

BIOSPHERE

## Fall Newsletter 2019



# <u>head's message</u>



Dear friends of the Department of Biology,

As I hope will be obvious from the rest of this newsletter, this is a great time for the Department of Biology at Texas A&M University. After a long hiatus, we are rapidly hiring new faculty members to help keep us at the forefront of research and teaching. Our three newest faculty members are highlighted in the Faculty Spotlight, and in the upcoming year we will be searching for three addi-

tional faculty members; one each in microbiology, neurobiology, and evolutionary biology. The influx of new faculty members has resulted in a 30% increase in external grant support for our research laboratories in the past two years, and this remarkable increase has been accompanied by improvements in scholarly output and national rankings.

Our teaching mission has also seen vast improvements in the past few years, and I encourage you to read about some of the details in the Reflections article by Dr. Wayne Versaw, our associate head for academic affairs. Beginning in fall 2020, the Department of Biology will offer a new type of undergraduate degree in neuroscience. This degree will be administratively housed at the university level, and our department will offer a bachelor's of science track in molecular and cellular neuroscience. The Department of Psychological and Brain Sciences will offer a track in behavioral and cognitive neuroscience, and the College of Veterinary Medicine will offer a track in pre-clinical neurosciences.

Keeping up with all of these changes and shepherding them to fruition certainly provides its challenges, but seeing the results pay off for both our research and teaching programs is exciting and rewarding.

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Thomas D. McKnight Professor and Department Head

www.bio.tamu.edu

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# faculty spotlight

## New Faculty Bring Cutting-Edge Research to Texas A&M



Dr. Angela Mitchell received her B.S. in Biotechnology from Elizabethtown College in 2008. In 2013, she received her Ph.D. from the Department of Microbiology and Immunology at the University of North Carolina at Chapel Hill. Angela pursued her dissertation research in the lab of Professor R. Jude Samulski, studying mechanisms to enhance transduction of adenoassociated virus gene therapy vectors by inducing cellular stress. During her postdoc in the laboratory of Professor Thomas Silhavy at Princeton, she continued her investigations of stress responses but moved to a bacterial system. She is investigating the interaction between nutrient limitation leading to stationary phase responses and the strengthening of the outer membrane permeability barrier, an important impediment to development of new antibiotics for gram-negative bacteria.



**Dr. Aref Zarin** applies cutting edge technologies to study the development and function of neural circuits driving motor behaviors in Drosophila larva. He has generated a comprehensive synapse-level motor connectome using electron microscopy reconstruction of the entire larval nervous system. Aref is a pioneer in application of calcium imaging methods to monitor neuronal activity and characterize animal locomotor behaviors at a singlemuscle level. By altering the neural function and examining the motor output, Aref links the activity of individual neurons to animal behaviors. Aref received his PhD from the University of Dublin, where he studied the transcriptional mechanisms underlying neural circuit development. He also has a M.Sc. degree in Molecular Genetics from the University of Tehran.



Dr. Daniel Paredes-Sabja received a B.Sc. degree from Universidad Austral de Chile and a Ph.D. from Oregon State University (OSU). During his Ph.D. work, he was mentored by Drs. J. Antonio Torres and Mahfuzur Sarker to study the molecular mechanism of germination of Clostridium perfringens spores. In 2009, he continued his training at OSU as a Postdoctoral Researcher under Dr. Sarker's supervision. In this position, Daniel began his work on the biology of Clostridium difficile spores. In 2011, he joined Universidad Andrés Bello, where he expanded his research interests into microbial pathogenesis, pathogen/microbiota-host interactions, bacterial spore physiology and genomic epidemiology.

## **SOUCH DULL** BIOLOGY FACULTY PROMOTION AND TENURE 2019



**Dr. Charles D. Criscione** *Professor* 

Dr. Charles Criscione received his Ph.D. in Molecular and Cellular Biology from Oregon State University in 2005. He joined the Department of Biology at Texas A&M University as an Assistant Professor in 2008 and was promoted to Associate Professor with tenure in 2014. Dr. Criscione teaches undergraduate and graduate courses in ecology, evolution, and parasitology. He developed a graduate population genetics course and was invited to Chile to teach a short-course in population genetics. His research focuses on basic and applied uses of population genetics to study the interplay between the ecology and evolution of parasites. Dr. Criscione has obtained over \$1.5 million in external research funding primarily from the National Science Foundation. He has 43 peer-reviewed journal articles and 2 book chapters. Since joining A&M, he has given 14 invited presentations including 2 international keynotes. He received the Young Investigator Award from the American Society of Parasitologists (ASP). Dr. Criscione has trained 2 postdocs, 3 PhD students, and 2 international visiting PhD students, and served on the committees of 8 other graduate students. He is an Editorial Board member of Journal of Helminthology, does extensive committee service for ASP, and several journals have recognized him for his reviewing excellence.

Dr. Christine Merlin received her Ph.D. in Insect Physiology from Pierre and Marie Curie University in France in 2006. Dr. Merlin joined the Biology Department at Texas A&M University as an Assistant Professor in 2013. She teaches undergraduate and graduate courses in organismal and molecular biology to students enrolled in many programs campus-wide. Dr. Merlin's research focuses on circadian and seasonal biology using an iconic model, the monarch butterfly, that she established as a genetically tractable system. She has received over \$2.5 millions in external research funding from the National Science Foundation, the National Institute of Health, and the Klingenstein Fund and the Simons Foundation. She has written 21 peer-reviewed journal articles including 5 review articles and one book chapter, and was an invited speaker at more than 20 conferences and departmental seminars. She received a Klingenstein-Simons Fellowship Award in Neuroscience in 2017 and the Junior Faculty Research Award of the International Society for Research on Biological Rhythms in 2018. Dr. Merlin chaired two doctoral committees and served on 15 others.



**Dr. Christine Merlin** Associate Professor with Tenure



Dr. Alan E. Pepper Professor

Dr. Alan Pepper received his Ph.D. in Genetics from the University of California at Davis in 1990. Dr. Pepper joined the Department of Biology at Texas A&M in 1996. Currently Dr. Pepper teaches a graduate course in plant molecular biology and an undergraduate course entitled "Genes, Ecology and Evolution," that he developed. This novel, highly interdisciplinary course has since been implemented as a requirement for the Biology major. The central theme of Dr. Pepper's research is the genetic and genomic analysis of plant adaptation to extreme environments. He has received over \$3.2 million in funding from the NSF, USDA, US Fish and Wildlife, Cotton Incorporated, and other entities. He has published 50 peer-reviewed manuscripts in journals ranging from Cell, to Nature Communications, to Genome Biology and Evolution. Dr. Pepper has chaired 12 doctoral committees and three masters committees. He has served on 73 doctoral and Master's committees in 12 different departments. Dr. Pepper is an Associate Editor of The Plant Genome. He has received the Association of Former Students College-level award in Teaching and has been named a Norman E. Borlaug-USDA Mentor in International Science and Technology.

### **BIOLOGY FACULTY PROMOTION AND TENURE 2019**



**Dr. Asha Rao** Instructional Assistant Professor

Dr. Asha Rao received her PhD in Entomology from Texas A&M University in 2002 and worked in Entomology before joining the Department of Biology in Fall 2011. Currently, she teaches undergraduate courses in Introductory Biology I and II for majors and Biology for non-majors. Dr. Rao strives to adopt motivating pedagogy and thus is constantly seeking effective teaching methodologies to engage students and improve their learning by attending various workshops. She has secured \$273,098 in Science Education grants as a PI or Co-PI to redesign the courses and improve student success. She was named National Academies Education Fellow at Summer Institute for Scientific Teaching. Dr. Rao's other notable student success initiatives are BioFirst, a learning community for first generation biology majors, and Science Peer Learning Center, a student hub in Biology with peer-tutors in science. She mentors and advises many undergraduates. Dr. Rao's research focuses on insect physiology and behavior. She has received \$317,168 in research grants, published 13 peer-reviewed journal articles, 2 book chapters, and has edited a book. She has served as an Asst. Editor and reviewer to various peer-reviewed journals. Dr. Rao has organized symposia and presented her research in national and international conferences.

Dr. James Leif Smith received his Ph.D. in Biochemistry from University of Florida College of Medicine in 2002. During his post-doctoral studies, he gained considerable experience under the guidance of the distinguished Microbiology professor Dr. Jeffrey D. Hillman. Dr. Smith joined the Biology Department at Texas A&M University as an Assistant professor in 2010. Dr. Smith teaches graduate and undergraduate courses in general and applied microbiology. He helped develop courses on antimicrobial agents and drug discovery. Dr. Smith's research focuses on isolating, identifying, and developing novel peptide-based antimicrobials. He has received over 1.8 million dollars in funding from the National Institute of Health and Cancer Prevention Research Institute of Texas. He is a cofounder of Sano Chemicals Inc., that is focused on commercializing an antifungal that was isolated by Dr. Smith. He has written 37 peer reviewed journal articles, one book chapter, and is an inventor on over 10 patent applications. Dr. Smith has chaired six doctoral committees, one master's committee, and has served on 15 others. He currently serves on the editorial board for Applied and Environmental Microbiology and Microbial Cell. He has also served on multiple departmental and university committees.



Dr. James L. Smith Professor



Dr. Andrew Tag Instructional Assistant Professor

Dr. Andrew Tag, Director of Lower Division Instruction, received his Ph.D. in Plant Pathology and Microbiology from Texas A&M University in 2003. Dr. Tag joined the Department of Biology at Texas A&M University as a Post-Doctoral Research Associate and Lecturer in 2003. Dr. Tag teaches undergraduate courses in introductory biology. He is currently the Lead Investigator revising and developing new laboratory curricula for both introductory biology courses. He developed two junior/senior level undergraduate research-based courses as part of the pilot Capstone Research program and has participated in curriculum revision for one course in the department. Dr. Tag also contributed to and curated large question pools for shared Introductory Biology I & II use within eCampus and taught the biology track for the 2018 STEM Posse cohort. Dr. Tag is an author of 5 peer-reviewed journal articles. Dr. Tag's research focuses on fungal functional genomics and bioinformatics in many species. Dr. Tag has received over \$115,000 in internal funding from Instructional Technology Services, Dean of Faculties, and Center for Teaching Excellence. Dr. Tag was named a National Academies Education Fellow in the Life Sciences in 2018.



### A member of the Texas A&M Biology faculty since 1997,

Dr. Deborah Bell-Pedersen earned her PhD at the State University of New York at Albany in 1991, followed by postdoctoral work at Dartmouth Medical School. Bell-Pedersen is an internationally recognized leader in the fields of circadian and fungal biology. In addition to helping to sequence the genome for Neurospora crassa, her laboratory made the first DNA chips containing the fungus's genes, which led to major insights into its biological clock. Bell-Pedersen continues to investigate how circadian clock regulates daily rhythms in behavior, physiology and biochemistry. Defects of the human clock are associated with sleep disorders and, for unknown reasons, epilepsy, cerebrovascular disease, multiple sclerosis, headaches, cardiovascular disease, and cancer. Understanding how biological clocks function and what they regulate at the molecular level can lead to new ways to improve human health.



### Deborah Bell-Pedersen Named to Inaugural Class of University Professorship Holders

Dr. Deborah Bell-Pedersen, professor of biology and associate head for operations in the Department of Biology at Texas A&M University, was named as one of five inaugural holders of a University Professorship. The new designation recognizes faculty who have demonstrated significant and sustained accomplishments in their discipline, earning them national and international recognition. The award also highlights the recipients' commitment to inclusivity, accountability, climate, and equity in their department, college and throughout their service at Texas A&M. Recipients will receive an annual stipend for three years and retain the title throughout their careers at the university as faculty members in good standing. Nominations for the distinction were submitted by department heads or deans, and the finalists were selected by a university committee and approved by the Provost. The professorships are funded centrally from research indirect cost return and philanthropic support. The perpetual title also comes with an unprecedented feature: the option for the holder to personally name the professorship for a significant emeritus or deceased Texas A&M faculty member who has served as an inspiration or motivating factor in the recipient's career and scholarship.

She is an outstanding ambassador for her field, for science in general, and for Texas A&M University

- Thomas D. McKnight

### Duncan MacKenzie Earns Distinguished Achievement Award



Dr. Duncan MacKenzie, Associate Professor of Biology and Director of the Biology Honors Program, has been honored with the prestigious 2019 Distinguished Achievement

Award for Teaching. Texas A&M University and The Association of Form Students selected 24 outstanding members of the school's faculty and staff to be honored with the 2019 Distinguished Achievement Awards. The university-level Distinguished Achievement Awards were first presented in 1955 and have since been awarded to more than 1,000 professionals who have exhibited the highest standards of excellence at Texas A&M.

Duncan joined the Texas A&M Department of Biology faculty in 1983 after earning his Ph.D. in zoology from the University of California, Berkeley, in 1980. He currently serves as director of Texas A&M Biology's Honors Program, which began in fall 2016 and already has more than 150 students. MacKenzie also serves as co-chair of the Graduate Marine Biology Interdisciplinary Degree Program. He is a two-time recipient of The Association of Former Students College-Level Distinguished Achievement Award for Teaching (2002 and 1989). His students have twice recognized him with the Texas A&M University System Student-Led Award for Teaching Excellence (SLATE). In 2018, the Department of Residence Life selected MacKenzie as one of the inaugural recipients of the Honoring Excellence Awards recognizing Texas A&M University faculty and staff for outstanding support of students and their academic success. He has served as research advisor to more than 60 undergraduate students who have worked in his laboratory. Twenty of these students have continued on to graduate programs, and thirteen have gone on to medical or veterinary schools.



### Richard Gomer Elected Senior Member of National Academy of Inventors

Dr. Richard Gomer, a member of the Department of Biology since 2008 and holder of a Thomas W. Powell '62 Chair in Science, is one of six Texas A&M faculty members among the 66 international recipients selected for the inaugural class of National Academy of Inventors (NAI) Senior Members in recognition of the achievement and contributions of academic inventors worldwide.

Richard earned his Ph.D. in biology from the California Institute of Technology and was a professor of biochemistry and cell biology at Rice University for 21 years before coming to Texas A&M, where he conducts research in three primary areas of biomedicine: tissue size regulation, tissue cell composition, and fibrosing diseases. A former Howard Hughes Medical Institute Investigator, he has authored more than 200 high-impact publications, earning recognition as a 2011 Texas Inventor of the Year by the State Bar of Texas, a 2013-2014 National Academies Education Fellow in the Life Sciences and a 2016 finalist for NPR's Golden Mole Award for Accidental Brilliance after serendipitously identifying a protein in human blood—serum amyloid P (SAP)—that prevents the formation of scar tissue in fibrotic diseases like asthma and cirrhosis. To date, he holds 14 patents with several more pending.

## 2019-2020 New Teaching Faculty

MS in Biomedical Science Texas A&M University

BS in Biology Prairie View A&M University



John Attia Lab Instructor



PhD in Biology University of Western Ontario MS in Biology University of California, San Diego BS in Biology University of California, San Diego

Dr. Amanda Adams *Lecturer* 

PhD in Genetics Texas A&M University

BS in Animal Science University of Illinois



Dr. Samantha Fletcher *Lecturer* 



PhD in Health Education Texas A&M University MPH in Epidemiology Texas A&M Health Science Center

MD in Medicine and Surgery University of Ibadan, Nigeria

Dr. Olufunto Olusanya Lab Instructor

PhD in Biology Texas A&M University MS in Marine Biology University of West Florida

BS in Marine Biology University of Tennessee



Dr. Allison St. Clair Senior Lecturer

### **RECENT PUBLICATIONS**

### **Rodolfo Aramayo**

Mateos, M, Silva, NO, Ramirez, P, Higareda-Alvear, VM, Aramayo, R, Erickson, JW et al.. Effect of heritable symbionts on maternally-derived embryo transcripts. Sci Rep. 2019;9 (1):8847. doi: 10.1038/s41598-019-45371-0 116.

### **Deborah Bell-Pedersen**

Baek, M, Virgilio, S, Lamb, TM, Ibarra, O, Andrade, JM, Gonçalves, RD et al.. Circadian clock regulation of the glycogen synthase (gsn) gene by WCC is critical for rhythmic glycogen metabolism in *Neurospora crassa*. Proc. Natl. Acad. Sci. U.S.A. 2019;116 (21):10435-10440. doi: 10.1073/pnas.1815360116.

### Joseph Bernardo

Figgener, C, Bernardo, J, Plotkin, PT. Beyond trophic morphology: stable isotopes reveal ubiquitous versatility in marine turtle trophic ecology. Biol Rev Camb Philos Soc. 2019. doi: 10.1111/brv.12543.

### Heath Blackmon

Armstrong, A, Anderson, NW, Blackmon, H. Inferring the potentially complex genetic architectures of adaptation, sexual dimorphism and genotype by environment interactions by partitioning of mean phenotypes. J. Evol. Biol. 2019;32 (4):369-379. doi: 10.1111/ jeb.13421.

### **Charles Criscione**

Caballero, IC, Criscione, CD. Little to no inbreeding depression in a tapeworm with mixed mating. J. Evol. Biol. 2019;32 (9):1002-1010. doi: 10.1111/jeb.13496.

### Kira Delmore

Rennison DJ, Delmore KE, Samuk K, Owens GL, Miller SE. *In press.* Geographic proximity more strongly predicts shared patterns of genome-wide differentiation than parallel selection after colonization of novel environments. American Naturalist.

### Jennifer Dulin

Conner, JM, Bain, GL, Dulin, JN. Intraspinal and Intracortical Delivery of AAV Vectors for Intersectional Circuit Tracing in Non-transgenic Species. Methods Mol. Biol. 2019;1950 :165-176. doi: 10.1007/978-1-4939-9139-6\_9.

### **James Erickson**

Gao, Y, Hu, H, Ramachandran, S, Erickson, JW, Cerione, RA, Skiniotis, G et al.. Structures of the Rhodopsin-Transducin Complex: Insights into G-Protein Activation. Mol. Cell. 2019. doi: 10.1016/j.molcel.2019.06.007.

### **Richard Gomer**

Suess, PM, Chinea, LE, Pilling, D, Gomer, RH. Extracellular Polyphosphate Promotes Macrophage and Fibrocyte Differentiation, Inhibits Leukocyte Proliferation, and Acts as a Chemotactic Agent for Neutrophils. J. Immunol. 2019;203 (2):493-499. doi: 10.4049/ jimmunol.1801559.

### **Dylan McCreedy**

Cappenberg, A, Margraf, A, Thomas, K, Bardel, B, McCreedy, DA, Van Marck, V et al.. L-selectin shedding affects bacterial clearance in the lung - a new regulatory pathway for integrin-outside-in signaling. Blood. 2019. doi: 10.1182/blood.2019000685.

### Jerome Menet

Greenwell, BJ, Trott, AJ, Beytebiere, JR, Pao, S, Bosley, A, Beach, E et al.. Rhythmic Food Intake Drives Rhythmic Gene Expression More Potently than the Hepatic Circadian Clock in Mice. Cell Rep. 2019;27 (3):649-657.e5. doi: 10.1016/j.celrep.2019.03.064

### **Christine Merlin**

Lugena, AB, Zhang, Y, Menet, JS, Merlin, C. Genomewide discovery of the daily transcriptome, DNA regulatory elements and transcription factor occupancy in the monarch butterfly brain. PLoS Genet. 2019;15 (7):e1008265. doi: 10.1371/journal.pgen.1008265.

### **Alan Pepper**

Burrell, AM, Goddard, JHR, Greer, PJ, Williams, RJ, Pepper, AE. Sporadic Genetic Connectivity among Small Insular Populations of the Rare Geoendemic Plant Caulanthus amplexicaulis var. barbarae (Santa Barbara Jewelflower). J. Hered. 2019;110 (5):587-600. doi: 10.1093/jhered/esz029.

### **Tapasree Roy Sarkar**

Sarkar, TR, Maity, AK, Niu, Y, Mallick, BK. Multiple Omics Data Integration to Identify Long Noncoding RNA Responsible for Breast Cancer–Related Mortality. Cancer Informatics. 2019. doi.org/10.1177/1176935119871933.

#### **James Smith**

Ravichandran, A, Geng, M, Hull, KG, Li, J, Romo, D, Lu, SE et al.. A Novel Actin Binding Drug with In Vivo Efficacy. Antimicrob. Agents Chemother. 2019; 63 (1). doi: 10.1128/AAC.01585-18.

### **Michael Smotherman**

Smotherman, M, Bakshi, K. Forward masking enhances the auditory brainstem response in the free-tailed bat, *Tadarida brasiliensis*, during a critical time window for sonar reception. J. Acoust. Soc. Am. 2019;145 (1):EL19. doi: 10.1121/1.5087278.

### **Joseph Sorg**

Shrestha, R, Cochran, AM, Sorg, JA. The requirement for co-germinants during Clostridium difficile spore germination is influenced by mutations in yabG and cspA. PLoS Pathog. 2019;15 (4):e1007681. doi: 10.1371/ journal.ppat.1007681. PubMed PMID:30943268 Pub-Med Central PMC6464247.

### **NEW GRANTS**

#### **Steve Lockless**

Department of Health and Human Services—National Institute of General Medical Science "Physiological Role for Cation Channels"

#### **Beiyan Nan**

Department of Health and Human Services—National Institute of General Medical Science "The Origin of Rod Shape in Bacteria"

### **Bruce Riley**

Department of Health and Human Services—National Institute on Deafness and Other Communication Disorders "Genetic Analysis of Inner Ear Development"

### **James Smith**

Small Business Technology Transfer—National Institute of Allergy and Infectious Diseases "Preclinical Development of OCF001 for Treatment of Yeast Infections"

# one voice

## Chris Figgener Leading the Straw Wars



hristine Figgener grew up in Germany and moved to Costa Rica to pursue her graduate degree. She worked there for several years before beginning her PhD at Texas A&M University. Her dissertation investigates the

basis and consequences of a female alternative reproductive tactics found in the olive ridley turtle. Alongside finishing her dissertation, Chris spends her time visiting schools to educate younger generations about the ocean. Her effort to focus the world's attention on the hazards of ocean plastic pollution has won her numerous awards, including Time Magazine 2018 Next Generation Leader and the Dallas Morning News 2018 Texan of the Year Finalist.

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### You have become a driving force behind the global movement to eliminate straws. How are you making your movement known?

The global anti-single-use plastic movement is not my movement, I am only a part of it. I do agree that my video showing a straw being removed from a turtle's nostril (watch Youtube video) has provided fuel for the movement and has proven to be an incredible tool to show people how wildlife is affected and connects people emotionally to the plastic issue in our oceans. I try to take advantage of all the opportunities that present themselves to talk to people about the movement. I am visiting children in their classrooms and have skype calls with schools all over the world. I receive requests for interviews and invitations to speak at different events and on podcasts. I also use social media as a platform to spread awareness. Honestly, I am using any medium I can to reach people to start a discussion about plastic pollution and what they can do to help.

# What are a few things that everyone could do to reduce their plastic footprint and help protect the environment?

Start with not using straws and bringing your own reusable shopping bags. Try not to buy drinks in plastic bottles; instead, bring a refillable water bottle or opt for aluminum cans. Refrain from using plastic cutlery in cafeterias and restaurants by buying yourself a set of bamboo cutlery and have it with you when going out.

### What does it take to change the world?

"To change the world" is an overwhelming phrase. I believe in the power of many small steps, taken by many different people. It always reminds me of a phrase someone once told me, "How do you eat an elephant? One bite at a time." No one person can single-handedly change the world—we need all hands on deck and as many people as possible to try. We don't need a handful of people doing zero waste perfectly, but we do need everybody to at least try, even if they do it imperfectly.

### Given all your experiences, insights, and lessons learned from last year, what's the best advice you could give yourself?

Stand your ground, believe in the worth of your own opinion, and don't let anyone prevent you from dreaming big.



### What is a phrase or mantra carrying you into 2020?

"Unless someone like you cares a whole awful lot, nothing is going to get better. It's not."

- Dr. Seuss, The Lorax

## You are inspiring to others (more than you will ever know)...Who inspires you?

There are several people who I look up to, who embody qualities that I aspire to emulate. My earliest hero was Dr. Jane Goodall. She championed wildlife conservation for decades and has always talked candidly about what role our daily habits play in the destruction of our planet. She has always emphasized that our everyday actions and choices matter, which I absolutely agree with!

My other role model is Lotte Hass, an Austrian underwater diver, model, and actress, who was a super star in a male-dominated ocean explorer world. She was the wife of Hans Hass, the Austrian naturalist and diving pioneer to popularize coral reefs, stingrays, and sharks. She made me believe that I could be anything I wanted to be as a woman.

Last but not least, the younger generation inspires me and gives me hope to continue what I am fighting for. Things can look bleak at times when you are a conservation biologist. I see so many ugly things and so much suffering.

## What are some interesting facts about plastic that would shock the readers?

People are consistently consuming plastic. We are breathing in plastic fibers from our clothes. We are eating and drinking plastic by eating seafood and food stored or heated in plastic containers. The scary thing is that we are only starting to understand how detrimental all of this is to our health. What we do know is that consumed plastic particles leak toxic chemicals into our bloodstream. Plastics accumulate other toxins on its surface, which we also consume when we consume plastics.

To learn more about how to reduce single-use plastics and how you can get involved, please go to <u>PlasticPollutionCoalition-NoStrawPlease</u>

# what's next



Andrew Anderson worked in Dr. Adam Jones' lab studying sexual selection and evolution. His work focused on sex-hormone response elements, the genomic location where nuclear receptors bind and regulate gene expression, and how they influence or are influenced by sexual selection. He received his PhD in August 2019 and has accepted a position as a visiting assistant professor of biology at Reed College in Portland, Oregon. He will take on a postdoctoral researcher position in Dr. Suzy Renn's lab at Reed College the following year.

Mary Janecka received her PhD in August 2019 under the mentorship of Dr. Charles Criscione. She has started a postdoctoral research associate position at the University of Pittsburgh in Dr. Jessica Stephensen's lab. She will be studying parasite transmission ecology and mating system dynamics of the monogenean parasite, *Gyrodactylus turnbulli*, on their guppy hosts.





Kathleen McAllister did her PhD work under the mentorship of Dr. Joseph Sorg. She recently took a position as a postdoctoral fellow in Dr. Richard Novick's lab at the Skirball Institute of Biomolecular Medicine at New York University Langone Health. She will be working on a translational project where the lab is developing a non-antibiotic, non-phage method of treating *Staphylococcus aureus* infections, called an anti-bacterial drone (ABD).

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The amazing training I received at TAMU Biology has prepared me well for this next step in my career.

- Kathleen McAllister

# at the forefront

### James Smith Receives Three Million Dollar Grant to Develop Antimicrobial Therapies

Dr. James Smith is a Professor of Biology at TAMU and cofounder of Sano Chemicals, a biotechnology company primarily focused on solutions for under addressed infectious diseases by developing novel antimicrobial therapies for clinical and agricultural use.

Dr. Smith and colleagues at Mississippi State University discovered the antifungal occidiofungin, a nonribosomally synantifungal peptide thesized with submicromolar fungicidal activity against a broad spectrum of fungi. They have developed novel applications in occidiofungin's use, such as products that cure fungal infections (nail, skin, and systemic) and products that promote a sustainable food supply by targeting fungal diseases in plants. The increase of patients with weakened immune systems has led to a need to identify therapeutics for the treatment of serious bacterial and fungal infections and cancer, debilitating illnesses that have a high mortality rate.



Millions of people each year suffer from infectious diseases without having effective therapeutic solutions. We aim to identify and develop novel microbially derived products to alleviate these problems and concerns.

- James Smith

The innovative endeavors of the scientists working with Dr. Smith at Sano Chemicals and the Department of Biology recently landed them a three million dollar Small Business Technology Transfer (STTR) grant from NIAID-NIH for the preclinical development of occidiofungin for the treatment of vulvovaginal yeast and invasive yeast infections. This antifungal agent addresses a market of millions of women domestically where there is no current approved treatment. Studies funded by the STTR grant are essential for filing two Investigational New Drug Applications (INDAs), and Phase 1 clinical trials are expected to start in mid-2020.

The second novel antibiotic Dr. Smith is working on in the Department of Biology and at Sano Chemicals is mutacin 1140, a lantibiotic-type compound produced by the oral bacterium, Streptococcus mutans. This compound targets multidrug resistant (MDR) bacteria, which are a leading cause of death associated with systemic infections. Because mutacin 1140 is effective against Gram-positive pathogens such as *Streptococcus pneumonia, Staphylcoccus aureus, and Clostridium difficile*, it is a much needed weapon in the fight against MDR infections.



Antifungal occidiofungin binding to yeast

# gig 'em

## 2019 Outstanding Staff Awardees



**Tylesha Ramirez** is the Administrative Associate I for the Lower Division Instruction office. She has been with the Department of Biology for six years, starting in 2013. Tylesha performs general office support duties as well as scheduling makeup exams for students and coordinating disability student test accommodations. She is the first person who faculty, staff, and students meet when they walk into the office. Tylesha's dependability and professionalism has earned her the respect of her colleagues. "She's become a critical cog in the machine that is the Lower Division Instruction office," wrote one of her nominators.

**Denise Valero** is the Facilities Coordinator II and has been with the Department of Biology since 2015. Denise administers routine, preventative, and planned facility maintenance for all of the department's buildings and space. She ensures that the facilities are in working order and safe for faculty, staff, students, and guests. She has helped restructure the department's safety compliance, lab decommissioning, and record keeping. One nominator wrote, "I am sure that I am aware of only a portion of what she does to keep our department running and running safe, but I know enough to say that we would be in a world of hurt without her tireless efforts."



# raising the bar



Meet Ashley Hayden '19, a first generation biology graduate who understands that the pursuit of one's dreams takes hard work and grit.

Originally from Friendswood, Texas, Ashley Hayden graduated this past May with a B.S. in Biology and minors in Bioinformatics and Psychology. While at Texas A&M, Ashley conducted undergraduate research in Dr. Christine Merlin's laboratory, where she studied the genetics behind Monarch butterfly migration using knockout mutant butterflies. She was co-chair of the Biology Honors Program Advisory Council, a University Scholar, Undergraduate Research Scholar, a member of the University Honors Program, and an Undergraduate Research Ambassador. Her senior year, Ashley was awarded an Astronaut Scholarship, that recognizes only 50 STEM students nationally each year for their research excellence. She is currently pursuing a Ph.D. in Neuroscience from Baylor College of Medicine in Houston, Texas. Ashley aspires to someday become a professor and run her own research lab.

### Facing Adversity Head On

By the time she was 15, Ashley carried the weight of the world on her shoulders. Her mom was rapidly declining from liver cancer, and due to a lack of affordable healthcare, Ashley took on the responsibility of her mom's care. She was also balancing two jobs to make ends meet, as well as the demands of her high school coursework. She knew she wanted to pursue a college education, so she worked tirelessly to be the perfect student while continuing to meet her obligations at home. By the time her mom passed away, Ashley had become a young woman of strength and character—someone who was fearless in the face of any obstacle set before her.

### A Passion for Knowledge and Mentoring

When asked what's the most important thing people should know about her, she unhesitatingly responds, "The three

biggest tenants in my life are learning, helping, and teaching." She became heavily involved with the Association of Former Students (AFS) when she discovered the organization's dedication to funding and helping the next generation of scientists and has become a resource for incoming scholars as well as a representative for new scholars. Her overall goal is to help people develop intellectually and personally while giving back to society through her scientific discoveries. "If I can make an impact on people's lives, I feel fulfilled."

WHAT EXCITES HER RIGHT NOW: The possibilities for the future. While sometimes overwhelming, we have such a bright, open future as an undergraduate or graduate student. We have countless opportunities to grow as people, to figure out what we love, and to meet new people. I am really enjoying the beginning of my Ph.D. because it is culminating all of these possibilities in one place.

**CHARITABLE CAUSE SHE SUPPORTS:** For the past four years I have volunteered at Friendswood Animal Control, logging in over 500 hours. I can honestly say that I cherish every moment I get with the shelter animals. In fact, the animals are the ones that inspire me. They genuinely appreciate every moment of life they are given, even when times are tough, and they remind me of how lucky I am in my life. Plus, every time I leave the shelter, I feel I am making a difference.

**WHO SHE ADMIRES:** Dr. Duncan MacKenzie, the Director of Honors in Biology. He singlehandedly expanded the honors program from 5 students to 157 students within the span of only three years. Personally, I attribute the success of the program to Dr. MacKenzie's incredible personality and leadership skills. Simply put, he is the most caring, driven, and brilliant mentor I have ever known. He tirelessly works to expand education and set a higher bar for students, all the while ensuring their success. Few people have had more of an impact on my life than he has, and I know I am not the only Honors student who feels that way. He and all of the professors in the Biology Honors program are making a huge difference in undergraduate education.

# whoop!

### Lt. Col. Patrick W. Kennedy

is a 1998 graduate of the United States Air Force Commissioned Officer Training Program, and a 2005 graduate of Texas A&M with a MS in Microbiology. He has held several positions during his distinguished military career, including Chief of the Molecular Biology Branch, Chief of Science Operations, and the Science and Technology Manager. He currently serves as the Director of the 60 Medical Group Clinical Investigation Facility at Travis Air Force Base in California.

His research at Texas A&M University focused on signaling pathways in the model fungus *Neurospora crassa* under the mentorship of Dr. Wayne Versaw in the Department of Biology.



Patrick has employed the knowledge and tools gained from his graduate studies in the Department of Biology toward a remarkable military career that has included leadership positions with Armed Forces Institute of Pathology (AFIP) and Defense Threat Reduction Agency (DTRA). He was hand-selected to develop significant Department of Defense (DoD) programs, including the Joint Program Executive Office/Chemical Biological Defense -Critical Reagent Program's Genomic Repository and DTRA's Chemical Biological Directorate Basic Research Portfolio for Medical Countermeasures to counter traditional and emerging chemical threats. His efforts in cultivating these DoD programs resulted in him twice being awarded the Defense Meritorious Service Medal (the third-highest award bestowed upon members of the United States military by the United States Department of Defense). He has been lauded for diagnostic/treatment assessments of ricin, prompting Office of Secretary of Defense policy changes.

In his current position as Director of the 60 Medical Group Clinical Investigation

Facility, Patrick oversees 15 Graduate Medical Education programs and an annual budget of more than \$12M to National Lab to develop nextgeneration technology benefitting soldiers and our nation as a whole.

At TAMU, Patrick displayed excellent leadership and mentoring abilities by aiding and supporting other lab members. As the head of DTRA's service academy initiative, he evaluated and mentored young cadets and midshipmen, awarding over \$75K towards science projects. He is a strong supporter of the Aggie Network, instrumental in helping TAMU graduates find key positions in the biodefense community, providing career advice, and providing access to networks within the DoD community.

Patrick follows a legacy of successful Texas A&M University graduates who have made significant and distinguished contributions to our nation's defense. His dedication and commitment to both science and service to our country is beyond reproach. Patrick is the first member of the armed forces to be inducted into the Academy of Distinguished Former Students, the highest alumni honor in the College of Science.

PATRICK IS THE EPITOME OF PROFESSIONALISM WHO EMBOD-IED THE AIR FORCE CORE VALUES: INTEGRITY FIRST, SERVICE BEFORE SELF, AND EXCELLENCE IN ALL WE DO.

- Wayne K. Versaw

# in memoriam

### WESLEY J. THOMPSON

Our friend and colleague, Dr. Wesley Jay Thompson, died March 26, 2019 in Bryan/College Station from complications of kidney cancer. He was 71 years old.

Wes received his BS and MS in biology with honors from North Texas State University. He went on to earn a PhD in molecular biology at the University of California, Berkeley in 1975. His thesis advisor, Dr. Gunther Stent, was a well-known molecular biologist who had recently converted to neurobiology. Wes' thesis research in Stent's lab concerned the problem of how neural circuits function in the relatively simple central nervous system of the leech, with a view toward gaining insights as to how neural circuits might work in the central nervous system of higher organisms. He used electrophysiology and cell-specific staining techniques for the project, which he continued to employ in increasingly sophisticated ways throughout his research career.

Upon graduation from UC Berkeley, Wes accepted a 2 -year post-doctoral fellowship for neurophysiology research at the University of Oslo in Oslo, Norway. With his postdoctoral mentor, Dr. Jan K. S. Jansen, he did pioneering work on factors that regulate the formation of neural connections to muscle fibers in mammalian skeletal muscles. In particular, they provided a major advance in developmental neurobiology by showing for the first time that the arrangement of neural connections to muscle fibers in mature muscles is dependent on the nature of the neurons' electrical activity during neonatal development.

Wes went on to undertake additional post-doctoral training at Washington University in St. Louis with the





well-known neurobiologist, Dr. Dale Purves, from 1977–1979. In 1979, he accepted a faculty position in the biological sciences at the University of Texas, Austin, where he climbed the academic ladder to full professor. In 2013, he moved to Texas A&M University where he joined the Department of Biology and the Texas A&M Institute for Neuroscience. Throughout his career, he published more than 50 groundbreaking research articles in peer-reviewed journals. Wes was a mentor to 13 PhD students and served on over 70 dissertation committees during his career. His colleague knew him as a wise and generous counselor, as well as an excellent scientist and teacher.

Throughout his career, he sought to instill his students with the concept that curiosity and kindness form the best foundation for a joyful and productive life.

# upcoming events

7 B.

The Department of Biology invites you and your family and friends to our annual tailgate on October 12, 3 hours before kickoff, in front of Butler Hall.

RSVP to ljean@bio.tamu.edu. We hope to see you there as we BTHO 'Bama!





Biology Seminar Series: Dr. Peter Lepage, Dept of Physics, Cornell University—4pm in ILSB 1105



Department of Biology Annual Student/ Postdoc Research Conference—1pm -6pm in ILSB 1105



Department of Biology Annual Tailgate—The Iawn in front of Butler Hall, 3 hours before kickoff



Bioinformatics: Research & Application Symposium—*All day in Rudder Tower 301* 

## MAKE A DIFFERENCE

Your support of the department is incredibly valuable. Please consider making a difference to today's students, faculty, facilities, and programs—at whatever level is right for you.

Contributions can be sent to the Texas A&M Foundation, 401 George Bush Drive, College Station, TX 77840-2811 or online. Please click on the box below to contribute online.

## SUPPORT BIOLOGY

WHEN YOU LEARN, TEACH. WHEN YOU GET, GIVE. - Maya Angelou

# reflections

## **STUDENT SUCCESS**

Great things are happening in the Department of Biology! I would love to describe them all, but I will instead limit this inaugural issue to a few choice examples that focus on undergraduate student success.

We recognize that the cost of attending college is a growing challenge. Consequently, students are no longer required to purchase a high-priced, four-pound textbook for their introductory biology courses. Instead, we adopted and then refined an open-source textbook that students can access for free. Similarly, we created free, web-based lab manuals to go with new lab activities designed to complement the lecture components of these courses. The revised lectures and labs will be available to all students this fall with a total savings to students of over \$600,000.

We made great strides over the last few years to improve student success through the use of novel active learning approaches. Students are performing better than ever at all levels and performance in introductory biology courses is phenomenal. Just a few years ago, only 60% of students earned an A, B, or C in these courses. Last year it was >80%. Pre-tests given on the first day of class in sophomore-level courses confirmed that these gains reflect deeper and long-term learning rather than simple grade inflation.

To extend and expand this positive trend in student success we recently initiated a full review of our curriculum to ensure that student learning progresses appropriately from the first day to graduation. Results of this review will be shared on our web site along with a description of each course – stay tuned.

The Department of Biology continues to excel in preparing students for professional programs and to be leaders in the health

sciences. Nevertheless, we recognized that we could do more, especially for students who pursue other careers. Therefore, starting this fall the wildly successful Careers in Biology course will be offered every semester instead of once per year. This will help far more students define their career goals and then find their first job.

Our pursuit of academic excellence also includes the Biology honors program. Although this program is in just its fourth year, it is already on track to encompass 10% of our graduates. The new minor in Bioinformatics has also attracted many students and its first graduate, and we expect many more to pursue the new major in Neurobiology that will be available in fall 2020.

Our past and future success relies on people – faculty, staff, and students. We mourn when we lose faculty and staff, but we are energized by new additions. Similarly, we miss the graduates we watched mature over a few short years, but also welcome the bright new minds who appear each fall. I encourage all former students to share with us their memories and thoughts for the future. These shape our department and expand your legacies. It is also a lot of fun to hear from you.

Way & Verson

Wayne K. Versaw Professor and Associate Head for Academic Affairs

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### BIOSPHERE • FALL NEWSLETTER 2019, VOLUME 1

### THOMAS D. MCKNIGHT

Professor & Department Head

## WITH SPECIAL THANKS TO ALL OF OUR CONTRIBUTORS.

# FOR MORE INFORMATION ABOUT OUR DEPARMENT AND EVENTS, CONTACT US AT:

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### The Department of Biology Biosphere

**Newsletter** is a publication for faculty; staff, students, alumni, and friends. We welcome comments and news of note, milestones, and transitions for inclusion in future issues. Please e-mail ljean@bio.tamu.edu.

Cover Photo Credits: photo of a dorsal root ganglion on the right by Prakruthi Amar Kumar, graduate student in Dr. Jen Dulin's lab; photo of *C. difficile* in the middle courtesy of cdc.gov; photo of immune cells in the injured spinal cord on the left by Dr. Dylan McCreedy