



THE BUZZ

Looking back on 2018



The Center for Integrative Bee Research (CIBER) - Safeguarding Pollinator Health
<https://ciber.ucr.edu/>

APRIL 2019

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UCR ENTOMOLOGY



CIBER researchers working in an almond orchard in the central valley, Feb. 2018.

Photo Credit Lauren Ponisio

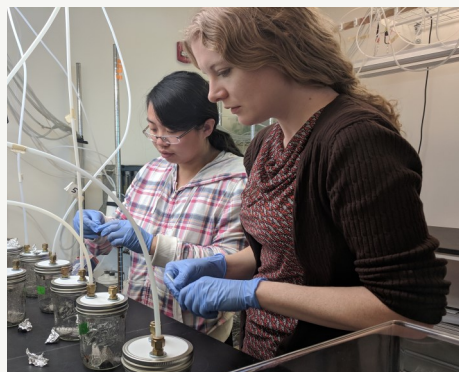
In late 2017, eight research teams at the University of Riverside formed the Center for Integrative Bee Research (CIBER) with the common goal to stop the decline of pollinator populations. Altogether, CIBER encompasses research expertise in pollination networks (Lauren Ponisio), climate change (Nicole Rafferty), chemical ecology (Kerry Mauck), proteomics (Boris Baer), symbiosis (Quinn McFrederick), invasive species (Erin Rankin), population genomics (Jessica Purcell), behavior and nutrition (Hollis Woodard), and extension to stakeholders (Houston Wilson and Monique Rivera). The team is currently formalizing CIBER's status as an official UC research center.

Using state-of-the-art facilities at the University of California, Riverside, CIBER scientists investigate pollinators across natural, agricultural, and urban landscapes. By combining their expertise, they are able to collect information from communities down to the

molecular processes inside individual bees.

As an example, a team of researchers out of the Ponisio Lab and in collaboration with the McFrederick and Woodard labs, led by post-doctoral scientist Hamutahl Cohen, collected bees within and around flowering almond orchards in the Central Valley in February 2018. The team's aim was to compare bee species, as well as the pollen these bees had collected, between groups of almond orchards with and without hedgerows growing wildflowers. They are also investigating parasites found inside the guts of bees foraging in these different landscapes. By collating their datasets, the team produced an accurate snapshot of pollinator abundance and pollinator health in an agricultural landscape. These findings now provide the baseline for recommendations to industry professionals on how to improve the health of pollinators in the future.

In order to develop tools to identify, quantify, and manage threats to pollinators, researchers from the Baer Lab started collaborating with Hyoseung Kim from the Department of Electri-



Scientists in the Baer and Mauck labs perform experiments to identify the scent of disease in honeybees.

Photo credit Ian Wright

Continued on page 8...

Students hard at work during their "Bees and Beekeeping" class



Letter from the Chair

Alumni and Friends of UCR Entomology,

Welcome from gorgeous sunny Southern California! As you might have heard or seen, we had significant rain this year, and consequently the wildflowers are stunning. Here is just one picture of the NRS Motte Rimrock Reserve taken in late March. Joshua Tree. Anza Borrego and just about all of Southern California's deserts are blooming. Try to get out and see this display!

Since our last newsletter in 2018, the Department continues to flourish with new scientific discoveries, the addition of new faculty members and new students. And of course we continue to be incredibly proud of our graduating undergraduate and graduate students. The campus continues to grow; we are now at ~24,000 students. The Chancellor just announced his goal to grow the enrollment to 35,000 by 2035. This is a far cry from what the place was like in the 1990s when I was hired. Labs are currently moving into the new Multi-Research Building and construction of the new East-Campus Greenhouse facility has begun. These are exciting times indeed.

We welcome Dr. Monique Rivera into the Department! Monique joined the Department in July of 2018 and is settling in to a refurbished lab in Chapman Hall. She comes to us from the University of Florida where she was working on the control and management of citrus pests. Her area of expertise is integrated pest management, especially as it is applied to citrus, avocados, and subtropical crops. The arrival of Chow-Yang Lee (the recipient of the Endowed Chair in Urban Entomology) was delayed a bit; he is now joining us this July. Currently we are also in the middle of recruiting two additional faculty members (neuroscience and veterinary entomology). Hopefully I will be able to introduce those new faculty members to you next year.

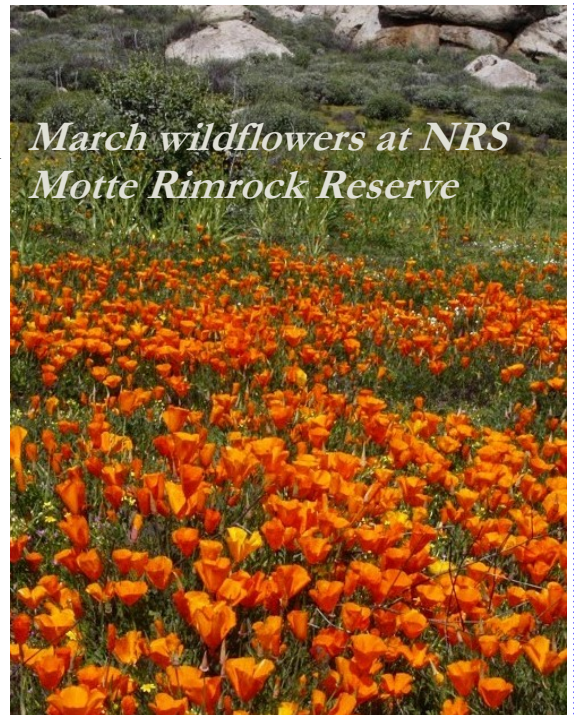
Both graduate and undergraduate Entomology programs remain strong as well as our participation in several interdepartmental graduate programs. In total we are training ~ 90 graduate students and ~40 undergraduates. Our proposed new 4+1 BS/MS program has cleared all campus hurdles and we are eagerly awaiting Systemwide approval to begin recruiting into that program beginning in Fall of 2019.

Once again, I cannot thank you, our alumni and friends, enough for generously supporting our programs. Your donations have been important to support our Entomology graduates and undergraduates in pursuing their research activities and allowing them to travel to meetings and conferences to present their exciting results. Additionally, these donations have allowed the Department to continue recruiting the very best students into our programs.

If you would like to make a donation to support our programs, please visit http://www.entomology.ucr.edu/supporting_entomology/ 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 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



A Special Thank you to all of our Contributors in 2018!

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 http://www.entomology.ucr.edu/supporting_entomology/ and then choose among the many Entomology funds that support our students and programs.

MONARCH LEVEL (\$1000 and above):

Ms. *Thais P. De Souza*
 Mr. *Mark Pomerantz* & Mrs. *Deborah Ford*
 Mr. *Aleksandr Knyshev*
 Dr. & Mrs. *Randolph S. Malone*
 Dr. *George Patrick Markin*
Agri-Turf Distributing, LLC
Arysta LifeScience
BASF Corporation
Bayer
Bayer Crop Science LP
California Date Commission
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Dewey Pest Control
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 Dr. & Mrs. *Mir S. Mulla*
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Oro Del Norte, LLC

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Rentokil North America, Inc.
San Diego PCOC
Total Labor Force, Inc.
Uman Davis Sister City Project

DEPARTMENT SUPPORTERS:

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 & Mrs. *Susan M. Cooley*
 Mr. *Saul I. Frommer*
 & Mrs. *Susan L. Frommer*
 Mr. *Robert F. Hobza*
 & Mrs. *Michele Hobza*
 Mr. *Kurt Leuschner*
 Dr. *John C. Lubman*
 Ms. *Lauralea Oliver*
 Mr. *Mike Richmond*
 & Mrs. *Gina Richmond*
 Mrs. *Dana M. Risch*
 Ms. *Chanpreet S. Sidhu*
 Ms. *Constance E. Spenger*
 Mr. *Michael T. Umeda*
 & Ms. *Deborah J. Lonie*
 Dr. *William D. Wiesenborn*



UCR Entomology Department, photographed during Student Seminar day, September 2018

Searching Type Localities in the “Big Dry”

Many of you know that I am interested in beetles of the Family Melyridae, also known as soft-winged flower beetles, which are particularly abundant and diverse in southern California. 2018 was another dry year, so, in an effort to pin down names, I focused field work on type localities of species already named. That is how, in late April, I rediscovered *Trichobrous kernensis*. The species was known from only 5 specimens collected in 1913 near the town of Havilah in Kern County. Measuring less than 3 millimeters long, *Trichobrous kernensis* is not easy to spot or recognize. I and other entomologists have seen all the related species known from the Havilah area on many occasions, but this particular species had proven especially elusive.

On this occasion, I had spent some time in the nearby Walker Basin scanning flowers there but had found nothing. I was walking back to my car when I noticed some black specks in some of the flowers in a wash along the roadside, and, sure enough, the specks were beetles, which on examination in the Lab. turned out to be the elusive *Trichobrous kernensis*, a species not seen for more than 100 years! I returned to UCR with a few dozen specimens out of what I estimate were thousands feeding on pollen from flowers of *Lasthenia gracilis* along the wash. Despite the undoubted role of adult melyrids as important pollinators, and their sheer numbers — estimated in the millions or billions for melyrid beetles as a whole — little is known about the biology of these beetles and their larvae. In over a century, we’ve only found what amounts to a literal handful of the larvae of this group of beetles, but we have no idea what they feed on or how long they live; pretty much everything is guesswork. A

real ecological puzzle, who’s solution would be a major accomplishment.

by **Adrieen J. Mayor**



Above: North end of Walker Basin in Kern County, where the beetles were collected.

Right: *Trichobrous kernensis*, a species not seen for more than 100 years!

Photo Credit: **Adrieen Mayor**



Targeted Opportunities for Giving to UCR Entomology

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 present 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 support 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.

Harry Scott Smith Endowed Fund in Entomology—supports graduate students studying biological control.

Visit http://www.entomology.ucr.edu/supporting_entomology/

Recent Honors and Awards

FACULTY

Brian A. Federici

Honorary Fellow of the International Society for Invertebrate Pathology

Alec Gerry

Recognition Award in Medical and Veterinary Entomology, Pacific Branch of the Entomological Society of America

Mark Hoddle

Elected Fellow of ESA

Doctor of Science, DSc. from University of Auckland, New Zealand

John Trumble

Entomological Society of America's Award for Exceptional Service (for serving 18 years as Editor-In-Chief of the Journal of Economic Entomology)

Bill Walton

Distinguished Achievement Award in Teaching, Entomological Society of America (National Award)

National Award for Excellence in College and University Teaching in the Food and Agricultural Sciences (Western Region), Higher Education Programs, USDA/NIFA/APLU

Award for Excellence in Teaching, Pacific Branch of the Entomological Society of America

Continued Service and Commitment to the Society for Vector Ecology, 50th-year Celebration

President of the American Mosquito Control Association

Naoki Yamanaka

NIH Director's New Innovator Award

STUDENTS

Austin Baker

Robert van Den Bosch Scholarship

Dr. Mir S. Mulla and Leila Mulla Endowed Scholarship Fund

1st Place, Student Presentation, ESA national meeting.

Chrissy Dodge

NIFA AFRI Predoctoral Fellowship (USDA)

Graduate Dean's Dissertation Research Grant

James and Margaret Lesley Annual Prize

Don Dahlsten Memorial Fund (California Forest Pest Council)

2nd Place, Student Presentation, ESA national meeting

Krissy Dominguez

Graduate Research Mentorship Fellowship

CNAS Herbert Kraft Scholarship

Amanda Hale

Ernest Propes Endowed Graduate Fellowship

UCR CONNECT International Student Mentorship certificate

Caleb Hubbard

"Advanced training in molecular and bioinformatics methods to study the biology of biting flies" BBSRC UK-US partnering Fellowship

Second Place, President's Prize runner-up, Student Presentation, ESA,

ESC, and ESBC Joint Annual Meeting

Carl Strom/ Western Exterminator Company Scholarship

Francis A. & Jane Davies Gunther Endowed Graduate Award in Entomology

Deena Husein

2nd place, Student Presentation, ESA, Pacific Branch meeting

Paul Masonick

Earle C. Anthony Graduate Student Travel Award, UCR Grad. Division

Nils and Annemarie Møller Andersen Travel Award, International Heteropterists' Society

Robert & Peggy van den Bosch Memorial Scholarship (Center for Biological Control at UC Berkeley)

James and Margaret Lesley Annual Prize

Nancy Power

2nd place, Oral Presentation, Agriculture, Food and Renewable Resources section of the AAAS Pacific Division meeting in Pomona

Harry S. Smith Biological Control Award

Robert & Peggy van den Bosch Memorial Scholarship (Center for Biological Control at UC Berkeley)

Ernest Propes Endowed Graduate Fellowship (UCR Grad. Stud. Assoc.)

Jacqueline Serrano

Student Travel Award from the International Society of Chemical Ecology

Earl C. Anthony Travel Award

Harry H Shorey Endowed Scholarship

Outstanding Teaching Assistant for the Department of Entomology

Tessa Shates

Shipleigh-Skinner Reserve - Riverside County Endowment

3rd Place, Student Poster Competition, ESA Pacific Branch meeting

Howie Wier Memorial Conservation Grant - Anza-Borrego Foundation

Rob Straser

Bill and Jane Fischer Vegetation Management Scholarship (UCANR)

Milton D. and Mary M. Miller Plant Science Award (UC Davis)

Davies Gunther Award (UC Riverside)

Corliss Knapp Engle Scholarship (Garden Club of America)

Julie Tsecouras

Ian and Helen Moore Marine and Aquatic Entomology Award

Ernest Propes Endowed Graduate Fellowship

Mari West

Harry Shorey Award

Xinmi Zhang

Ian and Helen Moore Marine and Aquatic Entomology Scholarship

2nd place, Student Presentation, ESA national meeting

UNDERGRADUATE STUDENTS

Phong Hong: Fulbright award

Cebrina Nolan: Semi-finalist for pending 2019 Fulbright award

Entomology Research Museum News

The museum has, in the past year, received and curated sizable donations of specimens from past and present members of the Department, including Greg Ballmer (figured is one of many drawers sorted by him from Malaise traps samples from western USA, in collaboration with Mike Irwin from Arizona), Saul Frommer, Gevin Kenney, Adriean Mayor, Doug Yanega, Lauren Ponisio, and Mark Hoddle (particularly valuable collections from New Zealand and Tanzania). The museum has also acquired material from outside projects, such as about 1,400 egg parasitoids of the Virginia creeper leafhopper, an invasive pest of cultivated grapes in northern California, and of many other leafhoppers in grape agroecosystems collected by Houston Wilson's project. There were voucher specimens from Serguei's cooperative project with the USDA-ARS and FUEDEI (Buenos Aires, Argentina) on the parasitoids of *Harrisia* cactus mealybug and other *Hypogeococcus* spp. from Argentina, Brazil, Paraguay, and Puerto Rico and adjacent islands, as well as numerous specimens of micro-Hymenoptera from an organic rice field in Taiwan installed by Serguei at the Taiwan Agricultural Research Institute in Taichung.

There has been a large amount of assistant and especially volunteer activity over the past year. Denzel Cardenas (undergraduate student) has been working part-time dehydrating ethanol samples using HMDS, and then point-mounting the resulting specimens. He has mounted several thousand specimens, most of which were labeled by Kristine Ziadie, and Ana Mendez and Cristina Carranza have been recently hired to carry on the labeling work. Michael Bellinger-Jones also helped with HMDS, as well as processing propylene glycol samples from Gevin Kenney. Cole Watson and several other people were also occasionally volunteering. We also enjoyed the regular and inspirational presence of Adriean Mayor who has been working in the

museum with melyrid beetles for the last few years. The three graduate students assigned to the museum were involved in the following projects: sorting slide-mounted, mostly donated Aphelinidae (Luke Kresslein); identifying and curating the Elateridae (Coleoptera) collection (Jackie Serrano), sorting out, identifying, and curating the teaching collection in Chapman Hall (Stephanie Castillo and Luke Kresslein), and organizing and running the Natural History Museum Club for UCR undergraduate students (Stephanie Castillo and Luke Kresslein). All of them have done a really great job.

Serguei provided assistance to Dr. Tom Perring's project on the pink hibiscus mealybug biocontrol, in cooperation with Dr. Sharon Andreason. As the result, two new species of Encyrtidae (Hymenoptera) from southern California were described (one of them is a parasitoid of the vine and citrus mealybugs), and many mounted, well-curated, and identified specimens added to the collection. Doug has also been helping provide barcode specimen labels for projects in the Heraty and Weirauch labs, assisting with IDs for various lab projects (Rankin-Wilson, Woodard, Hoddle, and Stouthamer), tutorials for bee IDs for the Ponisio lab, and assisted in the acquisition of cabinetry for the Woodard and Ponisio labs. Doug has also been involved in some TV, radio, and web interviews, in addition to acting as liaison with a professional photographer, Andre Duman, who is working with ultra-high-resolution digital imaging of insect specimens.

The Museum's regular database has grown to roughly 570,000 records (over 25,000 added in the last year), with an impressive 180,000 that are identified to genus-level or better and georeferenced, over half of which contain ecological data (mostly host plants).

by Serguei Triapitsyn and Doug Yanega



Alumni and Associates Tell us your News!

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

Email us at
richard.redak@ucr.edu

New Alumni (Students graduating during 2018)

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

**Graduate Students:**

Yike Ding
Alexander Knyshev
Michelle C. Miner
Erich N. Schoeller

Undergraduate Students:

Kyle Austin Whorrall
Seanathan Chin
Alexandra Lauren Vanecek
Shao-Hung Lee
Phong Kai Hong

*Welcome to our newest students!***Graduate Students:**

Benjamin Nyman
Danielle Ruais
Genesis Chong
Iris Chien
Jaime Kennedy
Magda Paola Argueta-Guzman
Shao-Hung Lee

Undergraduate Students:

Emiliano Gaitano Cuadra-Jones
Kevin Flores
Krystin Bernadette Gates
Maddux Bruce-Nguyen Le
Yao-Min Lee
Rosalia Vita Marengo
Darin Justin McGuire
Christie Kay Miranda
Emily Elizabeth Potter
Christian Caro Viduya

Where are they now?

After finishing my Master's degree in Entomology at the Seoul National University, I joined the laboratory of Dr. John Heraty in the UCR Department of Entomology, where I studied the systematics and diversity of wasps in the superfamily Chalcidoidea. I completed my Ph.D. in systematic entomology in 2003.

My time at UCR was fun and memorable, as I tried to adjust to American culture and attitudes. Early on, my nerves got the better of me at times: after meeting Dr. Heraty for the first time in his office in the morning, I was not able to recognize him during lunch! Upon reflection, he has many recognizable characteristics. My time at UCR was such an important period of my life because I worked very hard and I met many nice friends, colleagues, and mentors during the course of my dissertation. I owe them a lot. After graduation I continued on two post-doctoral fellowships, first with Dr. James Woolley at the Texas A & M University, and second with Dr. Brian Wiegmann at North Carolina State University.

Following my postdoctoral training, where I added Diptera (flies) to my taxonomic expertise, I joined the US Department of Agriculture APHIS PPQ (Animal and Plant Health Inspection Service, Plant Protection and Quarantine) as an Area Identifier at El Paso, Texas in 2014. I was subsequently promoted to a position with National Identification Services as a National Specialist for Diptera in 2017. I am stationed at the National Museum of Natural History (Smithsonian Institution) in Washington DC. My routine duties are port interception identifications and reviews of pest risk analysis. The best part of my job is that it is a high-tempo operation and there is always something new that I can learn each day. I continuously collaborate with USDA SEL (Systematic Entomology Lab) and Smithsonian entomology staff. I am proud to be a member of USDA team that is safeguarding agriculture in the U.S., and I believe that USDA provides me an unmatched opportunity to fulfill my dream as an entomologist.

“Woogie”
Jung Kim

*Recently Retired...***Faculty**

Brad Mullens

*25th annual UC Riverside
Dept. of Entomology
Student Seminar Day*

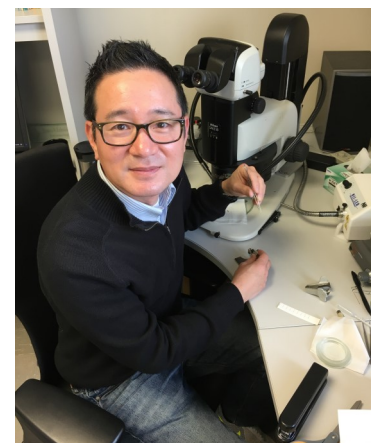
Oral Presentation:

1st place: Jackie Serrano
2nd place: Kaleigh Russell

Poster Presentation:

1st place: Christine Dodge
2nd place: Ryan Perry

Undergraduate
Gina Zhuo



Introducing Our Newest Faculty...



Allison Hansen The beneficial roles of microbes for plants and animals (including humans) have only recently become widely accepted and appreciated. Insects are excellent systems to study in order to understand the importance of host-microbe interactions. For example, a large diversity of insects possess microbial symbionts. These symbionts have direct effects on the ecology and evolution of insect hosts and as a result can dramatically impact human health and agriculture. In order to understand many aspects of insect life it is essential to understand their microbiota—the community of microbes that live with them. The focus of my laboratory is on the evolution and ecology of insect-microbe interactions. My lab teases apart the molecular mechanisms that underpin insect-microbe co-evolution using comparative and functional genomics in an evolutionary framework. Over the last several years my laboratory has discovered new ways that both insects and microbes regulate shared metabolic pathways via sRNAs and epigenomic mechanisms (i.e. “dark matter”) in the model pea aphid-*Buchnera* symbiosis. These findings have broad implications for the field of herbivore-plant specialization. In addition, knowledge generated by my laboratory can aid in combatting sap-feeding pests in agriculture through the dysregulation of these insect-microbe symbioses.



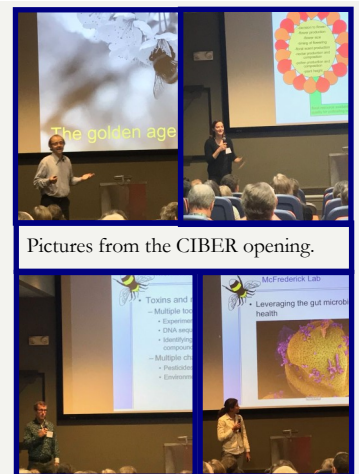
Monique Rivera I am a newly hired extension specialist of subtropical crops. My undergraduate degree is from University of Delaware, masters from North Carolina State University and Ph.D. from Rutgers University. I came to UCR from University of Florida where I was a post-doc working in vector borne diseases of citrus and avocado. In my new position, I am focusing broadly on research and extension on Huanglongbing (HLB) in Citrus as it spreads through Los Angeles backyard citrus. Tasked with this challenge, I am engaging my connections with researchers working in other citrus production areas such as Texas and Florida in order to best understand research priorities for HLB in California and how research should inform policy and management decisions. My research program currently focuses on understanding how predator presence influences feeding behavior of Asian citrus psyllid (ACP), how ants influence the distribution of ACP in commercial groves, and development of an attract and kill trap for Asian citrus psyllid. I am also interested in enhancing pollination of subtropical crops and the use of entomopathogenic nematodes in greenhouse production systems.

Continued from page 1...The Center for Integrative Bee Research

cal and Computer Engineering. Together, they deployed sensors into honeybee hives to test whether they are capable of sending measures of well-being or impending diseases onto the researcher’s mobile phones. To identify “sick bee smells” with the potential to be picked up by newly-developed chemical sensors, the Baer team further collaborates with chemical ecologists from the Mauck Lab. Eventually, the “Buzz Nose” will alert beekeepers via mobile phone when threshold levels of disease are high enough to warrant treating their hives.

In addition, the CIBER team is also working to interface with stakeholders in California and beyond. Supported by UCR RED (Office of Research and Economic Development) and CAFÉ (California Agriculture and Food Enterprise), the team invited 60 stakeholders from industry, NGOs, and government agencies to the Culver Center of the Arts, Riverside. During their one-day workshop in September 2018, participants identified the most imminent threats to national pollinator health and pathways to counter them. In a future workshop, the CIBER team will report their recent findings back to these stakeholders.

By Barbara Baer-Imboof, Research Specialist



Pictures from the CIBER opening.

In Memoriam

John Klotz was born November 30, 1946 in Pittsburgh and the family later moved to a 70-acre farm in rural Kansas. His early years were spent catching insects and exploring. Throughout his high school years John was an avid collector and his favorite subject was biology. After high school, John spent 4 years in the U.S. Navy beginning in 1968, much of it in the western Pacific.

John received his B.S. in biology from Rockhurst College in Kansas City, KS in 1976. He enrolled in entomology at the University of Kansas where he earned his M.S. and Ph.D. in 1985. His research focused on ant behavior under the mentorship of Dr. Rudolf Jander. His exposure to applied entomology began as the Technical Director of Lloyd Pest Control in San Diego. This practical experience would become a major influence on his future research. He also worked as a postdoctoral scientist and research scientist at Purdue University and THE USDA-ARS in Gainesville, FL before coming to the University of California Riverside as an Assistant CE Specialist and Entomologist in 1996.

The integration of ant biology and behavior into effective control strategies was an overriding theme in his publications. He is especially known for the numerous papers published regarding the use of boric acid in sweet-liquid baits against a variety of ants. He expanded this research to include the control of Argentine ants in organic orchards. His concept of focusing perimeter treatments on structural guidelines was an important contribution to ant control

around structures. This research would ultimately lead to reduced amounts of insecticides being applied in urban environments and help reduce the amount of insecticide runoff in waterways.

John was one of the driving forces behind the UCR Urban Entomology Conference held annually on campus. During his tenure as the Director of the Conference between 1997 and 2009, the attendance steadily grew with some 200-300 pest management professionals attending each year. The continuing success of the conference is a testament to John's leadership.

His productive research career culminated in a trilogy of books dealing with ants and their control: [Carpenter Ants of the United States and Canada](#); [Urban Ants of North America and Europe: Identification, Biology, and Management](#); and the [Urban Pest Management of Ants in California](#). These three publications provide a definitive treatment of ant control in California and the southwest. We often teased John telling him that his trilogy on ants was second in popularity to the Star Wars Trilogy.

He retired in December 2009 as a Specialist and Entomologist and moved to Sedona, AZ to enjoy the beautiful landscapes. Over the years John and his brother Stephen, an infectious disease physician, were interested in arthropods from the desert southwest of medical importance to humans. After his retirement, they continued to publish on topics such as triatomine bugs, Chagas disease, and cat scratch fever. He is survived by his wife, Jenny, brother Dr. Stephen Klotz and sister Suzanne Klotz.

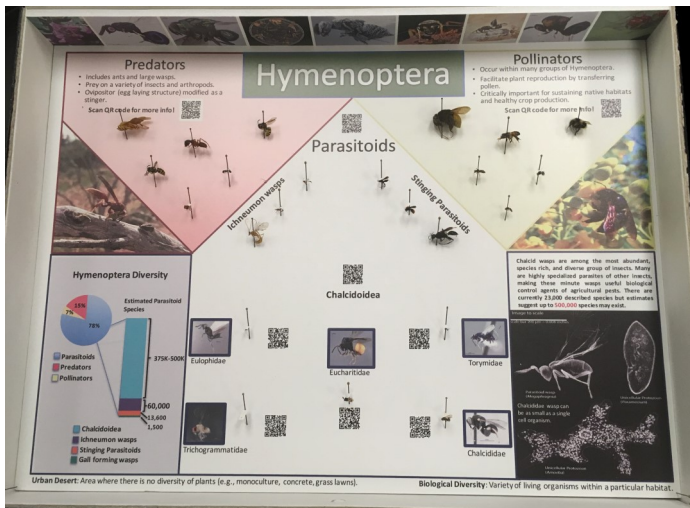
(By Michael K. Rust and Les Greenberg)

John LaSalle passed away in May 2018 in a tragic car accident. John received his PhD in Entomology from the University of California Riverside in 1984. As Director of the Atlas of Living Australia (ALA), Australia's national biodiversity database, John has been instrumental in integrating emerging technologies into taxonomy and collection management and has made Australia one of the foremost countries for biodiversity and taxonomic science. Through John's guidance and leadership, ALA has led to the digitization, imaging, and cataloguing of a vast portion of Australia's biodiversity and has supported numerous research in conservation, biological control, taxonomy, and invasive species management. John was also the head of the Australian National Insect Collection (ANIC) from 2002 to 2012. Under John's leadership, ANIC has transformed into one of the best maintained and modern collections in the world. Even as the head of the collection, John always made time to meet with visiting Hymenopterists, whether faculty or students, to share a coffee and a laugh and geek out on Hymenoptera. John's research focused on Eulophidae and Tanaostigmatidae (his dissertation work). He has over 150 publications, with 225 co-authors from 30 countries. He was a friend, colleague and mentor, and he will be greatly missed.

(by John Hearty)



Study boxes and outreach of Hymenoptera biodiversity to high schools



Teachers can request a study box with pinned specimens to aid in identification, and allow students to access further information through their smartphones.

As an outreach component of a chalcid wasp NSF grant, John Heraty, Ryan Perry, Iris Chien, Krissy Dominguez and Nicola Irvin from UCR, Jim Woolley and Devon Eldridge from Texas A&M, Matt Yoder from University of Illinois, and local teachers, Glen Bagwell and Linda Jirsa, from the Riverside Unified School District (RUSD) developed a free lesson plan on Hymenoptera Biodiversity for use in grades 9–12.



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

Components include a PowerPoint presentation, a pan trap experiment investigating Hymenoptera biodiversity, and ideas for engineering projects (see <http://outreach.chalcid.org/education>). The pan trap experiment involves students using a simple key to assess numbers of Hymenoptera in different habitats and encourages project-based learning and citizen science.

The team also created a supplemental study box with pinned examples of three groups of Hymenoptera, along with QR codes leading to additional information and photographs. New standards for teaching science have required school districts to rewrite instructional units, and RUSD will be incorporating the Biodiversity lesson into its Unit 2 Ecology of the high school curriculum. Requests for outreach materials have been generated from Riverside to Rancho Cucamonga and even the Chicago Field Museum. The Department of Entomology generously provided funds to help develop and distribute parasitoid study materials.

By Nic Irvin

Check out Chalcids 101 to see the education tools! <http://outreach.chalcid.org/>



Meeting with local teachers: Iris Chien (undergrad); Shannon Dadlez, John Robertson, Nicole Johnson (teachers); John Heraty, Ryan Perry (others). Showcasing wasps and outreach products.

Consequences of social organization



Kevin Loope (Rankin lab postdoc), Stephanie Gayle (field assistant), Erin Rankin, Jessica Purcell, and Madison Sankovitz (Purcell lab PhD student), from left to right, getting ready to excavate a yellowjacket wasp nest in Volcano Village, Hawaii.

Although many insect societies are composed of non-relatives, the evolutionary drivers of these groups remain enigmatic. One of the core research goals in my group is to understand the causes and consequences of evolutionary transitions from simple, single-queen societies composed of close relatives to complex, multi-queen societies containing unrelated individuals. This research is important because it contributes to answering long-standing questions in the field of evolutionary biology, and because many invasive social insect species are successful, in part, due to their ability to form colonies harboring multiple queens. My group is developing two systems to pursue these questions. In *Formica* ants, many species exhibit a polymorphism wherein they can form colonies containing either a single queen (= monogyne) or multiple queens (= polygyne). We have now sampled dozens of *Formica* species in western North America that have previously received little research attention, and we've sequenced a portion of the genome for more

than 7000 individual ants so far. These sequences will be used to investigate the genetic basis of this social system, the environmental factors that favor alternative social forms, the distribution of species that exploit one another, and the evolutionary history of common species.

In *Vespa pensylvanica* wasps, a recent introduction to Hawaii (in the last 50-100 years) has been accompanied by a shift from monogyne colonies that persist for one year to polygyne colonies that can persist for multiple years. UCR Entomology colleague Erin Rankin previously showed that these larger, longer-lasting colonies magnify the adverse effects of this invasive species. In our collaboration, we are investigating the genetic basis of this transition, as well as when and how the colonies in the invasive population accept new queens. This research will give more information about the optimal time to knock down these damaging colonies in Hawaii.

My fantastic team is also developing new questions that investigate the consequences of social organization. Graduate student Mari West is studying how *Formica* workers allocate tasks in societies and how this affects their efficiency. Graduate student Madison Sankovitz is investigating how *Formica* ant colonies from different environments and with different social organization influence soil properties. Finally, postdoc Aldo de la Mora is studying how socially parasitic ants (ants that parasitize the work of other societies for their own gain) influence the social structure of their hosts across the *Formica* range. Our research takes us to beautiful places, although we sometimes miss the views while we search the ground for ant and wasp colonies.

By Jessica Purcell



Jessica Purcell sampling *Formica* queens for a queen introduction experiment in the Swiss Alps.

UCR ENTOMOLOGY

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UCR Entomology Outreach

2018 was another banner year for the UCR Entomology outreach program. Led by our outstanding graduate students, the outreach program connects our Department to the community by communicating the importance of entomology in general and our research in specific. Importantly, our students share entomology and science as a viable career path for all students.

Much of the outreach presentations are done by our first-year graduate students, and the 2017-2018 student cohort was very large and dedicated. We were therefore able to present at over 100 schools, science fairs, and community events. In this age of mistrust in science, reaching the youth at such events is even more critically important than it has been in the past, and our graduate students are stepping up as excellent science ambassadors.

Our largest event continues to be the annual Riverside Insect Fair, which our Entomology Graduate Student Association co-organizes with the Riverside Metropolitan Museum. In 2018 our students took center stage, fielding questions about Entomology as a career and presenting their research to the Riverside community. Dr. Tom Perring was the event MC, and kept the crowd entertained with his singing and guitar-playing. The Department's



research and the importance of Entomology was on full display all day long, and we had an estimated 14,000 visitors. We are gearing up for the next Riverside Insect Fair, on April 27, 2019. Mark your calendars for this awesome event!

New for 2018 was our first ever Little Entomologists Summer Camp. This was another successful venture that was started by our industrious graduate students. As my daughter was one of the campers, I can say first-hand what a great camp it was. My daughter told me it was the best camp she has ever attended. The campers collected insects, made insect collections, and even performed the polymerase chain reaction (or PCR – a commonly used technique in molecular biology). The next camp will happen June 17-21, 2019, so sign up early as it will likely fill up quickly!

The mission of the UCR Entomology outreach program is to promote understanding of our students', labs', and department's science in our community. Our students are the ones that get this mission accomplished, and 2018 was successful all around. We will build on this success in 2019, but we could not do any of this without our dedicated students!

By Quinn McFrederick
Outreach Committee Chair

Find out more at <http://entomology.ucr.edu/outreach/>

