



# Animal & Comparative Biomedical Sciences

Feature

## ISSUE HIGHLIGHTS

### Research



Dr. Sadhana Ravishankar named to the National Academy of Inventors.

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### Teaching



At the 2023 Food Safety Conference, students gained valuable insight into careers in food safety from the career panel and practiced their public speaking during the poster session. - Page 6

### Extension



The Southern Arizona Equine Health Symposium brought relevant horse health care and management information to horse owners in this one-day annual program.

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## Patent Issued for Novel Therapeutic Agent Targeting Intestinal Pathogen

In December 2023, Drs. Gayatri Vedantam and V.K. Viswanathan were awarded a patent (#11,839,649) for a novel therapeutic agent targeted against the intestinal pathogen *Clostridioides difficile*. This organism causes severe diarrheal disease in humans and animals, and the US CDC has designated it an “Urgent Threat” to US healthcare. When patients are given antibiotics to prevent or treat infections, normal gut bacteria are suppressed (dysbiosis), and this allows *C. difficile* to colonize the GI tract, produce toxins, and cause disease. There is currently no vaccine to prevent *C. difficile* infection (CDI). Patients suffering from CDI are thus treated with yet more antibiotics that kill *C. difficile*, but delay the recovery of normal protective bacteria, perpetuating further cycles of disease.

To bypass this problem, the Vedantam laboratory engineered lactobacillus bacteria to mimic the cell surface of *C. difficile*. The resulting synthetic biologic (“Syn-LAB”) homes into, and occupies, the same areas in the gut where *C. difficile* would normally establish disease. In this scenario of microbial musical chairs, *C. difficile* loses out to Syn-LAB and is unable to cause disease. Syn-LAB is very effective in protecting hamsters and neonatal piglets against CDI. The V&V team are now completing pre-clinical testing of Syn-LAB and are focused on deploying it as both a preventive and treatment strategy against *C. difficile* in porcine and human populations.

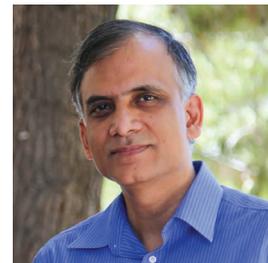
Drs. Vedantam and Viswanathan are Co-Directors of the Collaboratory for Anti-Infectives and Therapeutics (CATS), and they are actively exploring other novel treatment strategies to protect against deadly gastrointestinal infections.



The Centers for Disease Control and Prevention (CDC) estimate that *Clostridioides difficile* causes almost half a million infections in the United States each year. About 1 in 6 patients who contract *C. diff* will get it again in the subsequent 2-8 weeks. One in 11 people over age 65 diagnosed with a healthcare-associated *C. diff* infection die within one month.



Gayatri Vedantam



V.K. Viswanathan

# From the Director



Any of you who are watching/reading the news and reading your emails know that University finances are concerning and that the coming months will likely bring some changes that are somewhat out of our control. I understand that it can be difficult to find daily motivation during these periods of uncertainty. However, it's more important than ever that we focus on our mission of educating students, providing Extension programming to the state, and performing cutting-edge research. The ACBS team is already doing a remarkable job of delivering on the land grant mission of the University, and these efforts do not go unnoticed by me, our alumni, our stakeholders, or CALES leadership. In short, in difficult or uncertain times we must keep our heads down and keep moving forward; we all are working towards a higher purpose and that purpose is unchanged by the current financial situation.

To this end, I would like to highlight a few of the notable accomplishments that we can be proud of within ACBS. Enrollment in ACBS majors is at the highest level since the founding of the School. A look at the number of undergraduate students participating in our majors (Animal Sciences, Veterinary Science, Microbiology, and Applied Biotechnology) shows that our numbers continue to grow and are at the highest level since the School started. In fact, the number of students in our majors has grown by at least 136% in the last decade. Similarly, the number of student credit hours (SCH) that ACBS faculty deliver continues to grow; current data indicate that ACBS faculty deliver approximately 18% of all SCH that are taught in CALES. I find this particularly impressive given that we are only 1 of 10 units within the College.

In addition to instruction, our faculty continue to develop and execute scientific research that is impactful and needed. Together, our One Health research approach is bearing fruit, as evidenced by numerous publications (search the name of any of our faculty at <https://pubmed.ncbi.nlm.nih.gov/> to see their latest work), new and ongoing research grants (ACBS has seen numerous new awards in the past months and has a substantial portfolio of ongoing studies), and intellectual property development.

Finally, even though we are excited to hopefully add more Extension faculty to our ACBS family soon, our current Extension Specialists (Dairy, Equine, and STEM) are providing needed programming in these areas across the state. I've had the opportunity to attend several of these programs since my arrival to the University, including the recent 8th Annual Southern AZ Equine Health Symposium that took place at the Campus Agricultural Center just a few weeks ago. It was great to interact with stakeholders and to hear about the value of our Extension programming.

The highlights above are just a few of the notable things that are ongoing within ACBS and hopefully serve as examples of the dedication of our faculty and staff to our mission. I encourage you all, when feeling overwhelmed by things that are outside of our control, to simply keep doing the amazing job that you are already doing.

- **Scotty**

## D. Scott Merrell

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LEARN MORE AT [ACBS.ARIZONA.EDU](http://ACBS.ARIZONA.EDU)

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- Page 4 - Senior Celebration - ACBS Academic Advising Office; ABRCMS - Audrey Sweten
- Page 5 - Racetrack Industry Global Symposium - RTIP; Armstrong - Adobe Stock; Rodeo - Chris Richards/University Communications
- Page 6 - All photos Food Safety Consortium
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- Page 8 - All photos - Gerardo Lopez
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## Sadhana Ravishankar Named to the National Academy of Inventors

The National Academy of Inventors (NAI) has named Dr. Sadhana Ravishankar to the Class of 2024 Senior Members. Ravishankar is one of five University of Arizona faculty members honored with 2024 membership. To be selected

as a Senior Member, academic inventors must demonstrate their rising leadership within their fields and show success in the patenting, licensing, and commercialization of innovations stemming from their work. According to the NAI, they must have produced “technologies that have brought, or aspire to bring, real impact on the welfare of society.”

As chair of the University’s Applied Biosciences Graduate Interdisciplinary Program and the Food Safety Consortium, Ravishankar’s research focuses on applied food safety. She works to solve problems around foodborne bacteria in food production and processing environments, while controlling these bacteria using naturally occurring substances and sustainable, ecologically sound principles. She has received research funding from the USDA-NIFA, the Arizona Department of Agriculture, and the International Life Sciences Institute. A dedicated inventor, Ravishankar has published 74 peer-reviewed manuscripts and filed 18 invention disclosures, which have resulted in six provisional patent applications and three U.S. utility patent applications. As of today, she has two issued patents, including “Synergy of plant antimicrobials with silver” (#9,661,856), and “Plant antimicrobial compositions including an

emulsifier and/or ozone and methods of use” (#11,191,275), the latter of which has been licensed to her startup, PhytoCentric Solutions LLC.

“I am extremely delighted to be named as a Senior Member of the NAI. Professionally this motivates me to pursue my passion for additional discoveries in food safety for public health protection, and personally this encourages me to give back to society by educating the younger generation especially female and minority students to become inventors and achieve high,” she wrote in an email. “I am very thankful to TLA for teaching me everything regarding intellectual property protection, innovation, and entrepreneurship, and without their support, I could not have reached this far!”

Most recently, Ravishankar was selected to serve as a TLA Faculty Innovation Ambassador (<https://techlaunch.arizona.edu/about/facultyinnovation-ambassadors>). Through this new program, she will serve as a resource for information about intellectual property protection, licensing, startups, and details about commercialization for her colleagues throughout the College of Agriculture, Life, and Environmental Sciences.

### Read the Full Article

<https://techlaunch.arizona.edu/news/five-uarizona-innovators-named-national-academy-inventors>

### Contacts

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## Craig Awarded \$2.2M NIH Grant



### In Vitro to In Vivo Extrapolation of Toxicant Effects on Ovarian Function

**Agency:** NIH - National Institute Of Environmental Health Sciences

**Amount and Duration:** \$2.2 M - 3 years

**Principal Investigator:** Zeliann R. Craig, Ph.D., The University of Arizona

#### Co-Investigators:

- Mary Zelinski, Ph.D., Oregon Health Sciences University
- Karen Watanabe-Sailor, Ph.D., Arizona State University
- James Sluka, Ph.D., Indiana University
- Qiang Zhang, Ph.D., Emory University

**Project Description:** This proposal supports the creation of a virtual consortium that will use translational and transdisciplinary approaches to provide the research community with an innovative computationally-based method to predict adverse effects of phthalates on ovarian function in women. This work will benefit human reproductive health by enhancing the screening of chemicals that could harm ovarian function in women. The transdisciplinary and translational environment created by this consortium will also provide unique cross-disciplinary training opportunities to trainees in the five institutions involved.

### PIPP Phase I: BEHIVE – BEHavioral Interaction and Viral Evolution for Pandemic Prevention and Prediction

**Funding Agency:** National Science Foundation

**Co-PI:** Liliana Salvador

**Funding Amount:** \$100,011

### Development of an Integrative Approach to Enhance Surveillance Sensitivity Systems for Wildlife Spillover of Bovine Tuberculosis: Wild Pig Case Study

**Funding Agency:** Research Corporation for Science Advancement and the U.S. Department of Agriculture

**PI:** Liliana Salvador

**Funding Amount:** \$50,000

**Project Details:** Research Corporation for Science Advancement and the U.S. Department of Agriculture made awards to six multidisciplinary teams of early career scientists to launch new research in the detection and mitigation of emerging animal-borne infectious diseases.

The 18 awards of \$50,000 in direct costs went to 17 individual researchers from a variety of institutions. The funded projects include five new partnerships between USDA and academic scientists.

<https://rescorp.org/news/2023/12/scialog-mitigating-zoonotic-threats-concludes-with-awards-to-6-teams>



# ACBS Fall 2023 Outstanding Seniors and Grad Celebration

On December 14th, 2023, the ACBS Advising Center hosted an ACBS Fall 2023 Graduate Celebration honoring the Fall 2023 graduating cohort. Awards were presented to the Outstanding Seniors for Animal Science, Food Safety and Veterinary Science. Family, friends, faculty, staff and ACBS Director Dr. Scotty Merrell were invited to the celebration.

ACBS Outstanding Seniors were presented with a custom plaque and certificate by the ACBS Advising Team, and award nominators spoke about the student they nominated.

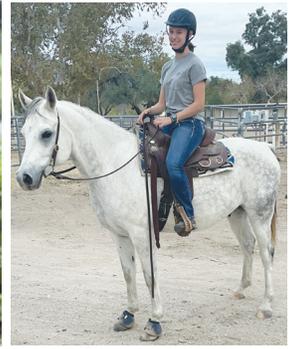
The Animal Science Outstanding Senior was Erin Coons. Erin plans to grow her horse training business and work in the equine industry. Food Safety Outstanding Senior Yulissa Sanchez graduated from the University

of Arizona Yuma campus, and will continue to make an impact on the Food Safety field. Finally, Azucena Wetherington, the Veterinary Science Outstanding Senior, is focusing on becoming a veterinarian and is applying to DVM programs to attend in the fall.

Although Erin and Yulissa were unable to attend, they were still recognized, and their faculty nominators spoke about their accomplishments. Our students continue to make us proud, and we look forward to another great year!

Photos clockwise from top left:

- Veterinary Science Outstanding Senior Azucena Wetherington.
- Animal Science Outstanding Senior Erin Coons.
- ACBS Fall 2023 graduating seniors at the ACBS Graduate Celebration.
- Not pictured: Food Safety Outstanding Senior Yulissa Sanchez



# ACBS Students Present Research at National Conference

ACBS sponsored travel for two ACBS undergraduate students to attend and present their research at the 2023 Annual Biomedical Research Conference for Minoritized Scientists (ABRCMS), November 15-18, in Phoenix, Arizona. Audrey Sweten was selected to present her research poster, “CRISPR interference (CRISPRi) Technology to Investigate Group B Streptococcal Pathogenesis”. Peniella Irakoze was also selected to present her research poster “Aberrant Expression of Transposable Elements and their Controllers in EBV – Associated Lymphoma”.

When asked about the experience, Audrey explained in an email, “I am very thankful to ACBS for sponsoring me to attend ABRCMS this year. I had an incredible time; this was my first time attending a national undergraduate conference. I loved being able to present my research project, which I worked on over the summer as a Research Experience for Undergraduates (REU) intern at the University of Alabama. My team from Alabama was attending as well, so it was great to be able to see them again. Furthermore, I enjoyed networking with the vast amount of biomedical PhD programs in the exhibit hall since I will be

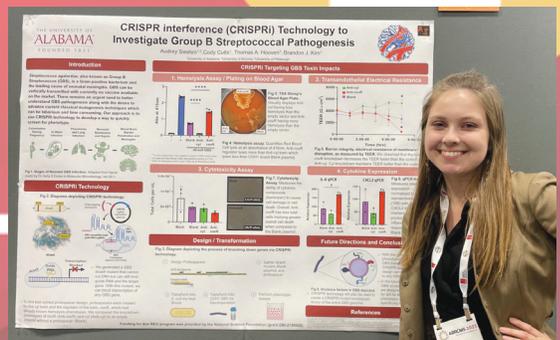
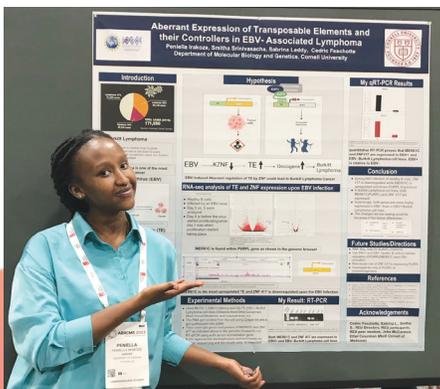
applying to graduate school in the next cycle during my senior year.”

Audrey and Peniella were able to attend a variety of useful workshops, such as “Smashing Doubts, Building Dreams: Conquer Imposter Syndrome for a Thriving STEM Journey” and “Key Questions to Ask Yourself and Others to Find a Grad School Fit.” For Audrey, attending this conference has secured not only her passion for research but also her great interest in obtaining a PhD in Biomedical Sciences/Microbiology.



Photos clockwise from top right:

- ACBS undergraduate students Peniella Irakoze and Audrey Sweten attend the ABRCMS in Phoenix, Arizona.
- Audrey Sweten displays her research poster.
- Peniella Irakoze with her research poster.



# University of Arizona's Race Track Industry Program Wraps Up Successful 49th Annual Global Symposium on Racing

The University of Arizona's Race Track Industry Program (RTIP) proudly concluded its 49th annual Symposium on Racing, held from December 4–6, 2023, at an event that brought together over 600 industry executives from around the world. The Symposium served as a platform for engaging discussions on critical issues and emerging opportunities within the horse racing community.

Kicking off the event was a keynote address by Randy Moss, NBC Sports' Analyst, who provided his outlook for the future of the sport. The morning continued with an engaging discussion with Andy Beyer, Steve Crist, and Jay Privman on the Legends of the Game – Racing's Iconic Turf Writers panel.

Throughout the symposium, the Horseracing Integrity and Safety Authority (HISA) and the Horseracing Integrity & Welfare Unit (HIWU) played a prominent role. Notable sessions included a pre-conference workshop on Monday, tailored for state regulators and stewards and moderated by Alex Waldrop. On Tuesday, HISA CEO Lisa Lazarus outlined the organization's visionary goals in the "HISA in 2024 and Beyond" presentation. The Symposium's final day featured a collaborative effort between HISA and HIWU, offering insights and updates on HISA's Racetrack Safety and Anti-Doping & Medication Control Programs.

Diverse panels throughout the symposium delved into vital topics such as Category 1 rules, the ramifications of race track

closures, strategies for maximizing handle in international markets, the role of computer-assisted wagering, analyzing horse racing's economic impact, and the critical issue of mental wellness within the industry.

Highlighting Tuesday's events were the presentation of RTIP and industry awards. Among the honorees were the Big Sport of Turfdom winner, Jena Antonucci, and the recipient of the Clay Puett Award, the Thoroughbred Aftercare Alliance.

Looking ahead, the 2024 Global Symposium on Racing is already generating anticipation. Scheduled to take place at Loews Ventana Canyon December 9–11, the event promises to build on the success of this year's symposium. Hotel and registration details for the 2024 symposium will be available on the official website, [www.racingsymposium.com](http://www.racingsymposium.com), in early 2024.



Randy Moss, horse racing analyst for NBC Sports, gives the keynote address at the 2023 Global Symposium on Racing.

## Dairy Extension Specialist Emeritus, Dennis Armstrong

Extension Specialist Emeritus Dennis Vern Armstrong passed away in early February. He was 88.

Dennis, a native of Big Springs, Nebraska, was the Extension Dairy Specialist in the University of Arizona Department of Animal Sciences from 1973 to 1999, when he retired.

After retiring from UArizona, Dennis continued his consulting work by traveling extensively worldwide until 2019. He was known internationally as a leading expert in dairy operation and management, specifically for his research on reducing the impact of high temperatures through facility designs. His influence on dairy operation design is visible throughout Arizona, Saudi Arabia, Thailand, and many other countries. Since his retirement, he has contributed to the University of Arizona through creation of the Dennis Armstrong Student Support Scholarship in Dairy Management, which has helped many UArizona students.



Apart from his academic and Extension contributions, Dennis was a mentor to many dairy scientists and will always be remembered as a great friend. He is survived by his children: Susan, Wallace (Debi), Elizabeth Larson (Ted), and Jill, five grandchildren, and three great-grandchildren.

## 85 Years of UArizona Rodeo

The University of Arizona hosted the nation's first intercollegiate rodeo in 1939, organized by members of the University's Rodeo Club. In the 85 years since, the competition has become a tradition for the club and the community.

The members of the club who compete in events make up the rodeo team. To compete, members must have riding experience and own a horse. The club also welcomes noncompeting members who help with events, fundraisers or the club's volunteer service at the Therapeutic Ranch for Animals and Kids (TRAK) in Tucson.

Read full article: <https://news.arizona.edu/employee-news/85-years-rodeo-university-qa-club-sponsor-samuel-garcia>



# 2023 UArizona Food Safety Conference

The 2023 UArizona Food Safety Conference, hosted by the Food Safety Consortium (FSC), provided attendees an exciting hybrid conference experience, with virtual presentations and in-person career panel, networking, and poster sessions. The virtual meeting, held Oct 25th, included nearly 100 attendees from around the world to participate in a wide variety of presentations covering topics relevant to food safety research and various food industry sectors.

Since 2019, the conference has been dedicated to an individual who has provided valuable service to the Food Safety Consortium. The 2023 conference was dedicated to Dr. Jean McLain, CALES associate dean of faculty advancement. Jean served as the Food Safety Consortium Chair from November 2012 to October 2013 and was instrumental in securing funding for the Food Safety Conference and in moving the group forward after the unexpected and tragic passing of the previous Food Safety Consortium Chair, Dr. Lynn Joens.

The in-person networking and poster sessions, along with the dedication plaque ceremony and Careers in Food Safety Panel, were held at the UArizona on October 26th. Career panelists, Dr. Joli Weiss with the Arizona Department of Health Services (on Zoom), Dr. Kadeem Hinton with PetSmart, and Dr. Duarte Diaz with UArizona Cooperative Extension, spoke about their varied paths to their current careers in food safety with moderator, Dr. Margarethe Cooper, and audience members to demonstrate to current students that there are many paths to a career in food safety.

Following the poster presentations, awards were presented to the top three student posters: Jennifer Mydosh, Kevin Dalson and Kirat Bains, each of whom received \$300 prizes. Additionally, student Dustin Loso received the Dr. Dan Engeljohn Crowd Favorite award with a \$100 prize. The Staff Poster award went to Dr. Victoria Obergh and included a \$500 prize to use for food safety-related travel or research.

For the first time in 2023, the FSC invited UArizona graduate students to apply for research scholarships to assist with food safety-related research projects in the amount of \$1,500 each. Dr. Sadhana Ravishankar had the pleasure of announcing the first cohort of grad student scholarship winners selected by the scholarship committee at the Food Safety Conference. The awardees included Richard Park (Ravishankar Lab), Luis A. Rodrigues-Medina (Ravishankar Lab), Jennifer Mydosh (K. Cooper Lab), and Kirat Bains (Ravishankar Lab). The students have one year to complete their research and will present the results at a future Food Safety Conference or seminar. Congratulations to the 2023 poster and research scholarship award winners!

Thank you to all of the 2023 conference sponsors for making this conference possible!

<https://safefood.arizona.edu/conference>



**Top of Page Right** - Dr. Sadhana Ravishankar (right) presents Dr. Jean McLain with the 2023 Food Safety Conference Dedication Award.  
**First Row** - Audience members; Jennifer Mydosh (left) receives a grad student research award from Dr. Sadhana Ravishankar; Kirat Bains (center), poster award and grad student research award winner presents her poster; Career panelists, Dr. Joli Weiss, Arizona Department of Health Services (on Zoom), Dr. Kadeem Hinton, PetSmart (table left), and Dr. Duarte Diaz (table right), UArizona Cooperative Extension.  
**Second Row** - Richard Park, grad student research award winner with Dr. Sadhana Ravishankar; Luis A. Rodriguez-Medina (right), grad student research award winner discusses his poster with an attendee; Dustin Loso receives the Crowd Favorite Poster Award from Dr. Margarethe Cooper; Dr. Sadhana Ravishankar welcomes attendees; career panel audience members.  
**Third Row** - Dr. Margarethe Cooper (right) with Kevin Dalson, student poster winner; Student, Nyreek Thompson (right), presents his research poster to Dr. Kadeem Hinton from PetSmart; ACBS Research Technician, Dr. Victoria Obergh (left), receives the Staff Poster Award from Dr. Margarethe Cooper; Student, Nguyen Dang (left), presents his poster.

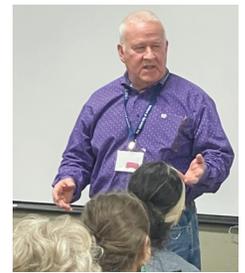
# 2024 Southern AZ Equine Health Symposium

The 8th annual Southern Arizona Equine Health Symposium provided an excellent environment for learning about horse health! The Tucson weather did not disappoint and provided welcome warmth during the arena demos and lunch.

Classroom highlights included a presentation by Dr. Randel Raub from Kent Nutrition Group titled “Stupid Horse! A Chance to Challenge Your Mind and Emotions” which covered the importance of evaluating how human emotion and reaction influence horse behavior. Dr. Sarah Bailey provided a highly rated discussion on biosecurity and how to keep horses safe from disease spread. In the demonstration arena Dr. David Byerly worked with attendees to teach leg and wound wrapping with the opportunity for hands-on practice.

For the lunchtime presentation we welcomed Drs. Kelsey Dayle John, Ann Baldwin, and Netzin Steklis to explore the Human Side of the Horse/Human Relationship in Equine Facilitated Learning, which provided a fascinating look into how horses respond to humans. Additionally, afternoon presentations included Dr. Karen Davison from Purina with tips on how to interpret nutritional product labels, and Horse Specialist Betsy Greene with Livestock Area Associate Agent Ashley Wright covering feeder options and the importance of selecting the right type of feeder for individual horse needs.

Check out the full schedule at <https://extension.arizona.edu/southern-arizona-equine-health-symposium>



Clockwise from top right:

- Dr. Randy Raub challenges common misconceptions about horse behavior.
- Dr. David Byerly, assisted by Dr. Ann Pearson, demonstrates how to wrap an injured leg.
- Farrier, Eddie McKenzie, discusses abscesses and puncture wounds in the hoof.
- Attendees learned about how to tie various knots and the use cases for each knot.

## FFA Horse Judging State Contest

The FFA Horse Judging State Contest was held at the Al Marah farm this year, with 138 FFA judges from across the state. Dr. Haley Collins served as the official judge, and several of her students did a great job presenting both halter and under saddle classes and listening to reasons.



Clockwise from top right:

- An FFA member gives their reasons to the judge.
- Participants judge a horse under saddle.
- L-R: Josie Dieu, statistics and data science major, Mikayla Askey, Student Horse Judging Chair and ag education major, Jordan Voong, ag tech management major, and Dr. Betsy Greene, Horse Specialist.

## Influenza and Zoonoses Education among Youth in Agriculture Workshop

Dr. Betsy Greene presented “2023-2024 Influenza and Zoonoses Education among Youth in Agriculture: Arizona Activities” and “Engaging Youth: Biosecurity Practices at Home” at the January 9-10, 2024 workshop held in Decatur, Georgia.



## Youth in Agriculture

Youth in Agriculture Public Health grant activities have included a Train the Trainer Workshop for UArizona Tribal Extension Agents at the Intertribal Agricultural Conference (December, 2023), and several classroom SCRUB activities in Gila County (March, 2024).



### SCRUB Trainer Workshop



### SCRUB Classroom Activities



# STEM Extension Program: *Inspiring the Next Generation of STEM Professionals*

## 4-H Tech Changemakers

The AZ 4-H Tech Changemakers (TCM) National 4-H Council Project funded by Verizon is well underway. Teen TCMs from five locations across the state help address the digital divide among adults by teaching one of four topics based on community interest. The four topics available to choose from are:

- Digital Marketing – Part 1: Social Media in the Workforce and Part 2: Deeper Dive into Facebook
- Using Microsoft Word to Develop your Resume
- Resources for your Career Journey
- Becoming a Recreational Drone Pilot

Four counties and one Federally Recognized Extension Program (FRTEP) recruited 16 Teen TCMs to teach this year's curriculum.

### Participating Counties and County TCM Coordinators

- Santa Cruz County - Norma Elisa Ruiz
- Pinal County - Kyle Treadway and Esther Turner
- Maricopa County - Valerie Gabrielson and Caroline Werkhoven
- Cochise County - Haley Chappell
- San Carlos Apache Tribe - Hubert Thomas and Juan Arias

The TCM program is also supported by UArizona faculty and students in the College of Education, Department of Agriculture Education, and CALES, and is managed and coordinated by the ACBS STEM Extension Program.



Tech Changemakers help address the digital divide among adults in their communities.

## Greenhouse (SEED) Project

Building community partnerships is key in preparing the next generation of STEM professionals for the state of Arizona. Carolyn Sawyer, Superintendent of Champion Schools and Dr. Jerry Lopez, ACBS STEM Specialist, are leading the way by working with principals from Champion Schools and Cooperative Extension members to offer 32 hours of professional development for Arizona teachers on the Greenhouse Sustainable Energy Engineering Design (SEED) Project.

The Greenhouse SEED professional development workshop series was led by Jose Fonseca, UArizona Math Department, and co-taught by Dr. Lopez. The four-hour sessions were conducted once per week for 8 weeks beginning in November 2023. Teachers and students worked together and engaged in hands-on problem-based learning experiences.

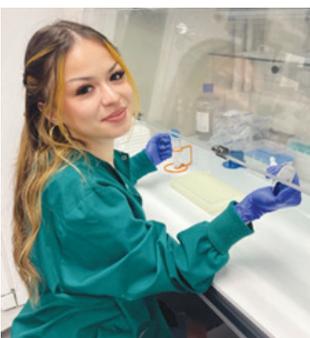
Teachers and students learned about the engineering design process, technical drawing using scaled blueprint perspectives (2D and 3D drawing), landscape design, and topography. They also learned about circuitry and sustainable energy technologies and how to install solar panels and wind turbines, and presented their team's weekly progress on their model-scale greenhouse SEED Project throughout the workshop series, helping students build on their public speaking skills.

The workshop series was successfully completed by five teachers from across the Champion Schools and 19 eighth grade students attending Chandler Campus, where the training was offered.



Teachers and students learn together during SEED Project professional development workshop series.

## Undergraduate Research Opportunities



This spring semester, ten undergraduate students are participating in the Vertically Integrated Projects (VIP) undergraduate research program with Dr. Jerry Lopez. Students work in the laboratory conducting research on *Cyclospora cayatanensis*, a foodborne human parasite associated with fresh produce outbreaks causing Cyclosporiasis. Students also read research articles and prepare posters and powerpoint presentations for lab seminars

or conferences. Students are supervised on a daily basis by first-year PhD student Khai Truong (BS Microbiology) and undergraduate senior Miely Suarez (Microbiology major, former three-semester Western Alliance to Expand Student Opportunities (WAESO) student, and Arizona's Science, Engineering, and Math Scholars Program (ASEMS) mentor).

# Ravishankar Lab Outreach Activities

## Global Produce & Floral Show - Oct 18-21, 2023

Dr. Law met and provided research updates on produce safety to industry collaborators at the show, hosted by the International Fresh Produce Association in Anaheim, CA.

## Pima County Health Department Meeting and Tour

Drs. Ravishankar and Law, along with other members of the lab team, met with the Pima County Health Department team in November, to discuss their food testing services and food safety research, and provide a tour of lab facilities at the ACBS building (photo below).



## Water Infrastructure Finance Authority of Arizona (WIFA)

Drs. Ravishankar, Law, and Witten met with regulatory representatives and engineers from WIFA in December to discuss a portable low-energy desalination technology as a potential augmentation project in Phoenix, AZ.

## Arizona Astrobiology Center Meeting and Luncheon

In January 2024, Drs. Ravishankar and Witten were invited to discuss research collaborations with researchers from the Origins, Spectral Interpretation, Resource Identification, and Security – Regolith Explorer (OSIRIS-REx) Asteroid Sample Return Mission, at the University of Arizona, Tucson, AZ.



## UArizona Research and Project (ReaP) Grants

Kirat Bains and Luis A. Rodriguez-Medina, ACBS graduate students in Dr. Ravishankar's lab, and Kara Miller, ACBS graduate student in Dr. Craig's lab, all received Research and Project (ReaP) grants from the University of Arizona Graduate and Professional Student Council for the 2023 Fall Round.

ReaP grants fund research and projects for UArizona graduate, professional, and undergraduate students that will be completed within one calendar year. Graduate and professional students can apply for up to \$1,500, and undergraduate students can

apply for up to \$750. Applicants may submit one application per round (three rounds per year: Fall, Winter, Spring), and applicants are only eligible to receive one ReaP Grant per academic year. The GPSC ReaP Grant is competitive and is not a guaranteed funding source. Applications are reviewed by previous graduate students from various disciplines, and all ReaP award recipients are required to serve as a GPSC grants reviewer.

<https://gpsc.arizona.edu/research-grants>

## ACBS Student Research News

### Postdoctoral Trainee Advances Career

Dr. Estela Jauregui, an ACBS postdoctoral trainee for five years with Dr. Zeliann Craig, began her independent career as an Assistant Professor of Physiology at Midwestern University, Glendale. Congratulations, Estela!

### American Heart Association Scientific Sessions

Xinran (Allison) Yang, an ACBS master's student in the Chi Zhou lab, was selected to present her research titled "The Roles of microRNA in Preeclampsia Induced Fetal Sex-Specific Endothelial Dysfunction" as an oral presentation. The presentation was included in the "New Potential Therapeutic Targets in Endothelial Dysfunction" session of the 2023 American Heart Association Scientific Session in Philadelphia, Pennsylvania, November 10-13, 2023.

<https://www.abstractsonline.com/pp8/?ga=2.60492589.1249663294.1692203591.1069560823.1691763922#!/10871/presentation/8454>



### Student Travel Awards

Three undergraduate students in the Craig lab - Amanda Adams, Taylor Massey, and Vivianna Metzler - were selected to receive Society of Toxicology (SOT) Undergraduate Diversity Program Student Travel Awards. This prestigious award provides the opportunity for promising undergraduate students in a science major with an interest in research careers to attend the SOT Undergraduate Diversity Program at the SOT Annual Meeting and ToxExpo in Salt Lake City, Utah, March 10-14, 2024.

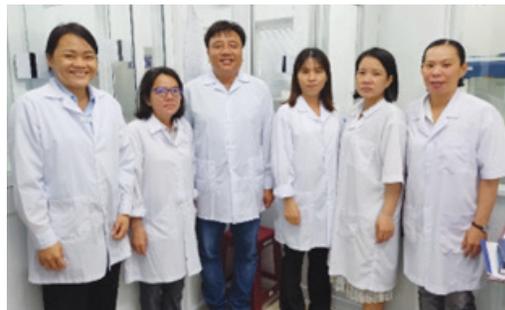
Recipients of the travel awards participate in a three-day program to learn more about toxicology and careers in biomedical research. The program includes networking in mentoring groups, an introduction to toxicology, an undergraduate education program, scientific sessions, poster sessions, the In Vitro Toxicology Lecture and Luncheon for Students, and concludes with additional networking and a special session on opportunities in the biomedical sciences after graduate studies.

# Aquaculture Pathology Lab Updates

## Training Courses

As part of a funded project in **Vietnam**, **Drs. Hung N. Mai** and **Arun K. Dhar** conducted a training on shrimp disease detection, November 20-24, 2023. They also audited the Analysis and Testing Center of Ca Mau and visited shrimp farms in the Ca Mau Province.

Located in the southernmost region of the country, the Ca Mau province is one of the major regions of shrimp farming in Vietnam. The province has one of the most extensive mangrove forests on earth. Efforts are underway to preserve and grow the mangrove forest and make shrimp farming sustainable in Vietnam. Drs. Mai, Dhar, and the host country members visited a mangrove forest area that is a critical location for spawning of wild crustaceans. Monitoring the health and disease prevalence of the wild crustaceans is critical for sustainability of shrimp farming in this region.



## Invited Speaking Engagements

**Dr. Arun K. Dhar** was invited to give the Keynote address, entitled, “Expediting pathogen discovery and developing antiviral therapy in shrimp”, at the 4th International Mini-Symposium on the Control of Aquatic Animal Disease 2023 (CAAD 2023). The meeting was held November 26-29, 2023, at the National Cheng Kung University, **Taiwan** (NCKU).

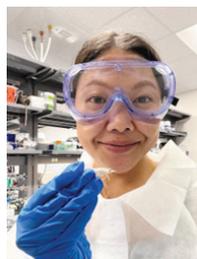


**Dr. Arun K. Dhar** was also invited to give a presentation on the “Aquaculture Pathology Laboratory, University of Arizona - The World Organization for Animal Health Reference Laboratory of Crustacean Diseases” during the launch of a Regional Aquatic Animal Health Laboratory Network (RAAHLN) for Africa, December 5-7, 2023, in **Pretoria, South Africa**.

<https://www.rr-africa.woah.org/en/news/launch-of-the-regional-aquatic-animal-health-laboratory-network-for-africa-2/>



## Visiting Fulbright Scholar



Fulbright Scholar,  
Dr. Magdalena Lenny  
Situmorang.

The Aquaculture Pathology Laboratory (APL) was excited to host **Dr. Magdalena Lenny Situmorang**, Associate Professor from the School of Life Sciences and Technology, Institute of Technology Bandung (SITH ITB), Indonesia, as a **Fulbright Visiting Scholar** from September to mid-December 2023. Dr. Lenny was mentored by Drs. Arun K. Dhar and Kevin Fitzsimmons. As a part of her visit, she conducted studies involving the application of synbiotic-supplemented functional feed for Enterocytozoon hepatopenaei (EHP) control in shrimp culture. The Certificate of Completion of the program has been recently issued by the Fulbright Association, and this marks an achievement for both institutions. Collaborations between SITH ITB and the APL will

continue in a wider global education program to contribute to a more sustainable and resilient shrimp aquaculture.



Photos from top right:

- Lab members of the Analysis and Testing Center of Ca Mau, Vietnam, with Dr. Mai (center).
- Drs. Mai, Dhar, and host country members visit a mangrove forest area in the Ca Mau province, Vietnam, which is a critical location for spawning of wild crustaceans.
- Attendees of the 4th International Mini-Symposium on the Control of Aquatic Animal Disease with Dr. Dhar (fourth from left) and Prof. C. F. Lo and Prof. H. C. Wang from the National Cheng Kung University, Taiwan.
- Attendees of the launch of the Regional Aquatic Animal Health Laboratory Network (RAAHLN) for Africa in Pretoria, South Africa.
- APL faculty and lab members meet virtually with faculty and lab members from the School of Life Sciences and Technology, Institute of Technology Bandung (SITH ITB), Indonesia.



## Publications

**Dhar AK, Mai HN, Cruz-Florez R** and Warg J. 2024. Comparison of Polymerase Chain Reaction (PCR) assay performance in detecting *Decapod penstylhamaparvovirus 1* in penaeid shrimp. *J. Virol. Methods*. 323: 114840.

Lee Y, Vijayan J, Roh HJ, Park J, Lee J-Y, Luan NT, Kim HJ, Kim W-S, **Dhar AK**, Park C-I and Kim D-H. 2023. Nucleic acid-based methods for diagnosis of shrimp viral diseases. *Review in Aquaculture*. 1–31, DOI: 10.1111/raq.12873.

Mastellar SL, Darrington J and **Greene EA**. 2023. Best Practices for Healthy Horsekeeping. UArizona Cooperative Extension. Pub AZ2073-2023. <https://extension.arizona.edu/pubs/best-practices-healthy-horsekeeping>

## Presentations and Invited Lectures

**Alenton RRR, Mai HN and Dhar AK**. “A replication-deficient shrimp viral vector engineered for the delivery of therapeutic RNA.” The Conference of Research Workers in Animal Diseases. January 20-23, 2024. Chicago, Illinois.

**Andrade TPd, Cruz-Flores R, Mai HN and Dhar AK**. “Emerging diseases that affect Brazilian and global marine shrimp farming.” XIX FENACAM 2023 (19th National Fair of Shrimp). November 14-17. Natal, Brazil.

**Andrade TPd, Cruz-Flores R, Mai HN, and Dhar AK**. “O Impacto de laboratórios de diagnósticos de doenças, com Sistemas de Gestão de Qualidade NBR ISO/IEC 17.025:2017, para sustentabilidade da cadeia produtiva.” XIX FENACAM 2023 (19th National Fair of Shrimp). November 14-17. Natal, Brazil.

**Bains K**. “Evaluation of the efficacy of natural antimicrobials and prevention of biofilms formed by foodborne pathogens on food contact surfaces.” UArizona Animal and Comparative Biomedical Sciences (ACBS) Fall 2023 Seminar Series. November 20, 2023. Tucson, Arizona.

**Dhar AK**. “Application of Next Generation Sequencing (NGS) for Pathogen Discovery in Shrimp”, in a training program on “Bioinformatics Tools and its Application in Predictive Ecology and Fisheries”, ICAR-Central Inland Fisheries Research Institute. January 24, 2024. Barrackpore, Kolkata, West Bengal, India.

**Dhar AK**. “Importance of Specific Pathogen Free Aquafeed in Health Attestation of Shrimp in a Breeding Program”, Conference on “Importance of SPF live feeds and modern technologies in present day”. December 13, 2023. India.

**Dhar AK**. “Resolving uncertainties in identifying the etiology of shrimp diseases by combining histopathology and molecular diagnostics”. Pukyong National University. December 13, 2023. South Korea.

**Dhar AK**. “Aquaculture Pathology Laboratory, University of Arizona - The World Organization for Animal Health Reference Laboratory of Crustacean Diseases Tools”. Launch of a Regional Aquatic Animal Health Laboratory Network (RAAHLN) for Africa. December 5-7, 2023. Pretoria, South Africa.

**Dhar AK**. “Keynote address: Expediting pathogen discovery and developing antiviral therapy in shrimp”. 4th International Mini-Symposium on the Control of Aquatic Animal Disease 2023 (CAAD 2023). National Cheng Kung University, Taiwan (NCKU). November 26-29, 2023. Taiwan.

**Dhar AK**. “Engineering a Viral Vector Platform for the Delivery of Therapeutic RNA in Crustacean & Developing Oral Vaccine in Fish”. Global Fisheries Conference. November 21-22, 2023. India.

**Dhar AK**. “Major Diseases & Disease Management in Shrimp Aquaculture”. College of Veterinary Medicine, Mississippi State University. November 10, 2023. Starkville, MS.

**Dhar AK**. “Diseases & Disease Management in Shrimp Aquaculture”. Bandung Institute of Technology (Intitut Teknologi Bandung). November 1, 2023. Jawa Barat, Indonesia.

**Greene EA**. “Science Creates Real Understanding of Biosecurity (SCRUB) Train the Trainer Workshop”. Intertribal Agricultural Council Annual Conference. December 12, 2023. Las Vegas, NV.

**Greene EA**. “2023-2024 Influenza and Zoonoses Education among Youth in Agriculture: Arizona Activities”. 2023-2024 Influenza and Zoonoses Education among Youth in Agriculture Workshop. January 9-10, 2024. Decatur, GA.

**Greene EA** and Carstens R. “Engaging Youth: Biosecurity Practices at Home”. Workshop at the 2023-2024 Influenza and Zoonoses Education among Youth in Agriculture Workshop. January 9-10, 2024. Decatur, GA.

**Greene EA** and Arias J. 2024. “Tribal Livestock/Equine Extension Team Tools & Resources”. 2024 Southwest Indian Agriculture Association Annual Conference. January 15, 2024. Las Vegas, NV.

**Greene EA**, Thomas L, Arias J and Alden E. 2024. “AZ Cooperative Extension and AZ Health Department Partner to Train Tribal Youth and Community Members About Human/Animal Disease Transmission”. 2024 Southwest Indian Agriculture Association Annual Conference. January 16, 2024. Las Vegas, NV.

**Greene EA** and Wright A. “Feeder Options for Your Horses”. Southern Arizona Equine Health Symposium. January 20, 2024. Tucson, AZ.

**Greene EA**, Davison K and Raub R. “Get the Answers: Feeding/Management Questions About Your Horses”. Southern Arizona Equine Health Symposium. January 20, 2024. Tucson, AZ.

**Greene, E.A.**, A.D. Wright, and D. Byerly. 2024. “Horse 101: Beyond Square and Granny Knots – How and When to Use Them”. Southern Arizona Equine Health Symposium. January 20, 2024. Tucson, AZ.

**Mai HN, Schofield PJ, Sealey WM and Dhar AK**. “Development of a PCR-based diagnostic assay for white spot syndrome virus (WSSV) in formulated aquafeed.” The Conference of Research Workers in Animal Diseases. January 22-24, 2024. Chicago, Illinois.

**Park R**. “Efficacy of Ozone Against Foodborne Pathogens in Non-Traditional Sources of Irrigation Water.” UArizona Animal and Comparative Biomedical Sciences (ACBS) Fall 2023 Seminar Series. November 13, 2023. Tucson, Arizona.

**Ravishankar S**. “Emerging Foodborne Microbial Threats in Produce: Challenges & Control Strategies.” Invited virtual oral presentation at the 2023 Maritime Silk Road International Conference on the Cooperation and Integration of Industry, Education, Research and Application. Hosted by the Fujian Agriculture & Forestry University, Fuzhou, China. November 1, 2023.

**Salvador L**. “Unraveling zoonotic bacterial genomic variations across organizational scales, The Pathogen and Microbiome Institute”. Northern Arizona. November 1, 2023.

**Salvador L**, Suez E, Azami HY, Quinn FD. “Genomic analysis of *Mycobacterium bovis* isolates to determine zoonotic tuberculosis infection patterns in Mexico”. World Conference on Lung Health, International Union Against Tuberculosis and Lung Disease. November 15-18, 2023. Palais du Congrès, Paris, France.

(Pubs continued on 12)

**Salvador L.** Conference Program Lead & Chairperson, Zoonotic Diseases section. World Conference on Lung Health, International Union Against Tuberculosis and Lung Disease, November 15-18, 2023. Palais du Congrès, Paris, France.

### Poster Presentations

**Bains K, Zhu L and Ravishankar S.** Comparative Evaluation of the Efficacy of Organic Sanitizers Against *Listeria monocytogenes*, *Salmonella enterica*, *Escherichia coli* O157:H7 and Leafy Green Native Microbiota on Different Food Contact Surfaces. Annual Food Safety Conference. October 25-26, 2023. Tucson, Arizona.

**Dalson K, Zhu L and Ravishankar S.** Efficacy of Plant-based Antimicrobials against *Streptococcus* species in vitro. Annual Food Safety Conference, October 26, 2023. Tucson, Arizona. And the Annual GDP Showcase. December 7, 2023. Tucson, Arizona.

**Dang N, Paradeza D, Bains K, Ravishankar S.** Soy Good! Edamame Multi-Snack Dip: Evaluation of Microbial and Quality Attributes. Annual Food Safety Conference, October 26, 2023. Tucson, Arizona.

**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. Annual Food Safety Conference. October 26, 2023. Tucson, Arizona.

**Mudigonda L, Chauhan V, Rodríguez L and Ravishankar S.** Comparative Analysis of Inoculation and Recovery Techniques for Better Recovery of *Listeria monocytogenes* on Ready-to-Eat Meats. Annual Food Safety Conference. October 26, 2023. Tucson, Arizona. And the Annual GDP Showcase. December 7, 2023. Tucson, Arizona.

**Rodríguez-Medina L, Zhu Z and Ravishankar S.** Evaluation of Fogger Technology with Plant-Based Sanitizers against *Listeria monocytogenes* in Ready-to-Eat Meats. Annual Food Safety Conference. October 26, 2023. Tucson, Arizona. And the Annual GDP Showcase. December 7, 2023. Tucson, Arizona.

**Sargent E, Mehrabi-Yazdi A and Ravishankar S.** A Comparison of the Total Native Microbiota and Lactic Acid Bacteria in Field-Grown vs Controlled Environmental Agriculture-Grown Leafy Greens. Annual Food Safety Conference. October 26, 2023. Tucson, Arizona.

### Local, Regional and National News

Ritter D. Tox Spotlight: Effect of DBP exposure on reproductive function. Southwest Environmental Health Sciences Center. News. January 17, 2024. <https://swehsc.pharmacy.arizona.edu/news/tox-spotlight-effect-dbp-exposure-reproductive-function>.

# 2024 Graduation Celebrations

## UArizona Commencement

Friday, May 10, 2024

7:30 pm | UArizona Stadium

<https://commencement.arizona.edu/>

Commencement is more than a ceremony. It's an experience unlike any other celebrating your next step in life. Wonder led you to this moment. And we can't wait to see where wonder will take you next!



## CALES Undergraduate Graduation Convocation

Saturday, May 11, 2024

2 - 4 pm | McKale Center

## CALES Graduate Graduation Convocation

Monday, May 13, 2024

2 - 4 pm | Crowder Hall

Please direct all questions to Leslie Grignon at [lgrignon@arizona.edu](mailto:lgrignon@arizona.edu) or 520-626-3091

<https://cales.arizona.edu/current-students/events/cales-convocation>

## ACBS Newsletter

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The University of Arizona  
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