



# Animal & Comparative Biomedical Sciences

Feature

## ISSUE HIGHLIGHTS

### Research



Congratulations to Dr. Gayatri Vedantam for her inclusion in the 2023 cohort of UArizona Women of Impact which recognizes exceptional women in research and innovation.

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### Teaching



KEYS Intern and High School Student, Nyreek Thompson, worked with the Ravishankar Lab to gain hands-on lab and food safety research experience.

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### Extension



Are you in middle or high school and Interested in STEM or Ag? Become a 4-H STEM or Ag Ambassador and gain leadership skills while helping promote STEM and Ag programs in your community!

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## ACBS Creates Food Safety Undergraduate Certificate Program to Address Growing Need for Food Safety Professionals

The School of Animal and Comparative Biomedical Sciences has developed a new 13-unit Food Safety Undergraduate Certificate Program for anyone interested in tackling the current and future food safety challenges facing Arizona, the United States, and the world. The first group of students began this Fall 2023 at UArizona Tucson and Yuma campuses and will be available to students across the United States through AZ Online starting in Fall 2024.



Every day in the United States over 330 million people consume almost 1 billion meals a day. An estimated 46 million foodborne illnesses (approximately 1 in 7 people), 128,000 hospitalizations, and 3,000 deaths in the U.S. every year.

The Food Safety Undergraduate Certificate Program was developed in response to the critical need for a workforce trained in all aspects of food safety. The certificate program allows for students from across the university to complement their primary area of study with food safety education, as well as, for currently employed food industry representatives, to advance their food safety knowledge and be able to immediately apply novel food safety approaches in their respective industries.

This dynamic, fully online program, offers complete flexibility to participants. The program was specifically set up to ensure that students completing the certificate in any area of study will be ready to join the food safety workforce and be meaningful contributors upon completing this unique and relevant combination of academics, experience, and certification.

The certificate program begins with a foundational microbiology course, and then moves into upper division coursework including Food Safety & Microbiology, Food Safety Laws & Legal Practices, and at least one specialized food safety elective. Students also receive hands-on training with 1-3 Practicum units that can include an internship in industry or independent study in a laboratory. Additional professional certification in different food safety areas of interest are available through the program.

(Food Safety continued on 2)



ACBS student Jessica Torres (right) holds her professional Basic Hazard Analysis and Critical Control Point (HACCP) Certificate earned this fall as part of her undergraduate Food Safety Certificate work. Dr. Margie Sánchez-Vega (left) teaches undergraduate and professional certificate classes for the undergraduate Food Safety Certificate.

# From the Director



November 3rd marked my 7-month anniversary in ACBS. Those months have been a whirlwind of meeting new people and hearing about all of the exciting things going on in our Extension programs, classrooms, and research labs. I'm continually impressed by the examples of dedication and hard work that I see on a daily basis! However, along with these amazing things, there will always be challenges that we need to address. One challenge that has been central to many recent conversations is the negative impact that the University

change to the new AIB financial model is having on CALES and many other colleges. Because of this shortfall, all of the units in CALES are being asked to improve efficiency and prudently manage funds and expenses. This "belt tightening" will undoubtedly be felt by all of us across this academic year. In the meantime, I want to assure you all that leadership is exploring every possible solution to the situation. I also want to assure you that a thorough review of ACBS instructional efforts and class sizes indicates that we are doing a remarkable job of delivering mission-driven content to a large number of students! While there are some areas that we do need to tweak, I and higher-level leadership are impressed with what you are all accomplishing daily. Thank you!

One area that I would like to see us work together on as a unit is development of a greater sense of community. It's important that everyone that is part of ACBS feel that they are part of the team and that their contribution is important. While we don't always need to agree on everything, we can all likely do a better job of listening to perspectives that are different from our own and then use those perspectives to reinforce our own views or to even alter our own viewpoints. Gossiping about someone's perceived shortcomings, the value of their work, or contribution to a particular area is almost never going to be productive. Thus, I challenge us all to be more supportive, to think about how we lift each other up, and to purposefully be problem solvers and not problem creators or perpetuators. We're all in this together!

As I've said before, you are all welcome to reach out to coordinate a time for me to hear about you, your work, and the things that you feel should be priorities for ACBS across the next few months and beyond. I always welcome your input!

Thank you for all that you do.

- **Scotty**

## D. Scott Merrell

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## Food Safety (continued from 1)

If you are interested in making a difference in protecting the world's food supply contact Dari Salvo, food safety advisor ([kdtrujil@arizona.edu](mailto:kdtrujil@arizona.edu)) or Dr. Margarethe Cooper, Victor P. Smith Endowed Chair in Food Safety Education ([cooperma@arizona.edu](mailto:cooperma@arizona.edu)).





## Support ACBS

*Finding Tomorrow's Solutions, Together.*

Gifts of any size help to propel ACBS closer to its goals and have an immediate and lasting impact on our programs and students. Gifts may be made online at the University of Arizona Foundation website or contact us to discuss more personalized options.

## Connect With Us:

Get all the latest news and information about the University of Arizona School of Animal and Comparative Biomedical Sciences.



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NEWSLETTER

[acbs.arizona.edu/news-events/newsletters](https://acbs.arizona.edu/news-events/newsletters)



FACEBOOK

[facebook.com/ua.acbs](https://facebook.com/ua.acbs)

## Photo Credits

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# 2023 UArizona Women of Impact - Gayatri Vedantam

Thirty accomplished women took center stage at Stevie Eller Dance Theater on Friday, Oct. 20, to be recognized as Women of Impact by the University of Arizona Office of Research, Innovation & Impact (RII). The awardees, representing a wide range of colleges, units, and disciplines across campus, were chosen by committee from over 200 nominations for their commitment to UArizona values as well as their professional achievements, community impact, unique skills in driving discovery and innovation, and their passion for empowering others.

Although the impact of an individual can be difficult to measure, the descriptive statements of each honoree show a unique depth of investment in the university and community as evidenced through actions and impact that resonates far beyond UArizona's campus. Each finalist also invited a mentee to join them at the event.

This year's guest list also included Young Women of Impact honorees, representing public high schools in Pima County as nominated by the school principal based on characteristics similar to the judging rubric for the UArizona Women of Impact finalists.

The awards celebration opened with remarks from Arizona Governor Katie Hobbs and University of Arizona President Robert C. Robbins. "Tonight's awardees represent the best characteristics of Arizona, it is obvious that you care deeply about our state – from the students who benefit from your dedication and passion to the people across Arizona who are impacted by your truly incredible research, innovation, scholarship, leadership, and mentorship," said Hobbs. "We are stronger when we have a state that empowers and works for everyone, so please join me in continuing to support and uplift one another, and in blazing trails for all those that come after us." President Robbins addressed the Women of Impact honorees saying "You are leading the way while empowering those around you and preparing the next generation." And to the Young Women of Impact honorees, he said "You are our future."



UArizona honors Women of Impact and Young Women of Impact at awards celebration.



Dr. Gayatri Vedantam, a Professor in the School of Animal and Comparative Biomedical Sciences and a U.S. Department of Veterans Affairs Research Career Scientist, has been incredibly influential in the fields of microbiology and immunology with her groundbreaking research and teaching. Gayatri's nomination came from 12 of her close collaborators, peer faculty, and students. If there was one common thread that came through on the nominations, it was Gayatri's standard of research excellence, which she displays in multiple ways. As the Co-Director of the Collaboratory for Anti-Infective & Therapeutic Strategies (CATS) here at the UArizona, she works hard to foster community and collaboration between colleagues across the university and/or external partners.

Most of her recent work has focused on a pathogen that affects millions of Americans, *Clostridioides difficile*. *C. difficile* causes infection in the large intestine, resulting in chronic, severe diarrhea – and can lead to death in immunocompromised patients. For this reason, Gayatri has a long history of working tirelessly to bring her scientific discoveries to market to ensure reduction of the devastating impact that *C. difficile* has on the world population.

The nomination letters noted how many of Gayatri's close collaborators are early career faculty, illustrating her role as a valued mentor to faculty, postdoctoral scholars, and students across and beyond the UArizona. This is a direct testament to Dr. Vedantam's ability to represent the Women of Impact program – though she could easily develop (and in fact, does develop) strong collaborations with high-profile researchers, her mentoring record illustrates her passion for empowering others and working with younger generations of scientists to facilitate change.

Another notable highlight of nearly every nomination letter was that Gayatri is, quite simply, extremely humble, nurturing, and approachable. Nominators noted that it would be understandable if she were at least a little bit arrogant – after all, this is a woman who has rubbed elbows with Dr. Anthony Fauci! But nominator after nominator noted that Gayatri is kind and very down-to-earth. Though kindness was not a criterion for Women of Impact, it did provide just one more reason that Gayatri is so deserving of this award.

Gayatri, who earned CALES Teaching Faculty of the Year recognition in 2011 and Research Faculty of the Year in 2013 and 2018, said she is "honored and grateful" to be part of the 2023 Women of Impact. "For me, this award also acknowledges all the people in our team who make our research possible," Gayatri said. "It's a team award."

Gayatri said her mission to help people lead healthier lives was sparked by her own life story. Her grandmother was the only one of the few survivors of the Bubonic Plague when it broke out in Southern India in the early 1900s.

"I'm here today because my grandma did not die of the plague," said Gayatri, who currently teaches bacteriology and infectious diseases classes at the College of Medicine-Tucson. "I grew up hearing her stories, as well as those of how infectious diseases shaped the histories of her children. So, my grandmother and mother are women of impact in my life."

# ‘Brain and Barn’ Experiences for ACBS160 Students

ACBS160 Human and Animal Interrelationships, co-taught by Drs. Dieter and Netzin Steklis, invites students to consider how the mind, behavior, and biology of both humans and domestic animals was changed by the domestication process—that is, the evolution of symbiotic mutualisms between humans and particular domesticated species. More commonly appreciated are changes in the domesticated animal, such as reduced body size and aggressive temperament, or increased productivity, but much less often considered are changes in the biology and behavior of the human domesticator.

The evolution of lactose tolerance in dairying societies is perhaps the best-known example of the human-cow symbiosis, some 10,000 years in the making. But there is also good evidence that over the millennia human emotion and cognition were shaped by the sustained, regular interactions with a diversity of domestic and wild animals. A significant part of the course covers this evidence, which includes a dive into brain anatomy and physiology.

Many students have little familiarity with such seemingly technical neurobiology,

and the majority have never seen, let alone, touched a human brain. This semester, held a special “meet your brain” after-class session for all interested in donning rubber gloves to hold and marvel at a formalin-soaked human brain! The many ‘wows” and questions indicated that this was a valuable and unforgettable experience.

This ‘brain encounter’ was followed up in October with the much anticipated once a semester ‘Animal Encounters’ event. A variety of domesticated animals are brought to the UArizona mall by TRAK (Therapeutic Ranch for Animals and Kids), giving students (and usually many passersby) the opportunity to interact with the very animals they have learned about in class. Students have loads of fun, but they are also asked to take a photo with an animal of their choice and to reflect briefly on what they have learned about that animal. They publish this animal selfie with a factoid to social media to educate their e-friends. A special plus for all is the relaxation and stress reduction experienced from cuddling with the friendly barn animals, be it chicken, goat, or sheep. Overall, a welcome treat and lasting educational experience.



Students gather around Dr. Dieter Steklis during a special “meet your brain” after-class session to view a human brain.



Dr. Netzin Steklis talks with students while they experience the ‘Animal Encounters’ event.

## 2023 KEYS Research Internship

During the summer of 2023, Dr. Ravishankar and her team, mentored and worked with KEYS Research Intern, Nyreek Thompson, from Palo Verde High Magnet School. Nyreek was paired with Dr. Ravishankar and her lab to learn more about their studies on controlling different pathogenic bacteria with organic methods which directly relates to his primary interest of organic farming.

The team members taught Nyreek microbiological techniques and guided him in performing his own independent research which he presented to friends, family, and the academic community at the Annual KEYS Research Showcase.

The BIO5 Institute’s annual KEYS program is one of Arizona’s premier training programs for high school students interested in developing STEM skills. Over the course of seven-weeks each summer, interns gain experience working on immersive, real-world projects under the mentorship of University of Arizona scientists.

Prior to engaging in the research portion of the program, KEYS interns are immersed in a one-week crash-course on a variety of bioscience and data science techniques, as well as



KEYS Intern, Nyreek Thompson, presents his research entitled “The efficacy of plant-based antimicrobials against food-borne pathogens *Salmonella enterica* and *Listeria monocytogenes*” at the KEYS Research Showcase.

the foundations of science literacy to ensure they have the base knowledge necessary to begin their assigned research projects. They are then each paired with a leading UArizona researcher working in an area of scientific study that they are interested in.

Applications for 2024 KEYS Research Interns are now being accepted and are due in early January.

For more information <https://keys.arizona.edu/>

# Over 60 Industry Thought Leaders to Speak at the 2023 Global Symposium on Racing



## GLOBAL SYMPOSIUM ON RACING

The University of Arizona's Race Track Industry Program is proud to host the 49th annual Global Symposium on Racing, taking place from **December 4-6, 2023, at Loews Ventana Canyon**. This premier event will bring together over 600 racing industry executives from around the world to delve into critical issues and emerging trends across the three racing breeds. The 2023 Symposium will feature a compelling lineup of topics vital to horse racing industry stakeholders, including:

- Out of the Shadows – Shining a Spotlight on Mental Health and Emotional Wellness
- Computer Assisted Wagering – The Good, The Bad, and The Future
- The Path Forward – Race Track Safety and the Anti-Doping & Medication Control Program
- Strengthening Your Simulcast Content – Maximizing Handle in Diverse International Betting Markets
- From Data to Dollars – Understanding Horse Racing's Economic Impact as Racing's Future is Questioned
- Land for Sale. How Will Race Track Closures Impact the Industry's Long-Term Sustainability?

One of the highlights of the Symposium will be the **“Legends of the Game – Racing's Iconic Turf Writers”** panel featuring distinguished racing journalists Steve Crist, Andy Beyer,

and Jay Privman. These celebrated figures have been unwavering advocates for horseplayers and have been instrumental in driving positive changes for the betting public.

Monday's agenda will include a full day of pre-conference meetings and workshops, setting the stage for the Symposium's opening evening reception. These pre-conference sessions include:

- HISA Workshop for State Regulators and Stewards
- 3rd Annual Racing Secretaries Summit
- Track Surface Regulatory Requirements
- NTRA Handicapping Contest Workshop

To learn more about the Global Symposium on Racing, including the full agenda and list of speakers, visit <https://rtip.arizona.edu/2023-symposium>

## UArizona's RTIP Gallops into the Spotlight at Keeneland Breeding Stock Sale

A horse bred by the University of Arizona's Race Track Industry Program (RTIP) went through the auction ring at the prestigious November Keeneland Breeding Stock Sale that boasts a lineup of over 3,500 thoroughbreds, predominately comprised of weanlings and broodmares.

Standing as a testament to the Program's dedication and expertise, the RTIP entered hip #1118, a Bay Colt sired by Game Winner out of the University-owned mare Hinder. The weanling was cosigned by Lane's End Farm and went through the auction ring on the morning of Saturday, November 11. A select number of RTIP students had the opportunity to travel to the Keeneland Sale to gain hands-on experience related to the bloodstock industry.

The RTIP's thoroughbred breeding program extends beyond Hinder and her foal. The University's Al Marah farm is home to three other broodmares – Savvy Lady, Miss Midnight Brew, and Tiz A Classy Lass. These mares each produced healthy foals earlier this year. The mares and foals aren't just for show, they play a pivotal role in the educational journey of equine students. Dr. Haley Collins, the newly appointed Assistant Processor of Practice, teaches the art and science of horsemanship through hands-on classes that build on textbook theory.

### Catalog listing and auction results

<https://catalog.keeneland.com/k323/catalog/hip/1118/?533>



Hip #1118 Bay Colt poses for his auction photos.



Bay Colt with his dam, Hinder.

# Meet Assistant Professor Dr. Lili Salvador

Dr. Liliana (Lili) da Conceição Monteiro Salvador grew up in Porto, Portugal where she received her BS and MS focusing on complexity theory at the University of Porto. She then pursued her PhD in Biology at the University of Lisbon. Her PhD was part of the PhD Program in Computational Biology at the Gulbenkian Institute of Science, which awarded her a PhD fellowship to do her research studies abroad. She was able to conduct her PhD research with Dr. Simon Levin in the Department of Ecology and Evolutionary Biology at Princeton University (Princeton, NJ), focusing on theoretical models to study animal movement. The support and opportunities she received during that time were unmeasurable and they paved her research path.

After Princeton, Lili worked at the Institute for Advanced Studies of Blanes – Spanish National Research Council (CEAB-CSIC), Spain with Dr. Frederic Bartumeus to study the statistical properties of *C. elegans* movement. After that, she was off to Scotland, where she was a postdoctoral researcher working with Dr. Rowland Kao at the School of Biodiversity, One Health, and Veterinary Medicine at the University of Glasgow and a Postdoctoral Research Fellow at the Royal (Dick) School of Veterinary Studies at the University of Edinburgh, developing simulation models to understand bovine tuberculosis dynamics. This is where she started combining her different sets of skills to understand important questions about disease dynamics with a particular focus on bovine tuberculosis control.

Before moving to UArizona, Lili was an Assistant Professor in the Department of Infectious Diseases and the Institute of Bioinformatics at the University of Georgia (Athens, GA), where her lab research focused on the development of bioinformatics tools to understand bacterial genomics and evolution.

In her current position Lili serves as an Assistant Professor in ACBS and is also a member of the BIO5 institute, and a faculty member of the Graduate Program in Applied Mathematics and the Graduate Interdisciplinary Program in Statistics & Data

Science. Her research aims to develop a better understanding of the evolutionary and transmission dynamics of pathogens. Within this context, she specializes in zoonotic bacterial pathogens that can infect humans, domestic animals, and wildlife alike. She is particularly experienced in animal and zoonotic tuberculosis where she works with state and federal agencies. In the last few years she has also started working with the genomics of *Leptospira* and *Salmonella*.



Lili has three grants in progress, including a grant from the Research Corporation for Science Advancement, SciLog: Mitigating Zoonotic Threats with colleagues from the Agricultural Research Service, U.S. Department of Agriculture. This study focuses on unraveling gene expression patterns after *M. bovis* infection of tissues from two of the animal reservoirs for bovine tuberculosis (bTB) in the US, cattle and white-tailed deer.

Additional grants include ‘Salmonella population dynamics in surface water’ and is funded by the United States Department of Agriculture. As well as, ‘PIPP Phase I: BEHIVE – BEHavioral Interaction and Viral Evolution for Pandemic Prevention and Prediction’, funded by the National Science Foundation. In this project, she focuses on the integration of pathogen genomic data with human behavioral factors.

Lili will start teaching classes next year when she will be teaching Clinical Virology in Spring 2024 and Ecology of Infectious Diseases in the following years. She would like others to know, “I am always up to meeting new people and having a nice chat about science”. She goes on to say, “I am excited to be at the UArizona and to explore Tucson, the surrounding desert, and the beautiful mountains that I see every morning”.

Lili can be reached at [lilianasalvador@arizona.edu](mailto:lilianasalvador@arizona.edu).



## Less snacking, more satisfaction: Some foods boost levels of an Ozempic-like hormone

Popular weight-loss drugs mimic GLP-1, a hormone the body makes naturally after eating. Hear from **Dr. Frank Duca** and his research colleges on which foods trigger GLP-1 better than others, making us feel full and eat less.

### NPR - Morning Edition - Oct 30, 2023

<https://www.npr.org/sections/health-shots/2023/10/30/1208883691/diet-ozempic-wegovy-weight-loss-fiber-glp-1-diabetes-barley>

## Food Sciences Club

The Food Sciences Club is an ASUA recognized nonprofit organization led by nutrition, microbiology, food safety and food systems students. Their mission is to promote greater understanding of food science and trends within the industry. The club also connects with many professionals in food science through tours and lectures, as well as product and recipe development. Students have the opportunity to participate in small production projects for various products such as fermented foods and beverages, cheese, and bakery goods. The club is open to all students who love food!



Luis Rodriguez (right), graduate student in the Ravishankar lab and 2023/2024 UArizona Food Sciences Club President, with the other club officers at the first meeting of the semester.

<https://www.facebook.com/foodscicats/>

# Arizona 4-H State Horse Show

The 2023 Arizona State 4-H Horse Show at Navajo County Fairground is done and in the books! What a fantastic event with great hosts, superb efforts by Superintendents, volunteers, sponsors, 4-H State Ambassadors, horses, youth participants, and all of our back of the show preparation efforts and everyone else who played a role! Special thanks to the entire Spurlock family (below left) and friends who were hosts, judges, superintendents, volunteers, timers, and made the event run smoothly. Congratulations to all of the competitors!



This year the Ranch Sorting portion of the Arizona 4-H State Horse Show was held in Queen Creek, AZ, on November 18th. The sorters (pictured above) got a bit of a wash down with morning rainstorms but had a very successful event.



## ALIRT Training Workshop

This year the Arizona Livestock Incident Response Team (ALIRT) Conference was held in Prescott, AZ, and had several hands-on opportunities for the Veterinarians, Extension personnel, and other participants to gain skills that are directly applicable to an ALIRT response. These ranged from knot tying to hands-on activities related to animal necropsies, with other presentations on Ag Bioterrorism, Large Animal Technical Rescue Training, and more. We had good participation and attendance at the event.



Arizona State Veterinarian, Dr. Ryan Wolker (right), demonstrates necropsy techniques to ALIRT First Responders.

## Heart of Extension Award

Dr. Betsy Greene was recognized as one of the recipients of the 2023 Heart of Extension Awards at a ceremony held during the Cooperative Extension Annual Conference held on campus Aug 4, 2023. The annual awards recognize extension staff and faculty who put their hearts into their work. Dr. Greene has worked with all FRTEP agents to identify tribal rancher needs, develop and conduct seminars and workshops, and authored several Extension publications on important topics including biosecurity, Sand Colic, Ionophore, Blister Beetle, and Horse Vital Signs. She was principal investigator on a Native American Agriculture Fund grant to educate tribal ranchers and families about livestock, horse, and small stock care and food safety and preservation to improve economic sustainability. She also worked with Navajo, Apache, Hopi, Hualapai, and CRIT FRTEP agents, veterinarians, and industry professionals to conduct horse safety, handling, health, first aid, disease prevention, nutrition, and digestion hands-on training for ranchers, 4-H youth, and adults at seminars, workshops, and youth camps. Congratulations Betsy on this well deserved award!



## NACAA Communication Awards

Betsy Greene won two regional Communication Awards at the recent national conference of the National Association of County Agricultural Agents (NACAA) held in Des Moines, Iowa. The first, for her photo published in the Fall 2022 School of Animal and Comparative Biomedical Sciences newsletter (pictured right), and the second for her "Knowing What's Normal in Your Horse" publication. <https://extension.arizona.edu/pubs/knowning-what-normal-your-horse>



# 4-H Tech Changemakers

The Arizona 4-H STEM program has been awarded a 4-H Tech Changemakers grant from the National 4-H Council funded by Verizon for the third consecutive year. Through the coordination of grant PI, Dr. Jerry Lopez, funding is used to help address the digital literacy divide among adults in Arizona and help them gain employment in underserved rural and urban communities.

The program recruits 4-H members from Arizona to be trained as Tech Changemakers (TCM) and lead various types of tech educational programs in their counties. For this year's curriculum four counties (Santa Cruz, Pinal, Maricopa, and Cochise) and one Federally Recognized Extension Program (FRTEP - San Carlos Apache Tribe) will recruit TCM's and participate in the program.

This year's cohort of TCMs are also supported by a fantastic UArizona leadership team with drone experience. US law requires that all recreational drone flyers pass an aeronautical knowledge and safety test called TRUST (the Recreational UAS Safety Test). Drone training was offered in early August to



TRUST certify 4-H staff and TCMs to prepare them to teach the drone curriculum.

Additional program preparation was provided by sending several team members to attend a TCM capacity building training in September at the Rock Eagle 4-H Center in Eatonton, Georgia.

Thanks to the support from the National 4-H Council, Verizon, and the AZ TCM team we are able to continue to address the digital literacy divide in our underserved and rural communities.



4-H staff and Tech Changemakers participated in drone training to receive their TRUST certification and to prepare them to teach drone curriculum.



# Vertically Integrated Projects Announces Catalyst Seed Grant Awards

Dr. Jerry Lopez, Associate Professor/Extension Specialist STEM, Food Safety and Environmental Microbiology, is pleased to be selected to receive a Vertically Integrated Projects (VIP) New Team Catalyst Seed Grant. Undergraduate research experiences are critical for students to develop into innovative researchers and STEM professionals. The VIP is a transformative approach to enhancing higher education by engaging undergraduate and graduate students in ambitious, long-term, large-scale, multidisciplinary project teams that are led by faculty. Students commit 9-hours/week to be in the laboratory conducting research, reading research articles, preparing posters, and PowerPoint presentations, for lab seminars or conferences. Students often also enroll in ACBS 492 - Directed Research to receive course credit.

Ten undergraduate students in Dr. Lopez's lab are participating in the VIP as well as in the Western Alliance to Expand Student Opportunities (WAESO) this fall including Ximena German, Avril Perez, Alyssa Gregory, Jessica Cruz, Chloe Wilcox, Hannah Martinez, Leila Yazzie, Scarlett Leon, Celina Arredondo, Miely Suarez. Khai Truong, BS in Microbiology and first year PhD student, oversees the laboratory and leads training to ensure students gain experience in molecular methods.

## ACBS Faculty Recipients of 2023 Catalyst Seed Grants

**PI/Team Leader: Gerardo Lopez, PhD**

**Proposal Title:** Understanding the prevalence, transmission, and the epidemiological trace back investigation of *Cyclospora cayentanensis* in Fresh Produce Growing Regions

**PI/Team Leader: Kerry Cooper, PhD**

**Proposal Title:** Driving undergraduate research to explore the gut microbiome of shelter animals



Undergraduate students in Dr. Jerry Lopez's lab conduct research and gain laboratory bench experience.

# STEM and Ag Ambassador Project

The AZ 4-H STEM YOUiversity Program is excited to offer the STEM Ambassador Project for the fourth year and to expand it by developing an Ag Ambassador Project for the first time. Youth in 6th-12th grade, interested in Science, Technology, Engineering, and Math (STEM) projects or Ag projects, are encouraged to participate.

Ambassadors will attend monthly zoom meetings as well as special workshops on leadership, resume building, cover letter and personal statement writing, and improving communication skills. They will also assist 4-H Staff in outreach programs by promoting and representing 4-H STEM and Ag programs at fairs and community events and designing personal action plans to help address issues in their communities.

Additionally, the AZ STEM and Ag Ambassador Program will partner with SciTech Institute's Chief Science Officer Program (CSO). As a nonprofit organization that strives to connect the STEM community and inspire individuals to pursue STEM-related

career paths, SciTech Institute's mission aligns perfectly with the STEM and Ag Ambassador Programs. This partnership will help to leverage resources in building future STEM and Ag leaders for Arizona communities.

Six Arizona counties (Pinal, Santa Cruz, Maricopa, Cochise, Greenlee, and Gila) and three Federally Recognized Tribal Extension Programs (FRTEP) (San Carlos Apache Tribe, Hopi Tribe, and Navajo Nation-Window Rock) will be offering the Ambassador projects in Arizona.

## STEM Ambassador Project Application Information

<https://extension.arizona.edu/stem-ambassador-project>

## Ag Ambassador Project Application Information

<https://extension.arizona.edu/ag-ambassador-project>



# Ravishankar Lab Outreach Activities

## International Association for Food Protection (IAFP) Affiliate - Indian Association for Food Protection in North America

Dr. Ravishankar served as a judge for the Student Oral Presentation competition held virtually on June 2, 2023. Awards were presented to the top three students.

## Food Safety Project Presentations and Demonstrations

Dr. Ravishankar and her team members demonstrated their food safety projects and performed demonstrations to out of state student visitors in August and to ACBS undergraduate students interested in current research in the department at an event organized by ACBS Academic Services in September.



ACBS undergraduate students learn about current food safety research projects in the Ravishankar lab.

# Recent ACBS Research Grants and Program Funding

**Title:** Creating a Pipeline of Future Professionals to Ensure a Safe and Resilient Meat Supply Chain

**Funding Agency:** United States Department of Agriculture

**PIs:** Duane Wulf

**Funding Amount:** \$650,000

**Title:** Dietary Fiber Improves Energy Homeostasis via Changes in Small Intestinal Microbiota-Host Interactions

**Funding Agency:** United States Department of Agriculture

**PIs:** Frank Duca

**Funding Amount:** \$630,909

**Title:** Identification of Gene by Environment Interactions Influencing Genomic Risk Alleles Contributing to Equine Metabolic Syndrome

**Funding Agency:** United States Department of Agriculture

**PIs:** Elaine Norton

**Funding Amount:** \$625,000

**Title:** Transcriptional Project Award

**Funding Agency:** American Heart Association

**PIs:** Chi Zhou

**Funding Amount:** \$300,000

**Title:** An integrated biosensing platform for in situ pathogen monitoring in coastal waters and aquaculture

**Funding Agency:** National Science Foundation

**PIs:** Yan Luo (UMass Lowell), **Arun K. Dhar**, Sheree Pagsuyoin (UMass-Lowell), Sarah Gignoux-Wolfsohn (UMass-Lowell), and Hongwei Sun (Northeastern University)

**Funding Amount:** \$1,000,000 (UArizona \$120,387)

**Title:** Development of an optical sensor-based diagnostics tool for shrimp disease diagnosis

**Funding Agency:** United States – Israel Binational Agricultural Research and Development (BARD)

**PIs:** M. Bashouti and **Arun K. Dhar**

**Funding Amount:** \$58,950

**Title:** Arizona Livestock Incident Response Team (ALIRT)

**Funding Agency:** Arizona Department of Agriculture

**PI:** Betsy Greene

**Funding Amount:** \$30,478.40

# Aquaculture Pathology Lab Updates

## Training Courses

The **32nd session of “Shrimp Pathology Short Course”** was conducted June 12-17, 2023 at the APL in Tucson, AZ. A total of 12 participants from five countries including Brazil, Colombia, Mexico, Venezuela, and USA participated in the training.

**Dr. Carlos Pantoja Morales and Dr. Arun K. Dhar conducted a training on shrimp disease diagnostics in Kolkata, West Bengal, India** as a part of an on-going project on building disease diagnostic capabilities to enhance sustainability of shrimp farming in West Bengal, India. Losses due to infectious disease remain as a bottleneck in sustainability of shrimp farming in India and elsewhere in Asia. Currently, India and Ecuador are the top two leading exporters of commodity shrimp in the US market.



## International Visitors

**Dr. Jahnier Caicedo Martinez and Ms. Claudia Patricia Calderon from Instituto Colombiano Agropecuario (ICA), Bogota, Colombia** visited the Aquaculture Pathology Laboratory as a part of an on-going project on infectious disease diagnosis in fish and crustaceans funded by the World Organization for Animal Health (WOAH, Paris, France). The goal of this project is to support building capabilities in infectious disease diagnostic in member countries of the WOAH. <https://www.ica.gov.co/home>

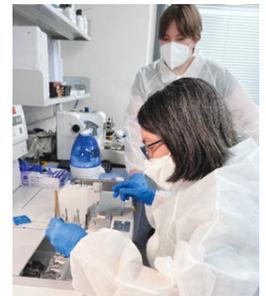


**Dr. Tram from Analysis & Testing Center of Camau, Vietnam** visited the Aquaculture Pathology Laboratory in connection with an on-going collaborative project on identifying etiologic agent associated with mortalities in mud crab. Located in the southern part of Vietnam, Camau province is the most important region for shrimp and other crustacean farming in the country. Recently, a state level delegation from the Camau province visited the Aquaculture Pathology Lab to establish a collaboration to further improve capabilities of crustacean disease detection and to enhance sustainability of crustacean farming in the Camau province.

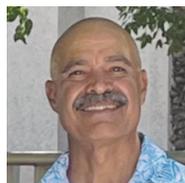


## Awards and Recognition

**Arun K. Dhar** received the **Fulbright Specialist Award** from the Fulbright Commission to visit the Central Institute of Fisheries Education (CIFE), Mumbai, India from September 4-17, 2023. CIFE is the leading research and teaching institution on fisheries science and marine biology in India. The visit gave an opportunity to interact with the faculties and postgraduate students in the institute, to discuss research work and explore collaboration. Dr. Dhar gave a series of lectures on infectious disease, disease diagnostics, and therapeutic developments in crustaceans, including a talk on “Expediting pathogen discovery pipeline to prevent disease pandemics in shrimp aquaculture”, during a one-day International Workshop on ‘Diagnostics of Future: Precision Diagnostics in Aquaculture’.



## New APL Members



**Dr. Carlos Pantoja Morales** joined the Aquaculture Pathology Lab in July 2023. Dr. Pantoja, an alumnus of the University of Arizona and a former staff of Aquaculture Pathology Lab, has an extensive experience in pathology of infectious diseases in crustaceans and brings a wealth of knowledge and skill sets in teaching and training histopathology and disease diagnosis in shrimp.



**Thi Huynh** joined the Aquaculture Pathology Lab in September 2023. She will be supporting on-going work in molecular diagnostics of crustacean diseases.



Photos from top:

- Attendees and instructors of the 32nd session of “Shrimp Pathology Short Course” held in Tucson, AZ.
- Attendees of the training on shrimp disease diagnostics in Kolkata, West Bengal, India.
- A delegation from Instituto Colombiano Agropecuario (ICA), Bogota, Colombia visited the Aquaculture Pathology Laboratory.
- Dr. Tram from Analysis & Testing Center of Camau, Vietnam visited the Aquaculture Pathology Laboratory.
- Dr. Arun K. Dhar at the Central Institute of Fisheries Education (CIFE), Mumbai, India.

## Publications

Akhmetova A, Guerrero J, McAdam P, **Salvador LCM**, Crispell J, Lavery J, Presho E, Kao RR, Biek R, Menzies F, Trimble N, Harwood R, Pepler T, Oravcova K, Graham J, Skuce R, Plessis L, Thompson S, Wright L, Byrne A, Allen AR. 2023. Genome epidemiology of *Mycobacterium bovis* infection in contemporaneous, sympatric badger and cattle populations in Northern Ireland. *Microbial Genomics*, (9)5, DOI: [10.1099/mgen.0.001023](https://doi.org/10.1099/mgen.0.001023).

Alenton, RRR, Mai HN, and **Dhar AK**. 2023. Engineering a replication incompetent viral vector for delivery of therapeutic RNA in crustacean. *Proc. Natl. Acad. Sci. Nexus*. 2: 1-9. <https://doi.org/10.1093/pnasnexus/pgad278>.

**Dhar AK**, Cruz-Flores R, Mai HN, Aranguren Caro LF, Intriago P, and Romero X. 2023. Detection of a novel microsporidium with intranuclear localization in farmed *Penaeus vannamei* from Latin America. *J. Inv. Pathol.* <https://doi.org/10.1016/j.jip.2023.107968>.

## ToxSpotlight Article

<https://academic.oup.com/toxsci/pages/toxspotlight>

Jauregui EJ, McSwain M, Liu X, Miller K, Burns K, **Craig ZR**. 2023. Human-relevant exposure to di-n-butyl phthalate tampers with the ovarian insulin-like growth factor 1 system and disrupts folliculogenesis in young adult mice. *Toxicol Sci.* 2023 Aug 29;195(1):42-52. doi: 10.1093/toxsci/kfad064. PMID: 37439711; PMCID: PMC10464517.

Niyakan S, Nagashima Y, Singh J, Metrani R, Crosby KM, Jifon J, Jayaprakasha GK, **Ravishankar S**, Brierley P, Leskovaar DI, Turini TA, Schultheis J, Coolong T, Guang W, Miller R, Patil B, Qian X, and Koiwa H. 2023. Genetic and Geographical Inputs that Shape Metabolomic and Transcriptomic Profiles of Melon Fruits. *Scientia Horticulturae*. 321: 112337.

O'Brien DJ, Thacker TC, **Salvador LCM**, Duffiney AG, Robbe-Austerman S, Camacho MS, Lombard JE, Palmer MV. 2023. The devil you know and the devil you don't: current status and challenges of bovine tuberculosis eradication in the United States. *Irish Veterinary Journal*, 76(1), pp.1-19. DOI: 10.1186/s13620-023-00247-8.

**Salvador LCM**, et al. 2023. The Many Hosts of *Mycobacterium* 9 (MHM9): A conference report. *Tuberculosis*, 102377. DOI: [10.1016/j.tube.2023.102377](https://doi.org/10.1016/j.tube.2023.102377).

Shibabaw A, Gelaw B, Ghanem M, Schooley AM, Soehnlen MK, Legall N, **Salvador LCM**, Gebreyes W, Wang S, Tessema B. 2023. Molecular epidemiology and transmission dynamics of multi-drug resistant tuberculosis using whole genome sequencing in the Amhara region, Ethiopia. *BMC Genomics*, 24, 400. DOI: 10.1186/s12864-023-09502-2.

## Microbiome Video Byte

A probiotic improves nutrient sensing and feeling 'full' by affecting small intestine microbes

<https://www.youtube.com/watch?v=9VM5csacG4Y>

Weninger SN, Herman C, Meyer RK, Beauchemin ET, Kangath A, Lane AI, Martinez T, Hasneen T, Jaramillo SA, Lindsey J, **Vedantam G**, Cai H, Cope EK, Caporaso JG, **Duca FA**. 2023. Oligofructose Improves Small Intestinal Lipid-Sensing Mechanisms via Alterations to the Small Intestinal Microbiota. *Microbiome*. 11, 169 (2023). <https://doi.org/10.1186/s40168-023-01590-2>.

Xu R, Prakoso D, **Salvador LCM**, Rajeev S. 2023. *Leptospira* transcriptome sequencing using long read technology reveals unannotated transcripts and potential polyadenylation of mRNA molecules. *Microbiology Spectrum*. DOI: [10.1128/spectrum.02234-23](https://doi.org/10.1128/spectrum.02234-23).

## Journal of Physiology's Editor's Choice 2023

[https://physoc.onlinelibrary.wiley.com/doi/toc/10.1111/\(ISSN\)1469-7793.Editor-Choice-2023](https://physoc.onlinelibrary.wiley.com/doi/toc/10.1111/(ISSN)1469-7793.Editor-Choice-2023)

**Zhou C**, Freel, C, Mills O, Yang X-R, Yan Q, and Zheng J. 2023. MicroRNA-29 differentially mediates preeclampsia-dysregulated cellular responses to cytokines in female and male fetal endothelial cells. *The Journal of Physiology*. 601:16. 3631-3645. 04 July 2023. <https://doi.org/10.1113/JP284746>.

## Presentations and Invited Lectures

**Alenton RRR** and Maningas MBB. "Development of Diagnostics and RNAi based therapeutics for the shrimp industry". National Cheng Kung University, Taipei, Taiwan, August 10, 2023.

**Dhar AK** and Cruz-Flores R. Identifying a novel parvovirus infecting Pacific white shrimp, *Penaeus vannamei* using laser capture microscopy and next generation sequencing. 55th Annual Meeting of the Society of Invertebrate Pathology. July 30 - August 3, 2023. University of Maryland. College Park, Maryland, USA.

**Greene EA**. "Protecting your horses from disease". Youth Workshop at the 2023 Southwest Indian Agriculture Association (SWIAA) Youth Component Livestock Field Days. June 27-28, 2023. Hon-Dah Resort Casino and Conference Center, Pinetop-Lakeside, AZ.

**Greene EA** and Arias J. "Tribal Extension Partnerships-CALS Award Team". Cooperative Extension Agriculture and Natural Resources Annual Retreat. Aug 30, 2023. Show Low, AZ.

**Greene EA**, McLain J, and Wright A. "Professional Development: Applying for Awards". Cooperative Extension Agriculture and Natural Resources Annual Retreat. Aug 30, 2023. Show Low, AZ.

**Ravishankar S**. Importance of Microorganisms in Food Safety. Webinar Presentation. International Microorganism Day 2023. Sathyabama Institute of Science & Technology, India. September 19, 2023.

**Ravishankar S**. Applied Bioscience s- Graduate Interdisciplinary Program. Faculty Industry Networking Event 2023. The University of Arizona. October 11, 2023. Tucson, AZ, USA.

**Ravishankar S**. Applied and Translational Research in Food Safety. Faculty Industry Networking Event 2023. The University of Arizona. October 11, 2023. Tucson, AZ, USA.

**Ravishankar S**. Current Trends in Biotechnological Interventions in Food safety. Webinar Presentation. The International Conferences on Advances in Biotechnology: Current Discoveries and Future Perspective (ICAB 2023). Amity University, India. October 17, 2023.

Rodriguez L and Bains K. Food Testing Services - University of Arizona. Startup Tucson Food Accelerator Program. The FORGE. October 17, 2023. Tucson, AZ, USA.

**Salvador LCM**. Diagnostic and Transmission Chains of Zoonotic Tuberculosis. Global One Health Summer Institute, Internal Medicine and Pediatrics Residency Training Program, Updates on Tuberculosis Management

(Pubs continued on 12)

and Programs in Ethiopia session. The Ohio State University Wexner in collaboration with the Medical Center and Nationwide Children's Hospital, Global One Health initiative (GOHi), Tikur Anbessa Hospital, Addis Ababa University, Jimma University, SPHMMC and the University of Gondar, Ethiopia. July 13, 2023.

### Poster Presentations

Carstens R and **Greene EA**. "Instilling Agricultural Knowledge and Understanding in Gila County Youth". Poster presented at the State UArizona Cooperative Extension Annual Meeting. Aug 2-4, 2023. Tucson, AZ.

**Greene EA**, Trott JF, and Beard JK. "Revisiting perceived needs of Arizona horse owners to update and focus cooperative extension horse educational programming and resource development directions. Poster presented at the State UArizona Cooperative Extension Annual Meeting. Aug 2-4, 2023. Tucson, AZ.

Law B, Park R, Zhu L, Witten M, and **Ravishankar S**. Development of a real-time biosensor to detect foodborne pathogens in leafy greens production environments. Poster presentation. Annual Meeting of the International Association for Food Protection (IAFP). July 16-19, 2023. Toronto, Canada.

Thompson N, Zhu L, and **Ravishankar S**. The Efficacy of plant-based antimicrobials against food-borne pathogens *Salmonella enterica* and *Listeria monocytogenes*. Poster presentation. 17th Annual KEYS Research Showcase. The University of Arizona. July 21, 2023. Tucson, AZ, USA.

Zhu L, Law B, and **Ravishankar S**. Survival of *Salmonella enterica* and *Escherichia coli* O157:H7 in compost amended soils. Poster presentation. Annual Meeting of the International Association for Food Protection (IAFP). July 16-19, 2023. Toronto, Canada.

## Upcoming Events

### December 4-6, 2023

2023 Global Symposium on Racing  
Loews Ventana Canyon  
Tucson, Arizona  
<https://rtip.arizona.edu/2023-symposium>

### January 20, 2024

8th Annual Southern Arizona Equine Health Symposium  
The University of Arizona - Campbell Ave Farm  
Tucson, Arizona  
<https://extension.arizona.edu/southern-arizona-equine-health-symposium>

### February 20-22, 2024

Southwest Ag Summit  
Arizona Western College  
Yuma, Arizona  
<https://yumafreshveg.com/southwest-ag-summit/#FEB23>

## In the Next Issue

### 2023 Food Safety Conference

### ABRCMS Scholarship Winners

### 2023 Summer and Fall ACBS Graduates

### Graduate Student Scholarships in Food Safety Research

### Student/Staff Food Safety Poster Session Award Winners

## ACBS Newsletter

Volume 9 : Issue 3  
Fall 2023

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The ACBS Newsletter is published three times a year for alumni and friends of the University of Arizona School of Animal and Comparative Biomedical Sciences.

Stories in this print edition have been edited for length. Visit the ACBS Newsletter online at [acbs.arizona.edu/news-events/newsletters](https://acbs.arizona.edu/news-events/newsletters) for past issues.

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