

AUBURN UNIVERSITY

Journey

College of Sciences and Mathematics

Fall 2017

INVERSE EVEREST

THE QUEST FOR ROCK BOTTOM



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JOURNEY

Fall 2017

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COSAM

Mission Statement

The mission of the Auburn University College of Sciences and Mathematics is three-fold: to teach by providing an environment that ensures excellence in the biological, physical, and mathematical sciences for the purpose of preserving, interpreting, and conveying existing knowledge; to research by creating, integrating, and applying new knowledge; and to reach out to others by fostering educational exchange within the university, the Alabama community, and society as a whole. The Auburn University College of Sciences and Mathematics is committed to providing opportunities for inclusion to its faculty, staff, and students.

For more information on the Auburn University College of Sciences and Mathematics, visit www.auburn.edu/cosam. *Journey* is published by the Auburn University College of Sciences and Mathematics. Issues are printed annually and are distributed to alumni and friends of COSAM. Inquiries, suggestions, and news items concerning *Journey* should be directed to:

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On The Cover:

COSAM alumnus Gergely Ambrus descended approximately 7,000 feet below the earth's surface into the deepest cave known to man, a feat described as an "Inverse Everest" expedition.



A MESSAGE

from the Dean

Nicholas Giordano

The College of Sciences and Mathematics has a unique role to play at Auburn University. We teach the foundational courses in science and math taken by all Auburn students, which makes us central to the success of all students at the university. At the same time, we conduct cutting-edge research as an essential part of Auburn's mission to serve our state and nation as a land grant university. And, of course, we have a direct service responsibility to the citizens of Alabama, which motivates our excellent outreach programs. This edition of *Journey* magazine highlights our work in all of these areas.

There is no better way for a freshman student to get off to a good start than to have success in their first mathematics course. This motivated us to create the Plainsmen's Prep program, in which incoming freshmen come to campus a few weeks before the start of the fall semester, at which time they focus on their math preparation. This might be reviewing the math they learned in high school, or going beyond that work to be better prepared for a more challenging course at Auburn. Plainsmen's Prep was offered as a pilot program in 2016, and we enhanced and expanded the program in 2017. Success and a fast start will help our students obtain their degrees in four years, a goal that makes students and parents (and us) happy.

Our mission in the areas of both teaching and research is built on a strong faculty, and last year we were fortunate to add nine new faculty to our college. This year is another aggressive recruiting year, with the goal of adding an additional eleven faculty. You will learn about some of these faculty elsewhere in this issue of *Journey* magazine. I would just like to add that our faculty continue to garner important external awards. The award of the Euler Medal to Professor Curt Linder is one of the highest awards in the field of mathematics and recognizes his many contributions to his field during his

career. Our young faculty continue to be recognized; this year Assistant Professor Bradley Merner received a CAREER award from the National Science Foundation. This award recognizes outstanding young faculty for their achievements and promise in both research and teaching. This is the fifth CAREER award received in the past few years by COSAM faculty, with Steve Mansoorabadi, Konrad Patkowski, Haruka Wada, and Wendy Hood also receiving the award.

The COSAM outreach program continues to do outstanding work. In particular, our new Southeast Center for Robotics Education (SCORE) is a new initiative that has already resonated with students. I am excited to see SCORE grow and play a major role in K-12 outreach throughout our region.

My letter welcoming you to this edition to *Journey* would not be complete if I didn't mention two more things. First, this spring we broke ground on a major new addition to the Leach Science Center. The new instructional and research laboratories, and faculty offices will be an outstanding home for the Department of Physics. This is just the first of several new buildings that are in the works for COSAM.

Second, I want to thank you for your contributions to *Because this is Auburn — A Campaign for Auburn University*. This campaign will run through December 2017, so there is still time to help us raise funds for student scholarships, faculty support, and new facilities, including our new buildings. We are extremely grateful for the support from the COSAM family and will continue to make you proud of our college.

War Eagle!

Nick Giordano
Dean
College of Science and Mathematics

FACULTY & STAFF HIGHLIGHTS

from around COSAM

Five from COSAM honored with university faculty awards

Auburn University honored the 2016-2017 Faculty Award recipients during a ceremony at The Hotel at Auburn University and Dixon Conference Center. Among the faculty award recipients were five from the College of Sciences and Mathematics (COSAM). The awards recognize some of the institution's most innovative teachers, researchers, and scholars for their unique and distinguished contributions to the university's mission.

"Once again, this year's recipients were selected from an outstanding group of talented faculty," said Timothy Boosinger, provost and vice president for academic affairs. "These awards symbolize the exceptional contributions of our faculty members to Auburn's mission and demonstrate their extraordinary service and dedication to advancing our university."



Robert Boyd, professor in the Department of Biological Sciences, received the Gerald and Emily Leischuck Endowed Presidential Award for Excellence in Teaching. Gerald and the late Emily Leischuck, 1964 graduates and retired Auburn University administrators, created the Endowed Presidential Award for Excellence in Teaching in 2005 to recognize full-time, tenured faculty members who have demonstrated effective and innovative teaching methods, along with a continuing commitment to student success through advising and mentoring.

Boyd is a California native who received a bachelor of science and master's in biology from California State Polytechnic University. He received a doctorate in

botany from the University of California, Davis. He joined the faculty at Auburn in fall 1988 as an assistant professor in the Department of Botany and Microbiology. He became a professor in 2000, when the Department of Biological Sciences was created, and became the department's undergraduate program officer in 2013.

Boyd has taught courses ranging from freshman introductory biology to graduate-level classes. His current teaching focuses on courses in conservation biology and plant ecology. Boyd's research interests include the management of rare and endangered plants, as well as the ecology and evolution of metal hyperaccumulator plants. He has published more than 100 journal articles and book chapters, has been a guest editor for special issues of three scientific journals, and has served on the editorial boards of three additional scientific journals.

"This award is meaningful at several levels, but a major meaning is that it shows that I have had an important impact on my students' lives," said Boyd. "A major goal of my career has been to serve and mentor students to help them achieve their goals and dreams as they progress through the university."



Michael Pindzola, professor in the Department of Physics, is the recipient of the Creative Research and Scholarship Award, which recognizes faculty members who have distinguished themselves through research, scholarly works, and creative contributions in their field. Pindzola received the award in the Sciences, Medical Sciences, Engineering, and Agriculture category.

Pindzola received a bachelor's degree from the University of the South and a doctorate from the University of Virginia. He began working at Auburn in 1977 after serving as an NRC Resident Research Associate at the NASA Goddard Space Flight Center. He is a fellow of the American Physical Society, fellow of the Institute of Physics,

and serves on the steering committee for the EU Atomic Data Analysis Structure Consortium and the U.S. Southeastern Laboratory Astrophysics Consortium. Pindzola's primary areas of research are photon, electron, and atomic ion collisions with atoms and molecules.

"Collaborating with scientists at other national and international institutions, such as ORNL and Queen's University of Belfast, has been a source of inspiration through the years," said Pindzola.



Stewart Schneller, professor in the Department of Chemistry and Biochemistry and former COSAM dean, received the Distinguished Graduate Faculty Lectureship. The Distinguished Graduate Faculty Lectureship Award is jointly sponsored by the Auburn Alumni Association and the Graduate School, and is awarded to a faculty member on the basis of excellence in research.

Schneller's research in antiviral drug discovery has been supported by grants with more than \$8 million coming from the National Institutes of Health. Schneller has been recognized with the prestigious Stone Award, given to a chemist in the Southeast who has "excelled in research, development of the next generation of scientists, public outreach, mentoring, innovative educational efforts, and public outreach." His research has appeared in more than 150 peer-reviewed publications, and he is credited with a number of provisional patents. Schneller is currently on the editorial boards of five international journals. Twenty-nine doctoral candidates,

nine master's students, and twenty-nine postdoctoral associates who have been in Schneller's research laboratory have garnered prestigious academic and pharmaceutical positions. More than fifty undergraduate students have performed research in Schneller's lab. In addition to directing his research, he teaches large sections of undergraduate organic chemistry.

"Watching my students walk across the stage at graduation and knowing that they are taking a little of me with them into their careers is inspiring."

-STEWART SCHNELLER



Stephen Dobson, professor in the Department of Biological Sciences, was named Alumni Professor. The Alumni Professorship program recognizes tenured faculty members with direct responsibilities in two or more of the institutional missions of instruction, research, and outreach. Faculty selected to receive a professorship must have demonstrated exceptionally meritorious performance, distinctive competence, and potential for continued high productivity and excellence.

Dobson received a bachelor's degree from the University of California, Berkeley, a master's from the University of California, Santa Barbara, and a doctorate from the University of Michigan, all in biological sciences. After completing his doctorate in 1984, Dobson held a NATO postdoctoral fellowship at the University of Alberta in Canada, followed by a postdoctoral fellowship at the University of Lethbridge. He returned to the University of Michigan as a visiting assistant curator in the Museum of Zoology and came to Auburn in 1988. Upon his arrival at Auburn, he

received National Science Foundation funding to work in Tibet each summer for four years. Dobson also conducted four years of summer research at the Savannah River Ecology Laboratory. In 1995, he began a long collaboration with French researchers, first at the University of Paris and later at the University of Montpellier. He was named a Chevalier of France in 2002, spent six summers as an invited professor at the University of Paris, was given two "Poste Rouge" scholarships, and was later appointed director of research in the French National Center for Scientific Research.

"I am humbled to be chosen among my fine colleagues as an alumni professor," said Dobson. "Auburn University's alumni and their association are renowned in the Southeastern region and nationally, and they should be. They keep the spirit of Auburn University alive in the countless citizens that have received their academic training here."



Anne Gorden, associate professor in the Department of Chemistry and Biochemistry, received the Provost Award for Faculty Excellence in Undergraduate Research Mentoring. Established in 2012, the award recognizes faculty who demonstrate a strong commitment to undergraduate research, whose efforts support Auburn students interested in careers in research and creative works, and who have demonstrated outstanding service to students.

A Texas native, Gorden started doing research as a Clark Foundation Fellow at the University of Texas at Dallas immediately after high school. She attended Emory University, where she majored in chemistry and literature. Gorden then returned to Texas for her doctorate work in organic chemistry with Jonathan Sessler at The University of Texas at Austin. She also worked at Los Alamos National Laboratory and Argonne National Laboratory as a Seaborg Institute Research Fellow. After receiving her doctorate, she completed her postdoctoral

studies with Kenneth Raymond at the University of California, Berkeley, and was appointed the inaugural Lawrence Berkeley National Laboratory Seaborg Center Postdoctoral Research Fellow. In 2005, Gorden began working at Auburn. She is an author on four patents and more than forty publications, and has received multiple awards for teaching excellence.

“I am very touched and honored to receive this award,” said Gorden. “It means recognition not just for me, but for my students. I have been lucky enough to work with some of the best students in the country who just happened to come to love Auburn and love the ideals of the Auburn Family.”



In addition to the COSAM faculty who received awards, the **Department of Geosciences** received the Departmental Award for Excellence in Education (see page 42 for full story). The Auburn University Departmental Award for Excellence in Education was created in 2013 and is administered on behalf of the Office of the Provost through the university's Biggio Center and the University Senate Teaching Effectiveness Committee. The award recognizes the efforts of departmental faculty for their commitment to improving education at both the undergraduate and graduate level. Mark Steltenpohl is Alumni Professor and chair of the Department of Geosciences.

Landers Selected for SEC Academic Leadership Program



Allen Landers, professor in the Department of Physics, was selected to participate in the 2016-17 Southeastern Conference Academic Leadership Development Program (SEC ALDP).

The SEC ALDP seeks to identify, prepare, and advance academic leaders for roles within SEC institutions and beyond. The program's two components include a university-level development program designed by each individual institution and two, three-day workshops for all SEC ALDP participants.

"It is our strong belief that helping to prepare administrators for the next phase of their careers has the potential to impact all of higher education, both now and in the future," said SEC Commissioner Greg Sankey. "Our universities make a significant investment in these individuals, and we are proud to work with them through this program."

Landers holds the Howard Earl and Carolyn Taylor Carr Professorship in the Department of Physics. His research includes studying atomic, molecular, and optical physics through the use of multi-particle imaging methods to explore the dynamics of electronic and nuclear motion in atoms and molecules. Landers teaches at all levels in the Department of Physics. He has received the Dean's Award for Outstanding Teaching, the Dean's Award for Outstanding Outreach in the College of Sciences and Mathematics, and recognized with the Auburn University Award for Excellence in Outreach.

The SEC ALDP is part of SECU, the academic initiative of the Southeastern Conference. The SEC supports and promotes the endeavors and achievements of the students and faculty at its fourteen member universities.

A new Director for Office of Diversity and Multicultural Affairs



Kimberly Mulligan, Ph.D., was named director for the COSAM Office of Diversity and Multicultural Affairs. Previously, Mulligan was the STEM education program advisor at the Vanderbilt Center for Science Outreach. As such, she worked in Abu Dhabi in the United Arab Emirates from 2015 to 2016 serving as a liaison between Vanderbilt University, pilot schools, and the Abu Dhabi Education Council. She also provided on-site program management and scientific expertise, assisted in the development and implementation of curriculum for the Abu Dhabi Education Council, worked with fellow scientists and teachers to design curricula appropriate for English-language learners, and aided in the development of protocols to evaluate the impact of the program and student progress.

"In most K-12 classrooms, science is taught through 'cookbook' labs," said Mulligan. "One thing that I have always enjoyed is the opportunity to motivate students to enjoy science through making it relevant to their everyday lives. Working with colleagues and students whose first language was not English helped improve my communication skills and made me think about how to relay difficult scientific concepts in ways that were not only understandable, but also relatable to issues that affected their lives. Additionally, because I worked with a diverse team of individuals from all over the world, I gained a better understanding of how to adapt to different leadership styles and form successful partnerships."

"On a personal note, I grew as an individual by having the opportunity to immerse myself in another culture. I was able to learn so much about their cultures, heritages, and values, and to also teach them about mine. This experience really

helped to broaden my worldview."

Prior to serving as STEM education program advisor, Mulligan was director of the Day of Discovery program, coordinator for the Research Experience for High School Students program, and a resident scientist in the Interdisciplinary Science and Research Program, all within the Vanderbilt Center for Science Outreach.

"I have a passion for increasing diversity in STEM and am driven by a desire to create channels for underrepresented groups to thrive in STEM-related fields. In order to accomplish this, we all need to work together to ensure there are equal opportunities for everyone. Diverse environments in STEM are critical for innovation, and I'm excited about working with the COSAM faculty, staff, and especially the students to ensure that our college is a reflection of the population."

Mulligan is or has been a member of several scientific societies including the American Physiological Society and the National Science Teachers Association, and she has received numerous honors and awards including the Organization of Black Graduate and Professional Students Distinguished Faculty Award and the Endocrinology and Metabolism Section Research Recognition Award. At Vanderbilt, she was involved in the Alliance for Cultural Diversity in Research and served as community service co-chair for Women in Science and Engineering.

Mulligan received a bachelor of science and a master of science in chemistry, both from Florida Agricultural and Mechanical University, and a doctor of philosophy in molecular physiology and biophysics from Vanderbilt University.

Mulligan began her tenure at Auburn University in August.

Simon Snyder, new Director of Business and Administration



Simon Snyder is the college's new director of business and administration. Snyder earned both a bachelor of science in accounting and a master's of accountancy at Auburn University before passing the Certified Public Accountant's Exam. After six years in public accounting, he transitioned to higher education finance in the Auburn University College of Agriculture's Alabama Agricultural Experiment Station, where he served four years as assistant director of finance. In April 2016, Snyder was awarded Auburn's Spirit of Excellence Award, which is a monthly university award given to staff employees that "go beyond the call of duty."

Armbruster Named Director of Museum of Natural History



Auburn Professor **Jonathan Armbruster** was named the new director of the Auburn University Museum of Natural History in the College of Sciences and Mathematics. His term began in spring 2016.

Armbruster joined Auburn in 1998 as an assistant professor. He was named associate professor in 2003, and Alumni Professor in 2007. He previously served as curator of the museum's fish collection, where he grew the collection from 25,000 jars to 65,000, obtained a specimen from every continent, and developed online searching capabilities through a database system.

His area of research involves the systematics, ecology, and functional morphology of fishes, particularly suckermouth armored catfishes, or Loricariidae, which are the largest family of catfishes in the world, also known as "plecos" in the aquarium trade. He is involved in survey work of several regions of South America, including Guyana and Venezuela, and also works on local projects involving ecology, behavior, and systematics of fishes.

Recently, Armbruster began collaborative work in a worldwide project, *All Cypriniformes Species Inventory*, which facilitates taxonomic work on minnows. His lab is particularly interested in the barbs of Africa and relationships of taxa worldwide. As part of this study, he has built a global database of minnow morphology and will use the information to explore aspects of the evolution of cypriniform ecology and functional diversity.

"I have been striving to make the collections at Auburn University into a museum since I arrived in 1998," said Armbruster. "Now that Dr. (Jason) Bond has ushered us into a new building and

upped our community presence, the question becomes what to do next. I hope to begin a series of initiatives in teaching and outreach over the next couple of years to further cement the museum's position in the Auburn University community and beyond."

Armbruster received bachelor's and doctorate degrees from the University of Illinois. Before his time at Auburn, he worked as a postdoctoral fellow at the Smithsonian Institution.

Throughout his career, Armbruster has secured a number of research grants from the National Science Foundation, Alabama Department of Conservation and Natural Resources, and National Geographic, among many others.

Aside from his extensive research, Armbruster has instructed many undergraduate and graduate-level courses including Comparative Anatomy, Evolution and Systematics, and Systematic Ichthyology. Armbruster has guided many graduate students to make new discoveries and publish their own work.

He has given a number of lectures, received numerous awards for teaching and research, participated in many outreach events, and has authored dozens of publications. Armbruster garnered international media attention in 2015 after naming a previously unknown species of catfish in honor of the *Star Wars* character, Greedo.

For more information on Armbruster, visit his website at this address: auburn.edu/academic/cosam/faculty/biology/armbruster/.

Beadles Joins COSAM as new Davis Arboretum Curator



The College of Sciences and Mathematics recently welcomed new Davis Arboretum Curator **Morgan Beadles**. An Auburn native, Beadles grew up in a house in downtown Auburn. She said as a child, the Auburn University campus was her playground.

"I always tell people that you can't get more Auburn than I am," said Beadles. "For my fourteenth birthday, my father got me a job as a student worker for Dr. Charles Gillam at the Patterson Greenhouses. I continued to work there through both high school and college as I earned my undergraduate degree at Auburn in horticulture. After graduation, I was accepted into the landscape architecture program at Auburn where I would go on to earn my master's."

Following graduate school, Beadles lived in Oahu, Hawaii, where she worked for architecture firm Phillips, Brandt, Reddick, and Associates as a junior landscape architect. She returned to Auburn in 2009 and began working for Creative Habitats Landscaping as a residential designer.

"When the curator position at the arboretum became available I jumped at the chance to apply," said Beadles. "I knew that being in the private sector for so long made me a long shot for the position, but I also knew that I would be the biggest cheerleader and champion of the arboretum if given the chance. To be

given this opportunity is a true honor and a dream come true for me. I have loved the arboretum since I was a child. To be in a position to share my love of this place, and hopefully expose it to a much broader audience, is exciting. My goal at the Davis Arboretum is to accent its beauty as the showpiece of Auburn's campus that I know it to be, while still protecting its integrity as an outdoor classroom and educational tool for students and the surrounding community across many disciplines, and encouraging continued research of our native species within the arboretum. I would love to see more collaboration across campus and more people in here daily enjoying its serene beauty."

For more information on the Davis Arboretum, visit the website at auburn.edu/cosam/arboretum.

\$2 Million Gift Creates First Eminent Scholar Chair in the College of Sciences and Mathematics



A \$2 million gift from **John and Rosemary Brown**, both 1957 graduates, has created the first eminent scholar chair in the College of Sciences and Mathematics.

The Browns established the endowed chair in the college's Department of Mathematics and Statistics to help recruit and recognize a top scholar in any of the department's foundational areas of mathematics, including algebra, differential equations, geometry, and analysis.

The new chair holder will be known as the Rosemary Kopel Brown Endowed Eminent Chair in Mathematics. Rosemary Brown graduated from Auburn with a bachelor's degree in chemistry and received her master of education from Rutgers University. Her thirty-year career as a math teacher ultimately led the Browns to make this commitment.

The gift is part of the Browns' historic \$57 million philanthropic investment—the largest gift in university history—made in support of *Because This is Auburn—A Campaign for Auburn University*.

“As a retired math teacher, one of my greatest joys is hearing from my former students about how education has made a difference in their professional careers,” said Rosemary Brown. “I am honored we are able to create this endowment to support an outstanding math faculty member who will affect the lives of countless Auburn students during the course of their math education.”

Eminent scholar chairs help enhance faculty salaries and provide crucial additional support for such things as research costs, laboratory equipment, and assistance from graduate students.

Nicholas Giordano, dean of the College of Sciences and Mathematics, said the Browns' gift will allow the college to bring a new distinguished scholar to Auburn who will help engage and retain additional accomplished faculty members and talented graduate students.

“This chair will enable us to offer new opportunities in the way of courses and research to our undergraduates and expose them to extraordinary faculty in their classes,” he said. “The ability to hire and recognize exceptional faculty will help us take the mathematics program to the next level and gain recognition nationally and internationally.”

Two from COSAM receive Spirit of Excellence award



Paula Norrell (pictured, left), office supervisor in the Department of Biological Sciences, and **Lori Bell** (pictured, right), office associate in the Department of Mathematics and Statistics, were both named Spirit of Excellence award winners in fall 2016. Norrell received the honor last August and Bell was named the recipient in October.

Spirit of Excellence is a monthly award from Human Resources given to employees in the areas of service/maintenance, secretarial/clerical, technical, and administrative/professional. The award recognizes employees who perform above the requirements of their position to improve service, quality, and the department's image; exemplify professionalism and dedication to excellent service by putting forth extra effort; provide outstanding contributions of significance to the university or department's mission; achieve accomplishments that exceed normal expectations; or have outstanding business contributions of significance. Congratulations to Norrell and Bell!

Ellis Named William P. Molette Professor



Professor **Holly Ellis** in the Department of Chemistry and Biochemistry was named the William P. Molette Professor in the College of Sciences and Mathematics. The professorship supports superior faculty who demonstrate a strong commitment to students and to the provision of high quality instruction, research, and teaching. The professorship serves to strengthen and enhance the college, and through the quality of the holder's work, promotes a positive role model for colleagues and students.

An Auburn University faculty member since 2001, Ellis has developed a strong reputation through both her teaching and research. Her research is in the area of enzyme biochemistry, and Ellis' work has been consistently funded by the National Science Foundation, including a prestigious NSF CAREER Award in the amount of \$844,784 for a project titled, "Mechanism of Flavin Transfer Between the Monooxygenase Proteins." Ellis also served as a program officer at NSF from 2011-2012, and she was elected chair for the 2018 Gordon Research Conference on Enzymes, Coenzymes, and Metabolic Pathways.

Ellis is well respected for her work with Auburn University students, and in addition to serving as the undergraduate program officer for the Department of Chemistry and Biochemistry, she has received numerous awards and honors for her efforts including the COSAM Teaching Award, the Student Government

Association COSAM Teaching Award, the Alpha Epsilon Delta Honorary Membership/Favorite Faculty Award, a Panhellenic Council Favorite Faculty Nominee, a COSAM Advisor Award, the Mortar Board Favorite Educator Award, and a Camp War Eagle Faculty Honoree Award.

"Over the course of her career at Auburn University, Holly Ellis has developed into an exemplary faculty member, one who contributes strongly in all areas, including research, teaching, service, and outreach," said Curtis Shannon, chair of the Department of Chemistry and Biochemistry. "She has made a significant impact in all areas of faculty activity over the course of her career thus far, and as such, she is an excellent choice to be named the William P. Molette Professor."

The William P. Molette Professorship in the College of Sciences and Mathematics was established with a gift made through the William P. and Ruth Molette Estate. Molette, a 1927 graduate of Alabama Polytechnic Institute, passed away on July 4, 1989. His wish was to leave his entire estate to Auburn University after his wife Ruth's passing. Upon her death in 2006, Ruth bequeathed a significant gift to Auburn University's College of Sciences and Mathematics.

Marie W. Wooten Distinguished Professorship Created in Memory of Former College of Sciences and Mathematics Dean



Auburn University Department of Biological Sciences Professor **Michael Wooten** recently established a professorship to honor his late wife, Marie Wooten, a longtime Auburn faculty member and former dean of the College of Sciences and Mathematics.

Created through a \$500,000 estate gift, the Marie W. Wooten Distinguished Professorship will be awarded to a female professor who will strengthen and enhance the program of neurobiology, and, through her quality of work, will serve as a positive role model for her colleagues and students.

"Marie felt that the work she inspired in neurobiology would be her contribution to the world," said Michael Wooten. "She truly loved every member of her lab group and her life revolved around the science research they conducted together. This professorship is meant to carry her legacy to future generations, and to honor her and all those that were part of her research family."

Marie Wooten served as dean of the College of Sciences and Mathematics from August 2010 until her untimely death in November 2010. Wooten joined the Auburn faculty in 1987, and prior to her term as dean, she served as the Scharnagle Professor in the Department of Biological Sciences, as department chair for Biological Sciences, and as the college's associate dean for research, a position she held for ten years.

Under Wooten's direction, external funding secured by the College of Sciences and Mathematics doubled during a ten-year period. Her research interests included cellular and molecular developmental neurobiology and neurodegeneration. Her work included discovering a genetic link between obesity and Alzheimer's disease, a

first step in curing the memory-debilitating illness that affects millions of individuals, especially the elderly.

Widely recognized for her contributions as a mentor, scientist, scholar, and academic administrator, Wooten was committed to student training and outreach. She was co-founder of the Institute for Women in Sciences and Engineering and provided leadership in developing numerous education initiatives in science, technology, engineering, and mathematics, or STEM, disciplines. Wooten was also a member of the National Science Foundation ADVANCE program, which focuses on enhancing diversity in STEM fields.

Additionally, Wooten held grants from the National Institutes of Health, National Science Foundation, the American Heart Association, NASA, and the U.S. Department of Agriculture. She earned two patents and commercialized one technology.

Wooten earned a bachelor's degree in microbiology from the University of Memphis and a doctorate in cell and molecular biosciences from Texas Women's University. She conducted postdoctoral training at the Medical College of Georgia and Cold Spring Harbor Laboratory in New York. She was a visiting scientist at the University of Alabama at Birmingham Medical Center and at institutions in South Africa and Spain.

Following Wooten's death, her friends, colleagues, and students established the Marie W. Wooten Endowed Scholarship. Since its creation, nineteen students in the College of Sciences and Mathematics have benefitted from this scholarship.

For more information, contact Sherri Rowton at rowtosj@auburn.edu or (334)844-1235.



COSAM
ADMINISTRATIVE
SPOTLIGHT:

TJ NGUYEN

Tj Nguyen is the assistant director of the Southeastern Center of Robotics Education (SCORE), an Auburn University outreach initiative designed to prepare future generations of STEM (Science, Technology, Engineering, and Mathematics) professionals by developing and delivering student robotics programs, online robotics resources, and professional development for educators. Nguyen, of Birmingham, received a bachelor's degree in mechanical engineering at Auburn in 2013. He completed a master's in secondary science education in 2016, and is projected to complete a master's degree in mechanical engineering in 2017. He has worked with the College of Sciences and Mathematics Office of Outreach since 2009, previously as a student program coordinator.

1

Tell me about the new SCORE program and how it is unique to Auburn.

As a member of the College of Sciences and Mathematics Office of Outreach for the past seven years, I spent a lot of my time doing robotics competitions, teacher trainings, and summer camps. The demand for robotics education around the state has increased so much that Mary Lou Ewald, director of the College of Sciences and Mathematics Office of Outreach, made the decision to branch off into a brand-new department. We want to become the premier robotics STEM education resource for K-12 schools in the Southeast, and, eventually, one of the best in the country. We help schools to create their own self-sustaining robotics programs in a variety of ways. We help create and plan curriculum, train teachers on programming and the engineering design process, and host robotics competitions, which is an integral part of our mission. Competitions give students an exciting opportunity to learn the STEM content that will prepare them for their future careers.

One of the things that makes us unique is Auburn University's status as a comprehensive land, sea, and space grant institution. We want to mirror these efforts by developing and supporting K-12 student activities and teacher professional development opportunities through land-, air-, and water-based robotics programs. By developing these types of programs to serve our state, we are aiding the workforce development efforts in Alabama, which is third in the United States in vehicle exports and home to more than 400 aerospace industries.

2

What made you interested in robotics?

One of the most beautiful things about robotics is that it is inherently motivating. I love bringing something that begins as an idea in your head to life. I started BEST Robotics as a freshman at Hoover High School, and that's when I knew I wanted to be an engineer. Our first year, we were terrible! We slowly got better, and, by the time I was a senior, we finally advanced to South's BEST at Auburn University. This was the first time I'd ever been on our campus and, honestly, a huge reason why I made the decision to attend Auburn.

3

Why did you choose a career in outreach?

BEST Robotics was my favorite activity in high school. When I found out that COSAM Outreach was part of the team that runs BEST at Auburn, I immediately wanted to join. I think more important than what got me interested in working there is what has kept me there for seven years; and that is my family of coworkers. I get to work with amazing people every single day. As for outreach in general, my high school engineering teacher, Mark Conner, has been one of the most influential people in my life. He has dedicated his life to high school engineering education. The effect that STEM outreach and education has had on my life is quite literally, unquantifiable. Everything I have had the opportunity to do has been because of people who have valued STEM education.

4

What are your hopes for the future of SCORE, and what do you hope to accomplish?

I would love to see SCORE become something nationally known for quality robotics education programs. I want to push the envelope with what can be done with robotics education. I envision using robots to link curricula from science and math to things like history, literacy, and art. My goal is to do whatever I can to improve science education and education in general in Alabama and surrounding areas. As an engineer, I of course had to quantify that somehow, so I want to be a part of raising Alabama science education to twenty fifth in the country before my career is over. I truly believe that our collective community can make this happen, and I would love to witness that in my lifetime.

5

What is a typical day like for you?

I start every day with a cup of my secret tea blend, and most days will involve me taking our Segway for a ride. I make an effort to spend at least part of everyday with my coworkers doing stretches in an effort to make us all healthier and happier. For the most part, all my days are different. I've spent whole days programming robots or flying and testing drones. Other times, I'm interacting with teachers trying to figure out how to support their robotics efforts. As an office, we spend a lot of time planning and preparing for upcoming events or coming up with ideas for new ways to get kids excited about STEM education.



CHILDRESS NAMED A WOMAN OF DISTINCTION

Auburn University's Director of Pre-Health Professions Programs, Beverley Childress, received the 2017 Women of Distinction Administrative and Professional Staff Leadership Award, given by the Auburn University Women's Center in the Office of Diversity and Inclusion.

The award honors outstanding female leaders in the Auburn community and recognizes Childress for her accomplishments, leadership, and the ways in which she serves as a role model for her colleagues and students.

As the director of Pre-Health Professions Programs, Childress mentors, guides, and implements tools for Auburn University students who have a desire for a career in health care. She serves as the advisor for the Auburn University Chapter of Alpha Epsilon Delta, a national honor society for students preparing for careers in the health professions. Childress coordinates the pre-medical preceptorship at Auburn, which offers students an opportunity to shadow local physicians. Perhaps the most time-consuming aspect of her role as pre-health director is coordinating the Pre-Professional Advisory Committee, or PPAC.

Chaired by Childress, PPAC is perhaps the single largest contributing factor to Auburn University's above-average acceptance rates to health professional schools—typically 30 percentage points higher than the national averages for acceptance to dental, medical, and optometry schools.

Her tireless efforts with PPAC ensure that Auburn University pre-health students have the tools and information they need to put their best foot forward when applying to medical, dental, or optometry schools. The committee helps Auburn students with the application process, and it consists of faculty leadership from across the university, but primarily from the Department of Biological Sciences.

"Beverley's work ethic is unparalleled," said Krysta Diehl, COSAM's pre-health counseling specialist. "She writes a summary letter for every applicant to medical, dental, and optometry school from Auburn, typically 200 per year. She also supervises and checks each application. Although tedious and time-consuming work, every application must be correct and complete for the applicant to remain competitive."

During the course of her career at Auburn, Childress has recognized a need to offer additional support for students who may have inadequate preparation as they embark on their undergraduate careers. First-generation students and rural or underrepresented students may not have the science preparation from high school that leads to immediate success in college.

"Beverley worked with Auburn's Department of Biological Sciences to

"Beverley's work ethic is unparalleled."

Krystal Diehl,
COSAM pre-health counseling
specialist

create a Pre-Professional Non-Thesis Master's Program," said Diehl. "This program allows students to spend a year in graduate courses and gain clinical experience to enhance their professional school applications, while earning a graduate degree. Beverley is committed to making professional school attainable for all students. She recently told us, with tears in her eyes, that a former student was accepted to dental school after a long wait. This particular student had almost given up, but Beverley gave her confidence."

Prior to joining the administration at Auburn, Childress had a career as a teacher and counselor at Holy Spirit School in Tuscaloosa, St. Joseph School in Bowling Green, Kentucky, and Chambers Academy in LaFayette. She was also an academic administrator and assistant headmaster at Chambers. Her career at Auburn University began in 1996 when she joined COSAM's Office of Student Services as an academic advisor. She was named director of COSAM's Pre-Health Professions Programs in 2000, and since her tenure began she has received numerous

Beverley Childress (left) receives the 2017 Women of Distinction Administrative and Professional Staff Leadership Award from Taffye Clayton, vice president and associate provost of inclusion and diversity.



honors and awards including: the U.S. Army Certificate of Appreciation for Exceptional Leadership; the NACADA Commission & Interest Group Service Award; the NACADA Commission Sponsored Conference Presentation Award; the Auburn University Society of Health Professionals Recognition; the Auburn University Student Government

Association Outstanding Advisor of the Year; the College of Sciences and Mathematics Staff Appreciation Award; and the Auburn University Spirit of Excellence Award.

Students and professionals alike who have worked with Childress will note her tireless dedication to her students:

“One of the things that has always stuck out to me about Mrs. Childress was how her input was never generic. She took time to get to know me, my interests, and my personality and was therefore able to provide individualized feedback and advice. She was not afraid to say if she thought something would be a good or a bad fit. I think this is a rare quality for a person tasked with advising large numbers of students. Once I found my direction, she was a tireless cheerleader as I went through the process of applying and interviewing for graduate school. The College of Sciences and Mathematics at Auburn is like an extended family largely because of people like Mrs. Childress who are so invested in the growth and development of their students.”

Kelly M. East '07 (microbiology)
MS, CGC
Certified Genetic Counselor
Clinical Applications Lead
HudsonAlpha Institute for Biotechnology

“Her diligence in improving the lives of students is witnessed when she spends her weeknights and weekends writing committee letters, helping with AED, or educating herself so that her students stand the best chance of being accepted.”

-Sally Harrison '16 (biological sciences)
Medical Student at University of Alabama at Birmingham

“She knew each one of us on a personal level: our doubts, our fears, our challenges, our dreams, our hopes, and our aspirations...She gave me advice and constructive criticism when I needed someone to be transparent with me.”

Cassie Bishop '02 (biomedical sciences)
DSR at Pfizer Pharmaceuticals

“As I have interacted with students from Auburn over the years, I have heard many stories about Beverley and the role she has played in helping these students find their paths to careers in healthcare. She is always focused on keeping up to date on the changing curriculum in various professional schools, frequently communicating with liaisons from the schools' admissions offices, both through yearly mock interviews and hosting these representatives as speakers at AED and the pre-health professions class. Quite frankly, when I learn a pre-med student attends Auburn, I know they have been able to work with the best health professions advisor in the state. Auburn has a reputation as a top-notch pre-med program, and I am sure that is, in part, because of Beverley's work.”

Lanita S. Carter, Ph.D.
The University of Alabama at Birmingham
Director, Medical Education and Student Services, Huntsville Campus Assistant Professor,
Medical Education
Interim Leadership Team, UASOM Admissions Committee

COSAM ALUMNUS GEORGE BAKER REFLECTS ON LIFE AS A STUDENT AT API IN THE 1940s

George Baker, pre-medicine '45, was born in 1925 in Columbus, Georgia, and he enrolled at Alabama Polytechnic Institute (now Auburn University) in 1941. During his childhood, Baker watched his father, Dr. E.L. Baker, practice medicine. As a result, Baker was naturally drawn to the field and studied pre-medicine while a student at Auburn.

Looking through his freshman year copy of the *Alabama Polytechnic Institute Bulletin*, a printed catalogue containing a list of majors and course requirements, Baker notes some differences he sees between the 1940s and today as a student at Auburn.

"Today there is more interaction between different lines of reasoning," said Baker. "The university has a bunch of different schools and colleges, and each of those have a bunch of different departments, and those different departments interact. And the research! The research aspect of Auburn now is mind boggling. If they did any research back then, I didn't know it. Other than Swingle's work."

Baker is referring to Professor Homer S. Swingle, who is known as the "father of modern aquaculture" for his work in pond management.

"He had begun building ponds back then," said Baker. "The citizens would hear about those catfish farms and write to the college wondering how they were doing it. Swingle would write out instructions and I would ship them. Today, Auburn has nuclear research and so much more. I don't see how young people know what to take because there are so many options."

As a pre-medicine student, Baker said he took a wide variety of science classes, including in zoology, entomology, botany, psychology, chemistry, biochemistry, and more. He specifically recalled Professor

Fred Allison, who founded Auburn's Department of Physics and provided leadership for the department for thirty one years.

"Dr. Allison stepped in as a substitute for one of my physics classes because the regular instructor had been drafted to serve in WWII," said Baker. "He was brilliant. On the first day, he put the lecture on the board and then immediately erased the whole thing because he assumed we already knew the information—he was used to teaching graduate students. He taught us $D=1/2 gt^2$. Most of what he said was over our heads. We sure were glad when he got someone else in there, because he was so brilliant, most of the time we didn't know what he was talking about."

While a student at Auburn, Baker's roommate was Jack Springer, a pharmacy student.

"We didn't have lab one day a week, so we would go down and see his momma and daddy who lived near Union Springs," said Baker. "On weekends, I went home so I could be with my daddy. I could eat breakfast with him on Monday morning, get in the car, drive to Auburn, and make it to an 8 a.m. class because of the time change. I had a new car, brand new, that lasted four years. It was a straight 8-cylinder, so it had a long hood. It was the last car of that model that came to Columbus before the war. Everyone would kid me about 'that piece of junk' I had, but that piece of junk would outrun all of them, except Dr. Petrie's car. He drove a big car and it went like lightening."

As he neared graduation, Baker received acceptance to the University of Tennessee College of Medicine.

"Times were hard," said Baker, "and I needed a paycheck more than another degree."

As a result, Baker sought the advice of J. M. Robinson, who was the head of Zoology and Entomology.

"He suggested I write a letter to TCI (Tennessee Coal, Iron, and Railroad Company, which later became U.S. Steel) and see if they would hire a chemist," said Baker. "They did. I was hired in 1946 and started on March 1. I moved up to Birmingham and worked thirty seven years, to the day, with the same company. I retired on March 1, 1983. I met my wife in Birmingham too, so J. M. Robinson really made a big difference in my life. A lot of the faculty at Auburn back then were absolutely amazing in how interested they were in the students. They treated their work like a calling, not just a job."

On Oct. 12, 1946, shortly after joining TCI, Baker was drafted to serve in WWII. He served as a chemist with a technical services unit at Dugway Proving Ground in Utah.

"It was fourteen degrees below zero and there were fourteen inches of snow on the ground, and this Georgia boy thought, 'I have made a mistake,'" said Baker. "I was lucky. I got in, in October and I was home in April. I like to tell people I fussed when they sent me home, but that's a lie. I was glad to go."

Baker returned to TCI and worked the first 20 years of his career in the coke plant as a chemist.

"We analyzed the organic compounds you get out of coal, and we analyzed the products that we shipped, and we analyzed the products that we collected from the gas stream," said Baker. "If you have the money and the know-how, you can get just about any chemical compound you want out of coal. Those organic compounds have their own laws and they go by them—and you will too if you fool with them!"

Baker also worked as a chemist in the tin mill, sheet mill, and wire works.

“That was some company,” said Baker. “At one time, they made just about everything. You could build an entire railroad out of what they made.”

Baker’s wife, Mabel Christine Chambers Baker, was also a scientist. The two met at the First Baptist Church in downtown Birmingham. A bacteriologist who ran the Department of Public Health Laboratory, Mabel Christine was from Tennessee.

“I noticed her and she noticed me, and the next thing you know, there were sparks,” said Baker.

Baker and his wife were married in 1953 and bought their first home near Legion Field in Birmingham. In 1960, they moved to Vestavia, where they remained until 2011 when they both moved to Galleria Woods, a senior living facility.

“After retirement, I did everything Mrs. Baker needed,” said Baker. “She died on April 28, 2015, and you can’t imagine how much of a vacancy it left.”

Today, Baker enjoys spending time with friends at Galleria Woods.

“I like it here,” said Baker of Galleria Woods. “This is where they keep the dinosaurs corralled. They have a time with us too—it’s worse than herding cats.”

Besides chemistry, his wife, and many friends, Baker’s other interests include the Steel City Rifle and Pistol Club, where he has held several offices, including president. Baker has the knowhow to reload his own bullets and once competed competitively, even securing a master trophy.

“The first time I ever shot my daddy’s pistol, I was eight or nine years old,” he said.

Baker also loves Auburn.

“My wife bought me an Auburn watch one April as a Christmas gift, and she was so excited about it, she went ahead and gave it to me,” said Baker. “Now, I wear that watch every day. When I think back on my time as a student at Auburn, the feeling I get is kind of hard to express. The professors were so gracious with their time and attention. The campus was always so welcoming and, well, I was just glad to be there because it seemed like a place where I belonged. Campus has changed—I don’t even recognize anything on West Magnolia anymore—but some things stay the same. The words Petrie penned in the Auburn Creed around the year I graduated are as true today as they were in 1945.”

Written by Candis Birchfield





A MESSAGE

from the Associate Dean for Academic Affairs

Jack Feminella

Another academic year has come to a close, and yet another has begun. Looking back at 2016-2017, our undergraduate enrollment continued to increase (22,658 students in fall 2016), as did our international undergraduate population (1,030), and our total enrollment (28,290 students); each of these levels was the highest in Auburn history. But the academic excellence of COSAM students in ACT scores and high school GPA continues to increase, reflecting our continued ability to attract outstanding majors to the college, and our ongoing commitment to offering top-tier educational experiences for all Auburn students.

In response to our growing enrollment, this fall the university unveiled its new learning facility—the Mell/RBD Classroom Complex. The state-of-the-art, 107,000 square-foot facility includes substantially renovated space in the RBD Library and adjoining new space, all designed for active learning—the idea that students work together actively in small groups to solve problems and understand concepts, and bring homework-based content into the classroom for presentation and discussion, and revision. The Mell/RBD Complex features twenty-nine active learning classrooms, including several lecture halls and classrooms, and numerous smaller modular rooms, each accommodating as few as sixteen and as many as seventy-two students. Modular design allows rooms to be quickly configured into lecture, discussion, group, or testing formats. Virtually all Mell/RBD classrooms have this capability, and this fall, COSAM courses in biology, chemistry, biochemistry, math, and physics are being taught actively in the Mell space. It is truly an exciting and transformative time for new and continuing Auburn students!

Beyond active learning and traditional classroom instruction, more and more COSAM online (distance) courses are being rolled out. Online courses allow students to return home for the summer, yet stay engaged in COSAM course work. We now offer online courses in all five COSAM departments, including non-majors biology, physics, general chemistry, geology, geography, calculus, and even genetics, comparative anatomy, and histology. Most online courses are lecture only, whereas the labs are separate and taught exclusively on-campus to maintain the hands-on format. Distance courses are not for every student as they require more organization and initiative than traditional face-to-face courses. But, for students with the right orientation and mindset, online courses can help them stay on pace with their challenging curricula. Each of these instructional approaches have COSAM's heralded stamp of excellence, and continue to assist our students in achieving their academic and professional goals.

Great things continue to happen in the COSAM Office of Student Services. We've hired our first student recruiter and scholarship coordinator, William (Will) Blakeley, and three new academic advisors, Anna Allen, Katy Crider, and Valerie Tisdale, to help expand our one-on-one face time between students and advisors. Will received a bachelor of science in environmental studies at Dartmouth, and was a senior admissions officer at Northern Arizona University before coming to Auburn. He plans to work closely with departments to help grow and diversify all majors in COSAM's traditional fields of study. Anna's from Albertville, where she received a bachelor of science in interiors

and housing at Auburn. She worked for several years as administrative assistant in the main office before moving into an advising role. Katy comes to us from Cullman, having received bachelor's and master's degrees in communication from Auburn. Valerie hails from Myrtle Beach, South Carolina, where she received a bachelor of science in psychology and an interdisciplinary master's in public policy and corrections at Coastal Carolina University before leaving the "Lowcountry" and migrating to COSAM. Valerie is the first professional advisor based in a COSAM department (Biological Sciences) where she advises our traditional biology majors. She is the first of several planned discipline-based professional advisors who will work closely with COSAM faculty to provide students the full spectrum of critical advising support. Last but not least, we welcome back our administrative support specialist, Malisa Hanson, after giving birth to her daughter, Molly. It's great to witness the growth of the Auburn Family and be at full strength in the main office once again!

Please remember my open invitation to keep up with the exciting happenings in COSAM through our social media platforms, including Facebook, Twitter, and Instagram. Or, if you're in town, feel free to come by and say hi! We'd love to see you.

Warmest regards and War Eagle,

A handwritten signature in black ink that reads "Jack W. Feminella". The signature is fluid and cursive, with the first letters of the first and last names being capitalized and prominent.

Jack Feminella
Associate Dean for Academic Affairs

HONORING THE BEST: COSAM SCHOLARS OUTPERFORM THE REST AT PHI KAPPA PHI AWARDS CEREMONY



The Auburn University Chapter of Phi Kappa Phi held the annual initiation and awards ceremony at the end of spring semester. Founded in 1897 at the University of Maine, Phi Kappa Phi is an honor society that recognizes and promotes academic excellence in all fields of higher education and engages the community of scholars in service to others. Of the ten awards bestowed at the 2017 ceremony, COSAM students received five, including at least one award in every COSAM-eligible category.

“As its core mission, Phi Kappa Phi promotes the love of learning and excellence in all elements of academic scholarship,” said Jack Feminella, associate dean for academic affairs. “The Most Outstanding Senior Scholar, the three Susan Stacy Entrenkin Yates awardees, and the Jewel Golden Eubanks Scholarship—all received by COSAM students—beautifully exemplify this description. Not only are the student honorees outstanding performers in the classroom, but they are also budding research scholars and unselfish service providers to others on and beyond campus. We are extremely proud of each of them.”

COSAM students honored at The Honor Society of Phi Kappa Phi awards ceremony include the following:

Phi Kappa Phi Most Outstanding Senior Scholar

COSAM's Natasha Narayanan received the Phi Kappa Phi Most Outstanding Senior Scholar award. Presented annually to the most outstanding senior student at Auburn University, criteria include scholarship, activities, honors, character, and a minimum 3.69 GPA. Graduates from summer and fall 2016 semesters, as well as spring 2017 semester, were eligible. Narayanan graduated last spring with a double major in biochemistry and Spanish.



A member of the Honors College, Narayanan became involved in undergraduate research as a freshman and said she considers it an integral and transformative aspect of her college experience. She spent three years working on two undergraduate research projects in an organic synthesis lab under the direction of Bradley Merner, the James E. Land Assistant Professor of Chemistry, and she worked in a pharmacology lab in the

Auburn University College of Veterinary Medicine under the direction of Assistant Professor Satya Pondugula. In summer 2016, she worked in a cancer biology lab at Cambridge University on a project that involved imaging the genetic material in cancer cells.

“Natasha is an exceptionally talented researcher,” said Merner. “She has an uncanny ability to retain information and a desire to make experiments work that cannot be taught. A truly gifted student, Natasha embodies all of the qualities that make for a future leader in science.”

As a junior, Narayanan was a recipient of the prestigious Barry Goldwater Scholarship, an honor bestowed to only 252 students nationwide in 2016. The scholarship is widely considered the most prestigious award in the United States for undergraduates in science, technology, engineering, and mathematics.

Narayanan was also named a COSAM Dean's Medalist, which is a group of outstanding graduating seniors nominated by faculty in each of the college's five departments based on academic performance, character, and potential.

While at Auburn, Narayanan worked as a Study Partners tutor, a supplemental instructor for chemistry courses, and an undergraduate teaching assistant for organic chemistry labs. In her free time, she enjoys riding horses, cycling, and hiking. She is continuing her education at Cambridge University.

The Susan Stacy Entrenkin Yates Awards

Presented annually to outstanding junior students at Auburn University, three Susan Stacy Entrenkin Yates Awards were bestowed at the 2017 Phi Kappa Phi awards ceremony, and all three recipients were COSAM students, including: Melanie Parrott, biomedical sciences/pre-med; Da Sol Jung, biochemistry; and Kristyn Suelflow, biomedical sciences/pre-physician assistant.

Recipients must have a minimum 3.69 GPA and, in addition to scholarship, are selected based on activities, honors, and character.

The Susan Stacy Entrenkin Yates Awards are named in memory of the mother of S. Blake Yates, a long-time member of the Auburn University Chapter of Phi Kappa Phi.

Jewel Golden Eubanks '33 Phi Kappa Phi Endowed Scholarships

The Jewel Golden Eubanks Phi Kappa Phi Endowed Scholarships are presented annually to current Auburn students who are active members of Phi Kappa Phi. Among this year's five recipients was COSAM's Annie Sauer, a junior in applied discrete mathematics.

Jewel Golden Eubanks '33 was born in Birmingham in 1910. She was a very intelligent and well-educated person. After earning two degrees from Alabama Polytechnic Institute (Auburn University), she became an educator who sought excellence in her life and work. Eubanks was an active member of The Honor Society of Phi Kappa Phi, and she endowed a scholarship to the Auburn University Chapter.

PLAINSMEN'S PREP STRENGTHENS THE FOUNDATION FOR MATHEMATICS SUCCESS



Auburn University is offering a new program, Plainsmen's Prep: A Bridge to Calculus, which is designed to give approximately seventy incoming freshmen an exclusive opportunity to review pre-calculus and calculus topics needed to be successful in their college courses. Sponsored by Auburn University's Academic Support Services and the Department of Mathematics and Statistics, Plainsmen's Prep: A Bridge to Calculus is also designed to acclimate students to the rigors of the Auburn University environment. Students interact with Auburn faculty, staff, and undergraduate students to help aid in their transition and give them at head start to their success at Auburn.

"We know that students are coming to Auburn and taking longer to complete their degrees because they have to take prerequisite courses before they can take the courses needed to fulfill their major," said Dana Jablonski, director of the Office of Academic Support. "In addition, many students are coming with some knowledge but may be rusty in pre-calculus or calculus

concepts due to a variety of reasons. The program was designed to assist any student who is feeling uneasy about succeeding in calculus at Auburn. The program gives them a chance to review pre-calculus and calculus topics needed to be successful in their courses."

Participating students are exposed to more than thirty hours of pre-calculus concepts developed and taught by Auburn mathematics faculty. The curriculum was created based upon Auburn mathematics faculty experiences and observations of the most needed information for success. Participants hear lectures and utilize classroom technology, as well as experience small group study sessions and collaborative learning activities led by faculty, staff, and successful undergraduate students. Workshops on time management, study skills, and more are also offered. At the end of the program, participants take a mathematics placement exam.

"A few years ago, the dean of the College of Sciences and Mathematics, Nicholas Giordano, spoke to the math department

about the length of time it was taking students to finish their degrees," said Regina Jackson, precalculus coordinator in the Department of Mathematics and Statistics. "We discussed that a major factor to longer times was having to complete prerequisite courses based on ability. This program was created as an avenue for students to receive the prerequisite skills without adding time until graduating. The program is designed to show students what they will encounter in their math class, what resources they will have, and what skills they will need to develop to be successful. There are a few community building activities, homework, and assessments to truly get a well-rounded snapshot of a semester at Auburn."

The inaugural program took place in August 2016 and participants represented a variety of disciplines from the Samuel Ginn College of Engineering, the College of Sciences and Mathematics, the Raymond J. Harbert College of Business, the College of

Architecture, Design, and Construction, the College of Agriculture, and University College.

In addition to intensive mathematics training, participants are provided extracurricular activities that encourage community building and socialization with other incoming first year students.

"We have planned some fun for them too, since we know they need to do some things other than Math!" said Jablonski. "Last year they participated in the Auburn University challenge course, visited the Raptor Center, and had a game night. The activities outside of the classroom are rooted in helping build community, leadership skills, help students make friends, and adjust to their new college life by feeling like a part of the Auburn Family."

For more information on Plainsmen's Prep: A Bridge to Calculus, visit the website at this web address:
academicsupport.auburn.edu/plainsmens-prep/.

Written by Candis Birchfield

2016-2017 COSAM LEADERS



The COSAM Leaders are an exemplary group of students who serve the college as official ambassadors. COSAM would like to thank this group of student ambassadors for their service during the 2016-2017 academic year.

Back row, from left:
Dr. Jack Feminella, advisor, David Loveless, Jonathan Dismukes, Tuck Borie, James Pate, Ryan Leonard, Payne Jennings, Austin Hughes, and Michael Matthews

Front Row, from left:
Emily Cragon, Llandess Owens, Liz Marks, Kristyn Suelflow, Alexis Thrasher, Janie Hampton, Madison Collins.

Not Pictured is Anna Boling.

2017 COSAM DEAN'S MEDALISTS

The COSAM Dean's Medalists are outstanding graduating seniors in each department. Students are nominated by faculty within their department and selection is based on academic performance, character, and potential. The number of medalists chosen from each department is based on student enrollment.

A photograph of each recipient hangs in COSAM's Dr. and Mrs. C. Lloyd Nix Student Services Center during the following academic year. Honorees also receive a book and a Dean's Medal on a plaque.

The 2017 COSAM Dean's Medalists are the following:



Doyon Kim, Mathematics and Statistics - Pyeongtaek, Republic of Korea

Doyon Kim graduated in May with a bachelor's degree in mathematics. He moved to Auburn from South Korea in 2011, rather unexpectedly, and said he appreciates every moment of his undergraduate experience. During the summer of 2015, he participated in the National-Science-Foundation-funded Research Experience for Undergraduates program in algebra and discrete mathematics at Auburn University under the direction of Professor Peter Johnson. He received an Auburn University

Undergraduate Research Fellowship and worked on a problem in discrete geometry under Professor Andras Bezdek. Kim presented the result at the 2016 This is Research: Auburn University Student Symposium and the 2017 Joint Mathematics Meeting in Atlanta. During the summer of 2016, he worked on a problem in number theory under the direction of Professor Luke Oeding. In the fall of 2016, he was a participant in the Budapest Semesters in Mathematics

program in Hungary. Kim has worked on six different research projects and written four papers, three of which have been published. He says he loves mathematics, and Kim plans to further his education and study number theory in a doctoral program.



Meredith M. Montgomery, Biomedical Sciences - Moulton, Alabama

Meredith Montgomery graduated this spring with a bachelor's degree in biomedical sciences and a 4.0 GPA. She conducted undergraduate research in the lab of Jennifer Panizzi, assistant professor of physiology in the College of Veterinary Medicine, working with zebrafish to investigate the mechanisms of primary ciliary dyskinesia. Montgomery is a member of numerous national honor societies including: Omicron Delta Kappa, a national leadership honor society; Mortar Board, a national honor society for college

seniors that recognizes achievement; and Alpha Epsilon Delta, a national health pre-professional honor society for which she served as a pre-med representative. While at Auburn, Montgomery maintained a passion for serving both the university and the community. During the last two-and-a-half years, she mentored two children through Project Uplift. She also served as a Camp War Eagle Parent Counselor and was honored to be named Parent Counselor of the Year by her peers. Montgomery is a member of a social sorority, and over the course of the last four years, she performed at football and

basketball games as a member of the Tiger Paws dance team, which she said was one of her greatest joys and passions during her time at Auburn. Montgomery was accepted to the University of Alabama at Birmingham School of Medicine through the Early Decision program, and she began her medical education this fall.



Reka D. Muller, Biological Sciences - Budapest, Hungary

Reka Muller was born and raised in Budapest, Hungary, where she graduated from the most prestigious high school in the country and lead the junior tennis rankings in every age group. As she continued her education at Auburn University, she maintained a 3.92 GPA in molecular biology, and she is a member of the prestigious Phi Kappa Phi and Chi Alpha Sigma Honor Societies. She continued to excel at tennis, helping Auburn's Division I tennis team break

multiple school records and a national ranking of #11. Besides athletics and academics, Muller was heavily involved in research at Auburn. As one of the Cellular and Molecular Biosciences Summer Research Scholars in 2015, her project on Glanzmann Thrombasthenia under the direction of Mary Boudreaux, professor emeritus in the College of Veterinary Medicine, was published in the Journal of Internal Veterinary Medicine. Most recently, Muller worked on gene therapy for a neurodegenerative disorder in the Scott-Ritchey Research Center that will soon reach clinical trial status. She

was also involved in leadership activities through the athletic department, and she served as an Emerging Leader for the past two years in the Auburn Leadership Institute, a program designed to help guide and mentor freshmen and transfer student athletes. As a community service executive in the Student Athlete Advisory Committee, she was heavily involved in giving back to the community and helping student athletes do the same.



Natasha K. Narayanan, Chemistry and Biochemistry - Auburn, Alabama

Natasha Narayanan graduated in May with a double major in biochemistry and Spanish. As someone who did not particularly enjoy chemistry in high school, she said she is grateful to the Department of Chemistry and Biochemistry faculty for igniting and supporting her interests in chemistry and teaching. A member of the Honors College, Narayanan became involved in undergraduate research as a freshman and considers it an integral and transformative aspect of her college experience. She spent three

years working in an organic synthesis lab under the direction of Bradley Merner, the James E. Land Assistant Professor of Chemistry, and, most recently, worked in a pharmacology lab in the Auburn University College of Veterinary Medicine under the direction of Assistant Professor Satya Pondugula. In summer 2016, she worked in a cancer biology lab at Cambridge University on a project that involved imaging the genetic material in cancer cells. As a junior, Narayanan was a recipient of the prestigious Barry Goldwater Scholarship. While at Auburn, she worked as a Study Partners tutor, a supplemental

instructor for chemistry courses, and an undergraduate teaching assistant for organic chemistry labs. In her free time, she enjoys riding horses, cycling, and hiking. After graduation, she will continue her education at Cambridge University.



Abigail A. Smith, Geosciences - Florence, Alabama

Abigail Smith graduated in May with a bachelor's degree in geography. She was a recipient of the National Multiple Sclerosis Society Scholarship, as well as a two-time recipient of the John G. and Tamara L. Trawick Scholarship. During her freshman year, she was a member of the Auburn University Wheelchair Basketball Team. She has also been a teaching assistant in the Department of Geosciences, where she assisted with the freshman Global Geography classes. Smith is a member of the national honors fraternity Phi Sigma

Pi, and the international geographic honor society, Gamma Theta Upsilon. During her senior year, she was elected president of Auburn's chapter of Gamma Theta Upsilon and has helped revitalize the chapter with emphasis on peer collaboration and outreach. Smith has conducted field work with a team that updated Lee County's 911 address database. Her academic focus was health and medical geography with career goals that include studying the spatial distribution of disease-related environmental factors. She will continue her education at the University of North Alabama in the Geospatial Science program.



Meredith E. Thomley, Biomedical Sciences - Birmingham, Alabama

Meredith Thomley graduated this spring with a bachelor's degree in biomedical sciences and is now attending the University of Alabama School of Medicine. While serving as COSAM School Council President, Thomley proposed a revised pre-medicine curriculum to promote the continued success of students in her college. She further shared her heart for health care with Auburn's campus as a Top Five Miss Auburn candidate. Her platform outlined providing additional resources for the Auburn University Medical Clinic

to better the student body as a whole. This vision to care for fellow students in need stems from her extensive volunteer work with the local nonprofit clinic Mercy Medical Clinic. Above all, Thomley said her most rewarding college experience was participating in undergraduate research conducted by the Applied Behavioral Analysis Lab where she worked with children with disabilities to encourage social skill acquisition. Inducted as a junior into the prestigious Mortar Board Senior Honor Society, Thomley is also a member of Phi Kappa Phi, Omicron Delta Kappa, Alpha Epsilon Delta, and Lambda Sigma

honor societies. Her favorite extracurricular activities include fulfilling mission work abroad, dancing at the annual Greek Sing philanthropy event, and participating in Auburn's Cooking and Baking Club. She said she is incredibly grateful for the opportunities given to her by COSAM and Auburn University, and she is phenomenally eager for the many to come in medical school.



Alexis H. Thrasher, Biological Sciences - Trussville, Alabama

Alexis Thrasher graduated in May with an undergraduate degree in microbiology and a minor in psychology. She will attend the University of Alabama School of Medicine beginning this July. Thrasher spent her senior year at Auburn University serving as president of COSAM Leaders, the official hosts and hostesses of the college. She participated in undergraduate research in the College of Agriculture under the supervision of Sang-Wook Park, assistant professor of entomology and plant pathology, studying jasmonic acid

precursors for potential chemotherapeutic mechanisms in plants. Thrasher also served as a Biology 1010 teaching assistant for the past two years. Outside of academics, Thrasher has been involved in her social sorority and says she enjoys spending time traveling with her friends and family.



Laura Beth Towery, Biomedical Sciences - Chelsea, Alabama

Laura Beth Towery graduated this spring with a bachelor's degree in biomedical sciences, a 4.0 GPA, and Honors Scholar distinction through the Honors College. She has performed undergraduate research in the departments of biology and kinesiology, and has passionately served the Auburn community through leadership as: vice president of scholarship for her social sorority; president of Mortar Board, a national honor society for college seniors that recognizes achievement;

scalpel reporter for Alpha Epsilon Delta, a national health pre-professional honor society; and director of Miss Homecoming for Omicron Delta Kappa, a national leadership honor society. In addition, Towery is a member of the prestigious Phi Kappa Phi Honor Society and the national service organization Cardinal Key. She also worked as a supplemental instructor for physics. Towery spent the past two-and-a-half years mentoring two children in the community through Project Uplift and has also served as a mentor for incoming freshman at The Oaks Retreat. She was accepted to four medical schools across

the country and will begin her medical education in the fall. Towery said she is tremendously grateful for the opportunities provided by Auburn University and for the support given by her advisors, professors, family, and friends.



Martin A. Wang, Physics - Huntsville, Alabama

Martin Wang graduated in May with a bachelor of science in physics and a bachelor of engineering in electrical engineering. Over the past two years, he conducted research with Marcelo Kuroda, assistant professor of physics, using large-scale calculations to study the characteristics of electrostatically-tunable band-offsets in 2-D material heterostructures. His research has been presented at the CNMS Meeting at Oak Ridge National Laboratory and at the NanoBio Conference. In summer 2016, he

worked at Boeing to help develop modeling and simulations software. In his free time, Wang enjoys water polo, badminton, reading, and gaming. Following graduation, Wang accepted a position in data analytics with ISSAC Corporation in Colorado Springs. ISSAC, or Innovative Scientific Solutions and Analytics, is an advanced data analytics and systems engineering firm.

2016 COSAM DISTINGUISHED ALUMNA: DR. KATHRYN THORNTON '74

Dr. Kathryn Thornton was recognized as the 2016 COSAM Distinguished Alumna. Selected by NASA in May 1984, Thornton is a veteran of four space flights: STS-33 in 1989, STS-49 in 1992, STS-61 in 1993, and STS-73 in 1995. She has logged over 975 hours in space, including more than twenty-one hours of extravehicular activity (EVA), and was the first woman to participate in a classified U.S. government space mission.

Thornton was a mission specialist on the crew of STS-33, which launched at night from Kennedy Space Center in 1989 aboard the Space Shuttle Discovery. The mission carried Department of Defense payloads and other secondary payloads. In 1992, on her second flight, Thornton served on the crew of STS-49 on board the maiden flight of the new Space Shuttle Endeavour. The following year, Thornton was again a mission specialist EVA crew member aboard the Space Shuttle Endeavour on the STS-61 Hubble Space Telescope, servicing and repair mission. On her final mission in 1995, Thornton served aboard Space Shuttle Columbia on STS-73, as the payload commander of the second United States Microgravity Laboratory mission.

Since leaving NASA, Thornton has served on several NASA review committees and task groups, including the Return to Flight Task Group, which evaluated NASA's work in meeting goals set by the Columbia Accident Investigation Board prior to resumption of Space Shuttle flights. In 2008, Thornton co-chaired a workshop held at Stanford University and subsequently testified on the results before the Committee on Science and Technology, Subcommittee on Space and Aeronautics of the U.S. House of Representatives. She is currently on the board of the Space Foundation and the Astronaut Scholarship Foundation, and is director of the aerospace engineering program at the University of Virginia.

Thornton is the recipient of numerous awards, including NASA Space Flight Medals, the Explorer Club Lowell Thomas Award, the National Astronautics Association Robert J. Collier Trophy, the Freedom Foundation Freedom Spirit Award, the National Intelligence Medal of Achievement, and the Auburn Alumni Association's Lifetime Achievement Award. She was inducted into the Astronaut Hall of Fame in 2010.

Thornton received a bachelor's degree in physics at Auburn University in 1974, followed by master's and doctoral degrees in physics at the University of Virginia.

Recipients of the Distinguished COSAM Alumna/us Award are recognized for achieving significant status in their field, whether business, academic, military, or government. Awardees have also demonstrated a history of commitment to Auburn University and COSAM. For more information, visit this web address:

auburn.edu/cosam/departments/alumni/distinguished_alumnus.



COSAM 2016 Distinguished Alumna, Kathryn Thornton with COSAM Dean Nicholas Giordano

I BELIEVE IN THE HUMAN TOUCH

COSAM Alumni Work to Promote Advances in the
Pharmaceutical Industry



From industry leadership to drug design and pharmaceutical sales, College of Sciences and Mathematics alumni can be found in all aspects of the continually evolving, multi-billion-dollar pharmaceutical field.

Our alumni work tirelessly to develop life-saving therapy to help children with genetic diseases, produce groundbreaking advances in drug efficacy, and form one-on-one connections with local health-care providers so that patients get the medications they need.

They all agree, it's the human touch, as described in the Auburn Creed, that propels them forward in their missions.

BIO TECHNOLOGY WITH A PURPOSE

Bo Cumbo, medical technology '94, is the senior vice president of Global Commercial Development at Sarepta Therapeutics, located in Cambridge, Massachusetts.

Sarepta Therapeutics is a commercial-stage, biopharmaceutical company focused on the discovery and development of unique RNA-targeted therapeutics for the treatment of rare neuromuscular diseases. The company's primary focus is on rapidly advancing the development of its potentially disease-modifying Duchenne Muscular Dystrophy drug candidates.

Duchenne is a rare, fatal neuromuscular genetic disease that occurs in approximately 1 in every 3,500 to 5,000 boys worldwide. The disease is caused by a change or mutation in the gene that encodes instructions for dystrophin, a protein that plays a key structural role in muscle fiber function. In healthy muscle, dystrophin interacts with other proteins at the cell membrane to stabilize and protect the cell during regular activity involving muscle contraction and relaxation. However, boys with Duchenne produce little or no dystrophin in their muscle fiber.

"These children lose their ability to walk by age twelve and start having respiratory declines in their teens," said Cumbo. "In their twenties, they will experience loss of respiratory and cardiac function. Every minute counts for them."

After a five-year trial, Sarepta's drug for combatting Duchenne, Exondys 51, was approved by the FDA, making it the first-ever FDA-approved injection for treating Duchenne in the U.S.

Typically, once a drug has made its way to human trials, the last step before FDA approval, the study drug is compared to a placebo-controlled arm. Since Duchenne is a fatal disease affecting children, a lack of placebo control caused the trial to last five years with multiple surgical biopsies needed as opposed to the normal one-year trial. Twelve boys with Duchenne were given the drug and were closely monitored for five years.

"This is the first time in my career that I've had the opportunity to really get to know families that are on our drug, and it's always nice to sit down and talk to the families," said Cumbo. "You really

"My education at Auburn was top notch. I knew I wanted to be in a science field, and I enjoyed being social. My career has given me the opportunity to do both in a very rewarding way."

understand how hard they're trying to find help for their child. It's sad to hear their stories, but at the same time it's rewarding to be in a company that gives me the opportunity to help these kids. This is the first time this technology has ever been used. Giving families hope changes them forever."

Although this disease is fatal, the drug's goal is to help slow down the process of Duchenne.

"Every minute matters for these kids," said Cumbo. "If we can buy them a year or two,



it could mean everything to them and their families."

Cumbo joined Sarepta in 2013 after working for Vertex Pharmaceuticals, where he was vice president of Sales and Treatment Education. At Vertex, Cumbo launched the company's first drug for Hepatitis C, which became the fastest pharmaceutical product in U.S. history to reach \$1 billion in sales at the time. He has more than twenty years of pharmaceutical and biotechnology experience, with more than ten specialty competitive launches during the span of his career.

"I always looked at the future of medicine, and my career path followed those trends," said Cumbo. "In the 1990s, there was a need in the HIV industry, so I followed that route. I launched nine or ten HIV drugs during this time in numerous roles, three of which were billion dollar drugs."

Cumbo decided to leave antivirals and go into rare diseases, specifically rare diseases in children.

"It was very rewarding in the early days working with HIV and transitioning into Hepatitis," said Cumbo. "It was really rewarding launching new drugs that could help people with these deadly diseases. I had the opportunity in my career to take a chance on a startup company that had a good vision of bringing the first drug on the market to help kids with Duchenne. This was a great opportunity to take everything that I've learned over the last twenty years and bring it to a rare disease community, and, hopefully, launch multiple drugs that will change the course of this fatal disease. It tears at your heart because you want to do more, and you want to work faster, but you can't. The last two

years we've been on hold waiting for a path forward. These families don't have the time to sit and wait. We hope that one day we will find a true cure for this disease."

Sarepta has streamlined its entire pipeline to focus strictly on Duchenne.

"There are multiple genetic mutations within Duchenne, each requiring its own specific drug," said Cumbo. "Only about 1,000 to 2,000 kids in the U.S. will benefit from the Exondys 51 drug, and we've spent more than \$800 million developing therapies. We owe it to the families to dedicate our time and effort to Duchenne. The human trials were very trying for those twelve boys, and it's so rewarding for them to have a drug that will help them, or others, at the end of the day. The kids and their families come in our offices all the time, and we put programs in place to help support the families throughout treatment. I think that's the motto—support the patient and support the family. Get the best drugs that you can on the market."

Cumbo, an Alabaster native, says his Auburn education and background in science have allowed him to thrive in his career.

"It's great to have a marketing or business degree in this field, but having a background in science helps me understand and explain the information to physicians and patients," said Cumbo. "My education at Auburn was top notch. I knew I wanted to be in a science field, and I enjoyed being social. My career has given me the opportunity to do both in a very rewarding way."

A GROUND BREAKING PARTNERSHIP

Mike Bentley and **Milton Harris**, both 1963 chemistry alumni, have been pioneering the biotechnology industry for almost three decades. The duo met as freshmen at Auburn. After receiving doctoral degrees and completing an extensive career in academia, Bentley left his position at the University of Maine and joined Harris, who had begun researching polyethylene glycol, or PEG, chemistry at the University of Alabama at Huntsville.

The pair then founded and developed Shearwater Polymers.

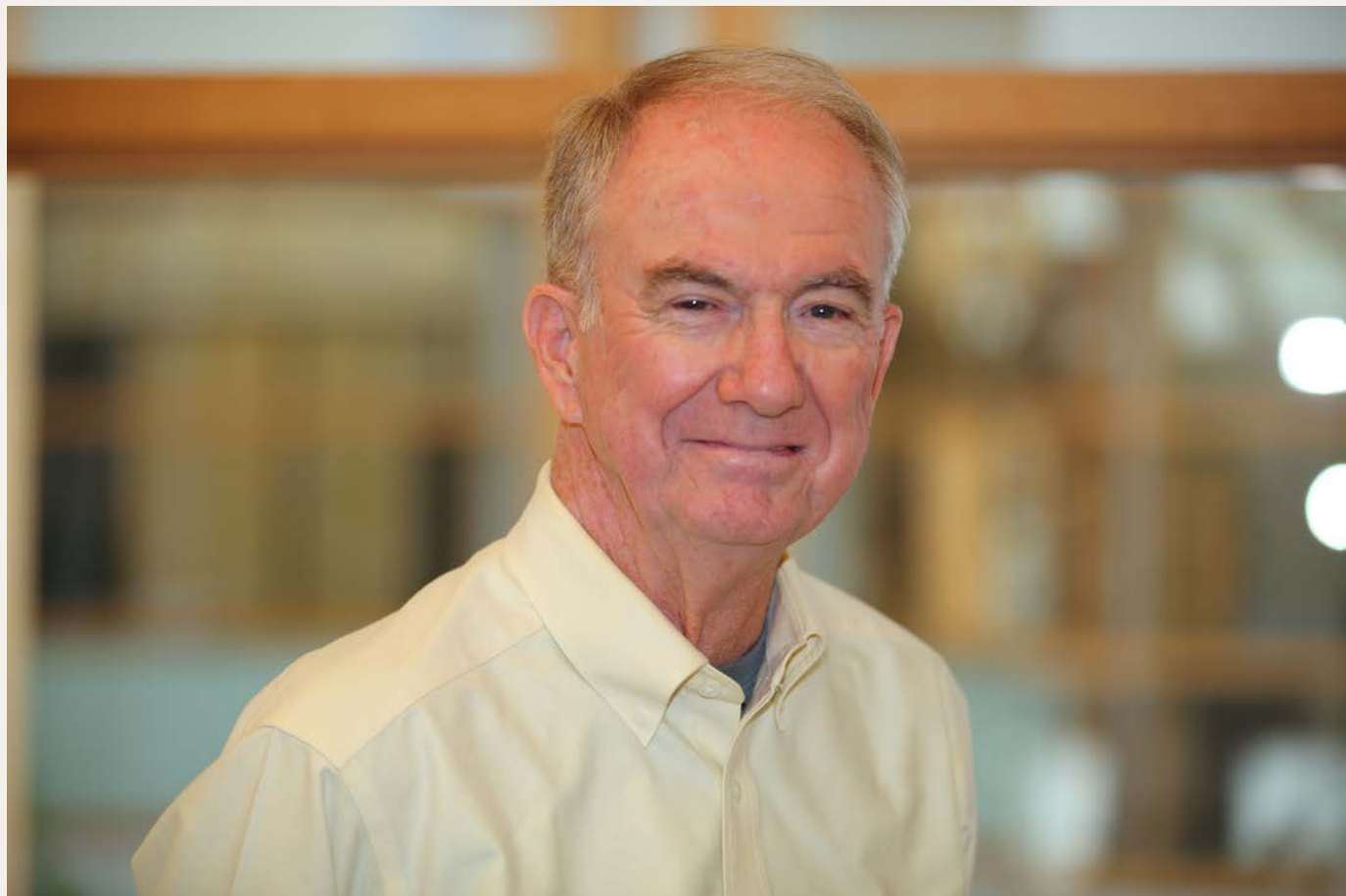
PEG compounds were originally created for biological purification in space. Harris discovered that the compounds had applications in the pharmaceutical industry. When attached to a drug, PEG enhances the drug's ability to circulate longer in the body, thus reducing the frequency a drug is needed and increasing drug efficacy.

In 2001, Shearwater merged with the public company Inhale Therapeutics and became Nektar. In 2006, Bentley and Harris retired temporarily.

"We retired for about six months and got bored," said Bentley. "So, we started up Serina Therapeutics. Despite its widespread success, PEG lacked a number of the desired features for designing an ideal polymer drug conjugate platform. We started working on a wholly distinct and more versatile polymer drug conjugate platform called POZ. What this technology does best is control drug delivery over time. We can tune it to release for a week or more by tuning the molecular structure."

Just like Shearwater, Serina Therapeutics has expanded and the two founders are excited for what the future has in store.

"We're now developing drugs to treat Parkinson's disease, epilepsy, and cancer," said Bentley. "All of these developments take years and a lot of money to perfect. We have to do the chemistry, measure drug release rates, conduct extensive animal studies, and begin a series of clinical trials. There is so much potential for the POZ technology."



Bentley received accolades when his drug, “Movantik”—as it is called by distributor AstraZeneca Pharmaceuticals—became the first FDA-approved drug for humans ever developed in Huntsville’s growing biotechnology sector.

The molecule for Movantik was invented and developed at Shearwater from the original PEG polymer technology. The drug blocks the constipation-causing property of opioids without blocking the opioid’s painkilling properties.

“When you think of Huntsville, people immediately think of rockets, but we’re really changing that,” said Bentley, whose company is located in the HudsonAlpha Institute for Biotechnology. “Yes, we have those things, but we can develop valuable drugs in Huntsville, and we’re doing it.”

Bentley, now seventy eight, and Harris, seventy six, continue to be actively involved in the day-to-day operations of their company.

“I don’t work at the bench anymore, but I do go in and talk with the chemists every day about their chemistry, their families, and all sorts of things,” said Bentley. “I never thought of chemistry as work. I’ve always enjoyed it. We have Parkinson’s patients come in to see us, and they’re very excited about the technology we’re developing. It feels great to know we’re helping people through years and years of work.”

“When you think of Huntsville, people immediately think of rockets, but we’re really changing that...Yes we have those things, but we can develop valuable drugs...and we’re doing it.”



CONNECTING THE PRODUCT WITH HEALTH-CARE PROVIDERS

As a diabetes business specialist for a leading Germany-based pharmaceutical company, Boehringer Ingelheim, **Angela Jenkins**, chemistry ’94, educates physicians in the Montgomery area on new developments in the rapidly-advancing pharmaceutical industry. She works to connect healthcare providers with the knowledge and drugs they need to administer top-notch care to their patients.

“Having a degree in biochemistry enables me to make a connection with many of the healthcare providers with whom I work on a daily basis,” said Jenkins. “An important part of being a successful sales representative requires the art of relationship-building. It is always helpful when you have something in common with your customers. Many of the health-care providers I encounter are also Auburn alumni, which makes us family.”

According to Jenkins, there is no such thing as a “typical day” in pharmaceutical sales, and that is one of the things she loves most about her career.

“Every day is unique and different,” said Jenkins. “Some days I may spend a number

of hours driving to and from provider offices located in rural areas of my territory, or I may spend the day in one particular area near a major medical center. Most times I work alone, however, there are times when I work in tandem with a sales partner. There’s so much I love about my job! Whether it’s the friendships I’ve developed within the medical community and my organization, or the flexibility and freedom the job allows, it’s hard to choose just one thing.”

Jenkins chose biochemistry after a series of personal tragedies made her career path clear.

“Initially, I began my studies as a chemical engineering major because I thought that was what I wanted to do,” said Jenkins. “After a series of personal tragedies during my freshman year, I quickly realized that I wasn’t sure of the career path I should follow. By my sophomore year, I had accumulated a number of upper level calculus and chemistry credits and didn’t want to ‘lose’ them, so I had to be meticulous in changing majors. Also, my mother succumbed to breast cancer, and at that time, I considered a career in research.

That’s when I decided to change my major to biochemistry. After completing a summer internship and my senior project, I learned a lot about myself. One thing I learned was that from a personality perspective, I thrived in ever-changing social settings and personal interactions.”

Jenkins currently promotes five oral, type 2 diabetes drugs, which are some of the newest therapies on the market.

“Because this is a highly regulated industry, pharmaceutical companies provide their employees with all of the information they need, or should use, for marketing purposes regarding new drug development and changes in managed health care,” said Jenkins. “Changes occur so frequently in this industry that it is extremely important that representatives are flexible and adaptable.”

Jenkins has previously worked for PDI, Inc., and Merck, and has been with her current employer for ten years. She was recently recognized with an Auburn Alumni Association Black Alumni Award.

Written by Lindsay Penny



CELEBRATING 20 YEARS OF SUMMER BRIDGE



Pictured at the 2017 STEM Summer Bridge Luncheon, from left, is Felicia Johnson with AT&T Pioneers, Sara Cooley and Bell Rogers, both with the American Business Women's Association Heart of Birmingham Chapter, and Kim Mulligan, Director of COSAM's Office of Diversity and Multicultural Affairs. The AT&T Pioneers and Alabama Business Women's Association are longtime supporters of the STEM Summer Bridge Program.

Greetings,

In 1997, Professor Overton Jenda, with the support of then-dean of the College of Sciences and Mathematics, Professor Stewart Schneller, began the Summer Bridge Program with twenty-seven incoming freshmen who were majoring in the sciences, mathematics, or engineering. The goal of the program was to provide academic enrichment as well as a sense of belonging to the Auburn University community for students from underrepresented groups majoring in science, technology, engineering, and mathematics (STEM) fields. During their four weeks on campus, students attended science and math lectures, were introduced to services on campus that would aid in their successful transition from high school to college, and formed meaningful relationships with individuals pursuing similar career aspirations.

According to a 2012 report by the President's Council of Advisors on Science and Technology, over the next decade the United States would need to produce approximately one million more STEM professionals for the country to retain its

historical preeminence in science and technology. This translates to a thirty-four percent increase in the number of students who were receiving undergraduate STEM degrees in 2012. While these numbers have been debated, a central theme that everyone agrees on is as the nation moves toward creating a more robust STEM workforce, we have to tap into the diversity of this country. This diversity encompasses many aspects, including ethnicity, gender, sexual orientation, and socioeconomic status, which all result in innovation by challenging individuals to consider different perspectives.

Looking back over the last twenty years of the Summer Bridge Program, we are excited to report that more than 500 students have matriculated through the program! As we begin thinking about the next twenty years, the Office of Diversity and Multicultural Affairs is focused on ensuring the COSAM student population reflects the demographics of the state. Our goal is to provide students with the necessary tools to be successful in STEM during their time at Auburn and beyond: the ability to think critically, work



collaboratively, communicate scientific ideas effectively, and, most importantly, build a strong sense of self-efficacy. To accomplish these goals, we have refreshed current programs, are implementing new ones, and working with other campus partners that have a vested interest in increasing diversity in STEM fields. The Office of Diversity and Multicultural Affairs is committed to providing a platform to assist students in becoming well-rounded, global STEM citizens.

We look forward to each of you joining us as we celebrate twenty years of the Summer Bridge Program on November 10, 2017!

Kimberly X. Mulligan, Ph.D.
Director, Office of Diversity and
Multicultural Affairs
Auburn University, College of Sciences
and Mathematics





A VIEW FROM THE BRIDGE:

The Summer Bridge Program at Auburn University has been a vital component of many students' college and professional careers for twenty years. This is a testament to the great leadership that has been in COSAM and at Auburn, leadership that has realized how beneficial this program is and has been for so many students. Because of the positive experiences that are provided and shared, the program continues to grow and expand, and it continues to be supported by the university as well as alumni of the program, their families, and their employers.

I personally benefited from participating in the Summer Bridge Program, and it encouraged me to want to give back to help other students and future students achieve academic and professional success. The Summer Bridge Program not only provided me with the academic skills and resources necessary to be prepared for the rigors of college, it also provided scholarships and a place to feel at home and be supported. The program opened the door to network with many other students like myself, several of

whom I can call friends and colleagues, and it gave me the opportunity to gain mentors in the STEM arena who have helped me achieve educationally and professionally in my career in higher education. Because of this program, I was motivated to strive for more, to not just always accept what was given, but to look for a greater opportunity, to want to grow personally and professionally, and to want to give back to the program as I went through college. I served as a counselor, tutor, and eventually joined the staff in COSAM after graduating from Auburn, and as such, I was able to coordinate the Summer Bridge Program. I am grateful for my experiences and thankful that I have had the opportunity to participate as a Summer Bridge student and see it all come full circle in my own life; I was able to do for someone else what Dr. Jenda and others in COSAM and at Auburn University did for me.

Charria Campbell, Chemical Engineering '05

COSAM'S OVERTOUN JENDA SECURES NATIONAL SCIENCE FOUNDATION GRANTS FOR INITIATIVES TO INCREASE DIVERSITY IN STEM DISCIPLINES



Overtoun Jenda, Auburn's assistant provost for Special Projects and Initiatives and professor in the Department of Mathematics and Statistics, secured an additional \$5 million from the National Science Foundation for a five-year project that aims to diversify the workforce in the Black Belt region of Alabama by increasing the number of students from historically underrepresented groups who receive undergraduate and graduate degrees in the fields of Science, Technology, Engineering, and Mathematics (STEM). Jenda had previously secured \$5 million in funding for two projects aimed at increasing diversity in the STEM workforce, bringing his total to \$10 million in the last year.

The most recent grant is part of the National Science Foundation's Louis Stokes Alliance for Minority Participation (LSAMP), which strives to assist universities and colleges in diversifying the nation's STEM workforce by increasing the number of baccalaureate and graduate degrees awarded to populations historically underrepresented in STEM disciplines, including African Americans, Hispanic Americans, American Indians, Alaska Natives, Native Hawaiians, and Native Pacific Islanders.

"Since 1991, LSAMP has been a flagship program of the NSF, and Auburn has been a member of LSAMP since 1994," said Jenda. "LSAMP is well known for its success in producing minority STEM degrees at the undergraduate and graduate levels."

Jenda will administer funding from the NSF LSAMP grant to benefit the Greater Alabama Black Belt Region Alliance, which consists of eight partner institutions, including Auburn University, Auburn University Montgomery, Alabama State University, Enterprise State Community College, Southern Union State Community College, Troy University, Tuskegee University, and The University of West Alabama.

Scholars at the partner institutions will receive benefits including scholarships, peer mentoring, free tutoring, research internships, travel to research conferences, collegiate success preparation, participation in enrichment programs and academies, study abroad opportunities, mathematics enrichment initiatives, and access to several academic workshops. Each year, funding from the grant will impact more than 275 minority undergraduate and graduate

students, and upwards of 200 high school students throughout the Alabama Black Belt region.

"We are thrilled at the opportunity to bring this program to Alabama's Black Belt region, and having Auburn University as the lead institution is truly an honor," said Jenda. "We are looking forward to working with our partner institutions to implement these activities that will lead to more STEM degrees and a more highly qualified workforce for the Black Belt region."

Working with Jenda from Auburn University on the Greater Alabama Black Belt Region LSAMP Alliance is Ash Abebe, professor in the Department of Mathematics and Statistics, and Edward Thomas, associate dean for research in the College of Sciences and Mathematics and Lawrence C. Wit Professor and Charles W. Barkley Endowed Professor in the Department of Physics.

The program began this fall at all eight alliance institutions.

Since fall 2016, Jenda has secured approximately \$10 million in grant funding to assist underserved and underrepresented students pursuing careers in STEM

disciplines, including two additional grants from the National Science Foundation, an NSF INCLUDES award (aub.ie/8nu6wq) and an NSF MAKERS grant (aub.ie/qsomen).

For more information about the Greater Alabama Black Belt Region LSAMP Alliance, including the informational flier and online application form, visit this web address: cws.auburn.edu/apspi/pm/LSAMP. For more information on the National Science Foundation's LSAMP program, go to this website: nsf.gov/funding/pgm_summ.jsp?pims_id=13646.

Additional inquiries may be directed to lsamp@auburn.edu.

Written by Brittany McCullough



INVERSE EVEREST

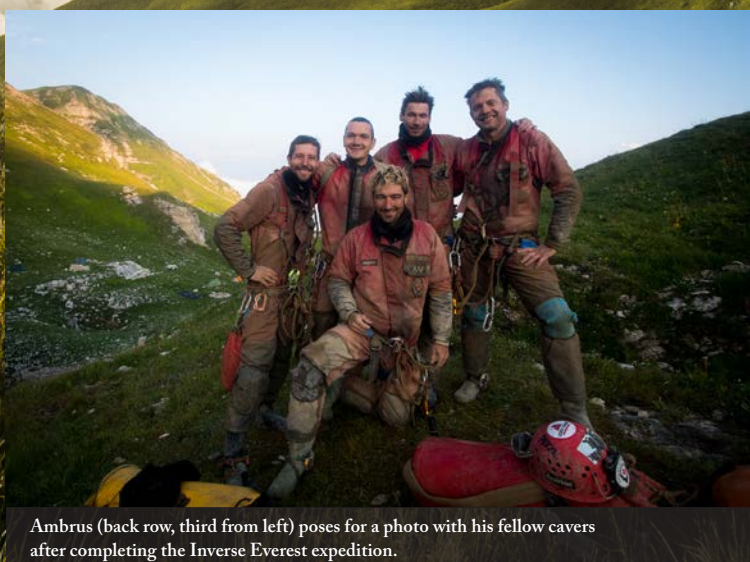
THE QUEST FOR ROCK BOTTOM



**COSAM ALUMNUS GERGELY
AMBRUS, MATHEMATICS '06,
DESCENDED APPROXIMATELY
7,000 FEET BELOW THE EARTH'S
SURFACE INTO THE DEEPEST CAVE
KNOWN TO MAN.**

The descent took place in Krubera Cave, located in Abkhazia, Georgia, in the Caucasus Mountains, and is known as an “Inverse Everest” expedition due to the extreme depth and challenge presented when attempting to reach the bottom. The journey took nine days to complete, but in many ways, Ambrus’ adventure began some sixteen years ago when he was first introduced to caving as an undergraduate student in mathematics at the University of Szeged in Hungary.

“The first time I went into a cave was in 2001,” said Ambrus. “I went with some friends from university. I joined them for a little caving weekend. Then I started to like it, so I went to more and more caves, mostly horizontal caves at first. After I became more experienced, I started to learn how to use ropes so I could explore vertical caves. Using the rope is similar to what climbers use. The main difference is that cavers are always hanging on the rope, and the climbers just use it for safety. Our weight is always supported by rope.”



Ambrus (back row, third from left) poses for a photo with his fellow cavers after completing the Inverse Everest expedition.



Ambrus, who is a native of Budapest, Hungary, has explored caves all over the world, including in Alabama during his time as a master's student at Auburn University, studying under the direction of Mathematics Professor Andras Bezdek.

"I've done a lot of caving," said Ambrus, "and you have really nice caves in northern Alabama. Really scenic pictures can be taken there."

Underground photography is one of Ambrus' areas of expertise, and for the Inverse Everest expedition, he and his fellow travelers set a goal of becoming the first team in the world to take professional photos and video of Krubera Cave.

"Being an underground photographer is something which is quite complicated," said Ambrus. "It's a really harsh environment for the cameras, you have to carry batteries

and equipment for nine days, you have to know how to take the photos. It's not an easy task."

It requires a team to accomplish any caving expedition, but especially a descent into Krubera Cave. A team is necessary for carrying all of the gear, which averages between sixty and eighty pounds per person. A team is also required for safety.

"The places we go are usually more than a day away from the entrance," said Ambrus. "If you are alone and something happens to you, even if you just dislocate your shoulder or your ankle, then you are pretty much dead because you cannot move to get out. For safety, you always have a friend with you, and we are always working together in the cave. We have to depend on one another, trust one another, and be responsible for one another. You should

never engage in any activity that may be too dangerous or cause the others to have trouble. Caving is really a group activity."

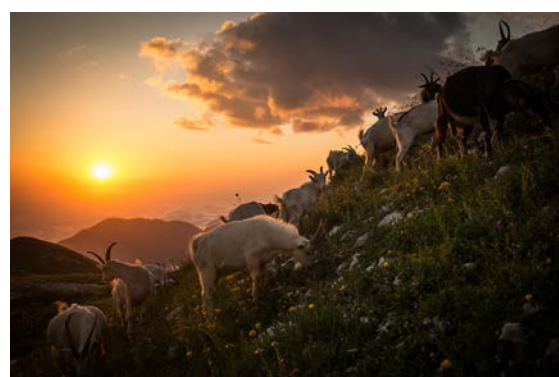
Ambrus completed the Inverse Everest expedition with a team of five other experienced cavers.

"You need a lot of caving experience to complete this task," said Ambrus. "We had been caving several times together in the previous year, so we knew one another quite well. You need to have the free time and the financial resources to make such a big commitment. You need to be physically fit. I do a lot of running, but the best way to prepare for something like this is by caving, because you also have to do a lot of organization, like packing equipment, food, and deciding what to take and what not to take. For this expedition, the planning is quite complicated because the cave is very wet, so you have to pack everything to be

waterproof. You have to make sure your sleeping bag remains dry, and so on."

In total, the team spent one month together, including the travel to the cave, which posed its own set of logistical hurdles.

There are only two points where travelers can enter Abkhazia. One from the north, in Russia, and one from the south, in Georgia. The team decided to enter from Georgia, which required them to cross into Abkhazia on a bridge via a horse-drawn carriage. After crossing the bridge, they waited several hours for the Russian Army posted at the boarder to let them into the country. Once in Abkhazia, they made a stop in the capital, Sukhumi, to get visas. From Sukhumi, the team traveled for approximately seven hours into the Caucasus Mountains on an old Russian army truck that broke down twice along the way. Once in the mountains, the team



unloaded their gear and hiked another three hours to the base camp.

The base camp at the top of the cave is adorned by a map of Krubera Cave and repurposed helicopter parts, including a make-shift kitchen table made of a rotor. The helicopter parts are what remain after a 2005 helicopter crash (everyone survived). Another piece of helicopter metal shields the entrance to a cave, and yet another serves as a “refrigerator,” providing protection for perishable food that travelers are able to pack in snow, even in the summer.

The expedition team used a shovel and giant plastic bag to gather snow each day, which was melted and used for drinking water. A nearby shepherd’s hut offered other conveniences, such as a gas tank for cooking, as well as an occasional visit to the base camp by a local goat, cow, horse, or dog.

The cavers spent approximately one week at the base camp before descending into Krubera Cave. During that time, they conducted day trips into the cave to deposit supplies and food, and also allow themselves a chance to get accustomed to the cave and techniques necessary for making the approximately 7,000-foot descent.

They also explored the area above ground, which is marked by green hillsides covered with grazing mountain goats and meandering limestone canyons that were carved out by rainwater. The limestone formations continue beneath the earth’s surface to form miles and miles of caves.

TO VIEW A GALLERY OF AMBRUS' PHOTOS TAKEN IN KRUBERA CAVE, VISIT THIS WEB ADDRESS: AUB.IE/IEGALLERY



“One of the biggest dangers to the caver is rainwater,” said Ambrus. “It is really important to watch the weather. One might think that weather does not affect a caver, but it does, because the most dangerous thing is floods—flash floods. If there is a big storm on the surface, then in a couple of hours there is going to be a lot of water with a lot of force in the cave, which can be fatal. Most caving accidents are a result of floods. You can imagine that if you are hanging in a deep pitch and a huge waterfall arrives, the water can suffocate and also transport a lot of stones. In a big pitch, if you have a little stone fall on your head from the height of 300 feet, it will kill you, so you have to be really careful with the weather.”

It is rainwater that makes small, unassuming cave entrances the most ideal for entering the cave. Whereas wide cave entrances will allow large amounts of rock to enter the cave, which may result in blocked passageways, smaller, more narrow cave entrances offer protection from rubble.

Ambrus and his fellow cavers entered a small hole in the side of the Caucasus Mountains to

“We have to depend on one another, trust one another, and be responsible for one another. You should never engage in any activity that may be too dangerous or cause the others to have trouble. Caving is really a group activity.”

begin their descent in Krubera Cave. The rope they used has been in place for years, so part of their expedition requires them to inspect the rope and make repairs, as needed.

For nine days, the team was inside the cave, without sunlight, in 100-percent humidity, and temperatures that averaged 35 degrees Fahrenheit. Permanent campsites are in place along the way down for adventurers to share. A telephone line also reaches to the bottom of the cave, and each morning and evening, the team used the line to contact base camp and let them know they were OK.

The cavers wore wetsuits beneath their outerwear and gear to protect themselves from the cold, wet conditions. As they descended, they experienced vast, open pitches and small, tight passageways that wouldn't allow them to change the position of their arms.

For drinking water, they used a water cleaning pump. In the evenings, they used petrol cookers to heat food beneath tents where they huddled in an effort to escape the harsh elements.



This passage, located 4,000 feet below the surface, required the cavers to submerge themselves and their gear under water to continue. Many have turned back at this point in the expedition.



Members of the Inverse Everest team with a makeshift Hungarian flag in "Game Over," the final chamber of the expedition, which is approximately 7,000 feet below the surface.





“It is nice because in the evening you can warm up a bit in the tent using the petrol cooker, and you can maybe make 65 degrees Fahrenheit, which is luxury,” said Ambrus. “But then, in the morning, after you have a good night’s sleep in your sleeping bag, you have to put on your wetsuit again, which is 35-degrees Fahrenheit and completely wet because it is 100-percent humidity in the cave. The humidity can also be a big problem for the cameras and the flashes, but we were quite lucky. All the gear worked pretty well.”

Perhaps the most daunting portion of the expedition is a passage located at about 4,000 feet below the surface that requires the cavers to submerge themselves under water to continue.

“You do not need diving equipment, you just take a big breath and go,” said Ambrus. “There is a leading rope, so you are pulling yourself through the siphon. Of course, it is very cold. The water is really cold, but the most important thing is to get yourself mentally ready. Everybody knows that the siphon is there, but many people turn back from that point, because once you are on the other side, after that point, any injury is surely fatal.”

The final chamber of Kruber Cave is approximately 7,000 feet deep and is named “Game Over.”

“Completing this expedition is the equivalent of reaching the top of Everest for a mountaineer,” said Ambrus. “Kruber Cave became the deepest cave in 2001, and in the last fifteen years, most of the caving efforts in Kruber went into diving. At the bottom of the cave there

are two forks: one leads to the Game Over chamber. The other fork goes under water, so you need diving equipment to try the passage, which leads to a deep syphon and eventually into the Black Sea, about fifteen miles away. A Ukrainian cave diver, Gennadiy Samokhin, reached a depth of about 52 meters, or 150 feet, so he has the record for reaching the deepest point in the earth.”

While Ambrus is thrilled to have conquered Kruber Cave, his true passion is in cave exploration.

“What I prefer the most is to explore new paths. For most of the caves in the world, especially those with high entrances, you have a lot of lot of unknown passages. I like to descend down into caves and try to find new, unexplored passages. We have done this in Italy, Slovenia, Croatia, Montenegro, Hungary, and in my life, I have been lucky enough to have found several kilometers of new passages, several miles of new passages. It’s a really fascinating experience to be the first person in a cave, the first person to bring light into a cave passage. Imagine what it’s like to explore a cave that has been there for perhaps millions of years, and nothing has ever happened there, and then you are the first to set footprints inside the cave. On the surface, most of the things in the world have been discovered and mapped, but underground, there is still a lot to do and a lot to discover.”

Ambrus is currently a research fellow at the Renyi Institute of the Hungarian Academy of Sciences, and a professor at the Budapest

Semesters in Mathematics. After receiving a master’s in mathematics from Auburn, he completed his doctorate in pure mathematics at the University College London in the United Kingdom.

Ambrus said his knowledge of mathematics, degree from Auburn, and experience in the U.S. aid him in his caving expeditions, including the achievement of successfully photographing and reaching the bottom of Kruber Cave.

“I think knowledge of mathematics—the logistics and the organization—is useful to have,” said Ambrus. “What is really similar in mathematical research and cave research and expeditions, is you have to set a goal and you have to keep at it. In mathematics, it’s the same. When you are doing research and you would like to prove a theorem, you try to prove it one way, then a second way, and a third way, and it usually doesn’t work out, but you cannot give up. You have to work for your goal, and it is the same in exploration, and it’s the same in expedition. You have to set your goals clearly and then just keep trying. I think that is a common theme in mathematics and caving.

“One more connection between caving and Auburn is the mentality I was exposed to in school. In Auburn, in the United States, I think people are really working hard toward their goals, and in that respect, I think it was really useful for me to learn and study at Auburn.”

Written by Candis Birchfield, Photos by Gergely Ambrus

DEPARTMENT OF GEOSCIENCES RECOGNIZED FOR EXCELLENCE IN EDUCATION

Auburn University's Department of Geosciences was selected to receive the 2016 University Senate Departmental Award for Excellence in Education, an honor that carries with it a \$30,000 grant that will be administered in three yearly installments of \$10,000 and used for activities that enhance teaching and learning.

"The Department of Geosciences is to be commended for its teaching excellence and progressive planning, and for putting together an excellent proposal that reflects their departmental goals," said Auburn University Provost and Vice President for Academic Affairs Timothy Boosinger. "The award recognizes the faculty's dedication to their students."



The award, established at Auburn in 2013 and first presented in 2014, is administered through the University Senate Teaching Effectiveness Committee on behalf of the Office of the Provost.

In early 2016, academic departments across campus were invited to submit to the Teaching Effectiveness Committee pre-proposals summarizing the departmental philosophy of teaching and learning and a narrative describing the approaches used to achieve and measure excellence in those areas. Four finalists were selected to give presentations detailing learning excellence and plans for future activities to enhance teaching and learning.

The winning proposal for the Department of Geosciences was written as a team effort by Department Chair Mark Steltenpohl and faculty Ronald Lewis, John Hawkins, Stephanie Shepherd, Daniel McGowin, and Carmen Brysch.

"The Department of Geosciences is made up of a diverse set of transdisciplinary researchers and teachers for whom the whole Earth is our laboratory," Steltenpohl said. "Our faculty bridge both the social sciences and the natural sciences, perhaps more so than any other unit on campus. We emphasize traveling the globe to involve students in field- and laboratory-based research and educational experiences that include study abroad courses, always placing a human face on science."

Offering undergraduate and graduate degrees in geology and geography, the Department of Geosciences serves 30 master's candidates, approximately 110 undergraduate students, and thousands of students annually in core sciences courses.

Plans for the award funding include a focus on undergraduate programs by implementing a sophomore-level professional development course that will facilitate the development of professional student ePortfolios; developing an apprentice program in which upperclassmen work with freshmen and sophomores in both lab and field research; the use of Engaged Active



Student Learning (EASL) classrooms; and development of a more rigorous internship program with input from a twenty-seven-member Geosciences Advisory Board.

The department will also make increased professional use of everyday technology by teaching students skills, such as how to gather data for geologic mapping, how to produce images of landforms, and methods of documenting interviews in human geography.

"Often, we will be using the same pieces of equipment that students already use in their personal life, such as smartphones, tablets, and laptops," said Lewis, associate chair for the Geology Program and chair of the Departmental Curriculum and Teaching Committee. "The funds will be put to good use in obtaining the needed hardware and software for this program."

Another focus in the future will be a move into one facility. The department's programs are currently housed separately, with the Geology Program temporarily located in Beard-Eaves-Memorial Coliseum, and the Geography Program in Haley Center, but plans include moving both into a new facility in a few years.

"Many of the curricular changes provided for by the grant were strategically drafted to allow the department to be well positioned to occupy our new home," Lewis said.

Written by Charles Martin and Caitlin Miley

COSAM RESEARCHER LINKS COLLAPSE OF MAYA CIVILIZATION WITH LACK OF HURRICANES, REVEALS BENEFITS OF CYCLONES



More than a millennium ago, in what is now southern Mexico and northern Central America, the ancient Mayan empire stretched across an area the size of Texas.

The Maya civilization flourished along the Yucatán Peninsula and built temples now regarded as one of the “Seven Wonders of the World,” until approximately A.D. 1000 when the Maya territory inexplicably disappeared.

For centuries, the collapse of the Maya civilization has both intrigued and puzzled researchers as studies have examined sociopolitical factors, endemic warfare, migration, and many other circumstances at the time of the Mayan’s demise.

A recent study by Martín Medina, associate professor in the Department of Geosciences, has determined that drought due to low tropical storm activity could be to blame for the Maya civilization collapse.

“Paleoclimate records discovered in the last two decades show that the Mayans

experienced severe drought,” said Medina. “We found that during the collapse, the Yucatán Peninsula in particular experienced eight events of droughts. It rained half as much then as it does today. Knowing what we know about the agricultural systems in the region and how they had to capture water in order to sustain their populations, a drop in precipitation by half would have had important implications for the Maya civilization.”

Medina developed a series of paleoclimate records by looking at stalagmites, calcium carbonate structures that grow in caves from the bottom of the floor, and stalactites, which grow from the ceiling of the cave. These structures are formed from drips of rainfall containing specific minerals.

“The way I see a cave is like a library of climate and environmental information that is waiting to be decoded and tapped into,” said Medina. “We extract the stalagmite, slice it, and inside of the stalagmite, it has growth bands like tree

rings, each corresponding to a certain time. We take little samples and measure the proportions of two forms of oxygen in the carbonate, and these tell us how much it rained in the past. The more it rained, the more of one of those forms of oxygen there will be. We can even determine changes in vegetation through pollen found inside the stalagmite.”

Once Medina determined the droughts existed, he and his team then looked at the reason these droughts occurred.

“We found out there is a strong relationship between tropical cyclone frequency and precipitation variability in the region,” said Medina. “When cyclones were more frequent in the region, it rained more in the Yucatán Peninsula and vice versa, when the frequency of tropical cyclones was lower, we found that there was a drought. The droughts coincided with times of low tropical cyclone frequency. Cyclones didn’t bring enough rainfall to bring the region above levels of drought in terms of rainfall.”

Medina says the study forced him to look at tropical storms in a new and different way, and allowed him to assess ways that regions can benefit from a hurricane’s rainfall.

“We never thought of tropical storms as being a positive force until we did this research,” said Medina. “Typically, you think of tropical cyclones only as destructive forces in terms of flooding and wind strength. If we are able to overcome the negative impacts, that will allow the natural systems to replenish themselves through tropical cyclones, which they’ve been doing for thousands of years. If you can withstand their negative impacts then you will be able to reap the benefits of their rainfall fluxes.”

Global circulation models predict that

by the end of this century, the Yucatán Peninsula will become even drier.

“In the Yucatán Peninsula, a tropical cyclone can produce as much rainfall in three days as it rains in the region over the course of a year,” said Medina. “So, thinking about the future, if the Yucatán becomes more arid and the water table becomes more depleted due to climate change and human extraction of freshwater, you can think of tropical cyclones as a source of freshwater that can help restore and support agriculture, drinking, and hygiene purposes.”

Medina’s theory has implications here in the United States, as well, especially in regions known to experience the devastation of flooding, like Louisiana and Texas.

“Flooding is a serious issue for our cities and they are not built to typically withstand dramatic rainfall fluxes like the ones associated with tropical cyclones,” said Medina. “The largest impact from tropical cyclones is in relation to storm surges, or the sea level rising, which causes ‘waves’ to come inland which floods large extensions of continental territory. There are infrastructures that we can develop like higher levies, and levies that can withstand a category 5 hurricane. Doing this will help mitigate the negative impacts from tropical cyclones.”

Medina’s study was selected as the cover story for the September 2016 edition of the scientific journal *Quaternary Research*.

His research is featured in the documentary “In Search of our Lost Future: A Journey to the Past to Find the Key to our Future.”

Written by Lindsay Penny



A look into the 48-year-career of an Auburn mathematician, Curt Lindner

The story of Curt Lindner's life and career as a mathematician is on full display in his office. Stacks of books and papers cover everything from his desk to a small sofa pushed against a wall. No surface is left untouched. Even the walls are adorned with photographs, notes, and drawings, each one a memento of his life and career.

Lindner is Distinguished University Professor at Auburn University, and the material in his office represents forty-eight years of service at Auburn.

Featured prominently on his office walls is his best friend, fellow mathematician Alexander Rosa, professor emeritus at McMaster University in Canada.

Lindner and Rosa met for the first time, face-to-face, in 1970 at a mathematics conference at the University of Montreal. The two immediately hit it off and began a life-long friendship and working relationship.

They published their first co-authored paper in 1975 titled, "Steiner Triple Systems Having a Prescribed Number of Triples in Common."

Lindner located a copy of the scholarly work buried within a stack of papers on the sofa in his office. Its pages now yellowed with age, the paper represents the beginning of a career-long collaboration between the two mathematicians who have more than forty published, co-authored papers.

"When we first began working together, he would come to Auburn or I would travel

to Canada," said Lindner. "Neither of us had any money at the time, and when we got together, I would sleep in the basement when visiting him, and he would sleep on the sofa in the living room when visiting me, and we would work on mathematics twenty-four hours a day."

Lindner and Rosa were both awarded the Euler Medal at the 48th Southeastern International Conference on Combinatorics, Graph Theory and Computing. The award is the highest honor bestowed by the Institute of Combinatorics and Applications.

"The medal is a high honor, a lifetime achievement award that they give only when they think you are about to croak," laughed Lindner. "The fact that Alex Rosa received the medal at the same time is wonderful. To receive it alongside my friend means more to me than getting the medal."

When asked if he always knew he wanted to be a mathematician, Lindner pointed to a photo hanging on his office door. The image shows a sixteen-year-old Lindner hanging out with three of his friends at a drugstore in Decatur, Georgia, called "Reddings." They are each donning either letterman or leather jackets and 1950s slick hairstyles.

"Back when I was a drugstore cowboy, I never dreamed I would be doing what I am doing now," said Lindner. "I failed Algebra I and Algebra II in high school, and I had to take it



LEFT: Lindner has always enjoyed Auburn football. One of the photos on Lindner's office walls features him on the field in Jordan Hare Stadium, sometime in the 1980s, doing the Heisman pose.

CENTER: A photo in his office of James Cagney in *Yankee Doodle Dandy* gives away Lindner's passion for musical theater.

RIGHT: Lindner and Rosa: Friends and colleagues Kurt Lindner and Alexander Rosa have come full circle. In this photo, they are at the first annual Southeastern International Conference on Combinatorics, Graph Theory and Computing, 48 years ago in Boca Raton, Florida. Lindner and Rosa were both awarded the Euler Medal this year at the 48th conference, which also took place in Boca Raton, Florida.

in the summer to make up for it. I did very well the second time around because I didn't have football or track to distract me. I didn't study in high school. All I cared about were girls, football, and track and field. I didn't give a damn about school. I had to take an IQ test to get into college. In college, I found mathematics came naturally and easily, so I studied it."

Immediately after high school, Lindner served in the Army before starting school at Presbyterian College, where he had a half scholarship in track and earned a bachelor of science in mathematics.

He was accepted at Emory for graduate school, but before beginning work on his master's, Lindner spent a year in Jacksonville, Florida, teaching at Duncan U. Fletcher High School.

After a year as a high school teacher, Lindner continued his education at Emory University, where he received a master's in mathematics. It's also where he began dating his wife, Ann.

Lindner pointed to a photo of his wife enjoying a day at the beach with their sons. As he looked at the image, he explained how he and his wife went to high school together in Decatur but didn't start dating until their paths crossed again at Emory.

Ann is a registered nurse. She and Lindner have three sons together, and Ann has traveled all over the world with Lindner during his career.

Their first stop after Emory was Coker College, where Lindner accepted a teaching position.

"What an experience!" said Lindner. "It was a women's college in South Carolina and the best four years of my life. The social life! There was an endless round of cocktail parties on the old plantations. It was a wonderful time. We had small children and no money, but it was a wonderful experience. Those were also the days when I really fell in love with mathematics. I realized I wanted to do research in mathematics."

Lindner returned to Emory and pursued a doctorate in mathematics.

"When I got my Ph.D. in mathematics, I was very lucky to be getting in on the ground floor of a certain area of finite mathematics that turned out to be fundamentally important," said Lindner. "I met world-famous mathematicians like the late Marshall

Hall, Jr., a leader in the Naval Intelligence effort to break Japanese codes during World War II."

Lindner looked at a photo of Hall hanging on his office wall and recalled hours spent with him, drinking martinis, discussing discrete mathematics, specifically combinatorics and design theory, a field Lindner described as an abstract form of geometry.

Lindner's office also features photos of mathematicians like Elizabeth Billington, a retired professor from The University of Queensland.

"The University of Queensland is one of my favorite places," said Lindner. "I am an honorary professor over there and spend a month there almost every year."

Lindner also travels to London once a year, but it's not a work-related trip. A photo in his office of James Cagney in *Yankee Doodle Dandy* gives away his passion for the theater and provides a clue as to why he travels to London.

"I am a big theater buff," said Lindner. "Every year I go to the West End in London and see seven shows in six days, mostly musicals. It's great. It's the best theater in the world. That's what I wish I could have been—a performer, singing and dancing my way into the hearts of all America—but it didn't work out that way."

Although Lindner harbors a desire to be an actor, he readily acknowledges he made the right choice to pursue a career in mathematics. He appreciates that his work has taken him all over the world, including Italy, Kuwait, Iran, Slovak Republic, Czech Republic, Turkey, Australia, Poland, Thailand, England, New Zealand, and more; and that he has developed lifelong friendships with colleagues both at Auburn and abroad.

"I love mathematics," said Lindner. "You get to solve problems. It is all esoteric. There is no money involved. What can I say? I just love mathematics. And writing papers is my life. I dream at night of getting to the point where I can just write papers. Mathematics is great. You can sit around and think about it, and you have close colleagues you can get together with and drink whisky and talk about mathematics. I have had a good career, and I don't know what I would have done if I actually had to work for a living. I couldn't do it."

Written by Candis Birchfield



A MESSAGE

from the former Associate Dean for Research

Raymond Henry

It is a pleasure to reflect on the progress and accomplishments that have stood out in COSAM. The new budget model promises to bring financial stability to the college along with the opportunity and ability for long-term planning and program development. This year we are in the midst of interviewing candidates for eleven positions, from Biophysics to Virology. In addition to the ten positions that the college searched for last year, this represents the nucleus of a vital core of young and energetic researchers to augment our faculty. It is this cohort who will chart the direction of the college in years to come. The college is actively involved in four of the ongoing Cluster Hires, and the call for the next round of clusters is on the horizon. Our current young faculty also continue to have success. Steve Mansoorabadi and Brad Merner, both of the Department of Chemistry and Biochemistry, as well as Haruka Wada of the Department of Biological Services, were recently awarded prestigious NSF CAREER awards, bringing the number of current NSF CAREER awardees in the college to five. Les Goertzen, in the Department of Biological Sciences, was awarded an NSF REU Site grant in Bioinformatics, which officially got under way this summer. Ed Thomas, in Physics, is leading an interdisciplinary group of Auburn researchers as part of the state's NSF EPSCoR grant in low temperature physics. Luke Oeding, in Discrete Mathematics and Statistics, is bringing two conferences to the Auburn campus this year. Faculty in Geosciences, working

together with Forestry and Wildlife Sciences, have developed a joint doctoral program in Earth Science Systems.

Leach Science Center is being expanded and renovated to house all of the research facilities in the Department of Physics, a section of Haley Center is being renovated to house the Department of Mathematics and Statistics, and the Department of Geosciences has been moved to surge space in the Beard-Eaves Memorial Coliseum while they await their permanent home in the new Interdisciplinary Science Building, one of two planned buildings to replace Funchess Hall. The process of replacing Allison Laboratory and Parker Hall is scheduled to begin soon.

We are in the third year of a three-year program to increase the levels of our graduate student assistantships, making us more competitive in attracting the best graduate students to our research programs.

So, as I end my three-year tenure as COSAM's associate dean for research, I can say with confidence that the foundation of research in the college is strong and the future is bright.

Raymond Henry
Former Associate Dean for Research
Professor of Biological Sciences

THREE FROM COSAM RECEIVE PRESTIGIOUS NSF CAREER AWARDS

The NSF Faculty Early Career Development, or CAREER, program is a foundation-wide activity that offers the National Science Foundation's most prestigious awards in support of junior faculty who exemplify the role of teacher-scholars through outstanding research, excellent education, and the integration of education and research within the context of the mission of their organizations. Three faculty from the College of Sciences and Mathematics (COSAM) are recent recipients of the prestigious award.

Chemistry professor combating red tides

Auburn University is familiar with battling against a red tide, but this time the foe is coastal red tides that have a significant negative impact on the environment and economy.

Steven Mansoorabadi, assistant professor in the Department of Chemistry and Biochemistry, received a five-year, \$703,000 CAREER Award from the National Science Foundation to study the problem through his project, "Mechanistic and Biosynthetic Studies of Dinoflagellate Bioluminescence."

"It's a very prestigious award, and it's very humbling," said Mansoorabadi. "I'm excited that I was selected for the award, and that my science is appreciated by the scientific community. Bringing in the resources to continue this research is great."

His research looks at dinoflagellates, marine microorganisms found in coastal and freshwater environments that bioluminesce, or glow. Some species of dinoflagellates produce toxins, which can cause harmful algal blooms and cause coastal waters to become brown or red, known as red tides.

"It's very costly both to tourism and the seafood industry, and is harmful to humans and marine life," said Mansoorabadi. "It can be detrimental to the environment. Shellfish poisoning is often caused by dinoflagellate toxins, and even breathing in spray from affected waters could cause respiratory problems in humans."

According to the National Oceanic and Atmospheric Administration, every coastal state in the U.S. has suffered a red tide over the last decade. Harmful algal blooms occurring in U.S. marine waters are conservatively estimated to have an average annual cost of \$82 million due to impacts on public health, tourism, and the seafood industry.

Mansoorabadi and his team are looking at a particular enzyme that causes the dinoflagellate to glow to better understand how the enzyme works and how it is regulated. Understanding the biochemical

process by which the enzyme is made will allow the researchers to target a specific pathway to treat red tides.

"Once we have a better understanding of the enzyme, comes the applications," said Mansoorabadi. "We can then create algacides for red tides and even use enzymes that glow as a biological tool for cell imaging and tracking infection in the body. The enzyme can really be developed for a number of potential applications."

The enzyme is thought to produce light through chlorophyll, the photosynthetic pigment found in plants and algae.


"There's an unknown pathway in which these dinoflagellates take chlorophyll and produce bioluminescent substrate," said Mansoorabadi. "We're a biochemistry lab, so we're trying to understand the fundamental biochemistry of what is going on and study these processes so we can rationally design a compound to inhibit their function. As far as I know, we are the only lab, nationally, to do this type of research. Woodland Hastings at Harvard University was a big contributor to this area, but since his death in 2014, no one else, that I am aware of, has picked things up since."

As part of the NSF funding, Mansoorabadi collaborates with two K-12 initiatives in COSAM's Office of Outreach, Destination STEM and the Summer Science Institute, to teach and inspire students to pursue careers in the sciences.

"Bioluminescence is really a fascinating phenomenon, and it really gets kids excited about biology and chemistry, and science in general," said Mansoorabadi. "We have a lot of hands-on demonstrations and activities that the students can come out and see. For some of the younger students, it's the first time these kids have been on a college campus, so they get to see what it's all about."

Prior to joining the faculty at Auburn University, Mansoorabadi was a postdoctoral fellow at the University of Texas, and he received a doctorate from the University of Wisconsin-Madison.





Biologist studies lifelong effects of stressors during development

Haruka Wada, assistant professor in the Department of Biological Sciences, is scientifically proving the old adage, “what doesn’t kill you makes you stronger.”

“We think we know stress or stressors because we feel them everyday, we talk about it everyday, but when it comes to the physiology of stress, there are a lot of unknowns, and this is partly because how we respond to stress depends on what we’re feeling that day,” said Wada. “The way you perceive a physical, physiological, or psychological stress is also influenced by what you’re currently going through and previous exposure to a similar stressor, including during childhood.”

Her project, “Proteostasis to Allostasis: Integration of Cellular and Organismal-Level Stress Responses,” will critically evaluate how a stress response is regulated while improving scientists’ understanding of stress responses at both the organismal and cellular level. The study is made possible through a five-year, \$1,018,132 NSF CAREER Award.

Scientists have long studied stress responses at the organismal level and cellular level separately, but the connection between the two levels is unknown. Wada will investigate how those levels link together, and how stress responses change with a previous exposure to a stressor and developmental conditions.

Wada and her team are currently using heat conditioning, a mild stressor applied to juvenile zebra finches the team is raising, as a way to increase stress tolerance in adulthood. For a month, the birds are exposed to mild heat stress for a few hours each day. As the birds become adults, they

are exposed to higher levels of heat stress and are able to better tolerate those higher levels.

“So, the question is, what are the physiological changes that allow them to tolerate those stressors later on in life?” said Wada. “In simpler terms, the physiology of what doesn’t kill you makes you stronger. We often consider being under stress as a negative thing, but being under moderate amounts of stress can have positive effects, such as enhancing memory or immune function.”

Though there are benefits of short-term, moderate stress, prolonged stress can cause long-term elevation of adrenalin and cortisol, which can lead to high blood pressure and suppressed growth, reproductive, immune, and memory functions.

“Low socioeconomic status is a common stressor in our region and often correlates with unhealthy lifestyle choices such as tobacco use, excessive alcohol consumption, lack of physical exercise, and unhealthy dietary choices,” said Wada. “Those lifestyle and dietary choices increase the risk for hypertension, cardiovascular disease, obesity, and diabetes.”

As part of her CAREER Award, Wada will work with COSAM’s STEM-IQ program. The program trains middle and high school teachers from rural areas within the southeast region of Alabama to promote participation in science fairs and enhance the overall quality of science projects.

Wada is developing a module to educate students about stress and ways to cope with daily stressors. She will also open her lab to teachers and students to help them conduct research and prepare for science fairs.

Playing molecular Lego: Merner explores the complex architecture and construction of creating carbon nanotubes

Bradley Merner, the James E. Land Assistant Professor of Chemistry, received a five-year, \$700,000 NSF CAREER Award for his proposal titled, “Functionalized Bent para-Phenylenes: New Strategies and Tools for the Synthesis of Carbon Nanotubes.”

“This CAREER Award from the National Science Foundation has enabled my research group to work in a very exciting area of chemical synthesis over the next five years,” said Merner.

The funding will allow two doctoral students, Nirmal Mitra and Caroline Merryman, to dedicate 100 percent of their efforts toward assisting Merner in the development of new strategies for the controlled synthesis of carbon nanotubes.

Carbon nanotubes were discovered in 1991, and today they have broad applications in materials science, engineering, and biological sensing. They are used in batteries, dental implants, electronics, cancer detection, biological and biomedical research, drug discovery, water filtration, and more. The applications, although broad, are still limited due to complexities inherent in the construction of carbon nanotubes.

Currently, scientists create carbon nanotubes by synthesizing benzene rings, stacked one on top of the other, continuing from the bottom up, to form a cylindrical carbon nanotube.

Complications stem primarily from carbon’s resistance to adapting to a cyclical molecular structure. The ensuing result is a carbon nanotube that is not uniformly synthesized at best, and completely disintegrated at worst.

The inability to construct uniform carbon nanotubes limits the possibilities and full potential of applications for usage, especially as it relates to research, since research depends upon a uniform control group.

“These hexagons (molecules) can be thought of as a sheet of plywood,” said Merner. “It is really hard to bend a sheet of plywood. Similarly, it is hard to bend benzene rings. Like bending plywood, a lot of strain and potential energy is built into



the benzene ring that needs to be released somehow. So, we have to be careful not to ruin the hoop-like structure that we have formed. Typically, what can happen with these compounds is they can succumb to rearrangement reactions, they can fragment and decompose.”

Merner’s group is seeking to discover more effective and efficient methods for constructing carbon nanotubes by building smaller sections of carbon nanotube that can be assembled into larger nanotubes in a systematic way.

“It’s like molecular Lego,” said Merner. “The idea is to take atoms, molecules, and the electrons that are associated with those atoms and molecules, and bring them together in a way that will allow us to access pure material.”

“One of the biggest challenges to discovering new applications for carbon nanotubes and pushing them forward is access to pure material. What chemists like me and my group are trying to do is come

up with control and selective chemical synthesis and develop methodology, strategies, and protocols that can ultimately lead to the synthesis of one type of nanotube. I think that once our group, or other groups—and there are several groups working on this project around the world—once that comes to fruition, we can really start moving forward with the applications of carbon nanotubes.”

In addition to the research function of the grant, Merner is developing an educational component involving the development of chemical synthesis teaching modules that are offered to rising junior and senior high school students in the southeast who participate in COSAM’s Summer Science Institute. Underrepresented, undergraduate students will also have an opportunity to participate in a graduate-level, chemical synthesis, summer research program, and students enrolled in the honors organic chemistry course at Auburn will synthesize materials used in research efforts in the Merner lab.

“We are able to offer students a cutting-edge chemistry experience,” said Merner. “Students are learning about chemistry that is really at the frontiers of chemical synthesis. They are learning the techniques necessary for graduate school, and they are learning how to think through problems.”

Merner has six doctoral graduate students in his lab, including Mitra and Merryman, as well as Kara Johnson, Sydney Jackson, Ana Dmytrechuk, and Nirob Saha.

For more information on Merner’s lab, visit the website at this address:
auburn.edu/cosam/faculty/chemistry/merner

Written by Lindsay Penny and Candis Birchfield





The long, hard road for **Hellbenders**

Scientists spend years searching for giant salamander in Alabama

On a hot, late August afternoon in 2016, an expedition of scientists carefully turned onto a narrow, one-lane, dirt road that ran parallel to the railroad tracks. Their trucks precariously balanced canoes and kayaks as they weaved a short distance marked by deep potholes. In single file, they arrived at the back entrance to the property, property owned by a family from scientist Jeff Garner's childhood.

"The gate's locked," shouted Garner to the team. "I know another way in!"

Garner grew up in Lauderdale County. A biologist with the Alabama Department of Conservation and Natural Resources Division of Wildlife and Freshwater Fisheries, Garner's local connections were the team's key to accessing the more remote portions of Butler Creek, portions that run through private property.

The group, led by James Godwin, an aquatic zoologist with the Auburn University Museum of Natural History's Alabama Natural Heritage Program, was searching for the Eastern Hellbender, the largest salamander in North America. A Hellbender can reach more than two feet long and can live for decades. Once found abundantly throughout its native range, which extends from northern Alabama and Georgia to New York, Eastern Hellbender populations are experiencing steep declines. In fact, the species was thought to be completely eliminated from the state of Alabama, but unconfirmed sightings in recent years have given scientists new hope that the species still exists in the state.

In 2015, another team of scientists working under Godwin's direction found an Eastern Hellbender in Alabama in the Flint River, not far from the Tennessee border.

Over the course of the next year, Godwin continued to organize Hellbender expeditions but was unsuccessful in locating the creature a second time, despite the animal's preference for a very specific habitat—swift-moving, clear-water streams or rivers with rocky bottoms in the northern Alabama, Tennessee River drainage basin.

On that summer afternoon in August, Godwin's latest team had already explored another section of Butler Creek. The only animals they caught were a couple of turtles and a Midland Water Snake. No sign of the Eastern Hellbender.

Facing a locked gate, the caravan drove back down the dirt road and continued several miles, circling the edge of the property before ultimately arriving at a private residence.

Garner led the team down a long driveway, past a family home, and onto a barely visible trail, marked only by tire-flattened grass. At the end of the trail stood a rusting metal carport that shielded a couple of free-roaming house cats and an old sofa, and beyond that was Butler Creek.

After gathering their field tools, including snorkels and masks, underwater flashlights, nets, and a malleable clasp cant hook, the scientists stepped into the water to continue their search for the elusive Eastern Hellbender.

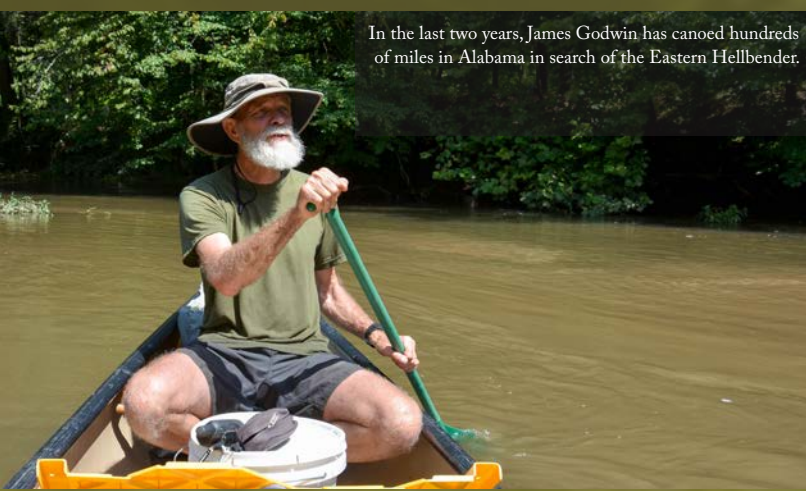
Butler Creek presents an ideal Hellbender habitat, and undaunted by more than a year's worth of searching with no results, Godwin and his team of scientists waded



During the search for the Eastern Hellbender, scientists dive underwater and search crevices beneath large rocks. Pictured is Eric Soehren (left), a biologist with the Alabama Department of Conservation and Natural Resources State Lands Division, and Mercedes Bartkovich, a wildlife consultant with Wetland Environmental Land Projects.



James Godwin poses with one of only two Eastern Hellbenders he has found in Alabama in the last two years.



In the last two years, James Godwin has canoed hundreds of miles in Alabama in search of the Eastern Hellbender.



The scientists found all kinds of animals during their search for the Hellbender.



James Godwin continues to work well into the evening by the light of a headlamp as he runs water samples through a filter to extract environmental DNA or eDNA, which is DNA collected from a source other than the actual organism, in this case, the water. The presence of hellbender eDNA in the water would indicate the animal is or was living in the area.

confidently into the waist-deep waters of the creek. So accustomed were they to the work at hand, they hardly noticed the rocks in their shoes, the occasional leech on their skin, or the stray dog that swam up to investigate the activity as they dived into the water over and over again, blindly running their hands beneath rocks, hoping to feel the large flat body and loose folds of skin indicative of a Hellbender.

The flat body shape of a Hellbender allows it to create chambers beneath large flat rocks in streams where they dwell during the day. At night, they come out and forage in the streams.

“Hey Jim, someone’s coming,” said Eric Soehren, a biologist with the Alabama Department of Conservation and Natural Resources State Lands Division.

“The good news is, he doesn’t have a gun,” said Godwin, as he turned to acknowledge an elderly man and a child walking along a limestone outcrop along the edge of the creek, making their way toward the group of scientists in the water.

Garner recognized the man as the property owner, Ulva Rhodes, whom everyone calls “Uvie,” and his grandson, Dalton.

“It’s just me!” called Garner.

A wave of recognition passed over Uvie, and the men settled into a long conversation about family, fishing, and the work the scientists were conducting in Butler Creek.

“Oh, yeah,” said Uvie, “I’ve seen them. What did you say they are called?”

Among locals, “Hellbender” is one of the least common names used for the massive salamander, preferring instead monikers like “Snot Otter,” “Devil Dog,” “Lasagna Lizard,” “Grampus,” or “Mud Cat,” among others.

Encouraged by the news that Hellbenders had been seen in the creek, the scientists continued their search, focusing their efforts on one area that appeared promising due to several large underwater rocks, prime habitat for the Hellbender.

“I’ve got one!” shouted Soehren.

The group moved cautiously toward Soehren. Then, one by one, the scientists took turns diving under water, flashlights in hand, to capture a glimpse of the Hellbender hiding in the back corner of a rock cavity.

“They are here!” said Godwin, giving everyone a thumbs up as he emerged from inspecting the Hellbender under water. “We haven’t lost them all!”

The Hellbender was just out of arm's reach, so the team explored other options for extracting the animal from its hiding place. The rock was large and heavy, and they feared if they lifted it using the malleable clasp cant hook, they might accidentally drop the rock on top of the Hellbender and kill it.

In addition, moving a rock that large would stir up a lot of silt, and Hellbenders depend on clean, clear water because they absorb oxygen in the water through their wrinkled, baggy skin.

Soehren and Godwin both tried to coax the Hellbender out of hiding using a long thin stick, but to no avail.

Knowing Hellbenders are most active at night when they are hunting for food, the scientists asked Uvie if they could return in early evening and try again.

"Sure," said Uvie. "As long as you aren't drinking or drugging, you are welcome to come back and work as long as you want."

Godwin's team was unable to find the Hellbender when they returned that evening.

The scientists spent a week exploring other locations in the area. They canoed more than eight miles down Sugar Creek and identified Wood Ducks and Great Blue Herons, River Cooters and hummingbirds. The team saw all manner of spiders and fishes, and countless wildflowers in bloom, but no Hellbenders.

Based on scientific records, populations of Hellbenders in Alabama have been in decline since the 1960s and 1970s. Declines of other aquatic species, such

as freshwater muscels, have also been reported during the same time period.

"As scientists, we ask why," said Godwin. "What has brought about this decline?"

Based on observations, Godwin believes the disappearance of Hellbenders, as well as other freshwater species, may be directly related to a decline in water quality.

“Out of approximately 836 total aquatic species in the state of Alabama, 246 are imperiled.”

"We know that we used to have a nice intact forest with good leaf litter on the forest floor that would capture rain water and serve as a water filter, cleaning out debris like sand, silt, clay, and other materials before slowly releasing the water into the streams," said Godwin. "Hellbenders thrive in clean, cool streams, and a natural forest would both clean the water and keep the water cool by providing shade. As the forests are being cut, as the landscapes are changing, as there are more impacts upon the natural areas surrounding the creeks, more soil is being freed up and washed into the creeks with each rain event. The adults cannot survive if there is too much soil, sediment, and silt coming into the stream system."

Godwin said another cause of the Hellbender's decline in Alabama is the construction of dams in the Tennessee

River, which have changed water flow characteristics, including the creation of lakes where there were once small streams. Chemicals related to agriculture could also result in detrimental physiological effects on Hellbenders.

"All these things begin to add up, and we begin to have extirpations and fragmentations of local Hellbender populations," said Godwin. "We also see reduced numbers of Hellbender food sources, like crayfish and fish, so it becomes a loss-of-species snowball effect."

Out of approximately 836 total aquatic species in the state of Alabama, 246 are imperiled. The outlook for the southeastern U.S., an international hotbed of aquatic diversity, is just as dim, with approximately 763 imperiled aquatic species in the region. It is the threat of losing more biodiversity that pushes Godwin to continue.

"The Hellbender is important because it is an indicator of water quality," said Godwin. "Where we find the Hellbender we find a stream of good water quality. If we could find ways to bring about improvements in our streams so that we have the natural ecological filtering systems back in place, it would improve water quality for the Hellbender, it would improve water quality for the mussels, the fish, the insects, the crayfish, and it would improve water quality for us. The need for good water quality links us all together. So, for our own good, we need to think about why we are losing Hellbenders, look for solutions, and implement those solutions."

Godwin has worked with the Alabama Natural Heritage Program for twenty

four years, and during that span, he has conducted research on a number of declining species in the state, including Eastern Indigo Snakes, Alabama Red-bellied Turtles, Alligator Snapping Turtles, Northern Map Turtles, Red Hills Salamanders, and more.

His current work with Eastern Hellbenders is supported in part by funding from the Alabama Department of Conservation and Natural Resources and a multi-state grant from the U.S. Fish and Wildlife Service.

For more information on the Auburn University Museum of Natural History Alabama Natural Heritage Program, visit the website at www.alnhp.org.

Written by Candis Birchfield

James Godwin and Duston Duffie, a biologist with the Alabama Department of Conservation and Natural Resources State Lands Division, carry a kayak through shallow water in Butler Creek in Lauderdale County.



Assisting Auburn University scientist James Godwin in the search for the Hellbender is a team of scientists from multiple institutions around the U.S., including Auburn University alumna Lesley deSouza, who received a bachelor of science in zoology and entomology and a doctorate in biological sciences, both from Auburn.



ALUMNA SPOTLIGHT

KATHERINE SELEY-RADTKE

Katherine Seley-Radtke is the Presidential Research Professor of Chemistry and Biochemistry at the University of Maryland, Baltimore County (UMBC). She earned her doctorate in organic chemistry at Auburn University under the mentorship of Stewart Schneller, former dean of the College of Sciences and Mathematics. Seley-Radtke followed a non-traditional pathway to her career in science, enrolling in college at the age of fifteen, but leaving to marry when she was eighteen. She later returned to academia in her late thirties to pursue bachelor's and doctoral degrees while raising a family.

Her research, which is primarily funded by the National Institutes of Health, involves drug discovery and development. She uses a synthetic organic/medicinal chemistry approach to nucleoside and heterocyclic drug discovery and development. Current projects include the investigation of flexible nucleosides/nucleobases, "fleximers," for use against SARS, MERS-CoV, Ebola, Zika, Yellow Fever, and Dengue, among other viruses. Notably, she and her group were the first researchers to publish a nucleoside inhibiting coronaviruses, with potent activity against both SARS and MERS. She also has two compounds currently undergoing studies against several cancers, such as triple negative breast, lung, renal, and prostate.

Seley-Radtke has given more than 100 invited talks worldwide in twenty-five countries, published more than seventy peer-reviewed papers, and has organized a number of international conferences focused on medicinal chemistry and drug design. She is currently the president of the International Society of Nucleosides, Nucleotides, and Nucleic Acids (IS3NA), and an executive board member for the International Society for Antiviral Research (ISAR), as well as serving on a number of committees for both societies. She is one of the National Academies of Science's Jefferson Science Fellows at the U.S. Department of State. She is also a member of the American Chemical Society's Medicinal Chemistry Division Awards Committee, and an associate editor for *Antiviral Chemistry and Chemotherapy*, as well as *Current Protocols in Chemical Biology*.



Most recently, Seley-Radtke was named the 2016 Maryland Chemist of the Year by the American Chemical Society.

1 What does the accomplishment of being named Maryland's Chemist of the Year mean to you?

This is an incredible honor. There are so many outstanding chemists in Maryland, many of whom are my colleagues. I still can't quite believe I was selected!

2 You were the keynote speaker at the 2008 Society of Women in Sciences and Mathematics Symposium. Why are programs like the Society of Women in Sciences and Mathematics important?

Women still remain a minority in many areas of science, including chemistry, however, I think we are making important strides. For example, I have many more female colleagues at UMBC than I did when I started out as an assistant professor at Georgia Tech (there were only two of us) eighteen years ago. More importantly,

since our enrollment numbers for women are at fifty percent or more at both the undergraduate and graduate levels, I think it is very important for young women to have successful role models to get them excited about science.

3 What is the most rewarding part of your career?

Two things; first, being able to do the kind of science that I do. Drug design is challenging and, at times, even frustrating, but knowing that every day you are working to try to find cures for neglected diseases such as MERS, SARS, Zika, Dengue, and Ebola, as well as cancer, is very rewarding.

The second is helping young scientists, particularly women, gain the confidence to pursue and be successful in a career in chemistry. As president of IS3NA, I started a scholarship program for early career women. This allows graduate students, postdocs, and young investigators to get training in someone else's laboratory, to attend a specialized workshop, or attend a specialized conference. I felt this would not only expand their skillset and their scientific expertise, but it would also help them gain self-confidence. Fortunately, friends of mine, Professor David Chu of the University of Georgia, and his wife, Jane, decided to support my vision, and I am deeply grateful for their support. Because of their support, we now have the IS3NA Chu Family Foundation Scholarships for Early Career Women, as well as a similar award for the International Society of Antiviral Research. I am also the program director for UMBC's NIH-funded Chemistry Biology Interface Graduate Training program. This program features hands-on and cross-disciplinary training, learning how to give talks and presentations, as well as helping students develop professionally so they can go on and be successful in their future careers. To me, helping students succeed is one of the most important things we do, and it is tremendously rewarding!

Written by Lindsay Penny

GOLF “FORE” A CAUSE AT THE COSAM DEAN’S SCHOLARSHIP

The College of Sciences and Mathematics’ (COSAM) Dean’s Scholarship Golf Classic is an annual event benefiting scholarships for COSAM students. Since its inception, the Golf Classic has awarded more than 50 scholarships.

The 22nd annual Dean’s Scholarship Golf Classic was held on September 15, at Robert Trent Jones Grand National in Opelika. Through the support of COSAM’s alumni and friends, two, in-state tuition scholarships were awarded to outstanding COSAM students Victoria Roberson (left), a senior in biomedical sciences/pre-med, and Madison Armstrong (right), a junior in molecular biology/pre-med.

The college appreciates the businesses and individuals who made the event a success.

To learn more about the COSAM Dean’s Scholarship Golf Classic, contact Brook Moates at brook@auburn.edu or (334)-844-2931.



ALUMNI UPDATES

making an impact

Upshaw Named Chair of the Pat Conroy Literary Center Board of Directors



COSAM Distinguished Alumna **Jane Upshaw**, mathematics '69, was named the inaugural chair for the Pat Conroy Literary Center board of directors. The center strives to cultivate a passionate and inclusive reading and writing community in honor of famous American novelist Pat Conroy, who dedicated his life to spreading his love for literature and writing to future generations.

"Pat Conroy was my friend for over twenty years," said Upshaw. "He really was an incredible writer. He was internationally known, had films made of his books, but what Pat really was, is a wonderful teacher. When he was so tragically taken from all of us, his family came together and said, 'We have to do something that will preserve and help move forward the generous heart that was Pat Conroy.'"

His family established the Pat Conroy Literary Center, which works to provide space for book clubs and writing groups, offer master classes in poetry, memoir, and fiction, and give support and encouragement to both emerging and advanced writers of all ages.

Upshaw holds both undergraduate and master's degrees from Auburn in mathematics, and a doctorate in mathematics education from the University of South Carolina. She was named a COSAM Distinguished Alumna in 2008. She was the first female chancellor of a senior campus in the University of South Carolina System, a former Auburn University Alumni Association board member, and a recipient of the highest, South Carolina civilian honor, the Order of the Palmetto, presented by the Governor of South Carolina. She is now the Distinguished Chancellor Emeritus. For more information on the Pat Conroy Literary Center, visit patconroyliterarycenter.org.

COSAM Alumna Named NASA Graduate Aeronautic Scholar



Jamesa Stokes, physics '14, is one of only five recipients nationwide of a NASA Graduate Aeronautic Scholarship.

The scholarships are funded by the STEM Education and Accountability Project for a total of \$275,000 and will be used to support research related to NASA mission priorities. Students are guided in their research by principal investigators at their institutions. The expectation is that the students' research will culminate in peer-reviewed journal publications and presentations at scientific conferences.

Stokes is currently a graduate student at Penn State University in the materials science and engineering program. Her research involves thermal barrier coatings to improve fuel efficiency of gas turbine engines.

While at Auburn, Stokes was a member of the Honors College and was awarded a Fulbright Scholarship, which allowed her to conduct research at the German Space Agency's Institute of Structures in Design in Stuttgart during summer and fall of 2014.

An Atlanta native, Stokes has completed internships with Goddard Space Flight Center in Greenbelt, Maryland, and the Jet Propulsion Laboratory in Pasadena, California. In addition, she was a Benjamin A. Gilman International Scholar to Reutlingen, Germany.

Trawick Named Senior Vice President and Chief Operating Officer for Southern Power



John Trawick, applied mathematics '90, has been named senior vice president and chief operating officer for Southern Power, a subsidiary of Southern Company.

Trawick was formerly senior vice president of commercial operations and planning for Southern Company. In his new role, Trawick will lead the operations of Southern Power's expanding electric generation fleet, as well as project development and construction, and asset optimization.

Trawick began his career as a senior consultant with J. Kennedy and Associates in Atlanta before joining Southern Energy Inc., in 1996, where he served as director of market affairs for Mirant Corp. He later transitioned to Southern Company as manager of portfolio management and served in a variety of roles, including director of strategic and corporate affairs for Southern Power.

In 2008, he joined the Tennessee Valley Authority as vice president of strategy, pricing, and contracts before returning to Southern Company in 2013.

Trawick is a member of the COSAM Dean's Leadership Council, and the COSAM Campaign Committee. In addition to an undergraduate degree from Auburn, Trawick has a master's degree in mathematics from the University of Tennessee.

Trawick and his wife, Tammi, have two sons and live in Birmingham.

Hansford Receives Andalusia High School's Outstanding Graduate Award



Dr. William "Bill" Hansford, pre-med '64, received Andalusia High School's Outstanding Graduate Award, an honor given to graduates whose personal lives, professional accomplishments, and community service exemplify the ideals of Andalusia High School.

Hansford is a longtime COSAM benefactor and member of the Dean's Leadership Council, along with his wife, Gerrie (pictured), laboratory technology '63.

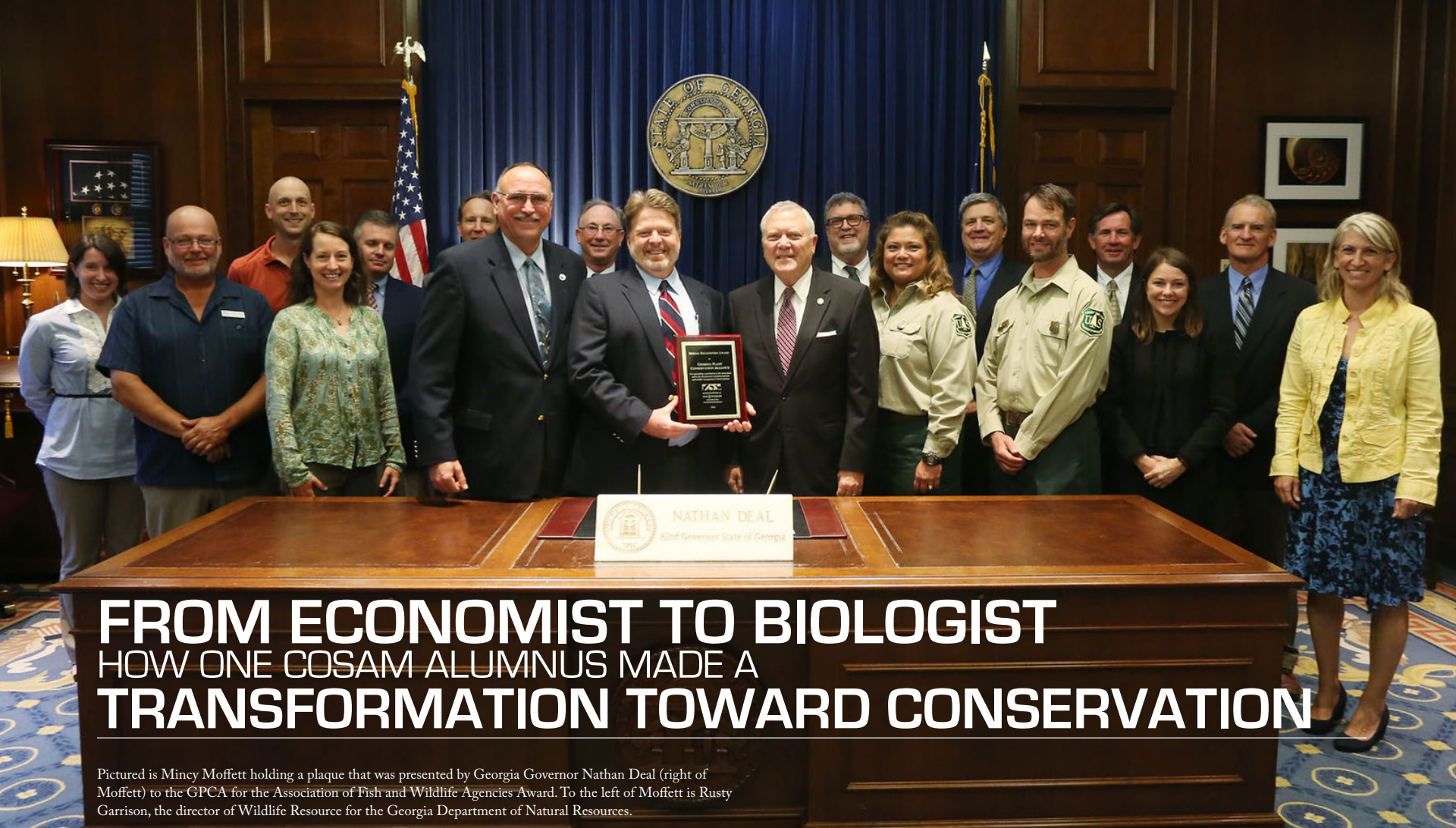
After his time at Auburn, Hansford attended the University of Alabama at Birmingham School of Medicine. From 1970 until his retirement in 2012, Hansford worked as a physician and medical director focusing on underserved communities in Texas, Arizona, and Alabama, specifically in his beloved Covington County and the surrounding area. He provided primary care on a Navajo Indian reservation, which he calls a "life changing experience and the highlight of his career."

Since his retirement, Hansford has continued his involvement in various charities, educational organizations, his church community, and his writing. He has authored a book, *Andalusia: A Collection of Photographs, Brief Genealogies, Histories, and Events Prepared by the Author for the City he Loves and the People he Loves*.

Hansford was presented the Outstanding Graduate Award at a ceremony held in his honor in Andalusia.

At his graduation from Andalusia High School in 1959, he received the school's Graduating Outstanding Student Award. He is the first in the school's history to receive both the Graduating Outstanding Student and Outstanding Graduate Awards.

The Hansfords reside in Shelby County and have three children and five grandchildren.



FROM ECONOMIST TO BIOLOGIST HOW ONE COSAM ALUMNUS MADE A TRANSFORMATION TOWARD CONSERVATION

Pictured is Mincy Moffett holding a plaque that was presented by Georgia Governor Nathan Deal (right of Moffett) to the GPCA for the Association of Fish and Wildlife Agencies Award. To the left of Moffett is Rusty Garrison, the director of Wildlife Resource for the Georgia Department of Natural Resources.

Mincy Moffett came to terms with a tough reality when he was in his late twenties. He had an undergraduate degree in economics from the University of the South (Sewanee), an MBA from Georgia State University, and a job with upward mobility at Georgia Federal Savings and Loan in downtown Atlanta, but he was miserable.

"I had a career that I hated and two degrees that I didn't want to use anymore, so I thought, 'Man, I've got to make a change,'" said Moffett.

Moffett decided to take a break and head north to Washington, D.C. He stayed with his brother for a month, which was time Moffett used to evaluate his career options.

"I had always been an environmentalist at heart, and there were a lot of environmental groups in D.C.," said Moffett. "I thought, 'I have this business background, and even environmental groups have a business side—they have to earn money, they have an administrative function that needs to be handled.' I decided to try to market myself to any environmental group that would consider me."

He was hired by Greenpeace USA, which is an organization that uses peaceful protest to call attention to environmental problems and work for solutions.

For seven years, Moffett worked for Greenpeace, rising to administrative director, utilizing skills he had acquired from his time spent in higher education, including his business acumen, leadership, financial management, and rock climbing. That's right. Rock climbing.

In addition to being paid for his administrative work, Moffett volunteered to participate in many nonviolent acts of civil disobedience. He had done some rock climbing in high school and college, so he often served as one of the organization's protest climbers.

"We hung a lot of interesting banners," said Moffett. "We scaled the DuPont Chamberworks water tower between I-95 and I-295 along the Delaware River and hung a big, blue ribbon banner that said, 'No. 1 ozone destroyer.' This was back when CFCs (chlorofluorocarbons) were being produced, and DuPont was the world's largest CFC producer."

Commonly referred to by the DuPont brand name "Freon," CFCs are chemicals primarily used as refrigerants or in aerosol cans. In the mid-1970s, CFCs were scientifically linked to chemical depletion of the ozone layer around the earth. Damage to the ozone causes an increase in ultraviolet radiation, which can have numerous adverse effects, including a rise in the incidence of skin cancer.

As a result, by the mid-1980s, concern and protest over the production and use of CFCs had reached a fever pitch, especially amongst environmental organizations like Greenpeace. Moffett's DuPont water tower climb took place in 1989, and the banner was sixty-five feet tall.

"The blue-ribbon banner was hung right under the DuPont logo on their tower, so it read, from top to bottom, 'DuPont No. 1 ozone destroyer,'" said Moffett. "We awarded the DuPont facility the blue ribbon for being the world's number-one producer of ozone destroying chemicals. Everybody traveling on that interstate corridor, Philly to New York, would have seen it."

Moffett and two other Greenpeace volunteers stayed on top of the 180-foot water tower for three days in protest of the manufacture of CFCs. They locked the ladder cage on the tower using steering wheel locks so no one could climb up and try to force them down. News helicopters hovered near the tower so they could interview Moffett and the other protestors.

Banking on the Environment

The World Bank United States headquarters in Washington, D.C., was another target of Greenpeace protest. In July 1994, the USA Today building was located next to The World Bank building. Moffett and fellow volunteers dressed like elevator repairmen and took the elevator in what was then the USA Today building to the top floor where someone let them onto the roof.

"Security is too tight in The World Bank building," explained Moffett, "so we had to jump from the roof of the USA Today building to the roof of The World Bank building. When I say 'jump,' I don't mean like in the movies. It wasn't very far. We sort of hopped over."

The protesters used the window washing arms as the basis for hooking up the rappel gear and the banner. Then, they put the window washing arms over the side of the building and rappelled down, unrolling a sixty-foot banner along the way.

“I got to hang a big banner on the face of The World Bank building on Pennsylvania Avenue, which is just four or five buildings down from The White House,” said Moffett. “This was pre-9-11. If you were hanging out on the top of a building on Pennsylvania Avenue now, you would get shot.”

The banner featured a “World Bankenstein” creature holding a chainsaw with the words, “No dollars for destruction.” The Greenpeace activists were protesting The World Bank’s role in funding projects that resulted in deforestation, damming of free-flowing rivers, and displacement of native peoples.

“We awarded the DuPont facility the blue ribbon for being the world’s number-one producer of ozone destroying chemicals. Everybody traveling on that interstate corridor, Philly to New York, would have seen it.”

“It was the fifty-year anniversary of the Bretton Woods Conference, which set up The World Bank, and they were inside the building throwing themselves a birthday party,” said Moffett. “We decided to throw them a birthday party Greenpeace-style. Suddenly they were being punked with this huge banner that covered a large chunk of their building. I just remember rappelling down, letting out the banner, and seeing one face through the glass after another with expressions that said, ‘What the @!*\$% is that guy doing?!?’

You can’t do that forever. That’s a young person’s game. I met my wife in D.C. She worked for Greenpeace too, and we decided we wanted to do something different.”

Turning Dreams into a Reality

Moffett, who had always loved plants, decided he wanted to become a plant scientist. The problem? He had no science background, whatsoever.



Moffett and his wife moved to Stone Mountain, Georgia, and lived with Moffett’s dad in the family home. For two years, Moffett attended Georgia State University and took basic biology, chemistry, and physics, and served as an undergraduate teaching assistant and assisted with several research projects, all in an effort to build his credentials for graduate school admittance.

“I was lucky,” said Moffett. “I had seven or eight offers of places to go, Auburn being one of them.”

Moffett ultimately decided to come to Auburn, in large part due to his initial impressions of Biological Sciences Professor Robert Boyd.

“Before I started in the fall of 1997, Dr. Boyd invited me to help set up research grids at Bon Secour National Wildlife Refuge on the Ft. Morgan peninsula and meet some of the other graduate students,” said Moffett. “We set up six massive research grids dispersed along twenty miles of beach totaling 1,200 sampling stations. We finished setting up the grid and Hurricane Danny hit while we were down there. It was only a category 1 storm, but it

cut off the narrow part of the peninsula so we couldn’t get back to Gulf Shores.”

Due to the hurricane, Moffett and the others had to spend several days at the research facility after their work was complete.

“One thing we were able to do was stop at a liquor store and buy a bunch of hurricane supplies,” said Moffett. “So, we drank hurricanes, at night, during the hurricane, and played cards, because there was nothing else to do. We had done our work; we couldn’t go anywhere. That was my first introduction to Auburn. If ever I had second thoughts about Auburn—which I didn’t—but if I had second thoughts about coming to Auburn, I realized during that hurricane, this is really cool. This is where I definitely want to be. Dr. Boyd and I just clicked. I was an older, non-traditional student, and there isn’t a lot of difference between our ages. We have a similar sense of humor, and it was just a really good fit. Sometimes it’s just right and you know it.”

Boyd’s lab is divided into two sections. One side of his lab focuses on research into how certain plants take up toxic levels of metals, how these plants are able to survive, and the plants’ relationship with insects. The other side of his lab is centered on plant conservation research, and this is where Moffett spent his time and energy.

During graduate school, Moffett conducted surveys on a variety of endangered or critically imperiled plants, including *Xyris tennesseensis* ‘Tennessee yellow-eyed grass.’

“Tennessee yellow-eyed grass is not a grass at all,” said Moffett. “In appearance, it is more like a dayflower or lily. The plant is only found in Georgia, Alabama, and Tennessee, and was the subject of my dissertation.”

Making a Difference

Moffett is now a rare-species botanist with the Georgia Department of Natural Resources, Nongame Conservation Section where he: conducts rare species surveys; restores and manages rare habitats on state, federal, and private land; reintroduces rare species back into restored habitat; serves



on the prescribed fire team; and conducts education and outreach programs for all ages and a variety of groups.

“There are about 30,000 recognized plant taxa (species, subspecies, and varieties) in the U.S. and Canada, and of that number about 4,500 can be found in Georgia,” said Moffett. “This includes mosses, liverworts, grasses, herbs, shrubs, trees—both native and exotic—you name it. Of those, about 700 native taxa are rare enough to be of conservation concern, and 155 receive state

Moffett (right) with his academic mentor, Robert Boyd, professor of biological sciences



legal protection. Of that number, 30 are federally listed. The number of plant taxa in Alabama is very similar to that found in Georgia.”

Along with his work with the Georgia Department of Natural Resources, Moffett serves on the board of the Georgia Exotic Pest Plant Council, the steering committee of the Bog Learning Network, and spends countless hours providing leadership for the Georgia Plant Conservation Alliance, or GPCA.

The GPCA is an umbrella alliance in the state of Georgia that has as its members any institution that is responsible for, or interested in, plant conservation. The alliance currently has approximately forty members including state and federal agencies, non-governmental organizations, utility companies, academic institutions, arboreta, and botanical gardens.

“We meet formally three times a year to discover how we can work together on plant conservation and what kinds of resources we have that can support our projects,” said Moffett. “The key is to bring people together who know how to grow plants, people who have regulatory authority, and people who have land management capability.”

The efforts of GPCA were recognized by the Association of Fish and Wildlife Agencies, a non-profit 501(c)(6) organization that promotes and advocates on behalf of the fish and wildlife agencies of the states, territories, and provinces

of North America. The GPCA was presented with a national Award of Special Recognition, an extraordinary accomplishment since plants are not recognized as “wildlife” by either federal agencies or most state fish and wildlife agencies.

“The Association of Fish and Wildlife Agencies has always dealt with wildlife, but their definition of ‘wildlife’ is animals,” said Moffett. “The traditional definition of wildlife does not include plants, so they have never dealt with a plant group before. They have never given a plant award before because they don’t have one to give.”

Moffett explained that excluding plants from the definition of wildlife dates back to English Common Law and the tradition that the king owns anything that moves; but the feudal lords own anything that is rooted. The tradition carried over into U.S. law.

“That’s one reason the Endangered Species Act is very tough when it comes to animals but lax when it comes to plants,” said Moffett. “It will only protect plants that are on federal property, or property with some federal nexus, but not plants on private property.”

The unprecedented award recognizes a plant conservation group for the first time; it honors GPCA efforts over the past twenty-two years, many of which Moffett conceived or improved, including the better utilization of the resources, knowledge, and work plan of GPCA to help implement the State Wildlife Action Plan for Georgia.

A wildlife action plan serves as a state’s comprehensive plan for managing and conserving species and habitats before they become too rare or costly to restore. A wildlife action plan is also a requirement for eligibility in the federal State Wildlife Grant (SWG) program. Funding from SWG is the lifeblood of nongame programs in state fish and wildlife agencies. Nongame programs focus on the conservation of thousands of plant and animal species that aren’t hunted or fished. In Georgia, the Department of Natural Resource’s Nongame Program relies on SWG funding for one-quarter of its operating budget. State Wildlife Action Plans are prepared by all U.S. states, districts, and territories.

“A State Wildlife Action Plan is a big, big, big undertaking,” said Moffett. “It involves a listing of rare species in the different taxonomic groups, information

about rare habitats, and an assessment of needs, threats, and opportunities. All of this information must then be prioritized into a plan for how to address these various issues. It serves as a ten-year guide for directing limited conservation resources. The plan, with appendices, ends up being 600 to 800 pages or more, so it is a lot of work.”

The GPCA helped develop the plant portion of the Georgia State Wildlife Action Plan.

“Every state prepares a wildlife action plan, but not every state includes plants,” said Moffett. “Currently, only sixteen states include plants in their State Wildlife Action Plan, so the Association of Fish and Wildlife Agencies was not only very impressed with our actual plant conservation efforts, but also that the plant portion of the action plan doubles as the work plan of the GPCA. The two are inextricably linked.”

Numerous states are looking to Moffett’s expertise and GPCA for guidance on establishing similar organizations, including Alabama, which established the Alabama Plant Conservation Alliance in 2009.

The award of recognition also honors the safeguarding efforts of GPCA as they work to collect seeds or propagules of rare plants, grow them in a protected place, like an arboretum or greenhouse, and eventually grow enough of them to put some back into the wild. It’s an effort to warehouse genetic diversity, spread the extinction risk across a greater number of locations, and restore rare species to a place of ecological relevance in nature.

“It’s not really the award itself that is so wonderful, even though it is,” said Moffett. “It’s the fact that the Association of Fish and Wildlife Agencies has never, ever, ever before recognized plant conservation exclusively, or any group focusing on plant conservation. We got over the hump.”

Although Moffett has rappelled down buildings and camped out on top of a water tower, it is the award presented by the Association of Fish and Wildlife Agencies that has meant the most to him in his professional career.

“I was shocked when we received the award,” said Moffett. “Once the shock wore off, I was ecstatic. It’s the biggest thing that has ever happened to me professionally. Nothing else has come close.”

Written by Candis Birchfield

Moffett volunteers his time to maintain an area in the wild that features threatened plant species.



Moffett (far right) and Boyd (front row, center) often collaborate on plant conservation efforts.



ALUMNI UPDATES FROM BOSTON

making an impact

COSAM graduates are making a difference across the nation and around the world. We caught up with a few of our outstanding alumni in the Boston area to see what they have been up to since their time at Auburn.



Robert Cartee, molecular biology '93, is the associate research director at Matrivax Research and Development Corporation, a start-up biotechnology company founded in Boston in 2007.

Cartee and his company are working to make more affordable vaccines for a variety of different diseases and illnesses affecting children by producing the medication in a unique way, eliminating multiple manufacturing steps. Their typhoid fever vaccine recently completed clinical trials and FDA approval.

He moved to Boston in 2010 to join the staff at Matrivax, and before that, was a postdoctoral fellow at the University of Alabama at Birmingham.

Cartee's parents and siblings all attended Auburn, and his father was a professor at the Auburn University College of Veterinary Medicine for many years.

When he is not working, Cartee enjoys volunteering with his local Habitat for Humanity.



Paige Norby McClees, biomedical sciences '10, was a staff physical therapist at Massachusetts General Hospital where she performs annual physicals and baseline concussion testing for the Boston Bruins, Red Sox, and Patriots.

McClees is passionate about combining neurology with sports medicine and orthopedics, and has conducted research on concussions and its long-term effects.

Baseline testing, combined with physical therapy, helps determine the best and safest time for an athlete to return to play.

McClees, a Birmingham native, moved to Boston to attend the Massachusetts General Hospital Institute of Health Professions. She recently returned to Alabama, and is excited to bring with her the processes she has helped develop to her home state.



Michael McCollough, physics '75, '81, is an astrophysicist at the Harvard-Smithsonian Center for Astrophysics. He has more than twenty five years of experience in spacecraft operations, the processing of scientific data from spacecraft, and archiving spacecraft data.

McCollough currently serves as an archival astrophysicist with the Chandra X-Ray Observatory, a telescope specially designed to detect X-ray emissions from very hot regions of the universe, including exploded stars, clusters of galaxies, and matter around black holes.

He has worked as part of the operations team for the Hubble Space Telescope where he managed a staff of astronomers and data technicians. For the last thirty years, McCollough has analyzed data from astronomical radio, optical, X-ray, and Gamma-Ray telescopes, maintaining archives for investigators around the world. He has received more than twenty-five grants from NASA.

McCollough joined the Harvard-Smithsonian Center for Astrophysics in 2003 after his mission at the Marshall Space Flight Center in Huntsville had ended.

At an early age, McCollough became interested in astronomy, and while in college at Auburn, learned more about careers similar to his own. He and his three brothers are all COSAM graduates.

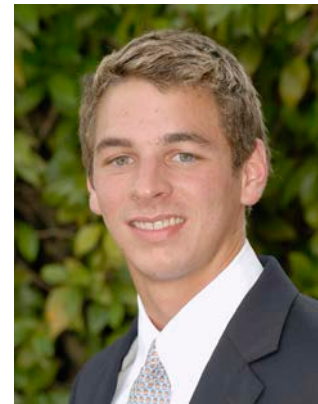


Hayes Morrison, earth science '98, is the deputy director of Maritime, Land Use, and Transportation Planning at the Massachusetts Port Authority, where she directs policy development and professional leadership for strategies and initiatives focused on transportation and maritime planning.

Morrison works closely with engineers to see that implementations of multi-million-dollar projects are on task, and she helps create strategic plans while offsetting the city's environmental footprint.

Morrison grew up in New Mexico and moved with her family to Madison, Alabama. She received a master's degree in city and regional planning at Clemson University, and accepted a planning position in Rockford, Illinois. She moved to Boston ten years ago when she received a job offer from the Massachusetts Department of Transportation.

She credits her Auburn education for her critical thinking skills, and says her background in biology and chemistry set her up perfectly as a planner.



Jordan Anderson, biomedical sciences '10, is a medical student at Harvard Medical School. At Auburn, Anderson was an All-American swimmer and Rhodes Scholar, where he studied medical anthropology at the University of Oxford for two years.

After completing studies at Oxford, he moved to Nashville, where he worked for a start-up, population health and accountable care organization at the leading edge of efforts to reduce health-care costs.

In 2014, he began medical school at Harvard, and is projected to graduate in 2018.

Anderson is married to Katie, biological sciences '10, a physician's assistant at Cambridge Health Alliance. The couple serves as pre-medical, non-resident tutors at the Winthrop House at Harvard.

Anderson, a Roanoke, Virginia, native, assisted his hometown dentists to provide dental care to low-income families, was a two-time SEC Academic Honor Roll member, was active with the Younglife Christian outreach program, and volunteered in many organizations as a student at Auburn.

ALUMNI SPOTLIGHT

DR. WILLIAM EARL BOBO



Dr. William Earl Bobo, molecular biology '92, is a radiation oncologist at the Southeast Radiation Oncology Group in Charlotte, North Carolina.

When he began his academic journey at Auburn, Bobo had set out to become a veterinarian.

"After meeting with Dr. Larry Wit (Professor Emeritus of Biological Science), I determined Auburn was the place for me," said Bobo. "I was drawn in a different direction and became interested in molecular biology, which was a new degree option at the time."

His advisors, Professors Bill Mason and Marie Wooten, helped guide Bobo into a career path he would soon love.

While at Auburn, Bobo was involved with the Beta Beta Beta biology society and was a part of the Wooten Laboratory, researching Fetal Alcohol Syndrome.

"My final decision to go into medicine was made late during my time at Auburn as I struggled between a Ph.D. and M.D.," said Bobo. "Ultimately, I felt medicine was right for me, as it would provide me more opportunities like patient interaction and the potential for research. My father was a surgeon, and despite his plea for me not to go into medicine, I felt it was my calling."

Bobo, a graduate of the Emory University School of Medicine, worked with cancer patients during his clinical rotations. As a result, Bobo made the decision to go into radiation oncology.

"I enjoyed the molecular aspects of cancer and all the advancements that were being made in our understanding of cancer processes, which appealed to my molecular biology background," said Bobo. "Radiation oncology satisfied my physics interests. The most rewarding part of my career is helping patients and interacting with them during their cancer journey. I visit with them weekly while on treatment and see them in follow up. The satisfaction I get from this experience is hard to describe. While there are depressing times in my career, it is also very rewarding to be with patients in their last days."

When asked about a favorite Auburn memory, Bobo says it is hard to say.

"I enjoyed so much; the energy of the school, the fantastic faculty, friendliness of campus, and the appeal of the small town, which is much larger now."

Bobo's daughter, an interior design major at Auburn, graduated in May 2017.

"It was truly a joy to go visit her on campus," said Bobo. "Auburn has grown so much since I graduated in 1992. The restaurants are fantastic, and we enjoy eating at as many as we can each time we go."

"Ultimately, I felt medicine was right for me, as it would provide me more opportunities like patient interaction and the potential for research. My father was a surgeon, and despite his plea for me not to go into medicine, I felt it was my calling."

Bobo says that his time spent in the College of Sciences and Mathematics (COSAM) was invaluable.

"My experience with COSAM was exceptional, and Drs. Mason and Wooten were very involved in my path and helped with my decision-making process," said Bobo. "The professors were readily available and always helpful. In fact, Dr. Wooten is the main reason I was awarded the Barry M. Goldwater Scholarship. She nominated me and worked diligently with me in the application process. She and many other faculty members demonstrated a true interest in my success."

Bobo and his wife, Kristi, psychology '92, have three daughters.

Written by Lindsay Penny



A MESSAGE

from the Director of Outreach

Mary Lou Ewald

What an exciting year it has been in the COSAM Office of Outreach. We have some new faces and new programs that I'm excited to share with you. Dr. Charles Eick, a recently retired science education faculty member from Auburn's College of Education, has joined the team to help manage our growing statewide Project Lead The Way (PLTW) program. Kristen Bond, a program administrator, was promoted to assistant director of the unit. She will now oversee many of the unit's educational programs, which will allow me to spend more time on our newest endeavor, the Southeastern Center of Robotics Education (SCORE).

Officially launched on December 4, 2016, SCORE was created to inspire and prepare future generations of STEM professionals by developing and delivering student robotics programs and competitions, online robotics resources, and professional development for educators. Tj Nguyen, who has worked in COSAM Outreach for the past eight years, first as an undergraduate student, then as a graduate student, was brought on as the first assistant director of SCORE and will oversee the center's programs. Nguyen has a background in mechanical engineering and science education, and he has a passion for inspiring kids to pursue STEM careers through robotics-based educational programs. Frank Ware, a retired middle school science teacher, brings his twenty-five-plus years as an educator, and his colorful personality, to the center. I am elated to have both of them on board as we develop SCORE from the ground up.

In addition to our collaborating partners on campus, we have also established a partnership with the Southern Museum of Flight in Birmingham, and we will host drone and aviation camps, and a variety of robotics programs at that location in the summers. As for funding, we are fortunate to have received a three-year commitment of support from the Daniel Foundation of Alabama to help jumpstart SCORE and establish a firm foundation for the new center.

You've probably heard the phrase "build it and they will come." This has certainly been the case for SCORE! To date, SCORE educators have traveled across the state to impact over 2,300 students and train 600 teachers, for a total of 8,650 contact hours. Events have ranged from science and technology teacher conferences and workshops, to community festivals, to in-school and afterschool programs for students. We've even hosted Boy Scout merit badge robotics events and birthday parties for kids. The response from our target audience has been overwhelmingly positive, and we are now faced with trying to expand our personnel to meet the vast need for this type of educational opportunity for schools in Alabama—a good problem to have for our first year of operation.

In closing, we are open to new opportunities and partners who can work with us to expand SCORE's efforts across Alabama and beyond. We'd love to hear your ideas and hope to see you at a SCORE event this year. Follow SCORE activities at scoreau.org.

A handwritten signature in black ink that reads "Mary Lou Ewald". The signature is written in a cursive, flowing style.

Mary Lou Ewald,
Director of Outreach

SCORE! ONE-STOP SHOP FOR K-12 ROBOTICS EDUCATION NOW OFFERED THROUGH COSAM

The Southeastern Center of Robotics Education (SCORE) is a new Auburn University outreach initiative designed to more effectively develop and deliver robotics education to K-12 students and teachers. The SCORE program centralizes the robotics education activities already underway in Auburn's College of Sciences and Mathematics (COSAM), Samuel Ginn College of Engineering, and Auburn University Aviation Center, and provides a mechanism for growth in the area of robotics education outreach. The initiative is the only center of its kind in the country.

"Jobs in today's industry require a much higher level of technical skills than twenty years ago, and will certainly require an even higher level of STEM-based skills twenty years from now," said Mary Lou Ewald, founding director of SCORE and director of outreach for COSAM. "More than ever before, it is critical that we invest in preparing the next generation of skilled workers—our future economy depends on it."

South's BEST (Boosting Engineering, Science, and Technology) is the premier robotics program hosted by Auburn and is included as a SCORE program. The dynamic, community-based enterprise aims to inspire middle and high school students to pursue careers in engineering, science, technology, and mathematics through participation in a sports-like science and engineering-based robotics competition.

SCORE also includes a BEST Robotics training workshop for teachers and mentors whose students compete in the competition. The workshop features sessions that allow teachers to become familiar with the VEX hardware used throughout the BEST Robotics competition.

Two additional teacher-based programs offered through SCORE are the Project Lead The Way RobotC Programming Workshop and the Project Lead The Way Launch VEX IQ Workshop.

"RobotC" is a programming language used in robotics. The workshop provides training and support to teachers interested in using RobotC as they incorporate robotics into the classroom.

The Launch VEX IQ Workshop gives elementary educators the knowledge and training they need to bring VEX IQ robots into the classroom for use as a learning tool.

"Robotics is still quite new to the K-12 education arena, and many teachers were not trained in robotics curriculum prior to entering the classroom," said Ewald. "Partnering with outstanding programs like BEST Robotics and Project Lead The Way gives SCORE educators instant access to a large number of teachers who want to be more prepared to lead their students into project-based robotics pursuits, but need the extra professional development to build their knowledge and confidence."

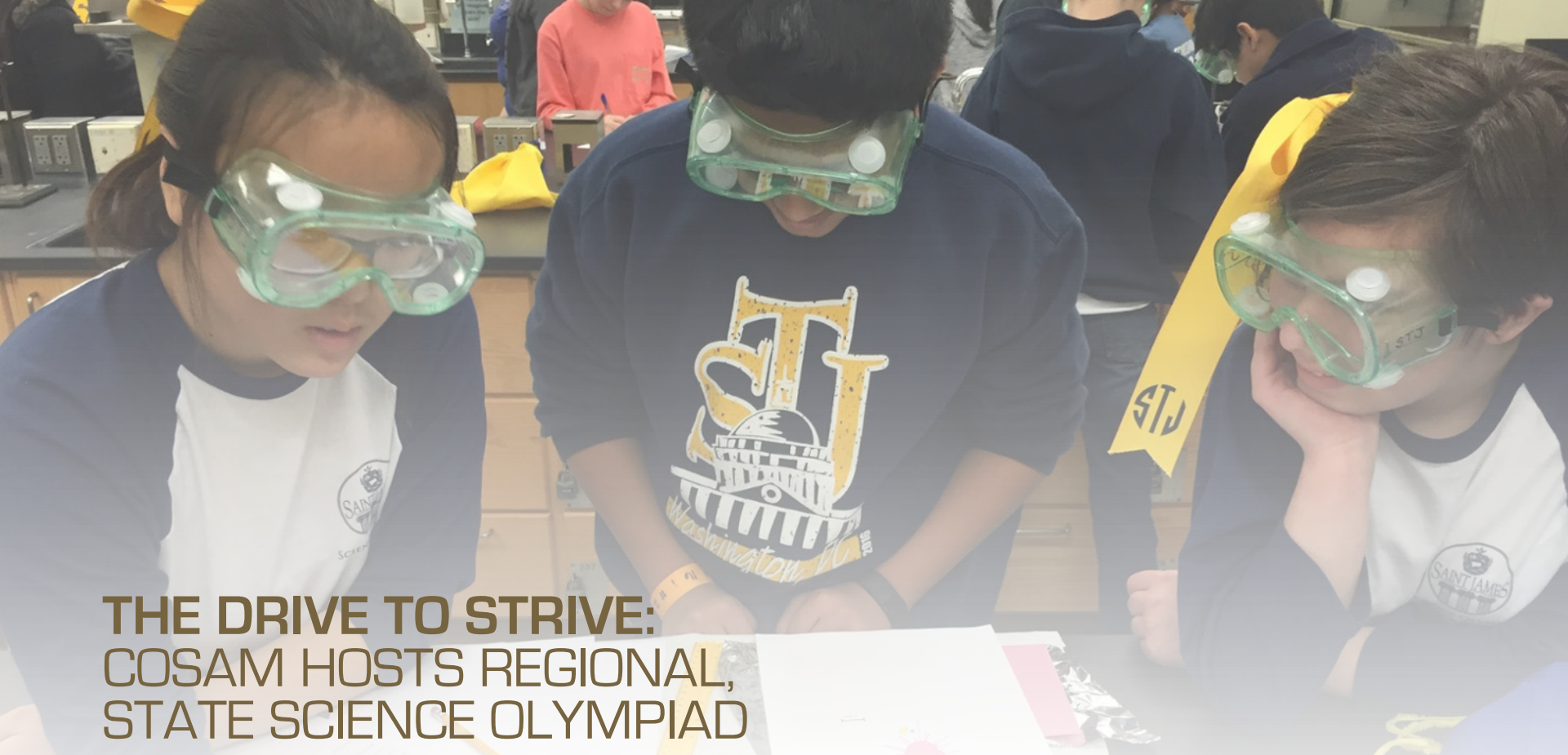
Several additional programs are offered through SCORE, such as a summer Drone Camp for middle school children.

"Robotics is a fun, engaging, and exciting platform to teach broader STEM concepts, and we're not limited to just STEM education," said Tj Nguyen, assistant director of SCORE. "SCORE educators are developing curriculum for elementary teachers that will enable them to use robots to teach social studies, history, math, art, literacy—the list of applications is only limited by our own creativity. There is nothing like SCORE in the country right now, and we are thrilled that Auburn University is taking the lead to develop a resource that will be a game-changer for preparing our students for tomorrow's challenges."

For more information on SCORE, visit scoreau.org.

Written by Candis Birchfield





THE DRIVE TO STRIVE: COSAM HOSTS REGIONAL, STATE SCIENCE OLYMPIAD

The College of Sciences and Mathematics' (COSAM) Office of Outreach has long hosted regional Science Olympiad competitions for K-12 students. This year, for the first time, the COSAM Office of Outreach hosted the middle and high school state competitions.

Science Olympiad is a national, academic, competitive science tournament. Participating K-12 schools develop Science Olympiad student teams who are coached and mentored as they practice for regional competitions across the country. Elementary teams compete at the regional level only, and COSAM hosted a regional elementary school contest in February.

The state of Alabama middle and high school regional tournaments take place in various locations throughout the school year. During the 2016-2017 academic year, top-performing middle and high school teams at regional competitions advanced to the state tournament at Auburn University in April, hoping to be selected to compete at the national level.

"Auburn faculty and staff are dedicating their time and resources to running the regional elementary competition, as well as the middle and high school state Science Olympiad events, which ran concurrently," said Kristen Bond, assistant director of STEM Outreach Programs for the College of Sciences and Mathematics. "During these one-day competitions, we hosted

more than 1,000 top students from all over the state of Alabama who participated in events and courses that are interpreted and implemented by Auburn faculty. The events would not be possible without the support of our faculty. We have coordinators representing various departments and units in the college who recruit colleagues to organize five to six events from their disciplines."

The coordinators for Science Olympiad were Narendra Govil, professor in the Department of Mathematics and Statistics; Minseo Park, the J. T. Walter Professor in the Department of Physics; David King, professor in the Department of Geosciences; Christine Sundermann, professor in the Department of Biological Sciences; and Tj Nguyen, assistant director of the COSAM Office of Outreach SCORE program.

"The College of Sciences and Mathematics is pleased to be hosting the middle and high school Science Olympiad State Championships, as well as the elementary regional championship," said Nicholas Giordano, Dean of COSAM. "As a land-grant institution, Auburn University's tripartite mission combines instruction, research, and outreach. Programs like Science Olympiad demonstrate the extent to which our faculty are dedicated to Auburn's mission as they volunteer their time and talent to ensure the

young participants receive an invaluable experience engaging in STEM education through hands-on learning and spirited competition. Programs like Science Olympiad strengthen and enforce important skills and knowledge that will benefit tomorrow's leaders, such as critical thinking, the ability to analyze data, the importance of teamwork, and a basic understanding of how science and math impact real-world scenarios."

King, who has participated in Science Olympiad for approximately twenty five years, enjoys the enthusiasm of the participants, especially during the award ceremony.

"My most profound memory from being an event sponsor was going over to the student activity building. They give the awards at the end, and the screams from the kids when they receive an award is just deafening," said King. "What I think is special about Science Olympiad is that it's set up like an athletic event, but it is a mental competition, and there are not so many of those versus the physical competitions. Also, there is such a diversity of activities, there are so many things they can do in so many field areas. Kids really seem to love it. There is a lot of enthusiasm."

Sundermann has been involved with Science Olympiad for approximately twelve years. She remarked that almost every faculty member she knows who

has volunteered to assist with Science Olympiad enjoys the experience and returns to help, year after year.

"Bob Lishak (professor emeritus of biological sciences) retired, and he still wants to come back and help with Science Olympiad. It really is a lot of fun," said Sundermann. "Part of what makes it fun is the enthusiasm of the kids. These kids get to visit Auburn, and many of them have never been here before. They get to see a college campus, which is a big deal for many of them. They come from all over the state, which is quite a trip, especially for middle school children."

Sundermann noted the event is also good for Auburn University.

"These kids who participate are the best of the best, and the event provides good exposure for Auburn University," said Sundermann. "We hope that some will chose Auburn eventually when it is time to make a decision about college. This is where you hope your future freshmen are going to come from, this pool of people, so it is good for Auburn, and it encourages and enhances the drive to strive for quality education in the schools. The coaches for Science Olympiad in the K-12 schools work hard to get the students prepared. It really is an Olympics for the brain."

Written by Candis Birchfield

For more information on Science Olympiad, including details on how you can get involved, contact Kristen Bond at Kristen.bond@auburn.edu or (334) 844-5769.

COSAM Office of Outreach Facilitates Statewide Project Lead The Way Training

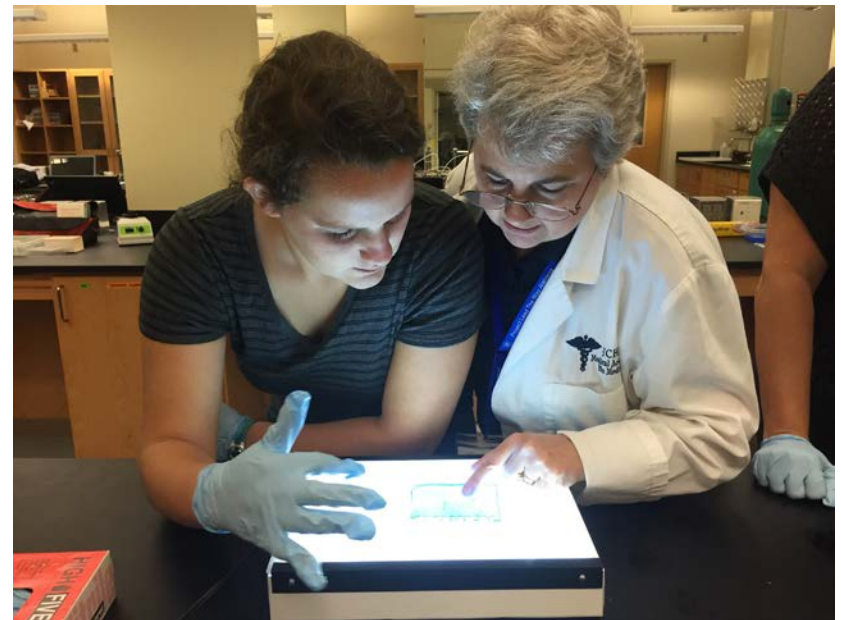
The College of Sciences and Mathematics (COSAM) Office of Outreach was busy this summer offering Project Lead The Way teacher training courses. Project Lead The Way is a national program that provides a transformative learning experience for K-12 students and teachers across the U.S. by stimulating an engaging classroom environment that empowers students to develop in-demand knowledge and skills necessary to thrive in an evolving world.

Auburn serves as Project Lead The Way's Engineering and Biomedical Science affiliate university for the state of Alabama. In this role, the university facilitates the delivery of the Project Lead The Way Engineering, Biomedical Science, Gateway, and Launch programs by providing professional development through its core training and counselor conferences, as well as college-level recognition, program initiatives, and statewide and regional support and communication.

This summer, the COSAM Office of Outreach offered 170 core training courses for 151 teachers. Courses included Engineering Design and Development; Principles of Engineering; Digital Electronics; Computer Integrated Manufacturing; Design and Modeling; Automation and Robotics; Medical Detectives; Introduction to Engineering Design; Principles of Biomedical Sciences; Human Body Systems; Medical Interventions; and Biomedical Innovations.

The courses aimed to empower educators by providing them with tools to transform the classroom into a collaborative space that supports an activity- project- and problem-based curriculum. The goal is to allow K-12 students an opportunity to apply their knowledge, identify problems, discover unique solutions, and lead their own learning.

For more information on Project Lead The Way, visit the website at pltw.org.



Friends OF THE ARBORETUM



Do something beautiful. Become a Friend of the Arboretum.

Friends of the Arboretum is a group of people dedicated to preserving Auburn's natural heritage through their support of the Donald E. Davis Arboretum. The Davis Arboretum is open 365 days a year, and there is no charge for admission. Each year, more than 5,000 visitors enjoy the blooming displays and lush greenery of Auburn's 13.5-acre public garden, thanks, in part, to groups like Friends of the Arboretum. Your participation in Friends of the Arboretum supports Auburn University students from multiple disciplines, including science, engineering, architecture, agriculture, and liberal arts, who benefit from

using the Davis Arboretum as a learning resource, outdoor classroom, and research facility. Friends of the Arboretum also allows the garden to host educational programs for K-12 school children and the community, as well as special events, such as the annual photo contest and Halloween Bat Walk. Support Auburn through the gift of nature and join Friends of the Arboretum today! For more information, visit the website at this address: www.auburn.edu/cosam/arboretum/friends.



A MESSAGE

from the Curator of the Davis Arboretum

Morgan Beadles

As I write this, the weather is beginning to turn brisk, the trees are slowly preparing for their winter slumber, and I am entering my second fall here as the curator of the Davis Arboretum. There have been numerous changes to the arboretum over the past year, and I am overflowing with excitement to share them! From the painting of the pavilion, to the resurfacing and redesigning of many of the walkways and paths, to the installation of a fountain in our pond, the amount of time and energy put into improvements on our grounds is impossible to miss. It is our hope that, by moving our collection in a more maintained and manicured direction and involving the arboretum with the community more, we can begin to show the Auburn Family how important native plants are to maintaining a diverse ecosystem within our state.

Over the past few months, the Davis Arboretum was able to close out the National Fish and Wildlife Foundation five Star Grant for Urban Stream Restorations, a grant that was awarded in 2015. The project used grant funding to remediate some of the problem areas at the headwaters of Town Creek during the renovation of the Garden of Memory project. The grant has improved our ability to teach students and the community about stormwater issues and best management practices for handling stormwater runoff and erosion control. This project will become a part of our already implemented stormwater management tour, and we are eager to highlight this work.

In addition to our registered *Quercus* collection, the Davis Arboretum is working toward having the native azalea (*Rhododendron*) collection accredited by the American Public Gardens Association's Plant Collections Network to become a nationally recognized collection of specimens from across the southeast within the coming year. The Smitherman native azalea collection, members of which one can find blooming from early spring to late fall, is one of the largest collections on our grounds. Our collection contains azaleas gathered from all over Alabama and displays the one-of-a-kind Auburn series azaleas that have been bred and trademarked for Auburn University and are available for purchase from the Davis Arboretum during our native plant sales. We are thrilled to see this amazing collection finally get the recognition it deserves on a national level.

We are honored to continue our relationships with the multiple schools and colleges across campus that use our grounds as a resource for their students. Last fall, Building Science students helped to replace over 2,000 square feet of broken asphalt sidewalk with permeable concrete paths, which are now much safer and more environmentally responsible. During spring semester, they also helped us by creating gateway structures throughout the arboretum to help draw visitors deeper into our grounds. Biosystems Engineering students used the arboretum for their senior design projects to help solve runoff issues in two separate areas, and they were

tasked with including an amphitheater space and a water feature into their designs. Students from the Environmental Interpretation class in the School of Forestry and Wildlife Sciences have been instrumental in designing some creative interpretive signage for us as well. We are also happy to be working closely with the Auburn University Museum of Natural History on more projects and outreach programs, some of which you should be hearing about soon!

As we continue to move forward with improvements and increase our outreach into the community, we would like to encourage everyone to come visit us and take a stroll around our grounds. It is our hope that you will enjoy your time enough to consider joining the Friends of the Arboretum (auburn.edu/cosam/arboretum/friends). It is through contributions and support from our friends and donors that we are able to continue to improve and grow.

War Eagle,

A handwritten signature in black ink that reads "L. Morgan Beadles". The signature is written in a cursive, flowing style.

Morgan Beadles

TOWN CREEK WATERSHED PROJECT IMPROVES WATER QUALITY FOR DOWNSTREAM NEIGHBORS



A number of entities came to campus to tour the Town Creek Watershed Project including Southern Company, The National Fish and Wildlife Foundation, The West Atlanta Watershed Alliance, Georgia Power, Mississippi Power, Southern Nuclear, Southern Power, and EPA Region 4.



Auburn University's Garden of Memory is not just a garden. Located across the street from the President's House and the Davis Arboretum, the Garden of Memory is also an ecologically important resource because within it are the headwaters for the Town Creek watershed. "Headwaters" is a term used to refer to the upstream areas of a watershed.

Water from the Garden of Memory travels to the Davis Arboretum and then leaves campus, flowing to Town Creek, on to Chewacla Creek, and into Chewacla State Park, about four miles away. Eventually, the water flows from Chewacla State Park to the Tallapoosa River. Thus, the ecological impact of the wetland in the Garden of Memory also affects places hundreds of miles away.

During the reconstruction of the Garden of Memory in 2016, through the collaborative efforts of multiple campus units, departments, and colleges, including the College of Sciences and

Mathematics and the Davis Arboretum, a team worked to design and implement an improved wetland and floodplain enhancement in the Garden of Memory's Town Creek watershed.

The project was partially funded by a National Fish and Wildlife Foundation – Five Star and Urban Waters Restoration Program 2015 grant and Southern Company.

"These Five Star grants are a reflection of the importance of corporate responsibility and stewardship," said Leslie Cox, manager of Southern Company's Environmental Stewardship Program. "The funding brings together public and private entities, encourages them to think outside the box, and sparks them to make a positive difference in the community."

The Town Creek Watershed Project in the Garden of Memory improved water quality by implementing a number of environmentally sound practices. Invasive and unwanted species in the

area, such as Chinese Privet, Bradford Pear, and Greenbriar, were removed and replaced with native plants that will provide the deep roots needed to limit siltation, stabilize the streambank and wetland areas, and increase habitat quality by producing needed nutrients in the watershed. The team developed a functioning floodplain and implemented best management practices to existing pipes that discharge into the stream. Natural rock structures were incorporated near the outfall pipes to slow down the water as it enters the watershed, and similar material was used to hold up the steep sides of the streambank.

By reducing siltation and increasing habitat quality, the Town Creek Watershed Restoration Project will contribute to the overall health of the Upper Tallapoosa River Basin.

In addition to promoting a cleaner watershed, the project serves as an educational and outreach tool for

multiple units across campus and the community. The installation has been incorporated into a larger Stormwater Management Tour that begins in the Davis Arboretum and impacts more than 2,500 students each year ranging from third grade to graduate students.

The project represents one of the largest interdepartmental collaborations on campus and includes the College of Sciences and Mathematics; Facilities Management; College of Architecture, Design, and Construction; School of Forestry and Wildlife Sciences; Office of Campus Planning and Space Management; Design Services and Construction Management; Office of Sustainability; Alabama Clean Water Partnership; Alabama Water Watch; Alabama Cooperative Extension System; Holcombe, Norton, and Partners, Inc.; and Landscape Services.



COSAM PROFESSOR PART OF TEAM THAT DISCOVERS REDNESS GENE IN BIRDS

Why do some birds have red feathers? Geoffrey Hill, professor in the Department of Biological Sciences, finally found an answer to this deceptively challenging question.

Thanks to modern genomics and a collaborative effort by Hill and an international team of scientists, including colleagues Miguel Carneiro at the University of Porto in Portugal and Joseph Corbo at Washington University in St. Louis, the key gene that enables birds to have red coloring in their feathers and skin is now identified.

“Red coloration is a prominent feature of many species of birds,” said Hill. “Most birds that show red coloration get the coloring from a special class of pigments called carotenoids. These are becoming more familiar to the public because carotenoids like lutein are now being put in vitamins. So, the same pigments that help with our vision and serve other vitamin functions are also the basis for red feathers in birds.”

To make the discovery, the team focused on a special breed of canary—red factor canaries—which were developed in pre-World War II Germany. Breeders crossed yellow canaries with a South American finch known as a red siskin and then backcrossed with a canary.

“They created a genotype that was a mix of half canary and half siskin, but then they backcrossed the hybrid line with canaries each generation, keeping the offspring with red feathers,” said Hill. “They kept selecting out all siskin traits except redness. The result was a bird that looks like a normal canary and sounds like a normal canary except it has red feathers.”

“These birds are called ‘red factor’ canaries because the genetic factor that enables birds to be red was moved from siskins to canaries. With modern genomics, we set out to find the gene that was transferred. We knew what a canary genotype looked

like and we knew what the siskin genotype looked like. Using these new tools, the genes that had been inserted into the canary genome lit up like a Christmas tree.”

Not only is this discovery beneficial for basic biology, but the red pigment also has implications in the food industry as well as medicine.

“This gives us tremendous insight into the genetic mechanisms that control animal coloration,” said Hill. “As for commercial application, the same pigments that make a bird’s feathers red also make the flesh of salmon and trout red. Farm-raised salmon are not red unless they are color-fed with red carotenoids. This new enzyme is potentially a new synthetic pathway for creating valuable pigments for a global industry.”

The pigments are also linked to cardiovascular health and control of oxidative stress in human bodies, which could be significant in developing new products and medications.

The study is a culmination of a decade of work. It was funded, in part, by grants from Auburn University’s Office of the Vice President for Research and Economic Development, along with the National Science Foundation.

The team is patenting the process related to the red carotenoids.

“Things we did in the study like genomic sequencing, which are now routine in modern biology, were unknown ten years ago,” said Hill. “Our study was a success thanks to the technology becoming available, and also due to a great group of experts working together.”

Written by Lindsay Penny

REMEMBERING THESE ALUMNI

Dr. Thomas Eugene Booth '36
Dr. Ben Hill Smith Jr. '37
Dr. C. Arron Dozier '42
Mrs. Margaret T. Kennell '44
Mrs. Nettie Kathryn Turnham '45
Dr. Hugh M. Long '47
Mrs. Marian Gay Parker '48
Dr. Andrew John Hughes '49
Rev. John M. Reagan Jr. '49
Ms. Mary Jane Chichester Dickson '50
Dr. William Robert Miller '50
Dr. Joe Selman Watson '50
Dr. Robert Long '51
Dr. John Stokes Martin '51
Mr. Raphael A. Dandl '52
Dr. Charles C. King Jr. '52
Lt. Col. William W. Reynolds '53
Dr. T. Bonner Stewart '53
Dr. Elizabeth Rogers Barnhart '54
Mr. Richard L. Howell Sr. '54
Dr. Samuel B. Jones '55
Mr. Jack B. Strong Jr. '55
Mr. Reuben Cumbee Finney '56
Mr. Robert Leon Orr '56
Mr. Albert F. Read '56
Mrs. Mary Ellen Wright '56
Mrs. Jacquelyn W. Risinger '57
Mrs. Peggy Norris Robinson '57
Dr. Dale H. Arner '59
Mr. Phillip A. Lavallet III '59
Mrs. Mary Seymore Lewis '61
Dr. James David Land '63
Mrs. Carol Whetstone Belcher '64
Dr. Robert Hackett Parker '64
Mr. Doyle Pearson Jones '65
Mr. James Edward Norris '65
Dr. Peter Fredric Olsen '65
Dr. David Kennedy Blough '66
Ms. Susan C. Monteith '66
Mrs. Norma Whatley Parker '66
Dr. David D. Cope '67
Dr. Michael O. Kilpatrick '67
Mr. Danny Mitchell Searcy '68
Mr. George Michael Searcy '68
Mr. Winford M. Dollar '69
Ms. Elizabeth B. Aiken Jr. '70
Mrs. Phyllis A. Brewster '70
Mr. William J. Buck '70

Mr. Woodson Dennis Wallace '70
Mr. Ralph George Beard Jr. '70
Ms. Patricia S. Blankenship '71
Mr. John Morgan Davidson '71
Mr. John S. Hoffmann '71
Dr. Betty Buchan Monsour '71
Dr. Edward Dyal Smith '71
Dr. Harry Ellis Womack '71
Mr. Carl Allen Cude '72
Mr. John M. Hammond '72
Cdr. George Bertwell Holk '73
Mrs. Cathryn Cain Marwinney '73
Dr. Lloyd M. Sutherland '73
Dr. Jerome L. McCombs '74
Mr. William T. Waters Jr. '74
Dr. Douglas Stewart Allen '75
Dr. Paul Louis Cammack '75
Ms. Madge S. Rushing '76
Mr. Bruce E. Dutton '84
Mr. David Charles Middleton '84
Dr. Anne Jenkins Isola '85
Mr. Todd Charles Hannah '92
Dr. Bettina Elenor Schmidt '94
Dr. Lawrence Emil Plaskett '05
Dr. James Albert Nelson '06
Ms. Sarah E. Britt '07
Mrs. Rachel Elizabeth Corscadden '07
Mr. Nathan W. Krauss '08
Ms. Megan Diane Cannon '10
Mr. Joseph C. Newton '10
Mr. Eric Alan Keenum '13
Ms. Rachel N. Dark '13



Dr. Edward L. Wampold, biological sciences, '53, was instrumental in establishing the College of Sciences and Mathematics (COSAM) Dean's Scholarship Golf Classic more than two decades ago. Wampold, a loyal supporter of the college, received the Distinguished Alumni Award in 2009 and was awarded an honorary doctorate by Auburn University in 2003. In addition to serving COSAM as a member of the Dean's Leadership Council, he was a member of the Tigers Unlimited Advisory Council and the Auburn Alumni Association board. Wampold passed away, but his legacy in COSAM will continue to endure.

Dr. Marjorie Higgins Fitzpatrick, mathematics, '60, was a former Auburn instructor and wife of Ben Fitzpatrick '52, former chair in the Department of Mathematics and Statistics. Throughout her career, Marjorie touched many lives as an instructor at Tuskegee University, Auburn University, and the University of Georgia.

COSAM benefactor **Mrs. Nancy Taylor Latimer** passed away in December 2016. Latimer established the Dr. Wendell

Hill Taylor Sr. Endowed Scholarship in COSAM in memory of her husband, Dr. Wendell Taylor Sr. '52, an orthodontist in Birmingham for many years. Along with her dedication to the college, Latimer was involved with many philanthropic endeavors including The Big Oak Ranch, The American Cancer Society, and The Botanical Gardens, and was actively involved in her community.

Mrs. Virginia "Ginny" Gammill Bourland '95, worked as an actuary with Protective Life. She was a former member of the COSAM Dean's Leadership Council and was involved in the Society of Women in Sciences and Mathematics (SWSM) where she was a panelist at the inaugural SWSM Symposium.



Davonya Person, instructor in the Department of Biological Sciences, passed away unexpectedly.

Born in Buffalo, New York, she graduated from West Seneca East High School. She received a bachelor's degree from Tuskegee University and a master's degree at Auburn University, where she was an anatomy and physiology instructor for fourteen years.

She was the co-author of *Student Animal*

and *Mammalian Physiology Handbook for the BIOPAC System*. She also received several awards from Auburn University and was acknowledged in many science journals.

She was a devoted daughter and friend. She loved to read, cook, and watch football, especially her beloved Auburn Tigers. She also loved her three cats.



Biological Sciences Professor **James Barbaree** passed away at the age of 76. A faculty member at Auburn for more than 25 years, Barbaree served as chair of the Department of Biological Sciences from 2002 to 2008, and he taught clinical microbiology and general microbiology. He was also the associate director for research at the Auburn University Center for Detection and Food Safety, as well as an adjunct professor in the Department of Pathobiology in the College of Veterinary Medicine.

Barbaree's research was in the area of rapid detection and subtyping of infectious pathogens, and he used the most current tools in molecular biology, including microchip sensors and pulse field gel electrophoresis (PFGE). He was instrumental in creating new devices for his research, and as such, held six U.S. patents. For example, as a member of the Auburn University Detection and Food Safety Center, Barbaree helped to create a sensor that can detect *Bacillus anthracis* bacterial spores, or anthrax.

With the Airliner Cabin Environment Research group at Auburn, he conducted studies into the transmission of diseases in airplane cabins. In his lab, he tested how long certain pathogens can survive on different surfaces in an airplane. He tested pathogens such as *Escherichia coli* O157:H7, *Methicillin-resistant Staphylococcus aureus* (MRSA), *Mycobacterium smegmatis* (a stimulant for tuberculosis), and *Bacillus anthracis*. His research into harmful bacteria in airplane cabins received international recognition and was highlighted by news and media agencies such as Forbes, BBC, NPR, USA Today, Fox News, and more.

Additionally, his research was widely published in books and scientific journals, including the *Wiley Handbook of Science and Technology for Homeland Security*.

During his career, Barbaree received numerous honors and awards, including: the Southeastern Branch of the American Society for Microbiology Ivan Roth Award; the Auburn University Mortar Board award as Distinguished Professor; the P.R. Edwards Award for recognition of service and contributions in microbiology; the Auburn University Pinnacle of Excellence group research award; the Auburn University Scharnagel Professorship; the James C. Feeley Award

for Outstanding Accomplishments in Environmental Microbiology and Occupational Health; the U.S. Public Health Service Unit Citation Award; the CDC Don Mackel Memorial Award; the U.S. Public Health Service Outstanding Service Medal; the Award for Outstanding Leadership as President of the Southeastern Branch of the American Society for Microbiology; a U.S. Public Health Service Commendation Medal; and a U.S. Public Health Service Special Achievement Award.

He served as president of the Auburn University Chapter for the National Academy for Inventors; in numerous roles on the Auburn University Intercollegiate Athletics Committee; as president of the Southeastern Branch of the American Society for Microbiology; the CDC liaison to the Environmental Protection Agency Drinking Water Subcommittee, Toxic Substances, and Science Advisory Board; and the World Health Organization consultant to China (Shanghai).

Memorial gifts can be made to the Dr. James Barbaree Endowed Fund for Excellence. Contact Brook Moates for more information at moateeb@auburn.edu.



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THANK YOU FOR YOUR SUPPORT OF TIGER GIVING DAY!

Auburn University's online crowdfunding initiative, Tiger Giving Day, fully funded twenty-two projects for various schools, initiatives, and units across campus. The online fundraising event, which ended at 11:59 p.m. on Feb. 21, inspired gifts from nearly 3,000 Auburn alumni, friends, and fans, who raised more than \$500,000. The College of Sciences and Mathematics would like to thank our generous supporters for their participation in Tiger Giving Day. Because of your donations, we were able to raise \$10,602 to help create a home for Auburn's dinosaur egg in the Museum of Natural History, and \$5,965 to go toward sending pre-health students on a study abroad trip of a lifetime in England, "History and Culture in the Development of Medicine." For further information about the projects and their goals, go to tigergiving.org.

For more information on the Auburn University Museum of Natural History, visit AUMNH.auburn.edu. For further information on the study abroad opportunity in England, visit auburn.edu/studyabroad.

