



THE BUZZ

Looking back on 2016



UCR ENTOMOLOGY

APRIL 2017

Dr. Cardé receives Certificate of Distinction



Dr. Ring Cardé was awarded a Certificate of Distinction for Outstanding Achievements by the International Congress of Entomology in 2016. Honorees are nominated by their peers and selected by the council of the ICE. The ICE holds meetings every 4 years, and awards a small number of Certificates of Distinction. Dr. Cardé was one of three scientists selected for this honor in 2016. By awarding

these certificates, the Council hopes to help inspire and connect all entomologists throughout the world. Dr. Cardé's research focuses on basic and applied aspects of odor-mediated behavior of insects, focusing on communication by pheromones in moths and host-finding by female mosquitoes. His contributions to the fundamental understanding of insect orientation and semiochemicals, and the methods used to study these phenomena have set a high standard in this broad field of research.

Multi-State Project Honored

Researchers at UCR are among those honored for a USDA Multi-state Project which won the 2016 Experiment Station Section Award for Excellence in Multistate Research. This award recognizes just one multi-state project each year for high scientific quality, the level of collaboration, and the professional leadership shown in conducting the project. Dr. Alec Gerry served as Project Chair for 2013-2016. Dr. Brad Mullens was also a member of this project. The project focuses on fly management in animal agriculture systems and impacts on animal health and food safety. The award was presented by the Experiment Station Directors at the November meeting of the Association of Public and Land

Grant Universities. This multi-state project includes researchers located at over 20 land-grant universities and several Hispanic-serving universities and Canadian institutions, as well as six USDA-ARS labs.



Multi-state project researchers including Dr. Gerry (bottom row- 3rd from right) and Dr. Mullens (middle row, 2nd from right). Former UCR associates include Dr. Nancy Hinkle (bottom, 4th from R) and PhD graduate Jeff Scott (back, 4th from left). Photo credit: Experiment Station Committee

23rd annual UC Riverside Dept. of Entomology Student Seminar Day

Oral Presentation:
1st: Kaleigh Russell
2nd: Emily McDermott

Poster Presentation:
1st: Amelia Lindsey

2nd: Alex Knyshov
Undergraduate
Daniel Pierce

Display Box
(a new category this year!)

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Letter from the Chair

Alumni and Friends of UCR Entomology,

Welcome from sunny (and wet) Southern California! I wish you all could be here to see the green hills and incredible desert flower bloom. With all of the rain we have received this year, the drought has largely been busted with an incredible response from the vegetation. If you get a chance for a visit before the end of April, take it; we have not had a desert bloom like this in over 10 years.

Since our last newsletter in 2016, the Department continues to be at the forefront of science with many new and exciting discoveries as well as important changes and additions to the Department. As I mentioned last year, construction on campus continues with the addition of a very large (50 labs) Multi-Research Building 1 (affectionately known as “MR. Big 1”). This facility is slated to come on-line in late 2019. On top of that, another large multi-research building has been cleared by the Regents for planning and should come on line a year or two after MR. Big 1. And “yes”, it will be referred to as “MR. Big 2”. On top of that, the campus is initiating the construction of new greenhouse facilities to the east of the Fawcett Lab (the old state-wide air pollution center). Collectively, these projects will provide us with much needed space for faculty and campus growth. We currently have ~23,000 students on campus with a target of 25,000. Faculty growth has lagged behind student growth, but we are catching up quickly!

Our turnover in faculty continues. Dan Hare, after serving as UC Systemwide Chair of the Academic Senate, retired this last December. Bob Krieger passed away unexpectedly last summer. We will sorely miss Bob. On brighter notes, the Department continues to be successful in new faculty recruitments. Starting in July, Dr. Boris Baer has accepted a senior-level position focused on the biology of honey bees and honey bee health. Also starting in July, Dr. Loren Ponisio will be joining the Department as an Assistant Professor investigating pollination networks. Added to this we are currently searching for a Cooperative Extension Specialist in the area of integrated pest management of orchard crops, a senior level position in urban entomology, and will begin searching for a Cooperative Extension position in citrus IPM this Spring. In related search activities, we are currently searching for two new positions in vector biology that may join the Department as well. I am confident that UCR Entomology continues to be one of the best entomology programs in the country, and with these recent and on-going hires of outstanding scientists, we will continue with this tradition.

Our educational programs remain strong with our faculty supporting over 40 Entomology graduate students and an additional 40+ students enrolled in interdepartmental degree programs. The undergraduate Entomology program also remains strong. We are holding constant with approximately 40 students in the program. We continue to provide our undergraduates a very rich and exciting curriculum with a wonderful ability to immerse them in research. They love it!

Finally, 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. As I have indicated in the past, I am biased and have my favorite fund: the Entomology Fund for Excellence. This fund is used to support our seminar program and to assist our graduate and undergraduate students with their research and research related travel needs. And of course there are several other targeted endowments for both faculty and students in need of your support; please take a look at the endowment page for a complete listing of opportunities that allow you to assist the Department and its programs. 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 2016!

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.

URBAN ENTOMOLOGY CHAIR FUND FOUNDERS CIRCLE (\$25,000)

Univar
Clark Pest Control, Joe Clark
Corky's Pest Control, Corky Mizer
Dewey Pest Control, Brock and Chip Dewey
Lloyd Pest Control, Jim and Jamie Ogle
Mega Fume, Inc., David Wadleigh
Orkin Pest Control
PAPA (Pesticide Applicators Professional Assoc.)
Payne Pest Management, Willie & Kathleen Payne
Pestgon, David Baro
Statewide Fumigation, William Lawson

MONARCH LEVEL (\$1000 and above):

Brock Dewey
Chip Dewey
Claire Thomas Federici
Corky Mizer
David Baro
David Wadleigh
Deborah Ford
Edward H. Traynor
Edwin Clark
Gary R. Veeh
James A. Ogle
James O. Lloyd-Butler
Katherine Ann Wright
Leslie A. Leavens
Linda Jean Strickman
Lynn Marie Le Beck
Merla Claudette Gaut
Michael Katz
Randolph Scofield Malone
William Kenneth Lawson
Willie Payne
APEAM AC
Bayer
Becker Microbial Products, Inc.
Blue Hills Fund
California Association of Nurseries and Garden Centers
California Avocado Commission
California Cherry Marketing Program
California Date Commission
California Pistachio Research Board
Covey Farms

Dewey Pest Control
E.I. Du Pont De Nemours & Company
Lehigh Agricultural & Biological Services, Inc.
Dow International Finance
Durling Nursery, Inc.
Fidelity Charitable Gift Fund
Finch Family Foundation
Gowan Company LLC
Hartz Mountain Corporation
Integral Ag, Inc.
Leavens Ranches
Luxembourg Pamol, Inc.
Marrone Bio Innovations, Inc.
Mega Fume, Inc.
Mosquito Research Foundation
Payne Pest Management
Pest Control Corky's
Pestgon, Inc.
Phytoauxilium
Primus Labs
Provivi, Inc.
Rees Agricultural Services
Rentokil North America, Inc.
San Diego CAPCA
Statewide Fumigation
Syngenta Crop Protection, LLC
Syntech Research, Inc.
Tessenderlo Kerley, Inc. (TKI)
The Nature Conservancy
Univar USA, Inc.
US Poultry
Van Der Kar Family Properties LP
Vestaron Corporation
Western Exterminator Company

QUEEN LEVEL (\$500 - \$999):

Cynthia Dong
Dorcas H. Thille
Elizabeth Anne Boyd
John M. Grether
Mud Creek Ranch Trust
Nora A. Hackett
Retha Keenan
Robin Smith
Sandy Sanborn
Shane L. Butler
Susan Deardorff

Susan Elizabeth Toscano
Thomas Lee Payne
Xochitl Hernandez
BASF Corporation
Grether Farming Company, Inc.
James Lloyd-Butler Family LLC
J.K. Thille Ranches
Shane L. Butler Family Growers, LLC
Sigma Xi, The Scientific Research Society
Morgan Stanley
Oro Del Norte, LLC
PL-B Ranch LLC
Vanguard Charitable

VICEROY LEVEL (\$100 - \$499):

Bonnie Jean Irwin
Carol C. Fujita
Carole S Whorrall
Carolynn H. Zuparko
Christine K. Halbritter
Cintia King
Colleen R. Klapproth
Dale Alan Powell
Daniel Cahn
Devin Patrick Carroll
Dexter Allen Dewey
E. Fred Legner
Gary R. Platner
Howard W. Vipperman
James A. Mcmurtry
Joan A. Goeden
John D. Pinto
John Naoye Kabashima
Konyn, Cathleen Marie
Kouichi R. Tanaka
Marian D. Larson
Oscar A. Suguitan
Pamela Marrone
Pamela Pavela
Philip Stephen McNally
Rebecca Christine Hesperheide
Richard Steven Vetter
Richard W. Pidduck
Robert B. Kimsey
Robert E. Orth

Establishment of the Endowed Chair in Urban Entomology

The idea of an endowed chair in Urban Entomology began in about 1995 when Dr. Mike Rust established an Endowed Research Fund in Urban Entomology. The possibility of an endowed chair was a way to acknowledge the pioneering efforts of Dr. Walter Ebeling at UCLA and to recognize the urban entomology program at UCR. The position would become a bridge between the university, cooperative extension, and industry. Initially Dow Agro-Sciences donated \$25,000 to help start the campaign. Unfortunately this initial effort was unsuccessful. For the next 18 years, the fund slowly accumulated about \$400,000 from Dr. Rust's honorariums, personal donations and small gifts made to the program. Target Specialty Products and Pest Control Operators of California (PCOC) annually conducted a special silent auction at their convention to support the endowed chair, the proceeds exceeding \$100,000.

With the advent of Dr. Rust's retirement in 2013, Corky Mizer, the founder and CEO of Corky's Pest Control, began inquiring about the status of the endowed chair.

With the aid of Corky Mizer, the CNAS Dean's Office, Chair of Entomology, and other members of the industry a new effort to establish the Endowed Chair began. A Founder's Circle of pest control companies that have donated at least \$25,000 was established. These companies include Clark Pest Control, Corky's Pest Control, Dewey Pest Control, Harbor Pest Control, Lloyd Pest Control, Orkin, PAPA (Pesticide Applicators Professional Association), Payne Pest Management, Pestgon, Statewide Fumigation, and Western Exterminator. Corporate Sponsors that have donated \$50,000 are Syngenta, Target Specialty, and Univar Environmental Sciences.

With the success of this effort, we were able to secure \$500,000 in matching funds from the President's Office to establish the Urban Entomology Presidential Endowed Chair. The Entomology Department expresses our deep thanks to all those who have made this Endowed Chair possible, and hopes to have more news about this position soon.

New graduate training program in computational entomology

Led by Eamonn Keogh, a professor of Computer Science and Engineering in UCR's Bourns College of Engineering, a multi-disciplinary team of researchers has received \$3 million from the National Science Foundation Research Traineeship (NRT) program to prepare the next generation of scientists and engineers who will learn how to exploit the power of big data to understand insects. The team includes Erin Wilson Rankin (Entomology), Anupama Dahanukar (Entomology), Daniel Jeske (Statistics) and Christian Shelton (Computer Science and Engineering). Dr. Keogh and his graduate students have been developing low-cost, wireless insect sensors that classify species with up to 99.9 percent accuracy and generate masses of data that can be incorporated into classification algorithms. In about three years, and with dozens of sensors running con-

tinuously, the team collected tens of millions of data points—more than all previous work in the field combined.

Challenges in entomology and ecology generate enormous amounts of data, and fully exploiting it calls for experts whose knowledge spans two disparate fields. This training program will bridge those fields, creating endless research possibilities and a new way to address some of the most critical challenges of our time,"

Keogh said. By counting and classifying insects on this scale, scientists can help farmers determine precisely when to apply pesticides, and help public health officials stop the spread of insect-borne diseases. Many other areas of entomology would benefit from such in-depth analyses, Keogh said. The computational entomology program, the first of its kind worldwide, will serve

as a replicable education and training model for other institutions with an interest in developing computational entomology programs.



Doctoral student Yan Zhu (left) and Eamonn Keogh, professor of computer science and engineering, adjust a mosquito trap designed by researchers at UCR and Microsoft.

Photo Credit: Sarah Nightengale, UCR Today

Recent Honors and Awards

FACULTY

- Ring T. Cardé: Certificate of Distinction for Outstanding Achievements, International Congress of Entomology,
- Timothy D. Paine: C.W. Woodworth Award, Pacific Branch, Entomological Society of America
Tokuji and Bettie L. Furuta Endowed Chair, UC Riverside
- Marshall W. Johnson: Honorary Member of the Global International Organization for Biological Control (IOBC).
- William E. Walton: President-Elect, American Mosquito Control Association
- Elizabeth Grafton-Cardwell: ANR Team STAR Award
- Mark Hoddle: ANR Team STAR Award
- Alec Gerry: 2016 National Experiment Station Award for Excellence in Multistate Research, Project Chair.

RESEARCH STAFF

- Michelle Duennes, Postdoctoral Scholar, USDA NIFA Postdoctoral Fellowship
ESA Science Policy Fellows Class of 2016

COMPETITIVE GRANTS: STUDENTS

- Amelia Lindsey**
van den Bosch Scholarship in Biological Control
- Austin Baker**
van den Bosch Scholarship in Biological Control
Harry Scott Smith Scholarship Fund
- Ryan Perry**
van den Bosch Scholarship in Biological Control
- Kelsey Schall**
Harry Scott Smith Scholarship Fund
- Yu-Chieh "David" Chen**
International Student Research Fellowships Program awarded by the Howard Hughes Medical Institute.
- Amy Murillo**
Postdoctoral Scholar, USDA NIFA Postdoctoral Fellowship
- Levi Zahn**
USDA NIFA Predoctoral Fellowship

STUDENTS

Congratulations to the UCR Entomology Linnaean Games Team which won second place at PacBranch, and moved on to compete at ICE 2016.

Eric Gordon, Fatemeh Ganjisaffar, Adena Why, Kaleigh Amanda Russell, Darcy Reed (coach)

Amelia Lindsey

Society of Molecular Biology and Evolution Young Investigator Travel Award, Title: "Genome evolution of a parthenogenesis-inducing Wolbachia symbiont"

Tejal Reddy Endowed Graduate Scholarship

3rd Place Graduate Student Presentation (International Wolbachia Conference)

Eric Gordon

Graduate Dean's Dissertation Research Grant

Aleksandr Knyshev

Graduate Dean's Dissertation Research Grant

Christine Dodge

Outstanding Teaching Award

Erich Schoeller

1st place Graduate Student Poster Competition: Biological Control and Insect Pathology, International Congress of Entomology

Adena Why

1st place Graduate Student Oral Competition: Genetics and Evolutionary Entomology: Behavior, International Congress of Entomology

Honorable Mention, Student Oral Competition: American Mosquito Control Association annual meeting

Nathan McConnell

Second Place, Poster Competition, American Mosquito Control Association annual meeting



Future Entomologist: New graduate students at the fall picnic, September 2016

Entomology Research Museum News

2016 was a busy year for the Museum, one of the busiest ever, in fact, thanks mostly to several workers processing specimens; Stephanie Kim has been doing HMDS dehydration and point-mounting, while Kristine Ziadie has been doing labeling, and Cole Watson has been volunteering to help curate, as well as having been hired recently to help database a large voucher donation from Gordon Pratt, of insects from the China Lake NWRs. As is typical, there have been many donations, mostly from the usual donors - Gevin Kenney, John Pinto, Mark Hoddle, and Greg Ballmer. All told, we added over 30,000 specimens, the biggest single-year increase ever, from either recent donations, vouchers, or processed backlog, in the past year.

Adriean Mayor was around for the majority of the year working on our melyrid beetles, and especially vigorous about field work, with dozens of different collecting trips all over California. As with the material from previous decades, these will all play a part in his revisionary work on the Dasytinae, and ultimately be deposited here.

Only a few significant loan returns came back this year; and we had relatively few visiting curators. We did finally manage to repatriate all of our ant collection from the LACM, where some 14000 of our specimens had been residing for decades. We are hopeful we soon begin repatriation of the much smaller number of bees and wasps still at the LACM, as well as our former primary type collection from the California Academy of Sciences, which has been on indefinite loan for several decades. This year, as last, a number of potential loans were avoided by sending database information or photographs instead of physical specimens, or tissue samples only (including a leg from an extinct moth species from Fiji). The number of new loans being generated by non-targeted requests via social media (mailing lists, FaceBook, etc.) continues to increase. As is usual, I gave several newspaper and magazine interviews, a TV appearance, several tours, and continue

to help manage traffic in the FaceBook groups that involve insect ID services, a task which I'm being helped with by former Entomology SRA Rob Velten.

The Museum's regular database has massively grown, to roughly 550,000 records, which is fantastic for a collection of about 4 million. I was personally on relatively few significant collecting trips this past year, but this included a major field trip to Guatemala, and found a few more new species there, as well as witnessing a volcanic eruption. Several of the folks who had loans out of our material described new species this past year, as well, including a new bee species from SoCal named *Perdita yanegai*, from specimens I had set aside years ago as a potentially new species (evidently, I was right!).

By Serguei Triapitsyn and Doug Yanega



Anagyrus ciomperliki Triapitsyn,

a new species of Encyrtidae (Hymenoptera) described in 2016 from Puerto Rico, which is a parasitoid of *Harrisia cactus mealybug*, *Hypogeococcus* sp., a destructive pest of native columnar cacti.

Targeted Opportunities for Giving to UCR Entomology

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 outstanding seminar speakers and departmental priorities.

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.

New Alumni (Students graduating during 2016)

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

Graduate Students:

Cole Symanski
Kimberly Stephens
Emily McDermott
Fatemeh Ganjisaffar
Debbie De La Riva
Amy Murillo
Tiago Pereira
John Hash

Undergraduate Students:

Fabian Vazquez
Jacob Tarango
James Helper
Pamela Hsi
Michelle Bui
Alec Yzaguirre Williams
Jonathan McGhee
Krissy Dominguez
Scott Heacox



*Go confidently in the
direction of your dreams.
Live the life you have
imagined. - Henry David
Thoreau*

Recently Retired...

Faculty

Dan Hare

Staff

James McElfresh
Darcy Reed
Nilima Castle

Welcome to our newest students!

Graduate Students:

Mark Dery
Chrysalyn "Krissy" Dominguez
Kaleigh Fisher
Stephanie Gamez
Deena Husein
Carlos Rosas Sanchez
Tessa Shates
Mari West

Undergraduate Students:

Dawon Kim
Shayan Lionel Akhavan
Andrew Tyler Staviski
Jacob Michael Herney Jones
Daniel Gonzalez
Julia Ann Perez
Mark Anthony Gomez
Alexandra Vanecek

Pictures from the 2nd Annual Riverside Insect fair

2016 saw our second annual Riverside Insect Fair, organized by UCR Entomology students and the Riverside Metropolitan Museum. This event attracted thousands of visitors to more than 60 booths in downtown Riverside.



Introducing Our Newest Faculty...

Kerry Mauck: The spread of insect-borne diseases is mediated by complex interactions among pathogens, their hosts, and insect vectors, but our understanding of the physiological and ecological mechanisms governing these interactions is limited, despite clear significance for agriculture, ecology, and human health. Chemistry invariably plays a central role in mediating such interactions; yet, relatively little work to date has addressed the chemical ecology of insect-vector-borne diseases. My research focuses on investigating the biochemical mechanisms mediating plant pathogen transmission in complex ecological settings and their implications for host plant interactions with other organisms. We are particularly interested in studying how vector-borne pathogens of plants and animals might evolve to alter traits of their hosts in ways that influence the frequency and nature of interactions between hosts and insect vectors. We also explore how pathogen-induced phenotypic shifts affect interactions between hosts and other (vector or non-vector) organisms in ways that modify food webs, alter the outcome of competitive interactions, and influence flows of energy and nutrients.

In Memoriam

Robert Krieger, UC Cooperative Extension specialist in toxicology at Riverside, died July 26 at age 72. Dr. Krieger had served as a CE specialist at UC Riverside since 1994, specializing in pesticide exposure assessment and worker health and safety. He also was an adjunct clinical professor in the Department of Environmental and Occupational Health at Loma Linda University. Krieger's first academic position with UC was in the Department of Entomology and Nematology at UC Davis from 1971 to 1980. He was a founding faculty member of the UC Davis Department of Environmental Toxicology. He has worked with many organizations including the Washington-Oregon-Idaho Regional Veterinary Medical Education Program, California Department of Food and Agriculture and two major Washington, D.C., consulting firms in toxicology and risk assessment.



Dan Gerling was a UCR Entomology Ph.D. graduate in 1965. He passed away March 26, 2016. He was emeritus professor of Entomology at Tel Aviv University and adjunct curator of whiteflies at The Steinhardt Museum of Natural History and National Research Center. During his career, Dan Gerling served as a visiting professor in numerous academic institutions including the Universities of California, Georgia and Hawaii, and Simon Frazer University. He was an active consultant and collaborator world-wide.

Continued from page 3: A Special Thank you to all of our Contributors in 2016!

**VICEROY LEVEL (continued)
(\$100 - \$499):**

Bartels Ranch
Beneficial Insectary, Inc.
Far, Inc.
Green Dog Pest Service
King & King Ranch
Las Palmitas Ranch
Leffingwell Ag Sales Co., Inc.
Limoneira Company
Lofthouse Ranch
McEwen Nursery
Nishimura Farms, Inc.

Premise Keppers Pest Solutions
San Diego PCOC
Santa Paula Creek Ranch
Sony Pictures Entertainment., Inc.
Sundance Natural Foods

DEPARTMENT SUPPORTERS:

Brianna Layne Wrightsman
Carolyn Louise Villines
Dana M. Risch
Glen Warren Forister
Guanyang Zhang
Jeffrey Hanlon

John Amarnath Immaraju
John F. Emmel
Karen Leilani Benites
Kyle Austin Whorrall
Lorraine C. Foster
Mazin M. Kashou
Muriel Jean Runholt
Nancy Reisig Power
Richard Ryan Neff
Ronda L. Hamm
Saul Isaac Frommer
Victoria Kannon
Vladimir Anatoly Kokoza
Anonymus

Using gene drive technology to stop spread of disease-carrying mosquitoes

Insect vectors of disease represent one of the greatest worldwide threats to human health. Currently, over half of the world's population resides in areas at risk for infection by an insect-borne disease. Last year alone, more than 700 million people were infected with malaria or Dengue, resulting in 440,000 deaths. Now the incidence of Zika is rising and threatening to spread within the US. In the absence of vaccines to prevent these diseases, protecting the public depends exclusively on mosquito vector control. With current mosquito control methods being woefully inadequate, development of transformative, species-specific, safe and effective control measures is an urgent priority for national security.

Recent developments in genetics and molecular biology now allow an innovative technique called “gene drive” that introduces genetic elements into a population to enforce the continued inheritance of selected genes. The overarching goal of the Akbari lab at UCR focuses on studying the genetics and physiology of mosquitoes with the goal of developing and applying creative genetic strategies for reducing the burden of mosquito vector borne diseases. For example, one promising mosquito related project being conducted in the lab is concerned with creating effective selfish genetic elements known as gene drives which are capable of rapidly transmitting themselves, along with linked cargo genes (e.g. anti-pathogen genes) into wild populations. The goal is that one day the mosquito gene drive elements that the Akbari lab is engineering at UCR will someday be used in the field to spread anti-pathogen effector genes into wild disease transmitting mosquito populations. Overall, the Akbari lab is largely dedicated to solving the mosquito problem by engineering clever genetic strategies that can be applied to control these disease vectors.



Akbari Lab photo
February 2017.

Top- Left to right: Judy Ishikawa (lab tech), Olivia Johnson (undergrad), Kenneth Truong (undergrad), Anna Buchman (Postdoc), Stephanie Gamez (Grad), Sagar Chopra (undergrad), Dennis Ostrovsky (undergrad), Christian Bowman (undergrad), Ming Li (Postdoc)

Middle- Left to right: Caila Ruiz (undergrad), Jennifer Shyong (Lab tech), Nicole Colindres (undergrad), Yeji Lee (undergrad), Nancy Zelaya (undergrad), Michelle Bui (Grad), Ting Yang (Postdoc)

Front: Dr. Omar Akbari.

Undergraduate receives Carnegie Mellon fellowship

Congratulations to Phong Au-Hong, a junior in the entomology department, who has been awarded one of 20 spots in the Public Policy and International Affairs Junior Summer Institute (PPIA JSI) at Carnegie Mellon University's Heinz College for 2017. This is an intensive 7 week program awarded to high potential undergraduate students from universities across the country. The goal of the PPIA Fellowship Program is to help students achieve a master's or joint degree, typically in public policy, international affairs, or a related field.

“As an entomology student, I am attempting to find the intersection between science and social activism,” Au-Hong said. “This opportunity with PPIA will provide a variety of different lenses at examining community issues.”

Pollination Research in the Arctic

In late June 2016, a team of UCR researchers embarked on an exploratory trip to investigate how Arctic pollinators may be affected by climate change, and what would be the implications of these changes for Arctic plants. The interdisciplinary research team consisted of Drs. Hollis Woodard and Jessica Purcell from the Department of Entomology, who study the behavior and genetics of social insects, Dr. Jeff Diez, an ecologist from the Department of Botany and Plant Sciences, as well as Dr. Michelle Duennes and Kristal Watrous, a post-doctoral researcher and a research specialist in the Woodard's lab, respectively. Dr. Alan Brelsford, an Assistant Professor in the Department of Biology who grew up in rural Alaska, and therefore served as a local guide to the dangers and beauties of Alaska summer. In addition, a reporter and photographer from the New York Times and the UCR Media Relation Officer also joined the team of scientists and published this storyline in the NY Times and UCR magazine, respectively. (<http://www.nytimes.com/interactive/2016/10/11/science/hunting-arctic-bumblebee-bombus-polaris.html>; <https://magazine.ucr.edu/5269>).

The Arctic is warming faster than anywhere else on the planet. Responses of pollinators to climate change are critical to understand because many flowering plants in polar region are highly dependent on pollinators for cross-pollination. Further, insect-pollinated flowering plants appear to be more phenologically sensitive to climate change than wind-pollinated plants. *Bombus polaris* is one of only two species of bumblebee in the high Arctic. This unique bee is a familiar mixture of black, yellow and orange, but has a thicker coat of hair than most bees. The long coat of hair has of course

helped them adapt to the cold, but also helps to spread pollen. The bumblebee also has the unique ability to increase its internal temperature up to 38 degrees Celsius (warmer than a human body). Bumblebees are critical pollinators of wild flowers and food crops, but some species are undergoing precipitous declines. A recent assessment of bumblebee status worldwide by the International Union for Conservation of Nature (IUCN) found alarming population collapses in Europe, North America, South America and Asia. They placed *B. polaris* in the "data deficient" category. The researchers are focusing on the Arctic because the effects of climate change are amplified in the Arctic, and *B. polaris* is the primary pollinator of about 80 plant species threatened in the region. The researchers' proposal is focused on understanding what factors lead to resilience of plant-pollinator systems in the Arctic. Specifically, they are proposing to investigate what affects plant reproductive responses to the changing plant-pollinator landscape. Using a combination of field observations, lab experiments, and statistical modeling, the researchers will examine how climate and floral resources affect bee populations, pollination services, and plant performance. The target plants will include species of great interest to Alaskans because of their berry resources and/or cultural significance, including Cloudberry (*Rubus chamaemorus*), Lingonberry (*Vaccinium vitis-idaea*), and Arctic poppy (*Papaver radicum*).

This project was funded by a collaborative seed grant from the UC Riverside Office of Research and Economic Development. The purpose of this funding is to help initiate new, inter-disciplinary research projects among UCR faculty. Re-

searchers will use their preliminary results from the research funded by this grant to compete for larger grants. The research also reflects a growing expertise at UCR surrounding pollination research. UCR has recently hired biologists who conduct research on bee health, plant-pollinator interaction networks and evolutionary ecology of pollination. The researchers are now putting together a proposal to leverage federal funding.



From left to right: *Bombus polaris*, Jessica Purcell, Alan Brelsford, Kristal Watrous, Jeff Diez, Bren Woodard, Hollis Woodard, Michelle Duennes

Entomology in the News

Find more about research highlights in the news at *UCR Today*:

Mark Hoddle, Recent detection of the South American palm weevil in CA.
<https://ucrtoday.ucr.edu/40984>

Jessica Purcell, Loner spiders prevail as pioneers.
<https://ucrtoday.ucr.edu/40440>

Brian Federici, Engineering a protein to combat Dengue Fever, Zika.
<https://ucrtoday.ucr.edu/40128>

Serguei V. Triapitsyn, Rediscovering a wasp after 101 years.
<https://ucrtoday.ucr.edu/38107>

John Trumble, Contaminants from treated wastewater on food produce.
<https://ucrtoday.ucr.edu/36087>

Dong-Hwan Choe, Scents from bed bugs' shed skin affect the pests' behavior.
<https://ucrtoday.ucr.edu/38734>

Jessica Purcell, Raft-building ants exhibit memory.
<https://ucrtoday.ucr.edu/36509>

Quinn McFrederick, Flowers are a critical link to bacteria transmission in wild bees.
<https://ucrtoday.ucr.edu/39332>

Dong-Hwan Choe, New Method to stop Argentine Ants.
<https://ucrtoday.ucr.edu/35424>

Amy Murillo and Bradley Mullens, Backyard chickens harbor many parasites.
<https://ucrtoday.ucr.edu/34009>

UCR Entomology alumni and former department members. We want to hear from you and share your good news.

Tell us your News!

Email us at
richard.redak@ucr.edu

Undergraduate Student Association

Botany and Entomology Undergraduate Student Association or BEUSA is a club that connects students with faculty members in the department. In each BEUSA meeting there is a guest speaker from either the Entomology or Botany department to present his or her research topics. Outside the biweekly meetings, BEUSA has collecting trips throughout the year at different types of habitats. At each collecting trip, at least one junior or senior member will join to help identify insects. BEUSA also has outreach events such as UCR STEM Day or Butterfly Day at Robidoux Nature Center. In those events, we encourage children and high school students to go to college and study Entomology. We show them the different subjects in Entomology and why insects are important to study. Overall, BEUSA connects undergraduate students to faculty members for research opportunities, learning how to collect and preserve insects, and reaching out to the community.



Undergraduate Research Spotlight

My name is Iris Chien and I am a 4th year Entomology undergraduate student. I was working on a teaching project over the summer. I ran ten YPT sites (yellow pan trap) throughout UCR campus for a three-day period. The traps were collected on the third day and examined in lab. Under the microscope I found large numbers of a wingless parasitoid wasp in the trap from Lot 30. Seven of the ten traps contain the wingless wasp and so far there are only females. It was later found that it is *Neodusmetia sangwani* Rao. It was a biological control agent that was imported from India and released in Texas in the 1960s to control Rhodesgrass mealybug. It was released again in Imperial county, California in 1980s' to indirectly control *Solenopsis invicta*. Last collection record was in Orange county 1992. The single trap site in lot 30 has more specimens than the Entomology Museum.



Wingless parasitoid *Neodusmetia*

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UCR Entomology Outreach

Our graduate student-led outreach program continues to inspire interest in Entomology and science throughout the Inland Empire. In 2016 we presented at over 40 events, ranging from elementary school visits to science fairs.

Our outreach booths were packed with visitors at regional events such as Earth Day. Our students presented to nearly 30 schools and student organizations such as Upward Bound.

Our most successful event was the second annual Riverside Insect Fair, organized by UCR Entomology students and the Riverside Metropolitan Museum. The second year of this fair proved to be even more popular than the first year, with an estimated 10,000 attendees! Undergraduate students, graduate students, staff, postdoctoral researchers, and faculty presented our research to the public, while vendors and an insect cooking demonstration entertained the crowd.

On campus, we presented at events such as UCR Discover Day, the CNAS Scholarship Breakfast, and the Fall and Spring plant sales at the Botanic Garden.

Our outreach program is a valuable tool for communicating the importance of Entomology to the public. Our students are fantastic ambassadors, and deserve a big thank you for their service.

**By Quinn McFrederick
Outreach Committee Chair**

