A Message from the Director

Dear Colleagues and Friends,

It is hard to believe we are already well into April and are nearing the end of the Spring 2018 semester. For many of our students, this summer will be filled with jobs, internships, and a chance to apply some of the knowledge they acquired to real world situations. For our graduating seniors, I hope you have wonderful and everlasting memories of your time at the UA and as an ACBS student. We enjoyed having you in our classes and getting to know you during your time at the UA. You will continue to leave an enduring legacy of excellence and achievement for generations to come. On behalf of our faculty, staff, and graduate students, we wish you all the best in your future endeavors.

As some of you know, I have accepted a position as Dean of the College of Agricultural, Human, and Natural Resource Sciences at the Washington State University and will be leaving the UA on May 4. While this is a tremendous opportunity for me to lead a college, it is bittersweet. I will miss working with the amazing faculty, staff, and students in ACBS and CALS, as well as our dedicated stakeholders around the state. I am pleased to say that Dr. Patricia Stock will be the Interim Director. I wish Patricia and the School well as ACBS continues to move, evolve, and advance as one of the top units at the UA.

To all our readers, thank you for your support over the past 3.5 years. I wish you and your families a safe and happy summer.

Kindest regards and Bear Down!
André Wright, PhD

Support ACBS

There are many ways you can support the School of Animal and Comparative Biomedical Sciences. Gifts of any size help to propel ACBS closer to its goals and have an immediate and lasting impact on our programs. Your generosity provides outstanding educational opportunities for our students and helps to attract and retain the brightest faculty. With your support, ACBS research gives back to the state of Arizona community through our extension programs, as well as the nation and the world, through the discoveries we make and the products we develop.

Gifts may be made online at the University of Arizona Foundation website: www.uafoundation.org/give/cals Be sure to designate the funds by selecting other and typing in ACBS.

Or contact our school business office to discuss specific ways your contribution can be made or dispersed. Whether you choose to give to a specific project or program, or simply donate to the school overall, we thank you.
A Message from the Incoming Interim Director

I am honored for the opportunity to be the Interim Director of ACBS. I have been at the University of Arizona for 16 years and through my tenure in CALS, I have developed a strong multidisciplinary research program that bridges the fields of Parasitology, Entomology and Microbiology. I use insects, nematodes and bacterial symbionts to study host-parasite interactions and the role of microbial symbionts in host fitness. I consider my research background unique yet multidisciplinary, as it has allowed me to collaborate with colleagues from diverse fields.

I believe that as an academic, my roles are to research, teach and lead. I have had the opportunity to combine leadership roles with teaching and research both at the University of Arizona and through my membership in several scientific societies. I believe that leading from the well of intellectual generosity, kindness, openness, and respect can be a successful and rewarding experience. I consider that I am at a point in my career where I can bring my leadership experiences and training to the next level.

I look forward to working with faculty, staff, and students to fulfill the vision and mission of ACBS. In particular, I look forward to maintaining and expanding our educational agenda and scientific programs so we can continue to attract students and faculty across the nation and internationally. My goal, will be to support and advance all research, educational, extension, and outreach activities of the school.

I also wish to assure you that I intend to be accessible to ensure the effectiveness of our work as a team. My philosophy is to have an open door policy and I will make myself available to listen to and interact with all members of our unit. I look forward to serving ACBS and working with you during this transition period.

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Dr. S. Patricia Stock

- Interim Director (Incoming), School of Animal and Comparative Biomedical Sciences
- Professor, Department of Entomology
- Professor, Honors College
- Joint Professor, School of Animal and Comparative Biomedical Sciences
- Faculty Fellow for Special Initiatives, The Graduate College
- Email: spstock@email.arizona.edu
- Phone: 520-626-3854

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Dr. Stock Named Interim Director of ACBS

College of Agriculture and Life Sciences, Dean Shane Burgess, has appointed Dr. S. Patricia Stock to become Interim Director of the School of Animal and Comparative Biomedical Sciences, effective May 4, 2018. With a background in zoology and parasitology, Patricia came to the UA in 2001 as an Assistant Research Professor in the then-Department of Plant Sciences, Division of Plant Pathology and Microbiology. She joined the faculty of the Department of Entomology four years later, began a joint appointment in the School of Animal and Comparative Biomedical Sciences in 2013 and continues to hold an adjunct appointment in Plant Sciences. Since 2016, Patricia has also served as Faculty Fellow for Special Initiatives in the Graduate College.

Dr. Stock maintains an active research laboratory where her research program focuses on the study of insect pathogens as model systems. Her laboratory studies entomopathogenic nematodes (EPN) and their bacterial symbiont bacteria which represent an emerging model of terrestrial animal-microbe symbiotic relationships. EPN symbiotic bacteria also represent a new and rich source of novel bioactive molecules with insecticidal, nematicidal, antibiotic, and antimycotic properties.

In a letter announcing Dr. Stock’s appointment, Dean Burgess writes, “Professor Stock has the excellent leadership skills we need to help Animal and Comparative Biomedical Sciences and all of us in the college find adaptive ways to meet today’s challenges. I think the team in ACBS is very lucky to have her and I know you will join me in wishing her well in this interim position.”

The search committee for the next ACBS director has been formed and is chaired by Dr. Jon Chorover, Professor and Head of the UA Department of Soil, Water and Environmental Science. About the search Dr. Chorover says, “Although the search is just getting underway, I encourage all of you to be engaged in the process of selecting the next Director.”

Feedback, comments, issues, and concerns on the search can be conveyed directly to him or through the members of the committee. Dr. Chorover can be reached at chorover@email.arizona.edu.

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Search Committee - ACBS Director

- Jon Chorover (chair), Professor and Head, SWES
- Steven Archer, Professor, SNRE
- Peder Cuneo, Specialist, ACBS
- Duarte Diaz, Associate Specialist, ACBS
- Hanh Do, Manager of Finance and Administration, ACBS
- Dennis Dugan, Dugan Dairies
- Samuel Garcia, Assistant Professor of Practice, ACBS
- Marianne Hadden, Director, CALS Development, Vet Med Program
- William Hendricks, Assistant Professor, TGEN
- Sean Limesand, Professor, ACBS
- Jeff Menges, Menges Ranch
- Casey Parker, Graduate Student, ACBS
- Aurora Plascencia, Executive Assistant, ACBS
- Dari Trujillo, Academic Advisor, ACBS
- Koenraad Van Doorslaer, Assistant Professor, ACBS
- Gayatri Vedantam, Professor, ACBS
- John Scott Wilbur, Assistant Professor of Practice, ACBS
ACBS Graduate Students Named 2018/2019 ARCS Scholars

Prestigious program provides financial awards to academically outstanding U.S. citizens to advance US leadership in global innovation, health and quality of life.

ACBS PhD students Caroline Geisler, advised by Dr. Ben Renquist, and Lindsay Rasmussen, advised by Dr. Zelieann Craig, have been selected as ARCS Scholars for 2018-19. The award consists of a $10,500 cash scholarship, a $500 travel grant, and full base graduate tuition. There are only 15 ARCS Scholars across the University of Arizona and Caroline and Lindsay are the only two graduate students representing the College of Agriculture and Life Sciences. Congratulations to Caroline, Lindsay, Dr. Renquist and Dr. Craig.

Caroline Geisler – ARCS Kathryn Johnston West Scholar Candidate, Animal Sciences

Caroline received her B.S. in Zoology from Miami University and a M.S. in Animal Sciences from the University of Arizona. Caroline is investigating the role of hepatic lipid accumulation in altering peripheral nervous system activity to effect changes in serum insulin and insulin sensitivity. This integrative systems-level approach to understanding how the liver regulates whole body metabolic activity will offer insights into the treatment of type 2 diabetes. Caroline was an ARCS Burton Scholar for the 2017-2018 academic year and a University of Arizona Fellow for the 2016-2017 academic year.

Caroline is excited and honored to have been chosen as a continuing ARCS scholar. She would like to thank her mentor, Dr. Ben Renquist, for his scientific guidance and her husband, Shannon Geisler, for his support. About receiving this award, she says “This award has provided me with excellent opportunities to meet and learn from other graduate students here at the UA and also from universities across Arizona, in addition to the wonderful organizers and donors who support the ARCS organization. This community has enriched my graduate education and I am very thankful for the funding which allows me to devote my full efforts to furthering my Ph.D. research in understanding the development of type 2 diabetes.”

Lindsay Rasmussen – ARCS Scholar Award, Phoenix Chapter PhD Candidate, Animal Sciences

Lindsay received her B.S. in Veterinary Science and her M.S. in Animal Sciences from the University of Arizona. Lindsay is investigating the effect of phthalates on female fertility. Phthalates are a family of endocrine-disrupting chemicals with a history of reproductive and developmental toxicities in animal models. Phthalate exposure in women has been confirmed by detection of their metabolites in urine and follicular fluid, and has been associated with adverse reproductive outcomes such as early menopause, decreased hormone levels, and early pregnancy loss. After graduation Lindsay’s career goal is to become an embryologist and work in a human reproductive facility. She hopes to one day be able to help families who are experiencing infertility achieve their dreams of having children.

Lindsay would like to thank the members of the Craig Lab for their continued and unwavering support. She would also like to say, “As an individual, my investments are in my education. My investment in education has been a lifelong commitment to continually strive to meet every challenge with dedication, determination, and a desire for knowledge. Receiving this scholarship is instrumental to helping me achieve my academic and professional life goals of helping couples grow their families.”

The ARCS Foundation

The ARCS (Achievement Rewards for College Scientists) Foundation, Inc., is a national organization dedicated to supporting the best and brightest U.S. graduate and undergraduate scholars by providing financial awards in science, engineering and medical research. It is the ARCS Foundation’s belief that support of STEM education is essential to US economic growth and technological competitiveness and helps to ensure continued US leadership in global innovation, health and quality of life.

The ARCS Foundation advances science and technology in the United States by providing financial awards to academically outstanding U.S. citizens studying to complete degrees in science, engineering and medical research. Working in close collaboration with University departments, that are recognized leaders in science and engineering fields across the United States, more than 1300 women volunteer members of 15 regional Foundation chapters, fund the most promising scholars at the startup or “seed stage” of their work and discovery.

ARCS Scholars have gone on to positions of leadership and distinction across academia, industry, and government efforts. Nine out of 10 ARCS Scholars work in their sponsored fields - sharing knowledge, developing technologies, launching startup companies, and inspiring youth to pursue the challenge of study and careers in STEM fields.

Since its founding in 1958, the ARCS Foundation has awarded more than $100 million, to over 10,000 ARCS Scholars in top rated STEM programs at leading U.S. universities. The ARCS is generously supported by corporate, foundation and individual donors, and by the countless volunteer hours of its dedicated membership. Gifts to the ARCS Foundation are not subject to administrative fees, either by the Organization or upon receipt by the University on behalf of an ARCS Scholar Award recipient, so that 100% of donations to Scholar Awards go to ARCS Scholars.

For more information on the ARCS Foundation go to https://www.arcsfoundation.org/.
Engagement: The Key to Success at the RTIP

Engagement is one of the hottest topics in academics today. Although the idea is new to some areas of campus, it was one of the founding pillars on which the RTIP was created in 1973. Interaction between industry and students guarantees success for both students and program supporters alike.

That concept has not changed over the course of the RTIP’s history. Students had the opportunity to learn from, and network with, industry professionals from all parts of the racing business and from all over the country and the world during the 2017/2018 academic year. Thirteen guest professors came to campus to discuss a variety of issues including:

Bill Nader, director of racing business and operations for the Hong Kong Jockey Club, discussed the importance of the vertical integration business model used by the HKJC. Bill spoke of his journey that started in New England and took him across the globe to lead one of the most respected racing organizations in the world. He stressed the importance of hard work and embracing opportunities, even if they come at an inopportune time, and to never stop learning.

TVG Network, Betfair US, represented by Jeff Lowich, director of industry relations, Rebecca Sommerville, senior TV producer and Kim Bijou, talent acquisition business partner made presentations in RTIP classes and met with students individually about internships and open positions with TVG. RTIP students gained a much clearer understanding of the size and scope of this international operation, that is not only the provider of two dedicated horse racing channels, but a world-wide wagering platform that serves horse players across the globe.

Scott Chaney, steward for the California Horse Racing Board, made his visit to Tucson just four days after the polarizing disqualification of McKinzie in the San Felipe stakes at Santa Anita. This call became a national hot-button issue to horse players across the country and students were the first to get an in-depth analysis of what happened in the steward’s booth while the decision was being made.

Dr. Mary C. Scollay, equine medical director for the Kentucky Horse Racing Commission, covered the duties of the regulatory vet, which include prerace inspection, managing equine emergencies and overseeing the test barn. Scollay also gave students the first look at the results of her research regarding environmental contamination causing positive drug tests prior to their publication in the racing press.

Odds On Racing Scholarship

New Full Tuition Scholarship and Hands-on Equine Opportunities Available for Race Track Industry Program Students.

A new four-year, full-tuition scholarship award, named the Odds On Racing Scholarship, has just been announced by the Race Track Industry Program. “This is such an incredible opportunity for students, who may have thought that attending the UA to prepare for a career in the racing industry was financially out of reach, to be able to take that first step toward their career goals,” said Wendy Davis, Director of the Race Track Industry Program.

The Odds On Racing Scholarship will be available to three incoming or transfer students and will cover all tuition costs of attending the UA’s RTIP.

The scholarship is thanks to a very generous donation from Dana Parham, a racing enthusiast and horse owner. Named for his current standardbred racing operation, Odds On Racing Stable, Parham generously donated the funding for the scholarship to support an industry that he’s passionate about and has been a part of in a variety of areas over the years. This gift allows him to give back to the industry and support the next generation of professionals who will steward the sport into the future.

“We are incredibly grateful for this gift and the doors it will open for those students who receive it. This award allows the best and brightest students, from any financial background, who are interested in the industry to attend the UA and join the long list of distinguished RTIP alumni in the industry,” said Davis.

Especially appropriate is the name of the scholarship – Odds On – which in racing terminology indicates a horse that is the favorite, or what some would call a “sure thing,” in his race. This gift will certainly allow the recipient to be the odds on favorite to succeed in their career goals.

While many students in the RTIP are interested in the operation of the racetrack and oversight of wagering, the other half are looking toward a career in the production, or bloodstock side of racing, including work on breeding farms, in sales and/or as bloodstock agents. In addition to the scholarship award, Parham has also made it possible to create a learning opportunity for students interested in the equine side of the industry.

“Thanks to the generous gift designated for the purchase of two outstanding Thoroughbred mares, students will be a part of every step – from the process of purchasing the mares to the sale of their foals. Never before has an opportunity to work with major industry bloodstock professionals in the national, and international, market been possible at the RTIP,” said Davis.

This project will allow students to work side by side with faculty, as well as various industry professionals, through all aspects of race horse production and sales. This will provide students with experience in the equine side that is second to none.
WAESO Provides Students with Research Experience

Students present work at the Western Alliance to Expand Student Opportunities poster session.

Undergraduates Kaitlyn A. Benally, veterinary science major in ACBS and Daisy A. Alvarez, public health major presented their projects on March 2, 2018 during the annual student poster presentations at the Western Alliance to Expand Student Opportunities (WAESO), in Phoenix, Arizona. Both Kaitlyn and Daisy have been participating in research activities in ACBS Assistant Professor, Dr. Gerardo (Jerry) Lopez’s laboratory over three semesters, working closely with Research Technician, Daniela Cabrera. Dr. Lopez is a faculty member in the the Western Alliance to Expand Student Opportunities (WAESO) a program supported in part by a grant from the Louis Stokes Alliance for Minority Participation (LSAMP) program of the National Science Foundation (NSF).

This long-standing LSAMP activity was designed to support a strong and vibrant scientific and technological workforce through recruiting, retaining, and graduating scientists and engineers from currently underrepresented populations. The WASEO Alliance utilizes a multi-contextual approach involving project activities in student research experiences, the establishment of peer networks, an emphasis on the social context of science, and development of a culture of professionalism in students.

Neurological Form of Equine Herpes Virus

How to minimize the risk to your horse.

"Isolate, vaccinate, and have good biosecurity practices in place", was the advice of Dr. Betsy Greene, when speaking with KVOA about the quarantine of a Phoenix area barn, when a horse tested positive for the neurological form of Equine Herpes Virus (EHM) (http://www.kvoa.com/story/37663532/ua-equine-expert-gives-lowdown-on-horse-herpes-virus).

Equine herpes virus (EHV) is a very common virus in horses worldwide. EHV-1 and EHV-4 are the strains that often cause disease. EHV-1 can cause abortion (Rhino), respiratory disease and neurologic disease. The neurologic disease is also called equine herpesvirus myeloencephalopathy (EHM). The incubation for EHV-1 is 1-10 days but clinical signs are often seen within 3 days. Clinical signs are fever, respiratory disease (coughing, nasal discharge), incoordination (hind limbs), urine dribbling, inability to rise and “dog sitting”.

The virus is transmitted by aerosol and by direct/indirect contact. Shedding from the respiratory tract may last 10-14 days or longer. Depending on environmental conditions EHV persists for days or weeks in the horse’s environment. EHV-1 does not cause disease in humans, however people who have contacted infected horses can carry the virus on their clothing and hands. If you have contact with an infected horse, you should change your cloths and disinfect your hands before handling other horses. The primary treatment for EHM is supportive treatment; the prognosis for recumbent horses is poor. Horses that recover can develop latent infections and under stress start to shed the virus. Strict biosecurity is the best protection against infection. Recommendations include veterinary examination of any horse that shows neurologic signs, strict isolation of infected and exposed horses, stopping all traffic on and off farms housing infected horses, personal sanitation after handling infected/exposed horses, and keeping vaccinations current.

UA Equine Specialist, Dr. Betsy Greene speaks with KVOA about the neurological form of Equine Herpes Virus (EHM) and how horse owners can minimize the risk to their horses.
Other Equine Extension Activities

UA Cooperative Extension Website

The UA Cooperative Extension Website has had a “makeover”, and while there are still some kinks to work out, the horse website is https://extension.arizona.edu/horse. If you happen to put in the old “horse-extension” language, it will still take you to the new site. Be sure to also check us out on Facebook. www.facebook.com/UAEquineExtension

Equine Extension Publications

Two more “The Informed Arizona Equestrian: Horse Health Series” publications are up! Preventing Sand Colic: publication az1759-2018 Ionophore Toxicity in Horses: publication az1758-2018. As always, these UA Cooperative Extension publications are available at no cost, and online. If you click on https://extension.arizona.edu/pubs and search for “Greene” in the search box, you will have access to all of the articles. There are several more articles near completion, including topics such as blister beetles, equine herpes virus, and more. These will all become a part of an online AZ Horse Owners Guide as we get more materials through the peer review process.

AAEA

As the President of the Arizona Agricultural Extension Agents (AAEA), Equine Specialist, Betsy Greene worked with Ashley Wright to plan a Winter Meeting in Tucson, focusing on hands on media training, tips and tricks with UA Vice President for Communications, Chris Sigurdson and UA Cooperative Extension Communications Manager, Faith Schwartz. The meeting was beneficial and timely for attendees and several members have already been able to directly apply the information provided. As mentioned to the right, AAEA hosted the National Board for their spring meeting in Tucson, and plans for the AAEA Summer meeting in Northern Arizona are currently underway.

Extension Travel

Spring and summer are the high extension and travel times for Dr. Greene. She has worked with 4-H and County Ag Agents to set up meetings, contests, and workshops in Phoenix, Peridot, Page, Window Rock, Tucson, Peach Springs, Holbrook, Safford, Kingman, Flagstaff, Globe, Casa Grande, Queen Creek, and Apache Junction. She has also been working on potential grant collaborations with Dine College in Tsaile, AZ and with national colleagues.

NACAA Spring Board Meeting in Tucson

The National Association of County Agricultural Agents (NACAA) Spring Board Meeting in Tucson was a great success. We had NACAA board representation from AK, TN, KS, FL, NC, MD, PA, MS, MI, UT, SD, and IL!

Our local Arizona Agriculture Extension Agents (AAEA), officers and board members showed them a great variety of Arizona agriculture on tour day, starting with an informative tour of the UA Agricultural Research Center, description of the UA Equine Program activities, stops at Civano Nursery (80 acres of awesome plants/cacti/ etc.), Green Valley Pecans, a quick drive through Saguaro National Park East for cacti photo opts, a visit with head Wrangler and UA alumnus Hope Martin at the Tanque Verde Guest Ranch to learn about a 150 year old ranch with as many (actually, more...) horses, cattle, and a corner on Agri-tourism, before ending with a banquet at the Mountain Oyster Club. And, we only went through two cases or so of water throughout the two days (with nobody dropping from the heat...!)

Ashley Wright and I would like to extend a special thanks to Josh Sherman (Commercial Horticulture) and Duarte Diaz (Dairy Cattle) for helping with the tour, and for sharing their expertise and projects/programs in UA Cooperative Extension.

Ashley (Beef Cattle) and I (Equine) also gave the low down on our programs and industries in Arizona. It was great to show off the good things that UA Cooperative Extension has going on to the National Board of our agricultural organization.

- Betsy Greene, AAEA President

Josh Sherman (Horticulture Agent) and Betsy Greene (Extension Equine Specialist) share a laugh at the Civano Nursery. Josh organized this stop of the tour.

Duarte Diaz (Extension Dairy Specialist) discussed the feed and heat stress trials as he showed the group around the Agricultural Research Center on the first stop of the tour.

The National Association of County Agricultural Agents Officers and Board members stop for a group photo at Javelina Rock in the Saguaro National Park East during their Ag Tour. (Not pictured - AAEA officers Betsy Greene, Duarte Diaz, and Ashley Wright)
2018 Southern Arizona Equine Health Symposium (SAzEHS)

Bringing up-to-date equine health, welfare, and safety topics to the Arizona horse industry.

The second annual Southern Arizona Equine Health Symposium was a great success. This event is organized in collaboration with Reata Equine Veterinary Group and Adobe Veterinary Center to bring up-to-date equine health, welfare, and safety topics to the Arizona horse industry. In addition to a full day of lectures and demonstrations, a portion of the proceeds go to support Therapeutic Riding of Tucson (TROT).

Over 160 attendees learned about everything from hands on bandaging techniques, health care for the older horse, dealing with emergencies on the trail, disaster planning, behaviors and vices, colic, and more. The presentations and demonstrations are chosen to be useful to the beginning horse owner, as well as the seasoned professional.

Dr. Betsy Greene, Dr. Ann Pearson, and Area Agent Ashley Wright, had great feedback on a “tag team” lecture they put together on Toxic Plants: Identification, Avoidance, and Treatment, which provided knowledge from the field to the veterinary treatment options. The evaluation results from trail emergencies indicated that many attendees were going to go home and “make a trail pack” which included things for desert trail riding (e.g. pliers, gloves, and comb for cactus removal).

During the lunch break, attendees were able to tour the UA Equine Facilities and watch an arena demonstration with Randy Helm from the BLM/Mustang program at the Florence Prison.

Overall, the evaluations indicate a very successful event. Thank you to Kim Horn (Coconino 4-H Extension) for bringing a van load of 4-H students and volunteers all the way from Flagstaff! This UA Cooperative Extension hosted event is one method of bringing the Arizona horse industry from the southern part of our state together to create life-long learning opportunities and an environment for industry interaction for both youth and adult horse owners.

SAVE THE DATE: 2019 SAzEHS will be at the Campus Ag Center on January 26, 2019.

Mark your calendars and plan to attend.

FFA Horse Judging at the UA Campus Ag Center

Student Coordinator Marlena Long (UA ’18), Equine Contest Chair Dr. Betsy Greene, UA Equine Farm personnel, and volunteers came to together to organize the annual Statewide CDE FFA Day on March 3, 2018. Marlena recruited volunteers (both horse and youth wranglers), handled registration, and worked closely with UA Assistant Barn Manager Sam Biffar to prepare 4 horse classes for the almost 200 FFA horse judging participants.

FFA Career Development Event, or CDE’s, are contests that members compete in to test their skills learned through agricultural education instruction. In the Horse Evaluation CDE, students evaluate and rank horses based on breed characteristics, conformation and performance.

We want to thank our official judges, Vanessa Schreeve (AZ National), Kacee Richardson (UA), and Alex Jeffers-Sample (UA ’20) and everyone that came together to make this event a success.

FFA Youth from all over Arizona judge a Halter class at the Campus Ag Center.
White Nose Syndrome in Bats

ACBS Graduate Student competes in UA Grad Slam competition.

White nose syndrome (WNS) is a mycosis that causes morbidity in hibernating bats with rates of over 99% mortality. The disease is caused by *Pseudogymnoascus destructans* which is a pathogenic fungus thought to have originated in Europe.

Since 2006, WNS has killed over 6 million bats, putting several species at risk for extinction and causing many others to become endangered. Spatial modeling has shown the damage caused by WNS to threaten the extinction of over 32% of the North American bat population, and is currently confirmed in 31 states and 4 Canadian provinces.

The fungus attacks the bats once they’ve gone into a state of hibernation or torpor. Because their bodily functions halt to nearly a standstill, the fungus is able to overpower the immune system and take hold in the cutaneous tissues of the bats. Due to the excessive immunologic activity they use up their stores of body fat at twice the normal rate. Bats infected with *P. destructans* have higher proportions of lean tissue to fat mass as compared to the non-infected bats. This finding means that bats with WNS use twice as much fat as healthy bats over the same hibernation period. The amount of energy they used was also higher than what is expected for normal healthy hibernating bats. The bats immune response to *P. destructans* is ultimately what kills them as they are unable to hibernate and have repeated periods of stimulation during a time when food sources are unavailable.

Having originated from Europe it was previously believed that *P. destructans* would be unable to survive in warm, dry climates. However, due to the emergence of infection in west Texas, we now know this to be untrue. It is thought that this may be due to the generally low temperatures and stable climates of caves country wide, which is where the fungus typically takes hold on hibernating colonies.

The heaviest densities of infection remain on the eastern coast of North America to date, but with the rapid spread of the disease, this could change at any time. Little is known about the ecology of bats such as their migratory, birthing, and co-roosting patterns, all of which would be pivotal in determining the potential spread of WNS. In the wake of the destruction caused by WNS, it was discovered that hibernating species in locations like Virginia hibernate with up to 8 other species at the same time, adding to the potential epidemic.

Gear (such as ropes, backpacks, helmets, headlamps) act as a passive and inanimate reservoir for *Pseudogymnoascus destructans* in that it remains unharmed by the disease causing organism. The organism itself cannot rely on this reservoir for sporogenesis but rather for transmission to a suitable host. It is believed that this is one of the primary ways that *P. destructans* is transported from one cave to another and particularly its transport from Europe to North America. Bats are a host/active reservoir for *Pseudogymnoascus destructans*, once transmitted to a bat *P destructans* colonizes and creates a disease state in that organism, eventually causing death.

Furthermore, it should be noted that *P. destructans* can survive in the absence of bats, such as on fomites, and in soil or on cave surfaces for upwards of 5 years. This is an issue when considering that bats often return to the same places to give birth and hibernate posing further danger for infection. A study conducted earlier this year collected mycology samples from 632 different Arizona native bats, belonging to 12 different species. Isolates revealed that 88.9% of the samples collected genotyped as actinobacteria belonging to the Streptomyces genera which posses a natural antifungal resistance to WNS. This is particularly valuable because it captured crucial mycological data from 12 of the 29 Arizona bat species and may hold the key to ending the catastrophic death toll of WNS in North America.

Impact

Twelve of Arizona’s 29 different bat species hibernate, if we were to sustain the loss of even one of them let alone all 12, it would be catastrophic, not only economically but ecologically. Humans have an unappreciated commensalism with bats, one that we would certainly suffer without. Bats pollinate our plants and eat pest insects, Arizona is on the verge of a crisis, and preventative measures need to be taken otherwise it will be too late. My data collection and sampling in southern Arizona’s caves looks to further our understanding of their ecology and microbiology and continue to preserve and protect bat species in the southwestern United States.

- Alexisandra Travis

Graduate student, ACBS

The University of Arizona

This article has been edited for space, for full article including references go to: acbs.cals.arizona.edu/news
Recent Activities of the Aquaculture Pathology Laboratory

OIE Twinning Project Workshop in Indonesia
Drs. Arun K. Dhar and Luis Fernando Aranguren Caro conducted a Shrimp Disease Detection Workshop at the Brackish Water Aquaculture Development Center, Situbundo, Indonesia. Veterinarians and scientific staff from different national laboratories in Indonesia participated in this workshop. The workshop was part of a collaborative project between the Aquaculture Pathology Laboratory, a World Organization for Animal Health (OIE, Paris, France) Reference Laboratory for shrimp diseases, and the Situbundo Brackish Water Aquaculture Development Center, a National Reference Diagnostic Laboratories for Aquaculture in Indonesia. The goal of the Indonesia twinning project is to assist one of the national laboratories in Indonesia with building their capacity and scientific expertise in diagnosing shrimp diseases. This collaborative project started in 2015.

AQUAINdia-2018
Dr. Arun K. Dhar, was invited to give a talk at the AQUAINdia-2018 conference held in Chennai, India, Feb 02-03, 2018. The two day conference was attended by academia and industry leaders from the Americas, Europe, Asia, Africa and Australia. Dr. Dhar gave a talk on “Acute Hepatopancreatic Necrosis Disease (AHPND) and Enterocytozoon hepatopenaei (EHP): Two emerging threats to shrimp aquaculture” and led a panel discussion on “Shrimp Diseases: Status, Challenges and Way Forward”. This conference is of particular interest because, in 2017, India became the largest exporter of shrimp to the US market, surpassing Ecuador.

Aquaculture America-2018
Several members of the Aquaculture Pathology Laboratory attended the Aquaculture America-2018, a World Aquaculture Society Meeting held in Las Vegas, NV, Feb 19-22, 2018 and gave presentations. During the four day event, Dr. Dhar, chaired a session on “Crustacean Diseases” and gave a presentation on the first report of Acute Hepatopancreatic Necrosis Disease (AHPND) in Texas that caused large-scale mortalities in shrimp farming in 2016. Dr. Luis Fernando Aranguren Caro gave a talk on the development of a new method for the detection of necrotizing hepatopancreatitis bacterium (NHP-B) disease in shrimp. Dr. Siddhartha Kanrar reported the detection of a microsporidium in shrimp feed and Mr. Paul Schofield gave a presentation highlighting the achievements and the role of the Aquaculture Pathology Laboratory - West Campus Agriculture Center (APL-WCAC) and its future.
**News from the Ravishankar Laboratory**

**Presentations**
Dr. Ravishankar presented an invited seminar entitled “Safer Salads & Grilled Meats: Clean and Green Approaches” organized by the College of Public Health (as part of their Spring seminar series) on January 31, 2018.

Dr. Ravishankar gave a presentation “Analyzing Non-traditional Water Sources for Foodborne Pathogenic Bacteria and Indicator Microorganisms & Evaluation of Treatment Technologies” for the CONSERVE Advisory Committee and industry stakeholders in Yuma, AZ on February 20, 2018.

Dr. Ravishankar gave a presentation on “Majors and Research Opportunities at the School of Animal & Comparative Biomedical Sciences” for the local high school students and their mentors at the Southwest Agricultural Summit- Student Program, at the Arizona Western College in Yuma, AZ on February 21, 2018. The new Food Safety Major, proposed to start in Fall 2018, was also highlighted in this presentation.

**Outreach Activities**
Dr. Ravishankar and her team gave a tour of her labs and demonstrated the food safety projects in her lab to a group of undergraduate students (freshman) from UA-Yuma campus on December 6, 2017.

**Student News**
Aishwarya Rao, a graduate student of the Ravishankar Lab, is the first CALS representative on the Graduate and Professional Student Council (GPSC) from ACBS. She has had the opportunity to converse with Dean Burgess and President Robbins on how to make ACBS and CALS a more attractive prospect for Graduate students. Having been the first student from ACBS to represent CALS, she is encouraging other ACBS graduate students to take up the responsibility and pride of representing the school at the University level.

**ACBS Staff News**

**Sam Biffar - University Staff Excellence Award**

UA Equine Center Assistant Manager, Sam Biffar, was presented a university staff excellence award recognizing her hard work and dedication. Students, family members, and farm colleagues surprised her with an afternoon tea and presentation of her award. She was a bit late to the party, since she was helping to wrangle a loose bull on the farm! There’s never a dull day on the farm. Congratulations and well deserved, Sam!

**Joanna Maes - Program Coordinator (ACBS Business Office)**

Joanna joined our ACBS family on February 27, 2018. Her major responsibilities include overseeing building management and surplus, coordinating several inventory programs, vehicle insurance reports, and processing financial transactions to support all members of our School.

Joanna has been with the University of Arizona for the last 3 years with a broad knowledge of University systems, policies and procedures. Over the last eight years, Joanna has served as a resourceful and dedicated Executive/Administrative Assistant with experience ranging from the missile defense to academia. Most recently, she has dedicated herself to providing support to UA undergraduate and graduate students in the Department of Residential Education.

Joanna is Arizona raised, proud wife of a UA Entomology and Insect Science PhD candidate, and mother of a beautiful 2-year old boy. She graduated from Colorado Technical University with a Bachelor of Science in Business Administration and a management concentration. She looks forward to applying her experience and abilities in her new role with us and is excited to be a part of the ACBS family.

The ACBS business office is located in Saguaro Hall, Room 217. Joanna can be reached at joannamaes@email.arizona.edu or 520-621-3817.
Presentations and Symposia


Forlastro, I. Galleria mellonella as a complementary model organism to study the enteropathogenic E. coli Type 3 secretion system. Faculty member: Stock, P. Area of Research: Microbiology. UA College of Agriculture and Life Sciences - Poster Forum. Tucson, AZ. March 23, 2018.

Geisler, C. Hyperinsulinemia and insulin resistance is a result of steatosis induced hepatocyte GABA production and release. Faculty member: Renquist, B. Area of Research: Obesity/Diabetes Metabolism. UA College of Agriculture and Life Sciences - Poster Forum. Tucson, AZ. March 23, 2018.


Ramamurthy, S. A GXXG motif within the transmembrane region of EspZ is essential for EPEC pathogenesis. Faculty member: Viswanathan, VK. Area of Research: Microbiology. UA College of Agriculture and Life Sciences - Poster Forum. Tucson, AZ. March 23, 2018.


Rasmussen, L. Effects of in vivo exposure to Di-n-Butyl phthalate on ovulation, fertilization, and early embryo development in the mature superovulated mouse. Faculty member: Craig, Z. Area of Research: Reproductive Toxicology. UA College of Agriculture and Life Sciences - Poster Forum. Tucson, AZ. March 23, 2018.


Publications


UPCOMING EVENTS

May 11
College of Agriculture and Life Sciences
CALS Graduation Convocation
9:00am - McKale Memorial Center
Tucson, Arizona
cals.arizona.edu/events/cals-graduation-convocation

May 11
University of Arizona
May Commencement
7:30pm - Arizona Stadium
Tucson, Arizona
commencement.arizona.edu

June 7 - 11
ASM Microbe
American Society for Microbiology
Georgia World Congress Center
Atlanta, Georgia
www.asm.org/index.php/asm-microbe-2018

June 24 - 27
ADSA Annual Meeting
American Dairy Science Association
Knoxville, Tennessee
www.adsa.org/2018

July 8 - 12
ASAS Annual Meeting
American Society of Animal Science
Vancouver, Canada
www.asas.org/meetings/annual-2018

July 10 - 13
SSR Annual Meeting
Society for the Study of Reproduction
Hilton New Orleans Riverside
New Orleans, Louisiana
www.ssr.org/18Meeting

July 13 - 17
AVMA Convention
American Veterinary Medical Association
Colorado Convention Center
Denver, Colorado
www.avma.org

July 26 - 28
Arizona Cattle Growers’ Association
Annual Meeting
Prescott Resort
Prescott, Arizona
www.azcattlemensassoc.org

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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.cals.arizona.edu/news for past issues.

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