AUBURN UNIVERSITY

Spectrum

COLLEGE OF SCIENCES AND MATHEMATICS

Fighting Diabetes

Christopher Easley makes headway with interdisciplinary research.

Research

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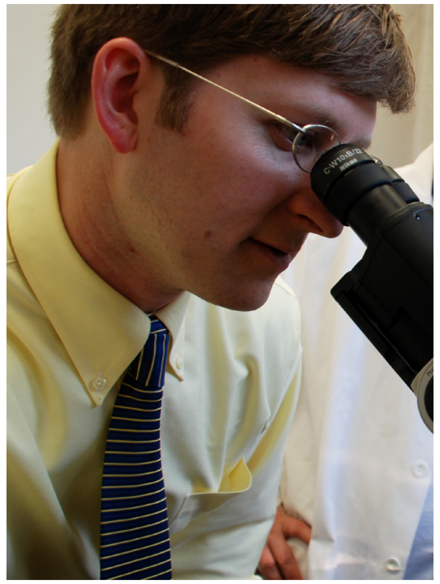
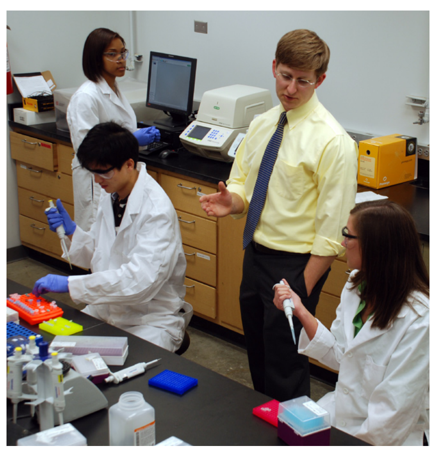
On the Cover



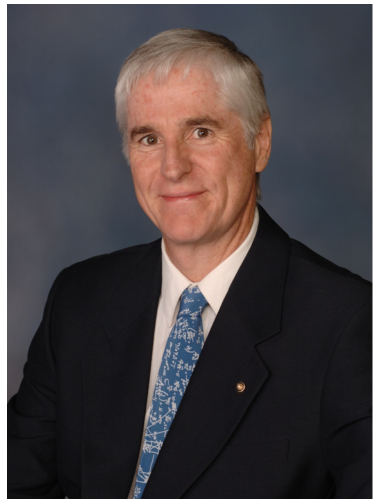
While scientists are still struggling to find a cure for diabetes, Chemistry Assistant Professor Christopher Easley makes headway performing interdisciplinary research as he explores pancreatic islets. *Turn to page 32 for details.*



A MESSAGE

From the Associate Dean for Research

Chris Rodger



It is my pleasure to introduce this report on the research activities of the faculty in COSAM. Just before the tragic death of Dean Marie Wooten, she announced that I would be stepping into her shoes as the associate dean for research and graduate studies. It was a role that I was delighted to accept, but will certainly miss the chance of working side by side with Marie.

A new component to this position is a focus on graduate students. It is clear that our graduate students are a vital cog in the success of our research activities, so I see this as a synergistic role. I have already met many eager, able, young scientists, filled with contagious excitement; this is one of the delights of working at a university!

We are fortunate to have a wonderful cadre of research faculty in COSAM, working on a wide range of challenging problems. It is my intention through this office to assist the faculty by identifying funding opportunities that match their interests, by helping to bring people with similar interests together to address interdisciplinary research issues, and by dealing with the day-to-day details so that they are able to simply focus on their research with the tools they need to succeed.

I look forward to another year in which research by the faculty in COSAM will bring exciting new discoveries and deeper understandings of fundamental concepts.

Chris Rodger

Chris Rodger, Ph.D.
Professor
Associate Dean for Research
and Graduate Studies

Paul Cobine

Biological Sciences Research Update, By Candis Hacker Birchfield

Biological Sciences Assistant Professor Paul Cobine has several research interests and each one has a common theme: metal homeostasis.

"Metals are essential to life," Cobine said. "If cells don't have enough, they will die. If they have too much metal, they die. So the goal is for the cell to remain balanced. Because metals are difficult to get, most cells are poised to take up as much as they can, then they deal with redistribution or export. This is true for multi-cellular organisms like humans and plants and unicellular organisms like bacteria, yeasts."

Cobine has a $295,000 three-year grant from the U.S. Department of Agriculture to examine how *Xylella fastidiosa* bacteria may steal essential metals from infected plants.

"The hypothesis is that the plant disease resulting from the bacterial infection is actually caused by a metal deficiency," Cobine said. "The plant takes up metals from the environment but the bacteria "intercept" it and the plant goes from balanced to metal deficient. We are exploring how the *Xylella fastidiosa* might capture the metals it needs."

Xylella fastidiosa affects crops such as grapevines, blueberry bushes, citrus crops and pecan trees, and if a plant is infected, it will die or be destroyed.

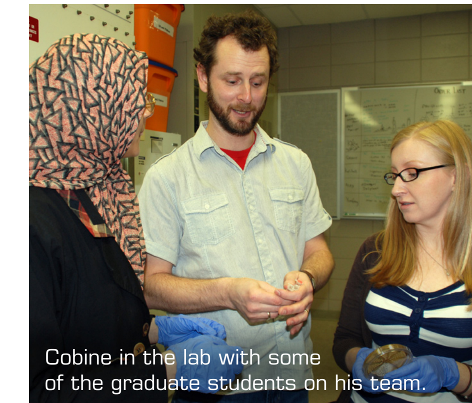
"We are still at the stage where we are researching which metals may be critical to progression of the disease, if any. Our future goal will be to look for ways to prevent the bacteria from getting the metals so that the plant will survive but the pathogen won't," Cobine said.

All cells – plant, human and bacteria – basically have the same metal requirements, so Cobine is also researching other aspects of cellular function related to metals. Specifically, he is exploring human cells and how copper gets from the cell membrane to the mitochondria where it is used to make ATP (adenosine triphosphate) for survival.

"Oxygen is metabolized in the mitochondria, and if we don't have copper, we can't use oxygen, and we will die," Cobine said. "Mitochondrial diseases occur when the cell stops or is limited in the ability to make ATP, the fuel for the cell. Mitochondrial diseases affect high-energy demand organs like the heart and brain. The diseases come by many different names like Luft Disease, Leigh Syndrome, Kearns-Sayre Syndrome...but the final outcome is often the same: the affected person dies, and our knowledge of the mechanisms is very limited. As of now, scientists have no idea how some fundamental processes, like copper getting from the membrane to the mitochondria, occur, and it's an essential process to life."

Cobine is exploring how copper moves through the cell using baker's yeast, *Saccharomyces cerevisiae*, as a model.

"It appears that copper gets bound by a small molecule and that's how it is transported to the mitochondria. This has been reinforced by recent research that demonstrates iron, another essential metal, is carried to the mitochondrion by a small molecule," Cobine said. "Our hypothesis is that transporters exist to carry copper into mitochondria and that they are members of the mitochondrial carrier family, which is a conserved group of transporters in the inner membrane."



Cobine in the lab with some of the graduate students on his team.

More about Cobine:

Paul Cobine received his bachelor of science and his doctorate in Microbiology from The University of Queensland in Australia. A native of Australia, Cobine moved to the U.S. in 2002 and did a postdoctorate at the University of Utah. During this time, he also received a postdoctoral fellowship at the United Mitochondrial Disease Foundation. In 2008, Cobine accepted a faculty position in COSAM's Department of Biological Sciences, and he currently teaches general microbiology, is active in undergraduate research training, and was a Camp War Eagle Faculty Honoree in 2010. A sports enthusiast, Cobine is also the faculty advisor for the Auburn Women's Rugby Club.

"I came from a sports background in Australia," said Cobine, who still follows the Brisbane Broncos, a professional rugby league football club in Australia. "Before I moved here, I thought it was weird that people would even think about college football, but now I am pretty well adapted."

Cobine, his wife, Tania, and five children have all enthusiastically embraced Auburn football and participate in traditions like rolling Toomer's Corner.

"Auburn has been a fantastic place to live because it has a family atmosphere in the town and the campus," Cobine said. "Getting to spend time at Camp War Eagle last summer, seeing the school spirit of the camp counselors, was a highlight for me. It is really great to see so much enthusiasm!"

Christopher Easley

Chemistry Research Update, By Candis Hacker Birchfield

More about Easley:

He says he has always loved science.

"I have always seen science in my future. My grandfather gave me a Texas Instruments calculator at age 4, a Commodore 64 computer at age 5, and we were watching Wild America with Marty Stouffer on PBS as far back as I can remember," Easley said. "My interest in chemistry probably began with tendencies toward pyromania when I had acres of land to explore…and explode. My general chemistry professor at Mississippi State University, William McMahan - who incidentally graduated from Auburn - helped hook me into the chemistry degree program. When Professor Chuck Henry mentored me in laboratory work, I was addicted for life."

When he is not working, Easley enjoys spending time with his wife, Joy, and their two children Liam, 4, and Annelise, 2.

"We love running around the outdoors, and we love watching movies indoors," Easley said. "I am also a big sports fan. I've had football season tickets at Auburn for the last three years. This year has been great, obviously. Finally, I enjoy performing scientific demonstrations for kids, including my own.

For more information on Easley's research, visit his website at www.auburn.edu/cosam/easley.

Christopher Easley, assistant professor of chemistry, believes that one of the most important aspects of his diabetes research is the interdisciplinary nature of the work. The research begins with the engineering of microfluidic devices. Microfluidic devices are created using a similar technological approach as the process used to make computer chips. However, instead of comprising tiny transistors like those found in a computer chip, a microfluidic device has a set of small channels that resemble miniature plumbing.

"These microfluidic devices give us the ability to study single cells or groups of cells and how they react with each other with different treatments," Easley said. "We focus on pancreatic islets and their relationship to diabetes. What makes pancreatic islets so useful and interesting is that they are aggregates of multiple cell types. A pancreatic islet is actually considered to be a 'micro-organ' because it can function as an individual."

Easley uses microfluidic devices to study the "architecture" of pancreatic islets. He utilizes his knowledge of biology to determine how many of each cell type is represented in an islet and examines their orientation. Easley then applies his background in chemistry to determine how the structure and location of the cell types affect their function in terms of glucose stimulation after a meal. This post-meal simulation is made possible through the use of microfluidic devices, which hold nanoliters of volume, or billionths of a liter.

"Pancreatic islets are very important to diabetes research. Research shows that islets can be taken from a donor and transplanted to someone with type 1 diabetes, and the diabetes actually begins to reverse. But obviously diabetes is not yet cured," added Easley. "We still have a lot of work to do, but the research thus far pertaining to pancreatic islets is very promising."

Easley and his team of four graduate students, one postdoctoral fellow and three undergraduates, work closely with the Boshell Diabetes and Metabolic Disease Research Program at Auburn University, which is an interdisciplinary research group sponsored by the College of Veterinary Medicine.

"Part of why I decided to come to Auburn was because of the Boshell Diabetes program," Easley said. "The program represents a collaborative effort throughout campus that strives to share knowledge and resources to benefit diabetes research."

Participants are represented from several colleges across campus including the College of Sciences and Mathematics, the College of Veterinary Medicine, the College of Human Sciences and the Harrison School of Pharmacy. In addition to a weekly journal club, members of the program also host a yearly conference that features leading researchers in the field of diabetes from around the U.S.

"This research program is very important, especially for the Southeastern U.S., which is where I grew up and received my education," Easley said. "Having grown up in southwestern Mississippi where we drank sweet tea every single day, it doesn't really surprise me that diabetes is so prevalent in the Southeast. Of course, diabetes is not entirely related to diet. There are also genetic factors that result in diabetes, but right now, more than eight percent of the entire U.S. population has diabetes and that number is growing. In general, it's a disease of prosperity. You will find the highest percentages of diabetics in developed or developing countries."

Easley says that he enjoys his research, not only because of the impact it can have on the lives of so many who suffer from diabetes, but also because the cross-disciplinary nature of his work allows him to branch out beyond his primary field of study, chemistry.

"As a chemist conducting diabetes research with the Boshell program, I can continually learn the language of biologists," Easley said.

Easley was born in Mississippi and attended Mississippi State for his undergraduate degree in Chemistry. He received his Ph.D. in chemistry from the University of Virginia, and conducted post-doctoral research at Vanderbilt Medical Center.

Jim Saunders

Geology Research Update, By Christy Kyser Truitt

Saunders with Auburn master's student Collins Aseto (center) and Indiana State University undergraduate Alex Steiner (left) discussing the geology of the mountains in Idaho.

Gold ore (in quartz vein sample) from War Eagle Mountain, Idaho

The summit of War Eagle Mountain

Geology Professor James Saunders grew up in Auburn. The son of an Auburn University chemistry professor and former dean of the then School of Chemistry, Saunders played with rocks as a kid. "I've always been interested in minerals and gold," said Saunders, Geology '75. A career in higher education kept him in the South with appointments at the University of Mississippi and Auburn University. But each summer, his research took him out West to none other than War Eagle Mountain.

"The U.S. is actually the fourth largest producer of gold in the world, mostly in Nevada. If Nevada was a country, it would be the fifth largest producer of gold. War Eagle Mountain is in Silver City, Idaho," said Saunders, who said he believes the name War Eagle Mountain originated during the Civil War when former Confederate soldiers escaped west. The name predates Auburn University's War Eagle by 30 years.

"Our research here at Auburn has focused on those gold ores formed as part of past volcanic activity in Nevada and Idaho. We study when and how those gold ores formed in relation to the volcanic rocks, with a goal of helping exploration strategies designed to locate new deposits," Saunders said.

Saunders explains that North America has moved over the years from northeast to southwest, causing the hotspot volcanism to track from Northern Nevada to Yellowstone National Park some 15 million years ago. "One important finding of ours was that a number of these gold-silver lode deposits formed about the same time the Yellowstone Hotspot first emerged," Saunders said. "This is the first time such a link between gold ores and a hotspot, which is deep-mantle plume, has been proposed and could lead to other interest in looking for gold at other hotspots around the world."

High-grade epithermal gold deposits have long been associated with volcanoes. Gold is a trace constituent in basaltic magma, and degassing of the magma chamber releases vapors containing gold and other volatile elements that mix with cooler ground waters, causing them to deposit out with quartz into rock veins. The deposits offer Saunders and his team a history of the hydrothermal activity associated with volcanism.

In the July 2010 issue of *Society of Economic Geologists Newsletter*, Saunders wrote, "We need to know more about this process to refine exploration strategies." The research, funded by National Science Foundation grants, studies the duration of epithermal ore-forming events, which also have major implications on the amount of gold present in a solution necessary to make an ore deposit.

"It always amazes me how something so beautiful (gold deposits) can come from something so dangerous (volcanoes)," Saunders said.

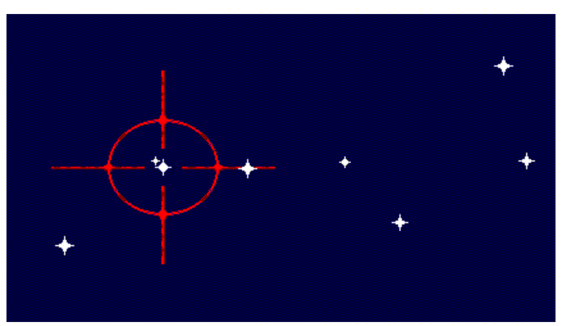
Krystyna Kuperberg

Mathematics Research Update, By Timothy Meeks

Origins of Krystyna Kuperberg's Mathematics Acumen:

My parents had a large pharmacy in Poland. Sometimes the accountant was not there and my mother would ask me to add columns of numbers – and I was very young. She didn't tell me, but she was checking also – and the numbers always agreed!

-Krystyna Kuperberg



Mizar mirror sites at:

- University of Bialystok, Bialystok, Poland (main site)
- SunSite ICM, Warsaw, Poland,
- Shinshu University, Nagano, Japan
- Auburn University, Auburn, USA.

Krystyna Kuperberg is an accomplished mathematics professor, recognized at Auburn University through numerous awards that cite classroom and research accomplishments. Her influence in the mathematics community extends internationally and her expertise is highly sought by a wide range of publications and organizations. Kuperberg, who works in dynamical systems, has been invited to join the Mizar Project to work on formalizing proofs based on rich geometric intuition.

The Mizar software verifies the correctness of mathematical texts written by mathematicians. Its original goal was to design and implement a software environment that supports writing traditional mathematical papers, where classical logic and set theory form the basis for all future developments. The Mizar Project, established in 1983 in Poland by one of the frontrunners of formalized mathematics, Andrzej Trybulec, received a big boost by funding from the U.S. Office of Naval Research in the 1990's. Kuperberg joins the team of international partners applying the approach of formally translating proofs in dynamical systems and supporting a growing database that deals with theoretical mathematics. To date, the database includes more than 9,400 definitions of mathematical concepts and more than 49,000 theorems.

"There is so much information and mathematical knowledge everywhere. Some may be unclear, some may actually have errors. By formalizing and storing on the computer, it will easily be accessible and available and provide a good basis for future research," Kuperberg said. "Computers require us to be very precise - and this is good for students as well - the importance of precision."

While writing and establishing the code is essential to success, Kuperberg emphasizes that sound mathematics is still at the core. The importance of a uniform language is essential in the trends Kuperberg sees in the field.

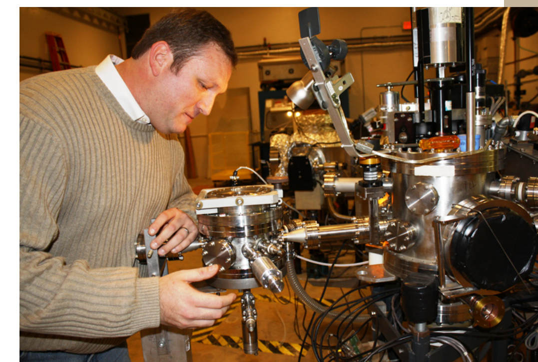
"The problems people are working in mathematics are becoming harder and harder as they become more complex and knowledge is assumed," Kuperberg said.

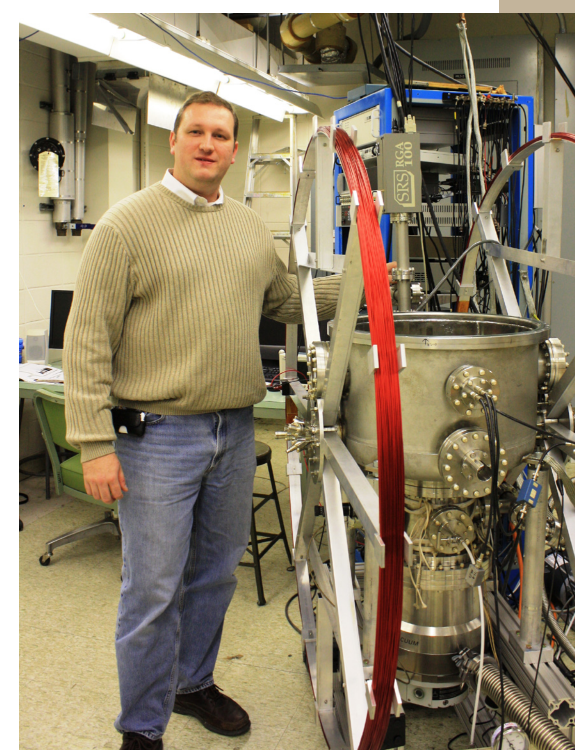
As much as she is invested with the link of computers and mathematics, Kuperberg cautions that education can't become too reliant on technology.

"We should use any kind of computer as an aid, with caution. They are certainly wonderful tools, but the computer can't do everything; you still need a person doing the thinking."

Mike Fogle

Physics Research Update, By Christy Kyser Truitt





Physics Assistant Professor Michael Fogle likes to aggravate atoms. His research in the field of atomic, molecular and optical physics focuses on the interaction of free electrons, over various energy ranges, with atoms and molecules.

"I study how collisions with matter and light affect the structure, or energy, in atomic systems, how electrons can be removed or excited to higher energy states in systems, and also how they de-excite," Fogle said.

The research provides insight into the basic understanding of the physics governing interactions and structures of atoms and molecules. The results may be used for modeling plasma environments.

"While the plasma state of matter isn't very prevalent on earth, it does make up over 90 percent of the observable universe," Fogle said.

In order to understand phenomena such as light emission, temperatures, elemental-matter densities, and the evolution of molecular species in plasma environments, it is important to model the reactions that take place on an atomic scale. Fogle's research provides input for these models and helps to benchmark how well the models describe nature.

For molecules, Fogle studies dissociation dynamics with respect to collisions of various energy particles. Dissociation studies determine how bonds are broken, how much energy is released when bonds are broken, collision orientation effects, and ultimately, how to use these characteristics to control bond breaking.

Fogle and associates obtain the information experimentally using atomic-scale collisions between interacting beams of particles. The experiments are conducted at Auburn and in collaboration with the Oak Ridge National Laboratory.

"I am currently in the process of building a new low-energy particle accelerator facility to continue studies of electron and atom collisions with molecules," said Fogle, adding that the new low-energy ion facility will also be used by the physics solid-states group to extend their research utilizing the newly available low-energy ion beams for implanting semiconductors.

"The applications are unlimited. We want to build up cross-disciplinary usage," Fogle said. "The low-energy ion facility is being constructed to accommodate multiple users."

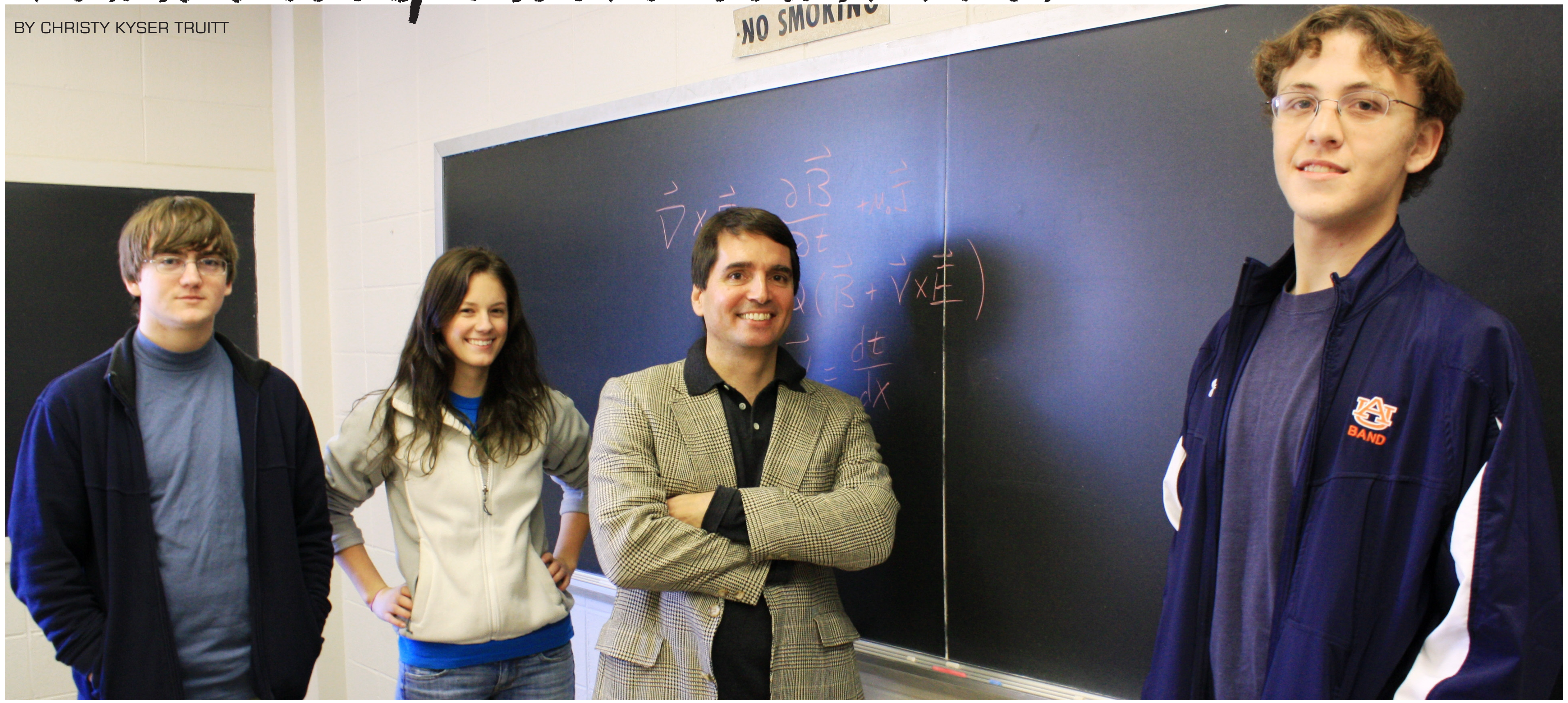
Fogle has also established a purely teaching- and outreach-oriented research initiative using the existing high-energy ion beam facility in the physics department. In collaboration with Terry Austin, Ph.D., of LaGrange College, Fogle uses the technique of Proton-Induced X-Ray Emission, or PIXE, spectroscopy for trace-element analysis. This technique utilizes characteristic X-rays caused by particle collisions to determine what types of atoms make up a sample. For example, Fogle and collaborators can find metallic residue in fish gills to determine where they originate through trace-element analysis.

In principle, Fogle and team can study the elemental composition of any type of sample that can fit into the vacuum system and for elements beyond aluminum on the periodic table. PIXE elemental analysis has applications to fields such as biology, agriculture, archaeology, metallurgy and many more.

"We would certainly enjoy collaborating with others that might have a need for such a tool," Fogle said.

Trapping Anti-Matter

BY CHRISTY KYSER TRUITT



In late 2010, research from an international team of scientists, including Physics Professor Francis Robicheaux, culminated in the successful trapping of the anti-matter version of the hydrogen atom for the first time in history. Due to the college's commitment to undergraduate research, COSAM students were able to work with Robicheaux on the project and contribute to the achievement.

Patrick Donnan, a sophomore in physics and music performance, said the anti-matter breakthrough is only the beginning. "Now we'll work toward putting anti-matter into practical applications."

The research collaboration at CERN, Europe's particle-physics lab near Geneva, Switzerland, has confined the anti-hydrogen atoms in a magnetic trap for more than 170 milliseconds, a breakthrough in the sense that while large quantities of the atoms were first made at CERN eight years ago, the scientists couldn't store them. Anti-atoms would touch the ordinary-matter walls of the experiments within millionths of a second after forming and were instantly converted to energy and other particles. This research, however, mixed the anti-protons with the anti-matter electrons, forming atoms cold enough to trap due to low-level energy.

Robicheaux credits the undergraduates with significant participation. "The only difference between what they do and what I do is that I know a bit more and can tell them what is interesting and worth doing and what isn't. Some of the projects the students work on have been quite important and have changed how the anti-matter experiments are run. Most of the students' work on a project is important enough that it is published in a professional journal when completed," Robicheaux said. "The research of undergraduates is important enough that I specifically include funding for it in my grants from the National Science Foundation and from the Department of Energy."

Physics major Kelsie Niffenegger, junior, learned of Robicheaux's undergraduate research during freshman physics. "I would have done the work for free because I had no idea you could perform research as a freshman. I knew it would look good on my graduate school applications, but then I found out you get paid for it too!" Niffenegger said.

Patrick Carpenter, currently pursuing a master's degree in computer science, also learned about the research opportunity during an honors physics class. "I had given some thought previously to solving physics problems on computers and thought it would be cool to get to try it out. I worked for Dr. Robicheaux from spring 2007 through fall 2008 and looking back, I feel like I did a lot of growing up – and learning – over those two years," said Carpenter, adding he would like to one day work with high-performance computing systems in a research and development capacity.

The students credit Robicheaux with instilling a desire to learn in each of them. "He's the kind of teacher where if you want to learn, you will learn. He's very patient," said Niffenegger.

"His passion for and dedication to his work were infectious. He expected results from his students, and his example really pushed us to try harder than we might have otherwise done," added Carpenter.

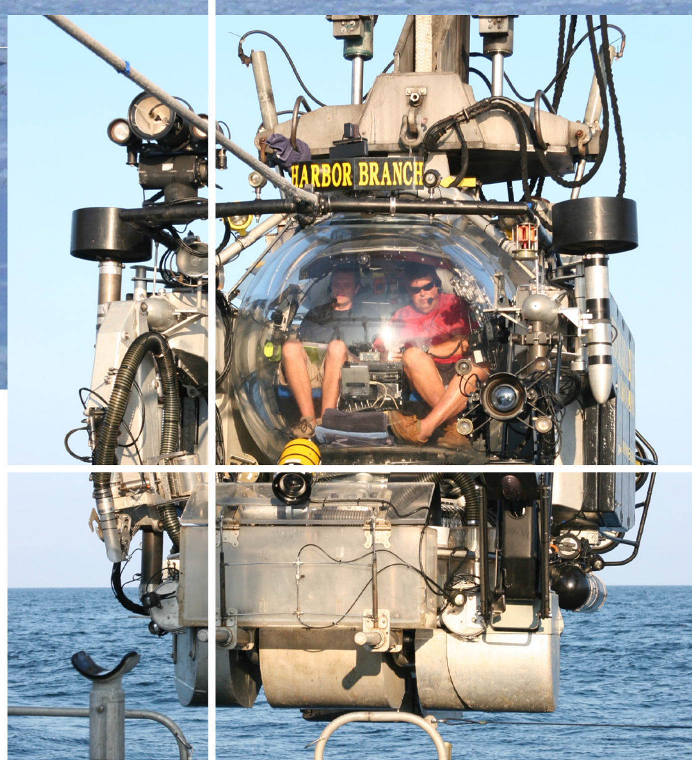
As an undergraduate himself, Robicheaux was hired into a research group. "That started me on the path of physics research. Six years ago, two students asked if they could work on a research problem during the winter semester after having taken my class in the fall. They did a fabulous job and seemed to learn more than in class. I've been happily incorporating undergrads into our group ever since," said Robicheaux.

The anti-matter research opportunity inspires Donnan to be a professor. "We need to create greater scientists, like Dr. Robicheaux, in order to advance scientific research. I'd like to pass the same experience onto someone else that Dr. Robicheaux provided to me in order to continue that legacy."

Expanding Horizons

Researchers Awarded $3 Million Grant and New Lab

By Carol Nelson and Candis Hacker Birchfield



A team led by Auburn University researchers Kenneth Halanych and Scott Santos was recently awarded a grant from the National Science Foundation (NSF) through the Assembling the Tree of Life program. The grant is in the amount of $3 million, with Auburn's portion totaling $1.4 million. Assembling the Tree of Life is an NSF initiative with the goal of understanding the diversity of life on the planet and how the Earth's more than 1.7 million species are related. Halanych and Santos are studying annelids, or segmented worms, one of the most abundant organisms on the planet.

"While everyone, young to old is aware of 'worms,' most don't realize how vitally important they are both environmentally and economically," Santos said. "Although this project's objectives are to explore the diversity within the annelids, it also presents an opportunity to raise awareness in this fascinating group of organisms."

With more than 16,500 known species, annelids serve important functions in terrestrial environments, are the basis of commercial enterprises, and can act as indicators of environmental health as well as become invasive or pest species when introduced into foreign environments. These life forms can contribute to a better understanding of genetics, biological development and the effects of disasters like the Gulf oil spill on marine life.

"We have to know what species are out there to appropriately manage those natural resources," Halanych said. "There are a number of unrecognized species that look morphologically similar, but we know they are genetically different, suggesting they are different species. We just need to do the work to figure out how and why they are different. This process will help inform us as to how animals evolve and adapt to environmental change."

The project also has implications in the fields of paleontology, marine biology, physiology and evolution.

"If we know of an organism that is commercially important for medical or economical reasons, it often turns out that many of the closer-related individuals are very important or could potentially be important in those realms as well," explained Halanych. "So understanding those relationships becomes very important."

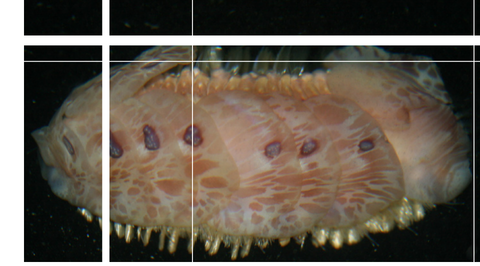
The project is an international effort with the University of Kansas, the University of Goethenburg, Colgate University, Texas A&M at Galveston, Southern Illinois at Carbondale and the University of Osnabruck, and includes the development of resources such as research databases, blogs of field trip journals, annelid news and recently released publications available through the Internet as a means of disseminating information to other scientists around the world as well as to the general public.

"Both Dr. Halanych and I believe that our mission as scientists includes informing the public on the importance of understanding and conserving Earth's biodiversity. By directly engaging the public through various avenues, we hope to instill the importance of supporting research while generating excitement in the next generation of scientists in our country," Santos said.

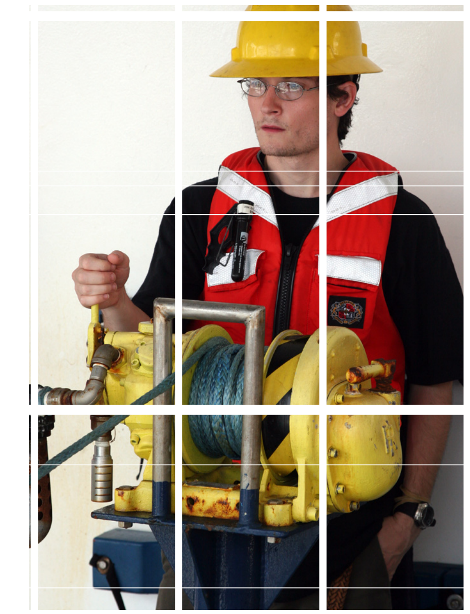
In the last two years, Santos, Halanych and Biological Sciences Assistant Professor Kevin Fielman have been instrumental in securing more than $3.5 million in research grants. As a means of supporting their efforts, on Friday, Nov. 5, 2010, COSAM dedicated the Molette Biology Laboratory for Environmental and Climate Change Studies. This state-of-the-art facility will enable COSAM faculty and students to expand their scientific research within freshwater and marine systems in the context of global climate change. The Molette Lab will also provide a basis for cutting-edge interdisciplinary research and position Auburn University as a leader in environmental research.

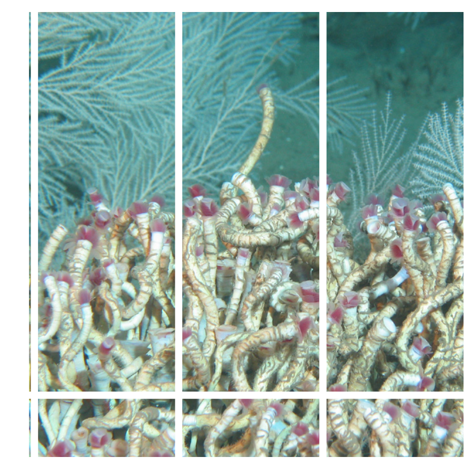
Halanych, Santos and Fielman will direct the lab that was made possible by a gift given by William Page Molette, Electrical Engineering '27, and his wife, Ruth. As a result of William Molette's interest in scientific research, he and his wife bequeathed their entire estate to Auburn University. Per William Molette's wishes, the estate was designated for non-endowed scientific research in COSAM. A portion of the $2.7 million estate gift was dedicated by COSAM to the establishment of the Molette Lab.

"We will use these state-of-the-art facilities to serve the state of Alabama by focusing on key topics such as the Gulf oil spill and human impacts on aquatic environments," Halanych said. "The generous gift from the Molettes has provided critical infrastructure needed to allow us to further our research endeavors on important environmental and climate change issues."



The Molette Lab positions present and future Auburn students with the opportunity to conduct cutting edge biological research on a variety of organisms from a range of Earth's environments. Funding for these endeavors, such as the recent Assembling the Tree of Life for the Annelida (worms), are secured through NSF as well as other federal and state agencies.

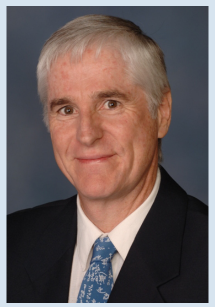




COSAM Faculty Receive Professorships


Ming-Kuo Lee
Geology & Geography

Robert B. Cook Professor
Geology and Geography professor, Ming-Kuo Lee, is the co-director of Water Education for Alabama's Black Belt Program and has been a faculty member at Auburn University since 1995. Named as one of the key scientists for NASA's Global Climate Change Education Program, Lee's research focuses on the areas of hydrology and environmental geochemistry. In 2009, Lee was awarded the Dean's Research Award in COSAM.


Chris Roger
Mathematics & Statistics

C. Harry Knowles Professor for Research Leadership in Mathematics Instruction
Mathematics and Statistics professor, Chris Rodger, has worked for the last 10 years to develop methods for teaching mathematics to both K-12 teachers and students. Rodger's research has gained national and international recognition, as several of his models have been used to provide professional development to teachers in Australia. This work resulted in his running workshops in the U.S. and internationally involving school teachers and university faculty and students. Rodger is also the Associate Dean for Research.


Minseo Park,
Physics

Marguerite Scharnagel Professor
Physics associate professor, Minseo Park, is the current director of the department's Park Group and has taught at Auburn since 2003. His research interests include optical characterization, device fabrication and nanotechnology of wide-band gap semiconductors. In addition to his research collaborations with private industry, Park pioneered development of a new course named "Physics of Music" where students learn basic physics by engaging in a variety of musical activities. Park has also promoted participation of Korean industries and national laboratories in research activities with Auburn University.


Raymond P. Henry,
Biological Sciences

William P. Molette Professor
An Auburn University faculty member since 1983, Biological Sciences professor, Raymond P. Henry, has developed a strong reputation through his teaching and research in the areas of Comparative Physiology and Biochemistry. Henry's acclaimed research program involves investigating the enzyme carbonic anhydrase, where he maintains a strong international reputation. Noted for challenging students by requiring them to actively engage in the subject material, Henry, also assistant chair of the Department of Biological Sciences, is often acknowledged for his ability to enable students to understand complex concepts.

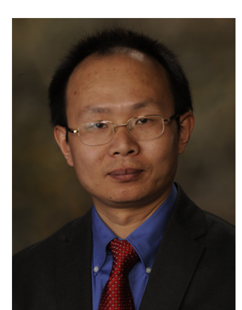
Dean's Research Award Winners


Monimoy Banerjee
Doctoral Student, Biochemistry,
Department of Chemistry & Biochemistry


James Barnett
Undergraduate Student, Biomedical Sciences,
Department of Biological Sciences


Francis Robicheaux,
Professor,
Department of Physics


Mary Clair Thompson,
Doctoral Student, Mathematics,
Department of Mathematics & Statistics


Aijun Zhang,
Doctoral Student, Mathematics,
Department of Mathematics & Statistics

SOLAR CONVERSION

Auburn Professor to Research Solar Energy with NSF Grant
By: Carol Nelson

Wei Zhan, assistant professor of Chemistry and Biochemistry, has received a five-year, $580,000 National Science Foundation Faculty Early Career Development, or CAREER award, to conduct research on solar energy.

Zhan's research proposal is titled "Molecular Photovoltaics - A Lipid-Based Approach" and his research is designed to provide insight into a more efficient conversion of solar energy to electrical energy. Although solar energy has the potential to reduce dependence on fossil fuels, many current technologies are inefficient and costly.

"Solar energy is essentially inexhaustible and doesn't generate green-house gases," Zhan said. "The traditional, silicon-based photovoltaic panels are very efficient and durable, but they are so expensive that they can't replace fossil fuels yet as the major energy source. Low-cost alternatives are always welcome."

The award supports early career development activities that combine both research and education. In addition to his research, Zhan's educational project initiatives will include classes and demonstrations to broaden awareness of alternative energy generation and outreach activities for a broad audience.

"At this moment, our research doesn't involve building practical devices, but with the lipid-based model system, we may have a test bed on which many physiochemical parameters critical to improving solar energy conversion efficiency can be studied systematically," he said.

"Dr. Zhan's CAREER award recognizes the contemporary nature of his research in solar energy conversion and materials chemistry and his commitment to teaching and science outreach," said former Dean of the College of Sciences and Mathematics, Stewart Schneller.

"This award is the most prestigious award granted by the NSF to young professors like me," Zhan said. "I feel grateful and lucky to be a recipient."

Zhan joins Holly Ellis and Susanne Striegler as the third faculty member from the Department of Chemistry and Biochemistry to receive the award.

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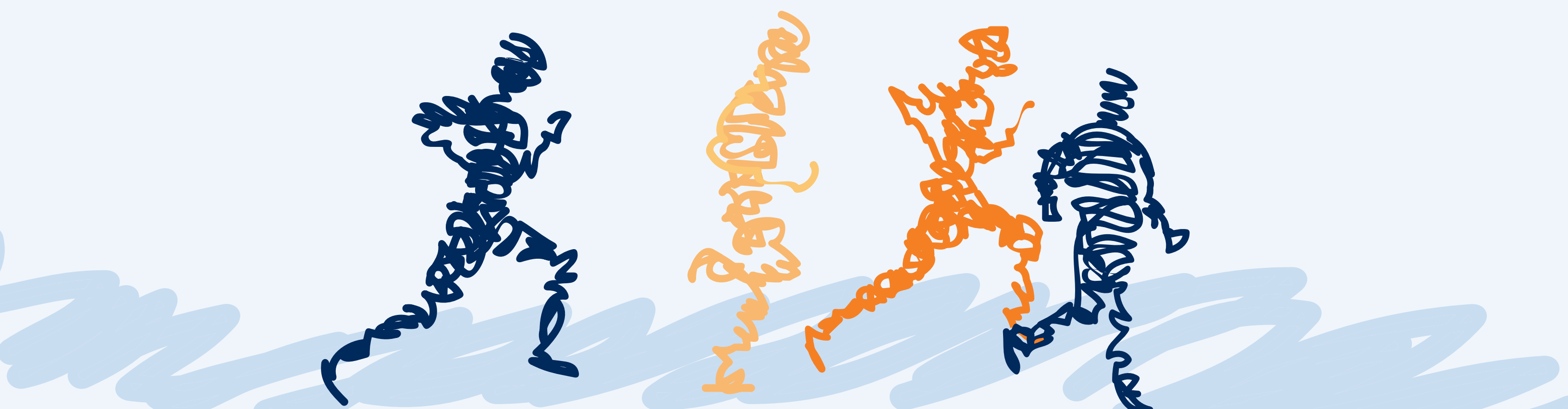

The Marie W. Wooten Memorial 5k Run

May 7, 2011

Proceeds will benefit the Marie W. Wooten Memorial Scholarship in the College of Sciences and Mathematics. Prior to Dean Wooten's death, she had planned to hold a 5k to raise money for scholarships. The race will honor Marie W. Wooten's memory and help COSAM continue her vision for the future of the college.

For more information, contact the COSAM Office of Development at 334- 844-2931.