SPOTLIGHT ON A SPECIES

The Plight of a Bumble Bee

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Franklin’s Bumble Bee, *Bombus franklini* (Frison), is a species in peril. It has not been seen since 2006, and may even be extinct.

This handsome bumble bee is endemic to southern Oregon and northern California. It has one of the smallest distribution ranges of any bumble bee known. It occurs between the Sierra-Cascade crest and the inner Coast Ranges from Sutherlin, Oregon, south to the Trinity Alps north of Weaverville, California (see map). A total range of about 190 miles north-south by 70 miles east-west, or an area of about 13,300 mi².

In 1973 when the Endangered Species Act came into being, Franklin’s Bumble Bee was considered a “Category 2 candidate species” (a term no longer used). This category was for species US Fish and Wildlife Service was aware might warrant listing, but there weren’t sufficient data to justify listing. This status for *B. franklini* was based primarily on its limited geographic distribution. Knowledge of its population status and specific biological characteristics: habitat requirements; potential threats to its existence; and other critical parameters that affect the persistence and viability of its populations were lacking.

In 1997, I was invited by US Forest Service to look into the status of *B. franklini* for potential listing. My surveys began in spring 1998. That year, I could find it everywhere I looked when I visited sites from historic locality records. I was even able to extend its range a few miles north and southwest. A few additional museum records were found to fill in its distribution.

Initially the species seemed to be doing well. It was in about the middle of the relative abundance scale for 20 species of bumble bees occurring within its range in 1998. So it did not seem to be a likely candidate for ESA listing. But suddenly, its numbers began to decline. Within a couple of years, I was no longer able to find it in many areas where it had been seen in 1998. A similar decline was noted for its nearest relative in the area, the western bumble bee, *Bombus occidentalis*. Both are members of the subgenus *Bombus*.

Since populations of many bee species fluctuate from year to year, it was not clear whether these dips were due to annual fluctuations or part of a long-term decline. After five years of monitoring data, it became clear that the downward trends in these two species were part of a long-term trend, especially since bumble bees belonging to other subgenera in the same area were thriving and some even increasing.

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UC Davis Museum Day

Saturday, February 2, 2013 marked the second annual UC Davis Biodiversity Museum Day. Six science museums, including the Anthropology Collection, Bohart Museum, Center for Plant Diversity, Geology Collection, Plant Conservatory, and Museum of Wildlife & Fish threw their doors open to put on a fun, afternoon public event.

The weather was perfect. Several thousand people visited the museums. We had more than 700 visit the Bohart Museum in the 3 hours of the event! Most of these organizations are closed to the public, so this was the first time most visitors have had the opportunity to view their collections. We also did demonstrations, herbarium staff did specimen preparation and answered questions. Wildlife Museum staff showed visitors how to prepare study skins and visitors got to handle reserved fish. In the Bohart, visitors got to handle live insects including our very game rose hair tarantula. More than 1,000 visitors came to the campus to explore the collections.

Next year we plan to expand museum with longer hours and more events.

MUSEUM NEWS

Wasbauer Matching Grant!

Many thanks to all of you who contributed so generously to match the challenge grant made by Marius and Joanne Wasbauer at the end of 2012. Your contributions totaled nearly $15,000, which has been added to the Museum’s endowment!

Thanks to:

- Anonymous
- Larry Allen
- Henry Borenstein
- Richard Brown
- Steve Clement
- Mark & Brenda Eberle
- John Edman
- Dave Faulkner
- Marion Frasier
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- Laurel Walters
- Marius & Joanne Wasbauer
- Bob Washino
- Rick Westcott
- Tom Zavortink

BioBoot Camp III

Bio Boot Camp is happening again on June 17-21! This is the third year the Bohart and the Museum of Wildlife & Fish Biology (MWFB), will be hosting this popular summer camp. Last year we had a blast exploring Davis and then an overnight at the UC Bodega Marine Laboratory. This year we will be spending several days at UC’s Sagehen Creek Field Station outside of Truckee where we will hunt reticulated beetles and common poorwills.

For more information or to download the pre-registration and scholarship forms visit: http://bohart.ucdavis.edu/html/summcamp.html

Thanks to the generosity of the Bohart Society members and the MWFB we can offer need-based scholarships.

UC Davis Museum Day

Megan Crawford (rear left) and Matan Shelomi showing off the museum petting Zoo to visitors.

Danielle Wishon demonstrating bed bug feeding on her arm to visitors.
Professor Ray Ryckman, from Loma Linda University, donated his impressive collection of triatomine kissing bugs, and many other insects, to the Bohart Museum. This collection is the result of his research spanning nearly half a century. Dr. Ryckman is one of the foremost scientists studying the blood-feeding kissing bugs and the pathogens they transmit to millions in the Americas, like Chagas’ Disease. The collection contains more than 20,000 specimens and includes 18 species of kissing bugs as well as 11 species of Tsetse fly and others.....

Triatoma sanguisuga; photo courtesy of Alex Wild. (alexanderwild.com)

Andrew Richard from the Bohart Museum and Prof. Ryckman standing in front of part of his collection at Loma Linda University.

M. A. Miller Isopod Collection

In the mid-1990’s Prof. Milton A. Miller donated his library and collection to the Bohart Museum. His collection held a rich diversity of terrestrial and marine Crustaceans: isopods and Tanaidacea (isopod-like invertebrates). Isopoda includes the common garden “rollie pollies”, pill bugs and sow bugs, but these are vastly outnumbered by a large fauna of marine species.

Through the Bohart Museum Society’s Visiting Scientist Program we invited two top specialists in the taxonomy of these groups of Crustaceans, Drs. Marilyn Schotte from the Smithsonian Institution, Washington, D. C. and Richard W. Heard from the Gulf Coast Research Laboratory, University of Southern Mississippi, to work on the collection.

They spent a week sorting and updating the names of the species and correcting the classification. As a result our valuable collections of these groups, which contains 20 species of Tanaidacea and about 200 species of isopods from all over the world, is accessible for scientific research.

Specialists Marilyn Schotte and Richard Heard.

Pill bug, Armadillidium vulgare. Photo by Franco Folini.
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Responses to a request for recent sightings of *B. occidentalis* via the listserv Bombus-List confirmed widespread declines in populations of *B. occidentalis* from central California to southern British Columbia, at least in populations of the species west of the Sierra-Cascade crest. Similar declines were being noticed in the two eastern species of the subgenus *Bombus affinis* and *terricola*.

What could cause these declines? Probably not the standard causes such as habitat loss and urbanization, since other bumble bees were thriving in areas where members of the subgenus *Bombus* were declining. My hypothesis: a disease, with members of the subgenus *Bombus* being most susceptible.

How could this happen so suddenly? In the early 1990’s a distributor of bumble bee colonies for greenhouse and field crop pollination was permitted to ship *occidentalis* queens from North America to Europe. Colonies produced from our queens by a company that also reared colonies of the European *terrestris*, (another member of the subgenus *Bombus*) were then imported back to the U.S. for crop pollination possibly bringing a pathogen acquired from *terrestris* with them. This hypothesis is being tested in collaboration with colleagues at the University of Illinois. Museum specimens collected before and after the 3-year window of colony introductions from Europe in the early 1990’s are being tested for the presence of DNA of the pathogen, *Nosema bombi*.

What is being done to protect Franklin’s Bumble Bee? It was listed as Critically Endangered on the IUCN Red List in October 2008. In September 2012, it was placed on the list of the 100 Most Threatened Species by IUCN (International Union for Conservation of Nature). It does not yet have U.S. federal protection. In June 2010, the Xerces Society for Invertebrate Conservation and I submitted a petition to list *franklini* as endangered. In September 2011, USFWS decided listing may be warranted and passed it on to the next step of the review process. Its status is still pending.

Meanwhile, I continue to search the historic range for the species. During the past four of my 15 field seasons, I have found small numbers of *occidentalis* suggesting this species may recovering as would be expected if there was disease resistance within its populations. I am hopeful that *franklini* is also out there “flying under the radar” at population numbers too low to detect.

The distribution of *franklini* is in the heart of the “Mythical State of Jefferson,” the area served by the NPR station, Jefferson Radio, in Ashland, Oregon. The State of Jefferson was the name adopted by a group from southern Oregon and northern California counties who planned to secede from their respective states and form a new state. Momentum for the movement built in late 1941. But the attack on Pearl Harbor shifted national focus elsewhere and the secession never took place. The concept of the state of Jefferson persists. Since *B. franklini* is endemic to the State of Jefferson, it would seem appropriate to consider it as the state insect. In doing so, I hope that Franklin’s bumble bee will not or has not become as mythical as the state it symbolizes.
MORE MUSEUM NEWS

Student Publications

Pokémon

I’m sure that the evolution of Pokémon characters, a popular video and card game, is a topic that has puzzled you for years. If so, Matan Shelomi, Andrew Richards, Ivana Li and Yukinari Okido recently published a paper titled A Phylogeny and Evolutionary History of the Pokémon, published recently in the Annals of Improbable Research.

The 2-minute Thesis!

Matan Shelomi (again) is one of the finalists in the PhD Comics, 2-minute video presentation of their thesis project. You can see Matan’s presentation at:

http://www.phdcomics.com/tv/#028

New Grad Student in the Museum—Ziad Khouri

Ziad started in the entomology Ph.D. program this past September and is working in the museum. He comes to us from Lebanon. He is interested in aculeate wasps and bees and is planning to do his thesis on revising the genera of Scoliidae.

The Dog faced butterfly Book is out!!!

The children’s book on the California state insect, the dogface butterfly, written and illustrated by Fran Keller, Ph.D. candidate, and Lanie Bauer, a recent UCD undergraduate is now published. You can see the book in the Museum and the museum gift shop, where you can also purchase a copy for $12.50. We have sent courtesy copies to The Governor of California, Jerry Brown, and the California Superintendent of Schools, Tom Torlakson.

Back and front cover of the book.

Scoliid from Saigon. Photo by Tom Roach.
INSECTS ON THE FAR SIDE...

Orkin’s Top 10 Bed Bug Cities
This ranking is based on the number of bed bug treatments done by Orkin Corporation in cities across the U.S. in 2012
1. Chicago
2. Detroit
3. Los Angeles
4. Denver
5. Cincinnati
6. Columbus, OH
7. Washington, D.C.
8. Cleveland/Akron/Canton
9. Dallas/Ft. Worth
10. New York

Society member Dick Meyer discovered and described this new, odd species of mosquito while doodling over a few beers in Queensland, Australia...

It is characterized by a number of unusual features as you’d expect from an Australian species...

- Female, with marsupial pouch (containing wriggler)
- Saltatorial meta-femur (jumping hindleg)
- Elongate abdomen (oddly tail-like)
- Elongate occipital scales (ears?)
- Reduced forelegs (kangaroo-like...)
- Wing scale patches (in the pattern of the Southern Cross)

A New Species of Australian Mosquito!

Trilobites???

Colleague, Donat Agosti, who studies ants, discovered this children’s sticker page (above) in a public market in Tehran. He thought we’d appreciate the English translations of the Arabic names for these insects, spiders and other invertebrates. See if you can find all the misidentifications. Hint, there are 22, including the title. Answers below.

Trilobites = Arthropods
Ichneumon wasp = fly
Bulldog ant = katydid
Cicala = katydid
Ant = plant hopper
Caseworm = caterpillar
Cicala = grasshopper
Beetle = OK
Adult dragonfly = OK
Red ant = spider
Spider = weevil
Firefly = caterpillar
Red tarantula = mite
Cicada = OK
Drone bee = OK
Tarantula = OK
Common cockroach = Scarab beetle
Hasan = OK
Common cockroach = OK
Common cockroach = OK
Common cockroach = OK
Red ant = OK
Dragonfly = OK
Cockroach = OK
Wolf spider = OK
Scorpion = OK
Cockroach = OK
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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.

The Beetle that Ate it All!

Every now and then you hear about something so peculiar it defies explanation. Beetles as a group seem to provide numerous cases that fall into this category, with truly astounding feats of longevity, intestinal fortitude or just downright perseverance.

Several decades ago the log cabin again became a very popular form of construction for summer or vacation homes, or homes in general. It seemed to be an ideal form of building -- relatively easy to put together, sturdy, self-insulating, and just generally an environmentally sound practice (if one overlooks the need to use stacks of whole trees for each wall). At the time no one anticipated just how habitat friendly this form of construction really was. Cabins built out of untreated logs soon developed their own fauna. The logs themselves were often already infested with wood-boring insects before they were used in construction. Once in place all kinds of wondrous (not to mention occasionally large and intimidating) creatures began to emerge from the logs, leaving behind holes and galleries in the wood. Most of these emergents were beetles, many small (the technical term used by scientists is LBB’s or “little brown beetles”); others were brilliantly colored in metallic greens and gold (Jewel Beetles in the family Buprestidae). This initial wave of emerging colonists may continue for years. Jewel Beetles for example, have been recorded to take as long as ten years to complete their development. Galleries and tunnels left behind then provide homes for new colonists — wasps, bees and more beetles. Unfortunately, some later colonists include termites and carpenter ants, creating the need for all kinds of environmentally unsound practices to keep the cabin from eventually being reduced to dust.

Wood-boring beetles can take a very long time to complete development. In the case of Jewel Beetles, there are records of fine furniture made from infested hardwoods, sitting in someone’s living room for more than two decades before adult beetles emerged. As a rule, the harder the wood, the longer beetles take to develop from egg to adult. Wood is a poor food source and the harder it is, the poorer it is nutritionally and mechanically.

Poor nutrition is one thing but downright poisonous foods are also part of the life history of some beetles. The most impressive is the cigarette beetle (Lasioderma serricorne). Although these beetles feed on a wide variety of stored products such as rice, dried fish, and spices, they received their common name because unlike many insects they can tolerated nicotine and are serious pests of dried tobacco leaf. (Before the discovery of synthetic insecticides nicotine was used on crops, particularly citrus, to kill pest insects,) Cigarette beetles will also feed on dried Chrysanthemums and cloves. Chrysanthemums were the original source of pyrethrums, a relatively recent class of insecticides, and clove oil is also a toxic chemical often used as a microbial sterilant. This beetle has truly impressive digestive capabilities, and it is amazing that there is any way to control it.

Then there are beetles that persevere in attempting to colonize places that are hazardous to their health. In the early days of communication, when telephone cables were sheathed in lead, the industry soon discovered that one group of beetles was attracted to the above-ground telephone cables. These powder post beetles (renamed California lead-cable borers) bored through the lead sheathing, allowing water to enter the cables causing short circuits. This activity reportedly caused one-fifth of the telephone cable troubles in southern California during the 1920’s and 1930’s. Apparently the lead had little or no effect on the beetles themselves.

Beetles are one of the most diverse groups of animals on earth, with at least one million species. They are so successful because they can inhabit nearly every environment and feed on materials that no other animal can tolerate. We are fortunate indeed that the one thing beetles do very poorly is parasitize other animals, and none have as yet developed a taste for blood.
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Visit the Museum today @
http://bohart.ucdavis.edu!