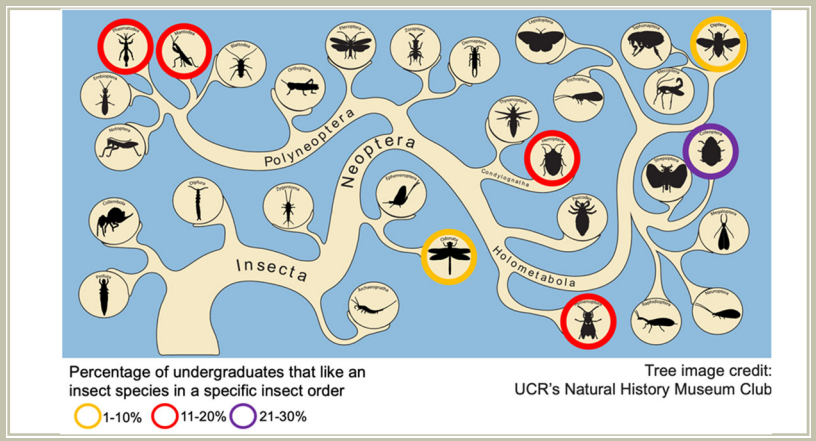
UCR ENTOMOLOGY

The Buzz

Looking back on 2021-2022

December 2022

Meet Our Entomology Undergraduates

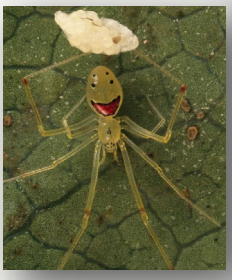


What are the undergraduate's favorite insects? Undergraduates in the Botany Entomology Undergraduate Student Association (BEUSA) answered the following questions to help us learn more about them and their enthusiasm for entomology.

Why did UCR undergraduates get into Entomology?

Many undergraduates at UCR got into entomology because of their fascination with insects and arthropods. Some loved bugs since they were young, while others were interested in studying their behavior or observing their small size and capabilities. For some, it was a subject they didn't have much exposure to growing up, making everything they learned new and exciting. Others became interested in entomology because of the decline of pollinators and their vital role in ecosystems. Some were exposed to exotic pets or had beekeeping in their family. Additionally, some discovered their interest in entomology through a course or as a complementary study to their primary focus in botany.

"I love bugs and I always played with rolly pollys – even in kindergarten!"



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Inside this issue:

Letter from the Chair

Alumni and Friends of UCR Entomology,

Welcome to the 2022-2023 UCR Entomology Newsletter. As usual we are late getting this out! Can I blame COVID still? Anyway, I hope you all are in good health and spirits as we continue to adjust to a post-pandemic world. Classes are now fully face-to-face, or online (we have a choice!) or hybrid. We do it all and the students seem to appreciate it. Also, we were finally able to hold in-person graduation ceremonies—both at the campus and departmental level!

Graduate and undergraduate Entomology programs remain strong as well as our participation in several interdepartmental graduate programs. There are currently 45 Entomology graduate students in the program and approximately 40 undergraduate majors. Additionally, our 4+1 BS/MS program (5 years to earn both degrees) has proven to be a great success and is serving as a model for other programs across campus. Currently there are three students finishing up their MS degrees with many more showing interest as Freshman and Sophomores.

As usual, I would like to emphasize our recently established endowment, *Advancing Inclusivity in Entomology Scholarship Fund.* This endowment supports those undergraduates who have faced systemic barriers in their scientific careers. Please consider making a donation and help us to grow our support funds to great heights! This year's internship is **Carolina Gonzalez** working in Jessica Purcell's lab. Once again, I cannot thank you, our alumni and friends, enough for generously supporting our programs.

If you would like to donate to support any of our programs, please visit https://entomology.ucr.edu/giving and choose among the many Entomology funds that support our students. And of course, I am always available to talk to those interested in establishing new endowments; if you have ideas, let's talk. Once again, *THANK YOU AND HAVE A GREAT REST OF THE YEAR!!!*

By the way, if you want to keep up with the activities of the Department, feel free to drop into the Entomology Department News website at https://entomology.ucr.edu/department-news. It is constantly updated with new items about the Department and the people that make is special.

And don't forget, I would like to hear from you, our alumni and friends. Please share with me your own story of success, and the role that UCR had in your achievements by emailing me at richard.redak@ucr.edu - perhaps you will be our next featured alumni in the "where are they now" section of the newsletter!

Dr. Rick Redak
Chair of the Department

UCR Entomology Department, photographed during Student Seminar day, September 2022

A Special Thank you to all of our Contributors in 2022!

The UCR Entomology Department would like to thank the many supporters of our students and departmental programs. The number of individuals and companies that have provided financial gifts is remarkable, and the funds provided are used to keep the Entomology Department one of the best in the world! If you would like to give a tax deductible donation to UCR Entomology, please visit our website at https://entomology.ucr.edu/giving and then choose among the many Entomology funds that support our students and programs.

MONARCH LEVEL ($1000 and above):

Debra Paul
Dr. Amy Murillo and Kelly Murillo
Mr. Mark Pomerantz
Mr. Gary Veeh
Mrs. Susan Deardorff
Dr. & Mrs. Randolph S. Malone
Dr. Ring T. Carde
Dr. Brian A. Federici
Dr. Michael E. Irwin
Dr. Elizabeth A. Boyd
Dr. Chow-Yang Lee
Dr. Christiane Weirauch
Dr. John M. Heraty
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Agri-Turf Distributing, LLC
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Entomological Society of America Pacific Branch
Fidelity Charitable
FMC Corporation
Insects4Inclusion
ISK Biosciences Corporation
Leavens Ranches
Lehigh Agricultural & Biological Services, Inc.
Marrone Bio Innovations, Inc.
Sempra Energy Foundation
Sumitomo Chemical Company, Ltd.
Syngenta Crop Protection, LLC
Triangle Community Foundation, Inc.
UPL NA, Inc.
US Poultry
Vestaron Corporation
Westbridge Agricultural Products

QUEEN LEVEL ($500 - $999):

Carilyn J. Weber
Dr. Michael E. Adams
Dr. Charles Beesley
Mrs. Kathryn A. Fowler
Ms. Jennifer A. Henke
Mrs. Retha E. Keenan
Dr. David Kellum
Dr. Quinn S. McFrederick
Mr. Aurelio Posadas
Dr. Richard A. Redak
Dr. Nick C. Toscano

VICEROY LEVEL ($100 - $499):

Susan J. Hansen
Kenneth E. Ward
Mr. Daniel Cahn
Dr. Devin P. Carroll
Mr. Glen W. Forister
& Mrs. Ann C. Forister
Mrs. Carol C. Fujita
Dr. Alec C. Gerry
& Mrs. Cheryl L. Gerry
Mr. Henry A. Hespenheide, III
Mr. Robert F. Hobza
Dr. John C. Luhman
Mr. Ronald W. Lyons
Dr. Kerry E. Mauck
Dr. Gregg Stephen Nuessly
Mr. Porfirio Pacheco
Dr. Gregory J. Partida, Jr.
Dr. John D. Pinto
Mr. Gary R. Platner
& Mrs. Patricia A. Platner
Dr. Dale A. Powell
& Mrs. Jun R. Powell
Dr. Richard Stouthamer
Mrs. Grace M. Tanaka
Dr. Neil J. Vickers
Dr. Gregory P. Walker
Dr. Naoki Yamanaka
Dr. Robert L. Zuparko
Rentokil North America, Inc.
Tognazzini Avocado Partnership

DEPARTMENT SUPPORTERS:

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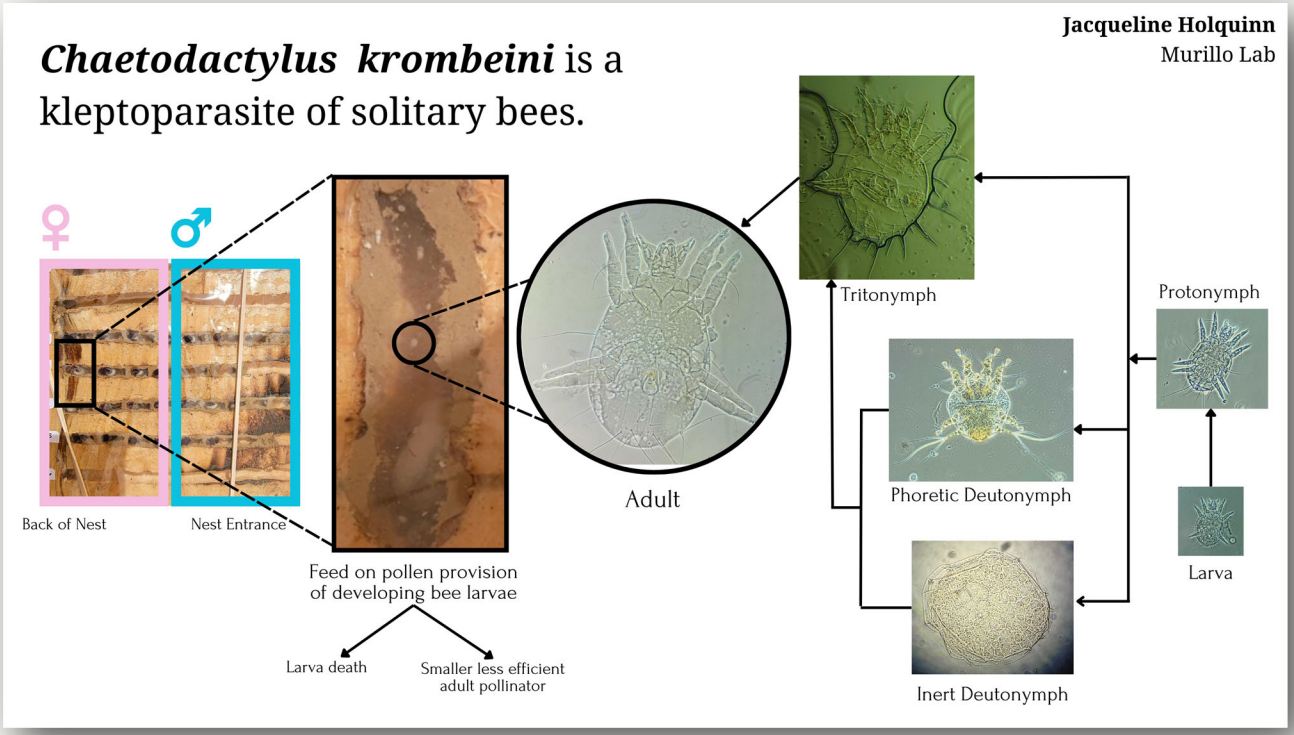
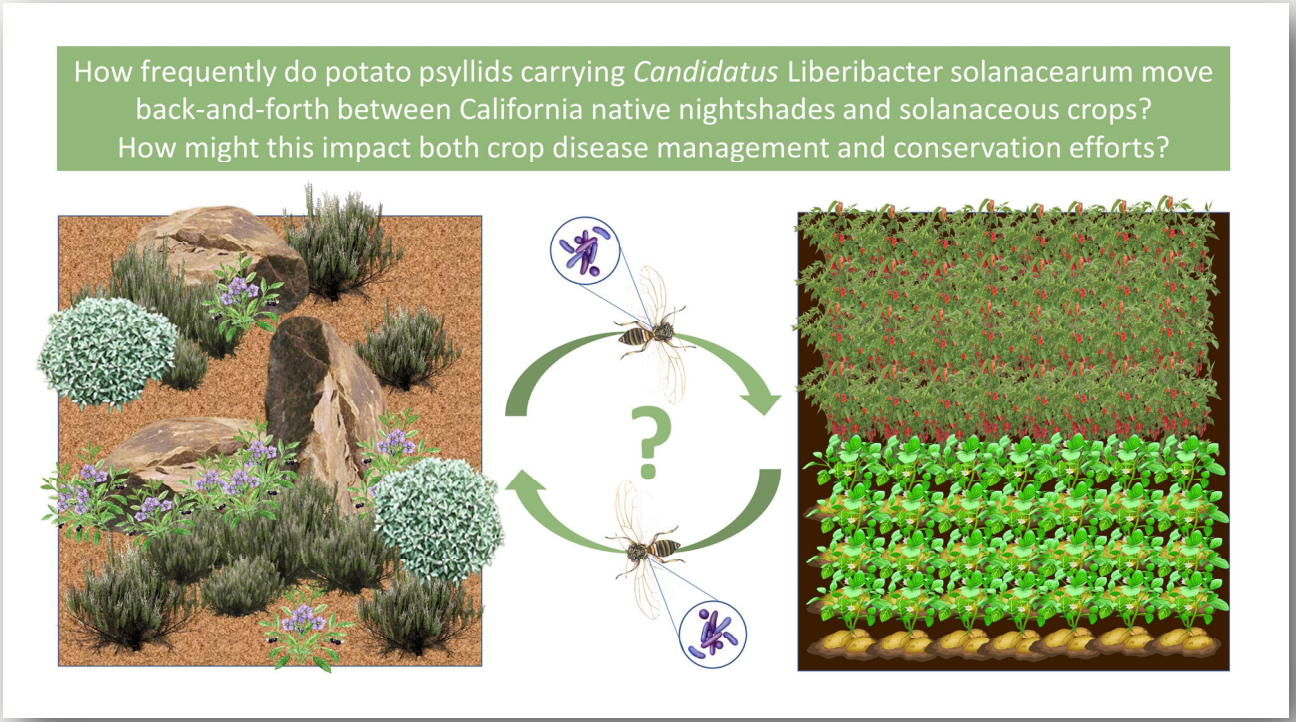
Mr. Mark S. Breidenbaugh
Mr. Robert B. Cooley
& Mrs. Susan M. Cooley
Ms. Kathleen A. Campbell
Dr. Thomas M. Dickson
Ms. Chrysalyn H. Dominguez
Dr. John F. Emmel
Dr. Ysabel M. Giraldo
Dr. Kimberly Hammond
Ms. Madison R. Hernandez
Mrs. Paige M. Mejia
Mrs. Dana M. Risch
Dr. Muriel J. Runholt

Graphical Abstracts Provide a Visual Summary of Research by Graduate Students



Abstract by Jacqueline Holquinn



Abstract by Jamie Kenney

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Targeted Opportunities for Giving to UCR Entomology

Visit: https://entomology.ucr.edu/giving

Featured: Advancing Inclusivity in Entomology Scholarship Fund — supports undergraduate students who experience social, cultural, and financial barriers with a scholarship that will support their ability to participate in laboratory research

Kenneth W. Gilstrap Endowed Memorial Fund — established by Frank Gilstrap and Marilyn McLaughlin to honor their brother Kenneth W. Gilstrap (November 25, 1947 – December 11, 2011). This perpetual legacy fund provides support for students in their professional activities including travel expenses for meetings

Distinguished Speakers Fund— supports invitation of notable scientists to present their research at a formal seminar to the students and faculty. Distinguished speakers include an eminent scholar selected jointly by students and faculty to pre-sent the "Boyce Lecture" each spring since 1977

Endowed Faculty Chairs

Alfred M. Boyce Endowed Chair in Entomology— honoring the memory of professor emeritus Alfred M. Boyce, this chair is currently held by distinguished professor Ring Cardé.

Mir S. Mulla Endowed Term Chair in Entomology—honoring professor emeritus Mir S. Mulla, this chair furthers instruction in entomology and research in arthropods affecting human and animal health.

Urban Entomology Chair Fund—gifts to this fund will sup-port faculty chairs in the field of urban entomology.

Departmental Scholarly Activities Funds

Entomological Museum and Insect Collection— supports programs and activities of the UCR Entomological Museum and Insect Collection.

Entomology Fund for Excellence—supports educational activities for both graduates and undergraduates

Endowments for Student Support

Lauren & Mildred Anderson Endowed Graduate Assistantship in Immature Insects—supports graduate students studying immature insects.

Theodore Fisher Family Endowment Fund in Entomology—provides research, curatorial, and student support for the UCR Entomology Museum and Insect Collection.

Francis A. & Jane Davies Gunther Endowed Scholarship—supports graduate pursuing research in pesticide chemistry.

Ian & Helen Moore Endowment for Marine Entomology—supports graduate students pursuing research on aquatic insects.

Dr. Mir S. Mulla & Lelia Mulla Endowed Scholarship Fund—supports students in entomology, bioagricultural, and biomedical sciences.

Harry H. Shorey Endowed Scholarship Fund— supports graduate students who are pursuing research on pheromones in entomology.

Honors and Awards received during 2021-2022

STUDENTS

Julie Tsecouras
- HEERF Dissertation Year Program Award, UCR
- Gilstrap Endowment Travel Award, UCR

Lyna Ngor
- Shipley-Skinner Award, Shipley-Skinner Reserve-Riverside County Endowment
- Utom Conservation Fund Fellowship, Wishtoyo Chumash Foundation, Santa Ynez Band of Chumash Indians, California Native Plant Society, and the Center for Biological Diversity

Savana Becerra
- Second Place, Graduate Student Poster Competition, Pacific Branch Entomological Society of America

Jaimie Kenney
- Second Place, Graduate Student Oral Competition, Pacific Branch Entomological Society of America

Robert Kresslein
- Robert and Peggy van den Bosch Memorial Scholarship

Krissy Dominguez
- Harry Scott Smith Biological Control Award
- Robert and Peggy van den Bosch Memorial Scholarship
- Career Mentoring for Underrepresented STEM Students for the Professoriate Scholar (CUSP)
- Grad Division Outstanding Teaching Assistant Entomology

Hannah Chu
- Carl Strom/Western Exterminator Scholarship
- Joshua Tree National Park Association Graduate Research Grant Program
- MUVE Travel Award
- Public Health Entomology for All Travel Grant

Jessica Webb
- Alate award Entomological society of America

CIBER Squad
- Christopher Allen, Genesis Chong, Sakshi Watts, Jessica Webb honorable mention Wilbur Ellis Innovation Award

DEPARTMENT STAFF AND RESEARCHERS

Serguei V Triapitsyn
- Honorary Member of the Entomological Society of Argentina (Socio Honorario de la Sociedad Entomológica Argentina)

POSTDOCTORAL RESEARCHERS

Caleb Hubbard
- Early Career Award, Entomological Society of America Medical, Urban & Veterinary Entomology Section

Ivan Milosavljevic
- Early Career Outstanding Scientist, International Organization for Biological Control Nearctic Regional Section (IOBC-NRS)

FACULTY

Naoki Yamanaka
- JSPS Prize, Japan Society for the Promotion of Science (JSPS)
- Japan Academy Medal, Japan Academy
- Peer Mentor of the Year, UCR Honors

Mark Hoddle
- C.W. Woodworth Award, Pacific Branch of the Entomological Society of America
- Outstanding Research Distinguished Service Award, UCANR

Jessica Purcell
- Distinction in Student Mentoring Award, Pacific Branch of the Entomological Society of America

Erin Rankin
- Distinguished Achievement in Teaching, Pacific Branch of the Entomological Society of America

Kerry Mauck
- Plant-Insect Ecosystems Award, Pacific Branch of the Entomological Society of America

Dong-Hwan Choe
- Distinguished Achievement in Extension, Pacific Branch of the Entomological Society of America

Chow-Yang Lee
- Distinguished Achievement Award in Urban Entomology, National Conference on Urban Entomology
- Recognition Award in Medical, Urban, and Veterinary Entomology, Entomological Society of America

Daniel Hare
- Oliver Johnson Senate Service Award, UC Systemwide Academic Senate

News From EGSA (Entomology Graduate Student Association)

Though the pandemic brought much uncertainty to the future of our department, our graduate student association knuckled down and supported each other into brighter times. With the return of predominantly in person activities we kicked things off with the Annual Insect Fair, after the 2-year hiatus the community of Riverside swelled the venue by the thousands. People's desire for social interactions were strong and we brought back departmental traditions such as the Welcome Back Picnic and our yearly camping trip and even added a few new events to the calendar. Community and solidarity were the unspoken themes of the year and graduate students across the UC system rallied together in a historical fight to increase our wages, we prevailed; our department remained united across all levels and once a month we gathered in the courtyard for fresh air, friendly chats and fizzy drinks during what we call "First Fridays". While that uncertainty still lingers; this year we enjoyed a slice of normalcy. We went to conferences with colleagues. We shared lunch with our seminar speakers. We celebrated every accomplishment. Through this period of transition, we demonstrated perseverance, we showed why UCR Entomology continues to be one of the top entomology programs in the country.

-Jess Webb, EGSA President

Winning t-shirt design made by Ashley Bui

A variety of chalcids on a dime. One education component focuses on biodiversity and the important roles of Hymenoptera.

Alumni and Associates, Tell us your News!

Please share your note-worthy happenings, we'd love to spot-light you in "The Buzz"

Email us at richard.redak@ucr.edu

Sterile Insect Technique for Navel Orangeworm

Sterile insect technique (SIT) is a unique method of pest management that aims to reduce target wild pest populations through the introduction of large numbers of sterile conspecifics. Wild pests mating with a sterile negates their ability to produce viable offspring, which in turn leads to the decline of pest populations. Sterile insect releases can include both males and females, although some programs utilize males only. The concept of using sterilized insects to control pest populations was first conceived in the early 20th century, and since the 1950s has been effectively used to control or eradicate a wide variety of agricultural, veterinary and public health pests.

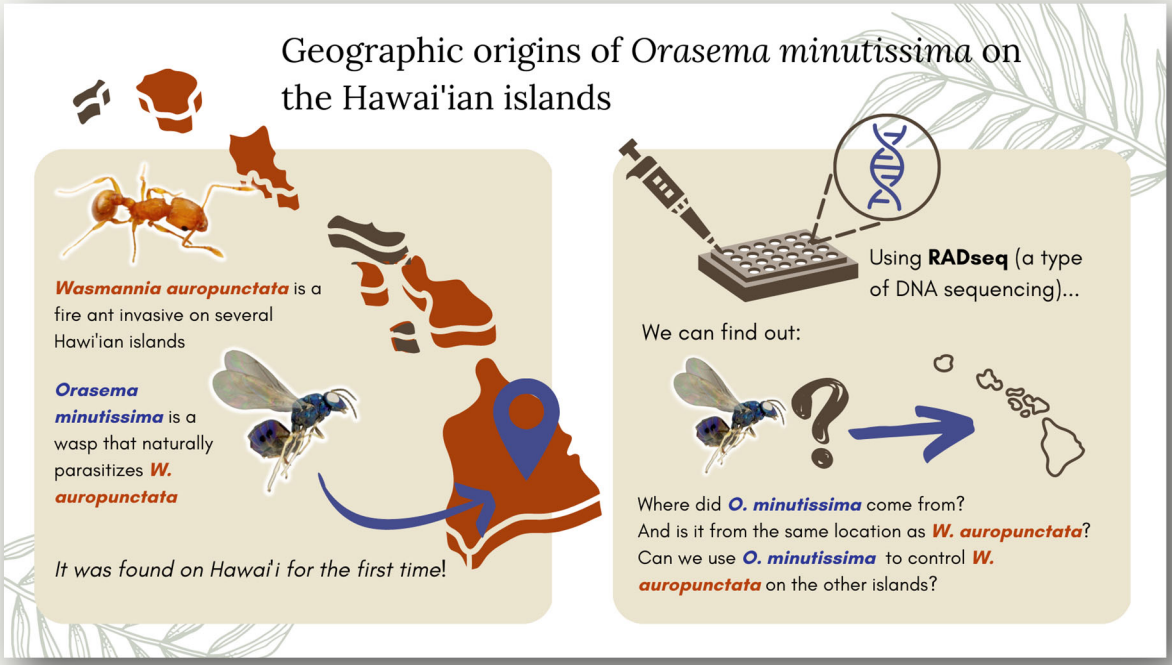
Navel orangeworm (Pyralidae: *Amyelois transitella*) is a key pest of pistachios and almonds in California (an $8 billion industry). The adult moths deposit their eggs directly onto developing nuts and larvae feed on the kernels. This not only reduces crop yield and quality, but infestation by navel orangeworm is associated with *Aspergillus* spp. fungi that produce aflatoxins, which are known human carcinogens heavily regulated in key markets. Modern management of navel orangeworm includes crop sanitation, mating disruption, timely harvest and, when necessary, well-timed insecticide applications.

In 2016, the California pistachio industry partnered with the California Department of Food and Agriculture (CDFA) and the United States Department of Agriculture (USDA) Animal Plant Health Inspection Service (APHIS) to pursue the development of SIT for navel orangeworm. This partnership leverages the availability of a mass-rearing and irradiation facility operated by the USDA APHIS in Phoenix, AZ, which was originally developed in the 1990s as part of a program to eradicate another moth pest, the pink bollworm (Gelechiidae: *Pectinophora gossypiella*). With the recent eradication of pink bollworm, efforts were initiated to retrofit this facility to accommodate navel orangeworm and begin testing the performance of these moths at field sites in California. Over the past six years, the laboratories of Dr. Houston Wilson (UCR Entomology) and Dr. Chuck Burks (USDA-ARS) have been conducting a series of experiments to improve the quality of navel orangeworm produced by the facility in Phoenix. This research team includes UCR postdoctoral scholars Dylan Tussey, Jean Liu, Nathalie Baena-Bejarano and Kadie Britt and UCR graduate student Joshua Reger. Additional collaborators are Dr. Ran Wei (UCR School of Public Policy), Dr. Brittney Goodrich (UCD Agriculture and Resource Economics), and Dr. Joel Siegel (USDA ARS). This collaboration has developed new release strategies, transportation methods and handling procedures, as well as improved experimental methods for marking and tracing moths, measuring flight capacity, and evaluating mate competition.

While historically SIT has primarily been used as a pest eradication tool, increased regulatory and consumer demands to reduce insecticide use in agriculture have led to renewed interested in SIT as an additional suppression tactic within the broader IPM toolkit. Optimizing the use of SIT for navel orangeworm has catalyzed a lot of new work to better understand the biology, ecology and area-wide management of this pest. In this way, regardless of whether or not SIT can be successfully developed for navel orangeworm, these efforts are generating a lot of new information on this pest that will improve existing management strategies.

By Houston Wilson

Graphical Abstracts Provide a Visual Summary of Research by Graduate Students continued...

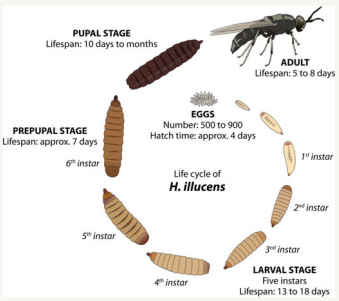


Abstract by Ashley Bui

Ode to the Black Soldier Fly, the problem solver

Waste. So much waste. Methane. Polluting fertilizers. Ever more expensive. Nitrates deep in the ground. In the water that is. Topsoil disappears. Fast. I could go on. But better stop here. Issues we know all too well. Agriculture is the victim and the perpetrator. The Green Revolution was not that green after all. The linear economy - take pollute produce pollute use pollute dispose pollute - is not sustainable anymore. Humans are suffering. Self-inflicted injuries. Bugs are suffering too. Ask the bumblebees. Ask the monarchs. Well, a few are thriving. (Un)willingly transported to new homes. Abundance of what they like. No much competition. But wait. Not so easy. Sooner or later other bugs will come for you. The good guys. Tiny wasps, mostly. The Aliens. Be assured. No more open bar. So helpful. Some can help alone. Some need help to help. They are out there. Waiting for us to untap their full potential. One of 'em is amazing. Evidence is mounting. It's the Special One. The.Black.Soldier.Fly. *Hermetia*, hermetic. *Illucens*, shining. Elegant, shines indeed. What a name. Ready to fight. For us. With us. It's not picky. Takes everything. Loves your waste. Will grow. Fast. A lot. Will poop. A lot. Its poop is gold. Microbes love it. Soil loves it. Plants love it. Where are they, you ask? Just look around. At the ugly warehouses. Can't miss them. Some house millions of soldiers. Smells a bit in there. To be honest. Small price to pay. Flies are mating. Females are hiding masses of eggs. Larvae are eating. Pooping. Eating some more. Pooping some more. Sacrificed, humanely. Or so I'm told. For the greater good. To help. Us. Yes, us. The wasteful ones. The polluting ones. Help us better deal with the mess. The one we made. Their bodies will feed your dogs. Your cats. The salmons you buy. Chickens. Pigs. So much less CO2. So much less methane. So much less water to make feed. Soon we will eat them too. In some form. Their poop will feed your plants. Plants will be so happy. Pests not so much. Pathogens neither. All that chitin. Will do them harm. Full circle. Too good to be true, you say? I feel you. Doubt is good. Doubt is scientific. Read the literature. Read the news. Follow the money. Big money has found it already. They have a good nose. UCR students have handled them. They fell in love. Join them. Kids at school should see this. They will fall in love. Okay, sure, sounds good. But where's your data? Coming soon. The Mauck Lab is working. Stay tuned.

By Marco Gebiola



Fun in Entomology

Dr. Heraty Chili Cook-off Champ

Chris Allen, Jess Webb, Genesis Chong, Sakshi Watts, and a participating engineering student were honorable mentions in the Wilbur-Ellis Innovation Award competition

The Department Research Social event organized by Emilia Burnham and Mona Tran, co-presidents of Botany Entomology Undergraduate Student Association (BEUSA). The event facilitated faculty, graduate student and undergraduate interactions and helped undergraduates find exciting research opportunities in Entomology labs.

A photo of the CIBER Squad at the annual honey bee health conference here at UCR

Fun in Entomology continued...

Student Seminar Day 2022, Students present their posters in the courtyard to the department.

Students and parents participating in UCR Discover Day in October 2022.

Entomology Games Team, Heraty's Hornets, represent UCR at the Entomological Society of America Meeting in Vancouver, Canada.

Gerry lab on a dairy farm (Laura Harmon, Julibeth Penaloza, Alec Gerry, Sara D'Arco)"

Entomology Research Museum News

The Museum is just recently getting back up to speed, post-pandemic, with the hiring of two undergraduates, Paulo Padilla and Hana Mancia, to assist with the mounting and labeling of specimens. Specimens are being dehydrated for mounting by Cole Watson, hired on as a temporary assistant curator, using funds liberated by a survey project of pollinators at Edwards Air Force Base, for which Doug Yanega is a co-PI with Erin Rankin Wilson. We also have temporary help from a "Transitional Return to Work" worker, Patrick Gephart, who is assisting with the databasing of our massive slide-mounted thrips collection. In March we will welcome back Adriean Mayor, a retired former UCR grad and volunteer curator, working on melyrid beetles. Adriean is hopeful, as many of us are, that the spring bloom will be exceptional this year, and possibly bring some rarely-seen insect species out of hiding.

Many of the specimens being processed recently are from remote areas in Oregon and Nevada, donated by Greg Ballmer (former staff researcher), as well as samples from Taiwan donated by Ricky Lara (former grad student).

In the past year, we've managed to add more than 20,000 database specimens to the collection, with many thousands more that have been processed and are now in the queue for mounting and labeling.

In addition the the EAFB project, Doug has been helping a number of students and postdocs from UCR and elsewhere with identifications of bees and other pollinators, and is also putting the finishing touches on a manuscript describing over a dozen new species of planthoppers,
including three species from Arizona whose identities had been mistakenly confused with a related species from the eastern US since
1923, with some help from people in the Hoddle lab, in conjunction with their studies on the invasive "Spotted Lanternfly"

By Doug Yanega

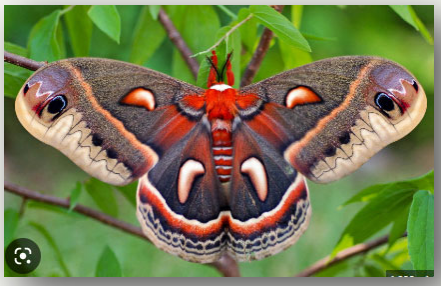
In fall 2022, Serguei Triapitsyn collected insects in Japan during a visit sponsored by a Short-term Invitational Fellowship for Research in Japan from the Japan Society for the Promotion of Science (delayed by two years because of the travel restrictions there during the pandemic). Serguei, in collaboration with Paul Rugman-Jones and scientists in Japan and Czechia, also figured out the identity of *Anaphes nipponicus* Kuwayama (Hymenoptera: Mymaridae), an egg parasitoid of *Oulema oryzae* (Kuwayama) (Coleoptera: Chrysomelidae), a pest of rice mainly in temperate parts of East Asia, as being conspecific with *Anaphes flavipes* (Foerster), a fairyfly native of Europe. *Anaphes flavipes* is an economically important egg parasitoid for the natural control of *Oulema* spp. leaf beetle pests of cereal crops such as barley, oats, rye, and wheat in Europe, and for the classical biological control of the invasive *Oulema melanopus* (L.) in North America. The synonymy was recently published in PLOS One journal (https://doi.org/10.1371/journal.pone.0273823).

Locally throughout 2022, museum staff collected insects by Malaise traps in two UC Natural Reserves, one in Pinyon Flats area of the Boyd Deep Canyon Reserve and the other in Cambria on the California Central Coast; the captured material will be used for DNA extraction and sequencing as part of the California Biodiversity Initiative.

By Serguei V Triapitsyn

New Alumni and Students (Students graduated during 2022)

Congratulations to our recent graduates!
We wish you the best as you pursue new opportunities!



Graduate Students:

Christopher W. Allen
Mark Dery
Benning D. Le
Adriana Medina Lomeli
Derin McGuire
Erica M. Sarro
Tessa Shates
John So
Robert K. Straser
Benjamin D. Sumner
Mari A. West
Xinmi Zhang

Undergraduate Students:

Clarence Cole
Aberdeen Fernandez
Kevin Flores
Jacob C. Hans
Jun Yin Lum
Justin A. Luy
Jamie Ramirez
Andrew T. Staviski
Catherine G. Velasco-Dong
Christian C. Viduya

Welcome to our newest students!

Graduate Students:

Christopher W. Allen
Jun Yin Lum
Nagham Melhem
Douglas Perry
Rattanan Chungsawat
Sarah Schroeder
Benjamin Van Raalte

Undergraduate Students:

Theodore L. Adams
Katelyn N. Du
Richard Gamero
Jesse A. Garcia
Scott D. Inouye
Hana A. Mancia
Paulo G. Padilla
Marina K. Shan
Jessica K. Simons

Meet Our Entomology Undergraduates continued...

What future careers do undergraduates in entomology want to have?

Undergraduates in entomology expressed an interest in a variety of future career paths. Some would like to work as museum curators, working with insect collections and helping to educate the public. Others dream of becoming wildlife biologists or conservation biologists, working to protect and conserve natural habitats and the insects that inhabit them. Other students were excited to become medical entomologists or field entomologists so they could research insects that impact human health. Another popular career interest for students was to become a forensic entomologist that would work with law enforcement agencies to help solve criminal cases. Many students also had an interest to pursue careers in agriculture, pest management, or insect breeding. Finally, some students were excited to pursue a career in academia as professors or medical doctors, leveraging their knowledge of entomology in their research and teaching.

Why are entomologists important for society?

Undergraduates in entomology argued that entomologists are essential to society because insects play a vital role in our ecosystem, from pollination to pest control, and are important in many fields, including agriculture, medicine, forensics, and ecology. They also mentioned that since insects are the most species rich animal on earth that studying them is essential to understanding ecology and evolution in general. Undergraduates also felt that entomologists offer valuable knowledge to the general public and help find ways to deal with threats to crops and prevent disease transmission. Students also mentioned that insects are a significant source of food for both people and livestock, and understanding their biology could benefit society in numerous ways.

"Entomologists help us understand a huge part of what makes the world go 'round!"

How has Entomology benefited undergraduates in entomology?

Undergraduates believe that the Entomology department has benefited them in numerous ways, including providing them with goals, mentors, and opportunities. They felt that the educational experience in Entomology at UCR has expanded their understanding of the interconnected world they live in and allowed them to see the world from multiple perspectives. Students also mentioned that learning more about Entomology has helped them overcome their fear of insects and appreciate their importance in society. Additionally, the field of entomology has given them a sense of purpose and passion, as well as opportunities for jobs and artistic expression. Undergraduates also felt the Entomology major has broadened their horizons of potential careers and taught them valuable lessons about the history and diversity of life on Earth.

How has research impacted undergraduate researchers in Entomology?

Research has had a positive impact on undergraduates by providing them with the opportunity to contribute to academia, gain insights into the scientific process, and develop time management, analytical, and wet lab skills. Being part of a research lab has also helped students determine whether they enjoy working in a lab and has opened up potential career paths. Furthermore, research opportunities have allowed students to earn income while gaining valuable career experience and has introduced them to a variety of research environments and personalities.

"Being in a research lab has helped me gain insight into just how much dedication it takes to make scientific discoveries."

By Allison Hansen

Honors Undergraduate Dana Moshed presenting her honor's capstone project from Dr. Allison Hansen's lab at the 2022 Southern California Conferences for Undergraduate Research (SCCUR) at Pepperdine University in Malibu, California.

A Conversation with the UC Chancellor's Postdoctoral Fellow Daniela Zarate, Ph.D.

Social Insects and Social Justice

Daniela Zarate is a newcomer to the UCR department of Entomology. She is a newly minted graduate from the University of California, San Diego (UCSD) where she defended her Ph.D. last summer. She joined the department shortly after as a UC Chancellor's Postdoctoral Fellow with Jessica Purcell. She is enthusiastic about joining the Purcell Lab, the Entomology department, and the overarching UCR community. Today, we sat down together and chatted about her scientific research and her commitments to advancing diversity, equity, and inclusion throughout her academic career.

Hi Daniela, we're so excited to have you here in Entomology. What are you studying for your postdoctoral work and why did you decide to come to UCR?

DZ: Thank you so much for welcoming me! Everyone here has been incredibly welcoming and I have been enjoying settling into a routine here in the department. Currently, I am studying the genetic basis of the social supergene system in the common ant genus Formica with Dr. Jessica Purcell. This is a fascinating system in which a massive gene complex controls social organization in the colony--namely, the number of queens a colony maintains. However, a suite of other traits are also correlated with supergene type, such as sex-ratio, worker size, and colony size. I'm interested in identifying the gene expression differences between different supergene types and come one step closer in illuminating how the supergene directly produces these distinct colony phenotypes. I'm also working on constructing genetic maps for various ant genera (Formica, Lasius, Camponotus, etc.) to deduce the evolutionary history of the social supergene in Formica. How did it form? What chromosomal re-arrangements happened to fuse this supergene together? Can we estimate when the social supergene emerged by comparing genetic architecture and speciation times across other distantly-related ant genera? These are the questions I'm interested in answering here at UCR Entomology. I wanted to come here to work with Dr. Purcell because she is the leading expert in the Formica social supergene system and it was through her research that Formica really emerged as a paradigm to study supergene evolution. UCR Entomology is also quite well-known as one of the strongest Entomology departments in the nation and I was attracted by the caliber of research and the opportunity for collaborations present here.

That's fascinating! What made you interested in social supergenes and entomology in general?

To be honest, I never thought I would become an entomologist! In college, I worked in a behavioral neuroscience research laboratory and then in an evolutionary ecology laboratory. I never worked with insects until graduate school. I went to UC San Diego for my Ph.D. and my advisor was Dr. Joshua Kohn in the Ecology, Behavior, and Evolution department. He had just published a paper with a Master's student on honey bee genetics and he asked if I was interested in working with honey bees. I had never thought about a honey bee in my life! Originally, I was supposed to work on collecting and generating DNA barcode data to quantify patterns of biodiversity in San Diego county. However, my curiosity was piqued by honey bee biology and behavior and so I started working with honey bees and I never looked back! Working with honey bees really exposed me to the beautiful, complex world of social insects and I was drawn to how confusing, mysterious, and downright alien that world was. There was another graduate student in my department who worked on Argentine ants (Dr. Ida Noughton from Dr. David Holway's lab) and it was through her that I learned about ants and how they were the "pinnacle of social evolution". I was also drawn to just how many ants there were! With honey bees, there are only a handful of species….but there are more than 12,000 ant species! I wanted to study how genetics regulates such complexity as can be seen in ant colony dynamics and so when I learned about the supergene system, I knew it was what I wanted to work on for my postdoctoral research.

A Conversation with the UC Chancellor's Postdoctoral Fellow Daniela Zarate, Ph.D. continued...

It's interesting to hear that you never imagined yourself as an entomologist! Do you draw on your story a lot for your DEI (diversity, equity, inclusion) service? I'm sure many people who don't envision themselves as entomologists might draw inspiration from your journey.

Yes, absolutely! In fact, I would say that I never imagined myself as a scientist or as a professor. I grew up to a single, undocumented, immigrant mother. We were poor and I had no idea what a Ph.D. was when I went to college. I had many wonderful advisors who guided me onto the path and kept me on there. Throughout college and graduate school, I participated in several programs designed to retain and empower underrepresented minority (URM) students. These programs were instrumental in helping me complete my doctorate. Because I understood the importance of these programs and of close mentorship, I have always been very involved in outreach and service. Not only for undergraduate and graduate students, but also for K-12 and adult audiences that are not always exposed to the world of scientific research and entomology. I am particularly interested in serving the incarcerated community of southern California. These are spaces that are in real need of educational programming because the barriers to working in these spaces are so difficult to overcome. Currently, I am working on developing STEAM (Science, Technology, Engineering, Arts, Mathematics) programming for the juvenile detention facility here in Riverside. I have also been teaching with the Prison Education Project (PEP) as a virtual instructor for the last two semesters. I think that more and more people are starting to realize the value in bridging universities and prisons together and the importance in those connections. I truly believe that higher education has fantastic potential to act as an agent of social change and social justice.

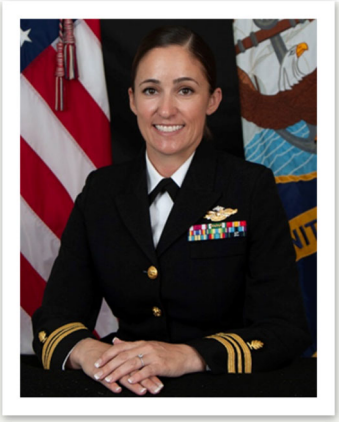
That's wonderful work you're doing. I'm interested in why you chose a STEAM approach, that is, an interdisciplinary science and arts approach, over a traditional STEM approach?

I always joke that I am an artist trapped in a scientist's body. For me, science is the most enjoyable, and accessible when you are using art to study it and engage with it. I am a multi-media artist and much of my artwork is inspired by my scientific research. I also think art is a fantastic way to convey a message and communicate important concepts.

That's amazing, and thank you for letting us print some of your work alongside this article. It was awesome getting to chat with you Daniela, Thank you very much and, again, welcome to the department!

All artwork by Daniela Zarate

Where are they now?



LCDR Jennifer A. Simmons

Graduated as Jennifer Wright

After completing her Ph.D. in Insect Molecular Biology under Dr. Peter Atkinson at the University of California, Riverside in 2011, Jen commissioned as a Medical Entomologist with the rank of Lieutenant in the U.S. Navy and promptly reported to Officer Development School in New Port, Rhode Island.

In June of 2012, she reported to the Navy Entomology Center of Excellence, Jacksonville, FL where she served in the Operations and Assessment Department where she managed over 30 research projects with 22 federal, state, academic and civilian collaborators.

In 2015, Dr. Simmons reported to the Navy Environmental and Preventive Medicine Unit 5 (NEPMU-5) in San Diego working initially in the Vector Control Department and ultimately in the Education and Training Department. In 2016 she deployed on the hospital ship USNS Mercy (T-AH 19) to Vietnam, Indonesia, Timor-Leste, Malaysia and the Philippines supporting Global Health Engagements as part of Pacific Partnership 2016.

In 2018, she was selected to attend the Army Command and General Staff College, Fort Leavenworth, KS where she completed 12 months of graduate level curriculum in strategy, doctrine, history, operations, and force management.

Pursuing experience in the Indo-Pacific region she reported to 3d Medical Battalion, 3d Marine Logistics Group, Okinawa Japan in 2019. She was appointed as a Medical Planner responsible for planning medical support for operations in Thailand, Japan, India, and Tinian.

Next up she headed to Guam as the Officer in Charge of Task Force Medical where she led the effort to control a large-scale outbreak of COVID-19 on the USS Theodore Roosevelt as the Task Force Medical Officer in Charge. Currently, she is living in Hawaii and working at a Navy preventive medicine unit where she once again gets to work as a medical entomologist. In her spare time, she enjoys SCUBA diving, hiking and spending time with her husband and son. If anyone is interested in learning more about being in or working with the military, please feel free to contact her at Jennifer.a.simmons34.mil@health.mil and she will share the good, the bad and the ugly with you.

Dr. Clare Casteel

During her undergraduate studies at the University of Missouri, she conducted research with Dr. Elaine Backus and examined the defensive properties of glandular-haired alfalfa in response to the potato leafhopper (Empoasca fabae). She went on to pursue a master's degree at the University of California, Riverside with Dr. Timothy Paine and Dr. Linda Walling, where she investigated the impact of the plant resistance genes Mi-1.2 on the tomato psyllid (*Bactericera cockerelli*). After her MS, she went on to pursue a PhD with May Berenbaum and Evan DeLucia at the University of Illinois at Urbana-Champaign. Her dissertation examined how global climate change will impact biotic interactions in agroecosystems using molecular ecology approaches with field and laboratory trials. To expand her expertise in genetics and biochemistry, she completed postdoctoral studies at the Boyce Thompson Institute for Plant Research with Dr. Georg Jander, where she collaborated on various projects and initiated a new project on virus-vector-plant interactions. This research became the foundation of her first position as an assistant professor at the University of California, Davis.

Dr. Casteel is currently an associate professor at Cornell University, where she continues to investigate the mechanisms behind plant-insect and plant-microbe interactions, with a focus on developing sustainable pest control strategies. She uses two model systems to achieve this goal: the first system focuses on beneficial soil microbes in organic agriculture and their impact on crop resilience to hemipteran insects, while the second system examines pathogenic plant viruses that are transmitted in the environment by insects. Through the use of ecology, molecular biology, biochemistry, and field and laboratory trials, she aims to identify the functions of microbes in these interactions and their underlying mechanisms. Dr. Casteel has secured over $4.8 million dollars in external funding to support her research, has published 53 articles in high impact journals, such as Nature Plant, Nature Communications, Plant Physiology, Plant Cell, and PNAS, and has been invited to present her research 60 times at national and international venues. In addition to her research, she is committed to promoting equity and justice in academia, through her work on the national Equity in Graduate Education consortium as a representative for the School of Plant Science at Cornell University.

In Memoriam: Mir S. Mulla 1925 - 2023

In Memoriam

Mir S. Mulla, PhD

February 15, 1925 – January 29, 2023

Dr. Mir Subhan Mulla passed away peacefully at home January 29, 2023 at age 97. Born February 15, 1925 (his chosen birthday) in Zangawat, Afghanistan to a family of 12 brothers and 4 sisters, Mir came to the United States in 1948 on scholarship to Cornell University for his undergraduate degree in Entomology and Parasitology. During graduate studies at UC Berkeley, he met Lelia (Lee) Patterson at the International House. They married in August 1954. and moved to Riverside two years later when Mir accepted a position establishing a medical entomology department at University of California Riverside. In 1956, Mir joined the UC Riverside faculty to help establish a medical entomology program on this young campus. His early research focused on the control of eye gnats and mosquitoes.

Over his 50-year career, Mir developed practical control strategies for mosquitoes, eye gnats, and other pests of humans in southern California. These strategies greatly improved public health throughout the region and provided solutions supporting economic development particularly of the Coachella Valley. A wonderful video produced in 2007 and honoring Mir's 50 years of service developing practical strategies for management of these pests in the Coachella Valley can be found here: https://youtu.be/tp9rnRf6v_g

Mir served as a major professor for 27 Ph.D. students and three M.S. students; mentored more than 30 visiting scientists from overseas; and trained 20 postdoctoral scientists. He was a prolific writer, authoring over 500 scientific publications. He provided service and leadership to numerous national and international organizations, including the World Health Organization (WHO) where he served as science advisor, member of the Expert Advisory Panel, member or chair of steering committees or scientific working groups, and as Advisor to numerous international projects. As a consultant for WHO, Mir helped build teaching and research capacity for medical entomology in many developing countries.

In recognition of his many achievements, Mir was elected a Fellow of the American Association for the Advancement of Science and a Fellow of the Entomological Society of America. He was also recognized by the Society for Vector Ecology with the Distinguished Service Award, Distinguished Achievement Award, and with the Lifetime Achievement Award. In recognition for Mir's many years of research in support of the Coachella Valley, the biological control building at the Coachella Valley Mosquito and Vector Control District was dedicated and named for Mir in 2006.

Mir served as a leader in the Riverside Muslim community. He and Lelia founded the Islamic Society of Riverside and Orange Counties and played a key role in building the Islamic Center of Riverside, the first mosque in the Inland Empire. His philanthropic work included supporting the local Muslim community, donating land to Riverside County Parks to preserve public access to Sugarloaf Mountain for generations and establishing scholarships with the University of California Riverside in the College of Agriculture and Natural Sciences.

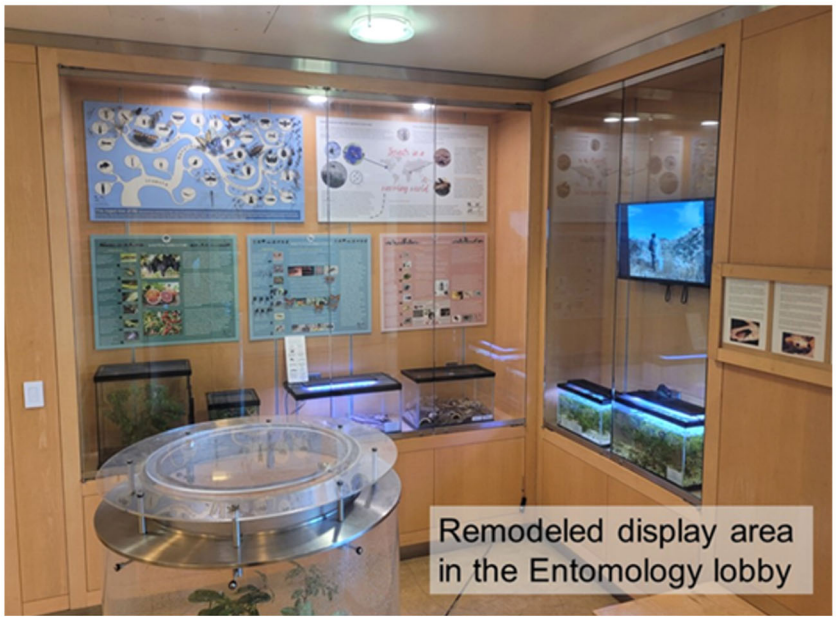
Annual Insect Fair

The Riverside Annual Insect Fair is a collaborative event between UC Riverside Entomology and the city of Riverside. Started by the Entomology Graduate Student Association (EGSA) several years ago, the insect fair is now one of the city's iconic events. In 2019, on a sunny April Saturday, over 15,000 people attended the event.

Graduate Students (Jacqueline Holquinn, Hannah Chu, and Ben Nyman) provide information on insects of medical/veterinary/forensic importance
WON BEST BOOTH!

Sakshi Watts, Jessica Webb, and Owen Wagner showing importance of honeybees for food production and human health

Chow-Yang Lee showing a young visitor how to pet a Madagascar Hissing Cockroach, while Jun-Yin Lum and Rattanan Chungsawat observed.


Remodeled display area in the Entomology lobby

Our Outreach program has emerged from somewhat limited activities during the pandemic and is back in full swing. While school outreaches were slowly picking up during Spring 2022, requests were back to normal by the beginning of Fall 2022. Alas, funding in the form of Graduate Student Research assistantships that were so important for maintaining a vibrant outreach program have dried up, and Entomology Outreach is currently largely relying on student, staff, and faculty volunteers to deliver insect-focused science education to schools and the general public. In addition to these volunteers, the program is now supported by three Entomology undergraduate students, who are in charge of coordinating events (Emilia Burnham) and maintaining our growing Living Arthropod Collection (Sydney Wilson and Troy Manzano). Thanks to all of you for being committed to this program and volunteering your time!

Our Live Arthropod Collection was decimated to little more than a handful of insect and arachnid species by the end of the pandemic. During the past year, we have grown our "Insect Zoo" to maintain close to 30 different species of terrestrial and aquatic insects, crustaceans, and arachnids. These include three species of stick insects donated to us from our sister campus in Davis, five species of tarantulas, a vinegarroon, bessbugs, and seasonal displays featuring local species of butterflies and mantises. Most of our arthropods are kept behind closed doors in our rearing facility, but some are on rotation (Fig. 1) in the remodeled display area in the Entomology lobby in the glass cases surrounding the "stick terrarium". This new display area (Fig. 2) features five eye-catching and informative panels designed and assembled by members of the Natural History Museum Club (NHMC) at UCR showcasing insects around us, a striking insect tree of life, and case studies on insects in a warming world. In addition to exhibiting some of our live arthropods, this space also features a TV monitor that showcases the exciting insect research conducted in our department.


Giant desert hairy scorpion

Western Gulf Fritillary caterpillars on passion vine

In Fall 2022, The Outreach Committee organized an "Oh My and More" Display Drawer Competition to modernize permanent displays on the 2nd and 3rd floor of the Entomology building and the Research Museum hallway. Submissions were fabulous (Fig. 3) and now educate visitors to the Entomology building about the wonders of crypsis and mimicry, disease-vectoring sap-sucking insects, stages of decomposition (yes, these are 3D-printed models of human bodies…), thermoregulation in butterfly wings, and insects in the movies. Thanks to all competitors for this amazing new array of displays!


"Oh My and More" Display Drawer Competition

After a 2-year hiatus, the Riverside Insect Fair was back on April 30, 2022, and in a new location (Fig. 4). Thousands of visitors enjoyed insect-focused activities and displays surrounding the Main Library in Riverside. This annual event was founded in 2015 by the UCR Entomology Graduate Student Association (EGSA) and the Riverside Metropolitan Museum and is co-organized by the two organizations. EGSA is in the process of gearing up for the 2023 event that will feature lab-oriented research booths, "Touch a Bug" opportunities, and insect-focused talks and panel discussions, all to bring insect science to our Inland Empire communities. Mark your calendar for April 22, 2023 (Earth Day) and join us between 10AM and 4PM! The Junior Entomologist Summer Camp also returned in 2022 (June 13-17) and allowed students entering grades 4 and 5 to interact with live insects, make a bug collection, run experiments, and listen to guest speakers. Thanks, as always, to EGSA for coordinating these events and all students, staff, and faculty for volunteering their time to make them successful!

Finally, we now have an undergraduate and graduate class focused on "Outreach and Science Communication in Entomology!" The class will be offered for the first time in Spring 2023 and the co-instructors (Quinn McFrederick and Christiane Weirauch) are looking forward to work with our students on designing new displays, creating outreach modules for schools and community events, and honing science communication skills while generating podcasts, social media, and videos.

Christiane Weirauch, Outreach Committee Chair

Find out more: https://entomology.ucr.edu/engagement/outreach/outreach-program