in decline, and some species are in much worse shape than the Monarch.* And they have no connection whatever to milkweed. The declines appear to result from a "perfect storm" of climate change, habitat loss, and pesticides (especially neonicotinoids?). *If you want to be part of the solution, IMHO the most useful thing you can do is work politically for effective responses to climate change.*

Art Shapiro, Department of Evolution and Ecology, UCD, July 2, 2021

Monarch caterpillar.
Photo courtesy of Will Brown, Wikipedia.



Periodic cicada broods in North America. Map courtesy of the U.S. Forest Service..

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.

Beetle Invasion



Red grain beetles. Photo by Valerie Rios.



Tribolium castaneum. Photo by Peggy Greb, Wikipedia.

West Davis recently had an impressive invasion of red grain beetles, *Tribolium castaneum*.

More than 45 homeowners reported these beetles in their homes over the space of a month. Best we can tell, they were dispersing from grain fields to the north and west of town had been harvested about a month earlier and plowing, plus north winds let to a mass movement of the beetles into the suburbs.

New Asian Giant Hornet



Male giant Asian hornet discovered in Washington State. Photo courtesy of Washington State Dept. of Agriculture.

A dead male hornet was found this June in Snohomish Co., Washington. Although the specimen was dried out the color and DNA indicated that it was a different

form of giant hornet than the ones found previously. The hope is that this specimen fell out of a cargo container or something else brought from China, particularly since hornets only produce males in the fall.

Mystery Caterpillar



Sarah Caves sent us the photo above of a very monarch-like caterpillar. Dave Wagner identified it as a species of *Cucullia*, probably *laetifica*; a group of moths otherwise known as lettuce sharks. Sarah went ahead and reared the caterpillar, with the resulting moth above.

Crabronid Nest



Crabronid nest. Photo from Bonnie Brandt.

This nest was found underneath a tarp. It was posted by Nevada County Wildlife Sightings on Facebook. Not sure which crabronid but fully developed larvae and their prey caterpillars are visible.

Leaf footed Bug Eggs



Leptoglossus zonatus eggs. Photo by Will Crites.



Adult *Leptoglossus zonatus*. Photo courtesy of Wikipedia.

Will Crites observed these odd rectangular eggs on a leaf. They turned out to be the eggs of the leaf-footed bug, *Leptoglossus zonatus*.

Mystery "Eggs"

Recently we were sent this photo of mystery "eggs" found on bamboo leaflet in Long Beach, California. If you have any ideas of what these might be please let us know at bmuseum@ucdavis.edu.





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