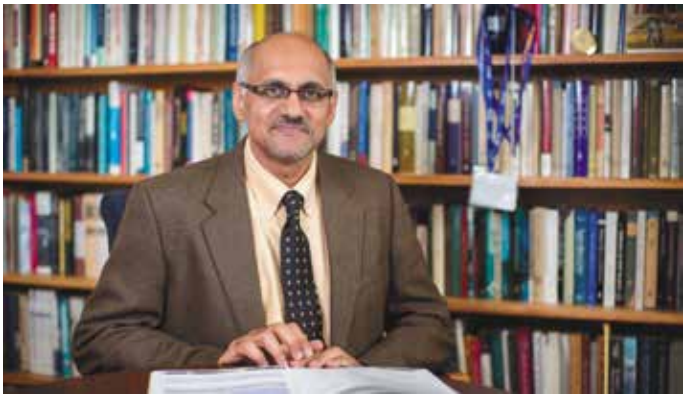
LSU RESEARCH

Office of Research & Economic Development ····· The Constant Pursuit of Discovery | 2018–19

TABLE OF CONTENTS

COVER FEATURE

RESEARCH WORKS

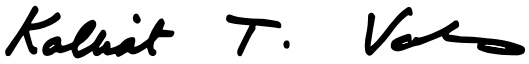


FROM THE VICE PRESIDENT

It is imperative now more than ever that we clearly and effectively communicate the value of research to society. We cannot afford to have pundits and politicians control the narrative and spew misinformation. Major research universities around the world and their researchers have a responsibility to speak out about our work and worth. In these pages of *LSU Research* you will see how we are pushing the boundaries of communication. In a truly transdisciplinary effort, our researchers, videographers, graphic designers, photographers, and writers joined forces to bring our research to life in a new and innovative way. We developed an app, LSU AR, which you can download from the App Store. So in addition to reading our articles, you can experience our research through augmented reality content wherever you see the LSU AR app icon.

Furthermore, in the following pages, we present research that brings together what may seem like unlikely pairings, but nevertheless forge new paths forward. You will read about the benefits of nature infused in architecture, the interconnectedness between human, animal, and environmental health, and how we are using technology to create safer and healthier communities. These are just a few of the gems in this issue of *LSU Research*.

I hope you enjoy the stories and information about our research. For more details and content, please visit our website, **LSU.edu/research**.



Kalliat T. Valsaraj

Vice President, Research & Economic Development
Charles and Hilda Roddey Distinguished Professor of Chemical Engineering
Ike East Professor of Chemical Engineering

ABOUT THIS ISSUE

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About the Cover

The cover is designed by staff graphic designer Sydney Langlois and represents the impact our research has on a multitude of scales. The concept of this issue developed from ongoing conversations about communicating our research effectively to people outside of the university including the general public. The result was a year-long LSU Research Works campaign led by the LSU Division of Strategic Communications that included a series of fact sheets, videos, and a companion website that was spotlighted in the Education Advisory Board's University Research Forum report, "Tactics for Communicating the Value of University Research."

The success of the LSU Research Works campaign is extended into this issue of the *LSU Research* magazine. LSU's talented graphic designers, videographers, and writers teamed up to create an augmented reality experience that allows readers to see and hear LSU researchers talk about their work in their own words. We developed an app, LSU AR, which can be downloaded from the App Store to deliver this additional content to your mobile device. We hope you enjoy this issue of the magazine and the stories by our researchers.

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Produced by the LSU Division of Strategic Communications
353-0045 • 1.6M • 10/18

NEWS

By Amanda Rabalais

Biodegradable Mardi Gras Beads

Tens of thousands of plastic Mardi Gras beads end up in landfills. However, one LSU biologist has found a way to maintain the Mardi Gras tradition while protecting the environment.

LSU Department of Biological Sciences Professor Naohiro Kato is developing an innovative new form of biodegradable Mardi Gras beads. The discovery was stumbled upon accidentally after one of Kato's students forgot to check on a test tube sample of algae one night. The next morning, Kato found a large glob of algae accumulating oils—one of the ingredients used for bioplastic production.

With the desire for a "greener" Mardi Gras on his mind, Kato immediately saw the potential for biodegradable beads. After the initial discovery, he began growing large quantities of this microscopic algae, or microalgae, in a six-foot kiddie pool outside. With the warm, humid temperatures and abundance of sunshine in Louisiana, he found this environment to be ideal for microalgae growth.

Financially, Mardi Gras bead production can be costly, but Kato has a plan to offset these costs. Kato's variety of microalgae is also appealing to the nutraceutical industry. By using microalgae, these companies can market products as vegetarian or vegan, which makes the microalgae profitable.

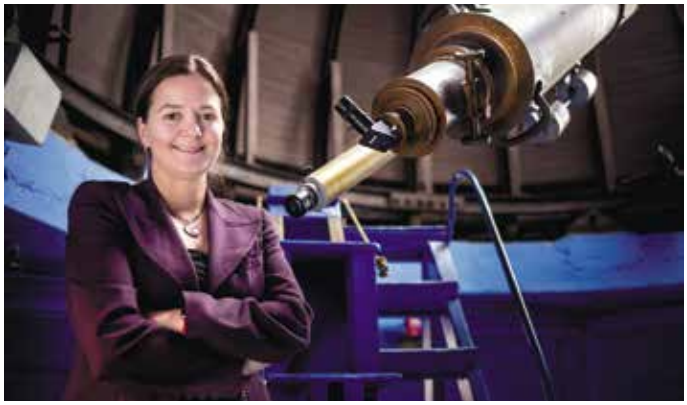
Kato has a patent pending to make beads entirely out of microalgae using the leftover biomass unused by the nutraceutical industry.

"I believe we can change and do better. We have great resources to make our Mardi Gras celebrations more sustainable and to protect our environment and health," Kato said.

Credit: Paige Jarreau, LSU.

Biodegradable Mardi Gras beads developed by LSU Department of Biological Sciences Professor Naohiro Kato.

New Data Debunks Alien Megastructure Theory on the 'Most Mysterious Star in the Universe'



Credit: LSU

LSU Department of Physics & Astronomy Assistant Professor Tabetha Boyajian led a team of scientists that debunked the alien megastructure theory surrounding the "most mysterious star in the universe."

A team of researchers, led by an LSU professor, is one step closer to understanding "the most mysterious star in the universe" after debunking the theory that an alien megastructure was orbiting it.

The star is KIC 8462852, or "Tabby's Star," named after LSU Department of Physics & Astronomy Assistant Professor Tabetha Boyajian. Upon first glance, Tabby's Star is an otherwise normal star more than 1,000 light years away. It is about 50 percent bigger and 1,000 times hotter than the Sun. However, the star has been inexplicably dimming and brightening sporadically like no other star.

Its mystery is so compelling that more than 1,700 people donated over $100,000 through a Kickstarter campaign to fund and support more data on the star through a network of telescopes around the world. Through this outpouring of community support, the star's researchers have been able to collect a new body of data about the phenomenon.

Many theories have been suggested by the researchers, including the idea that an alien megastructure is orbiting the star and causing the occasional dimming of light. However, new research from the team disproves this theory.

"Dust is most likely the reason why the star's light appears to dim and brighten. The new data shows that different colors

of light are being blocked at different intensities. Therefore, whatever is passing between us and the star is not opaque, as would be expected from a planet or alien megastructure," Boyajian said.

According to Boyajian, the data discovery is only possible due to the support from the public.

"If it wasn't for people with an unbiased look on our universe, this unusual star would have been overlooked," Boyajian said. "Again, without the public support for this dedicated observing run, we would not have this large amount of data."

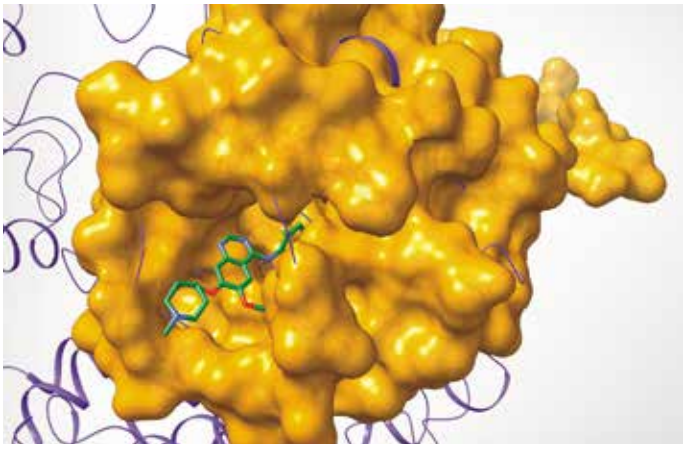
Researchers Computationally Find the Needle in a Haystack to Treat Rare Diseases

One in 10 people in America is fighting a rare disease, or a disorder that affects fewer than 200,000 Americans. Although there are more than 7,000 rare diseases that collectively affect more than 350 million people worldwide, many companies in the pharmaceutical industry avoid developing new therapies for these diseases.

It is not profitable to fund cures for diseases that only affect a small proportion of the population. However, researchers at the LSU Computational Systems Biology group have developed a sophisticated and systematic process to identify existing drugs that may be used to fight against these rare diseases.

The team has developed a unique virtual screening software called eMatchSite to match FDA-approved drugs and proteins that are involved with rare diseases.

"Rare diseases sometimes affect such a small population that discovering treatments would not be financially feasible unless through humanitarian and governmental incentives.



Credit: Misagh Naderi, LSU.

LSU Computational Systems Biology researchers developed a virtual screening software to match FDA-approved drugs with proteins found in rare diseases.

These conditions that are sometimes left untreated are labeled 'orphan diseases,'" said Misagh Naderi, a LSU Department of Biological Sciences Ph.D. graduate. "We developed a way to computationally find matches between rare disease protein structures and functions and existing drug interactions that can help treat patients with some of these orphan diseases."

Red Wine Proves Good for the Heart

Credit: Ginger Guttner, LSU.

LSU School of Veterinary Medicine Professor Tammy Dugas is developing a stent that releases antioxidants found in red wine to promote healing.

Heart disease is the leading cause of death for both men and women, and roughly 630,000 people die each year from heart disease, according to the Centers for Disease Control and Prevention. Heart disease occurs when plaque builds up within artery walls blocking the blood flow through tissues in the body, increasing the risk of a heart attack or stroke.

There is no one cure for heart disease. Surgical procedures are often used in severe cases. A common procedure is coronary angioplasty in which a surgeon inserts and inflates a tiny balloon into a blocked or narrow artery in order to widen it and allow blood flow through to the heart. Often, this procedure involves a stent, or a permanent small mesh tube that supports the blood vessel. Unfortunately, these stents can often release toxic chemotherapy agents that can cause the blood vessel to narrow again. However, LSU School of Veterinary Medicine Professor Tammy Dugas is harnessing the antioxidants found in red wine to improve stents. She is developing a stent that releases antioxidants slowly over time to promote healing and to prevent blood clotting and inflammation.

"By delivering red wine antioxidants during conventional angioplasty, it may be possible to prevent excess tissue from building up and the blood vessel from narrowing again as it heals," Dugas said.

Mapping Blue Carbon in Mangroves Worldwide

Coastal scientists have developed a new global framework to more accurately assess how mangroves along different types of coastlines from deltas to lagoons store carbon in their soil. They found that previous studies have underestimated the blue carbon levels in mangroves by up to 50 percent in some regions and overestimated levels by up to 86 percent in others. This study published in *Nature Climate Change* will help countries develop and evaluate their carbon footprint and blue carbon inventory that potentially can be used in the global marketplace.

"We took a huge step further by testing a robust model that more clearly defines the global variation of carbon storage of coastlines taking into account different tides, river flow, geology, and rainfall that occurs around the world," said co-author Robert Twilley, who is a LSU Department of Oceanography & Coastal Sciences professor in the LSU College of the Coast & Environment and the executive director of the Louisiana Sea Grant College Program.

Carbon is one of the most abundant chemical elements on Earth. It is in the atmosphere, the ocean, and the human body. It is also part of carbon dioxide—a gas that comes from both natural and manmade sources, from exhaling to car exhaust. Excess amounts of carbon dioxide emitted into the atmosphere is connected to climate change. Carbon dioxide concentrations in the atmosphere reached a historic high this year.

However, the ocean and coastal ecosystems can store large amounts of this excess carbon from the atmosphere—referred to as blue carbon. Mangroves are considered blue carbon ecosystems similar to green carbon ecosystems found on land in forests and grasslands. Mangroves, saltmarshes, and seagrass beds are connected to the shallow intertidal parts of the ocean, where they accumulate more carbon from the atmosphere than they release thus serving as blue carbon sinks. Mangroves are unique. They are tropical forests that thrive in salt water and are found in a variety of coastal settings from deltas to estuaries to weathered reefs and limestone rocks worldwide. Mangroves are able to store vast amounts of carbon in its soil for long periods of time, thus helping reduce the amount of carbon dioxide in Earth's atmosphere.

Credit: LSU.

Scientists Robert Twilley, Edward Castaneda, and Andre Rovai collect soil samples on Sanibel Island, Florida.

The scientists focused their study on the neotropics, which covers the southern U.S., Central America, and South America, where about 30 percent of the world's mangroves live. The neotropics are considered a global blue carbon hotspot. However, until now, many countries lacked blue carbon data.

"We saw an opportunity to improve the contributions of tropical countries around the world in mitigating carbon enrichment in the atmosphere by putting together a higher quality dataset and using a sound conceptual model of how different coastlines serve as carbon sinks to guide our modeling approach," said lead author Andre Rovai, who is a LSU Department of Oceanography & Coastal Sciences post-doctoral researcher.

Rovai and his colleagues from Brazil, the U.S., and Costa Rica collected soil samples from 36 mangrove sites spanning from the Florida Coastal Everglades to south of the Amazon in Brazil. They measured the amount of carbon in the samples. They found that blue carbon has been underestimated by up to 50 percent in coasts with limestone rock, such as those found on the southern tip of Florida and in the Caribbean. The scientists also found that blue carbon has been overestimated by up to 86 percent in coastal deltas in previous studies. In addition, this study provides new estimates for about 57 countries that lack blue carbon data. ■

Credit: LSU.

LSU Department of Oceanography & Coastal Sciences Post-doctoral Researcher Andre Rovai collects a soil core sample from Taylor Slough in the Florida Coastal Everglades.

Vince LiCata and Kristin Sosnowsky

Credit: LSU.

SciArt Conversations

Q&A with scientist Vince LiCata and arts and communication educator Kristin Sosnowsky

By Beth Carter

Although art and science may seem like an unlikely pairing at first, Vince LiCata, a professor in the LSU Department of Biological Sciences, and Executive Associate Dean of the College of Music & Dramatic Arts Kristin Sosnowsky aim to bring the two disciplines together with their event series, SciArt Conversations.

The two started the program in 2011, and they work to bring LSU scientists and artists together on common ground to have open discussions with the public on the intersection of science and art. They are planning a SciArt conference to be held at LSU next spring, where they hope to discuss the integration of art and science on a national scale.

What interests both of you about the intersection of science and the arts, and how did SciArt Conversations evolve from that?

LiCata: I'm in the biological sciences department, but art has just always been something I'm interested in. I work on SciArt topics all the time and we were looking for a sort of low-maintenance thing to do. Putting on something like a play is such a big production; you have to bring in outside artists, it's really expensive, and it takes a lot of time. So we were thinking: what can we do at LSU that brings science and art together and puts them on a stage? We came up with this idea: a conversation, not a lecture, where you bring a scientist and an artist and you make them talk about the same topic.

Sosnowsky: I'm interested in theatre as a communication method, whether it's on issues of social justice, types of political activism, that sort of thing. Vince first started working in the theatre department in 2007 when he co-wrote a play with a visiting artist we had, and I think that kind of spurred the idea of science and art and communication all working together. [This intersection] is a place that's just starting to blow up in terms of how people are combining science and art, so it just seemed like something that really made sense for LSU.

You mentioned that science and art are "blowing up" recently. What has the public reaction to and interest in SciArt Conversations been like since you started?

LiCata: We always get really good feedback about it. Over the past 10 years, it really has started to look like science and art are about to explode; more and more universities and private companies are doing things that tie science and art together. And it just continues to expand.

Sosnowsky: What we try to do with these SciArt Conversations is about the accurate communication of science. There are lots of science fiction art out there, but that's not really our focus. We're trying to communicate science accurately to the public.

What are the similarities between science and art that make the two such a good pair?

LiCata: Topic-wise, I think they're still far apart, and that's why people are afraid to blend them. But if you really look at artists and scientists, they've got very similar personalities. They're super-driven; they're very creative; and they both like to do things that have never been done before. You can almost come up with a list of identical personality traits for scientists and artists, except that they are experts in totally different, hard-to-master fields. In some cases, a lot of artists are afraid to dive into scientific topics and vice versa. But once you start crossing those boundaries, you discover that people are just so similar that it's easy to work with people across those boundaries.

How do you find scientists and artists and bring them together?

LiCata: Usually I call them up and they say, "You want me to do what?" They usually get nervous about talking about their science or their art with someone they've never met before. But after they exchange information with each other and discuss what each person's going to talk about, it always goes very smoothly.

Sosnowsky: We're actually planning a SciArt conference at LSU next April that will expand what we're doing in the conversation series but in a more structured and academic way. We want to bring together scientists, artists, and scholars to talk about this intersection, specifically science and theatre. It'll also include a playwriting festival for new science-based plays, and we're really trying to expand the initiative beyond the LSU community.

Do you have any personal favorite past SciArt Conversations or one that's really stood out?

Sosnowsky: We had one that was popular a while back where we had two physicists talking about string theory and then we had improvised string music by a classical violinist.

LiCata: One of my favorites was when we had a researcher talking about spider silk and we had Nick Erickson from the School of Theatre doing an aerial silk performance in the dance studio.

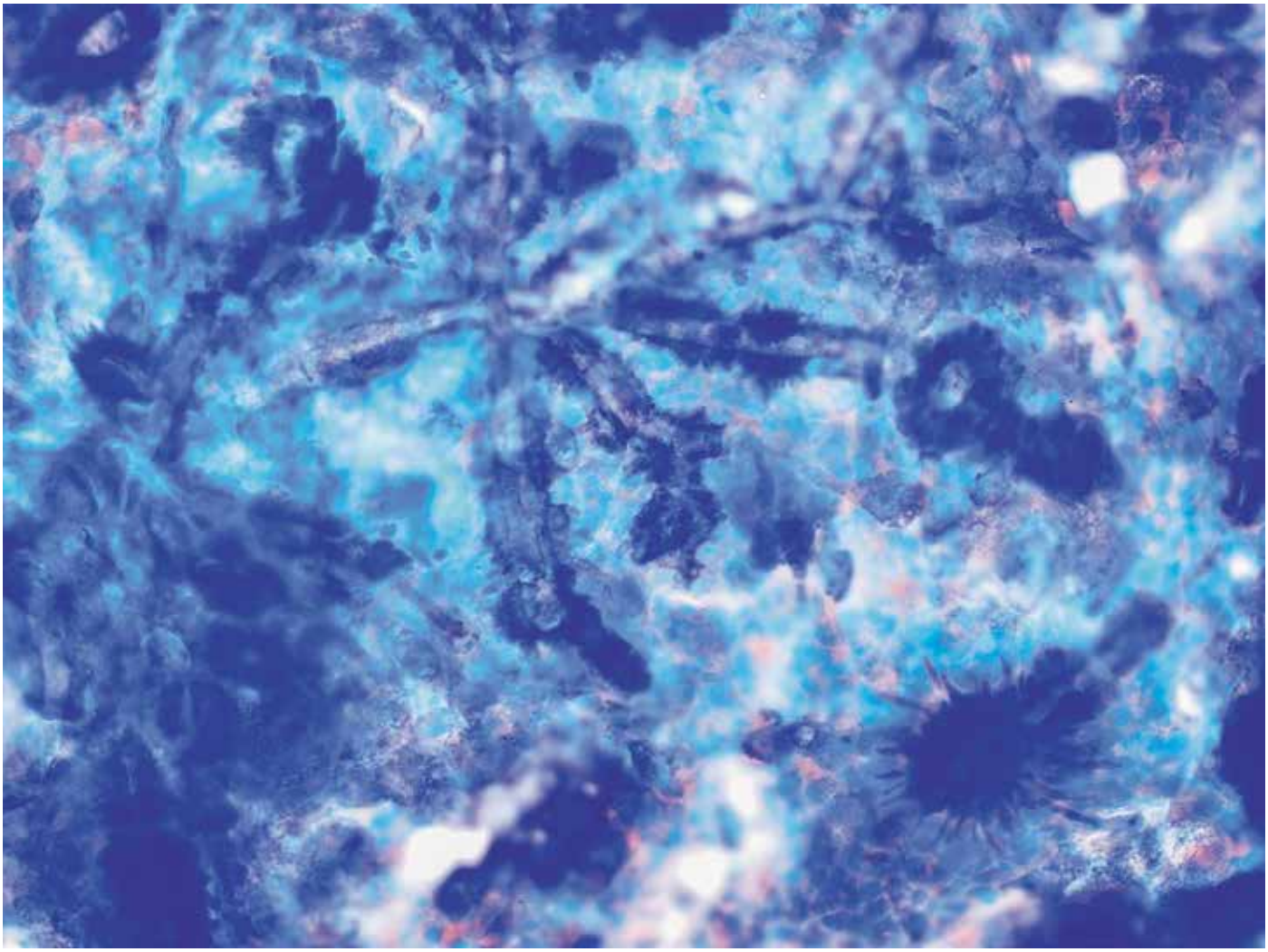
Sosnowsky: Sometimes the science and art are closely combined and touch on the same topic, but other times we bring together two loosely related or completely unrelated topics—like string theory and string musicians, or spider silk and aerial silk—and get really interesting and beautiful results. ■

The Art of Science

By Jackie Bartkiewicz and Alison Lee Satake

Scientists from a range of disciplines create images that help them with their research. Not only can these visuals be critical to advancing our understanding of the natural world or offering solutions to some of our most pressing challenges, but they are also extraordinarily beautiful.

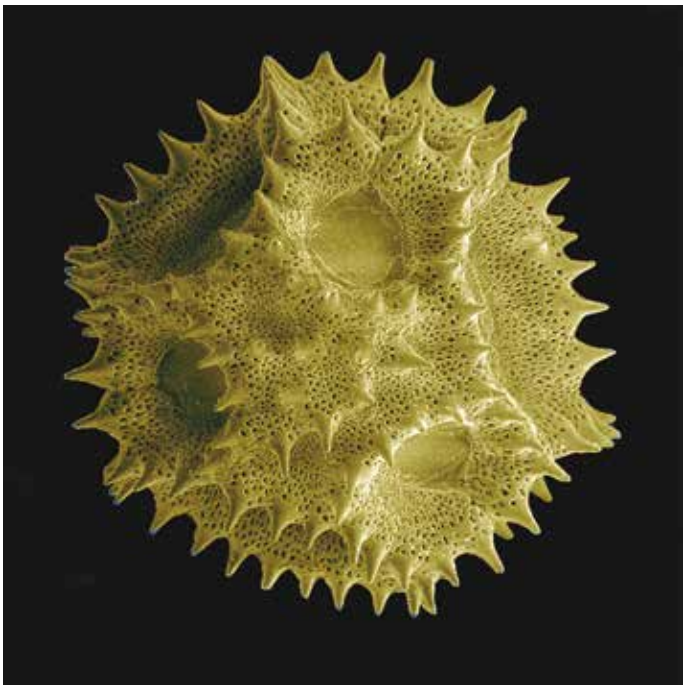
LSU Research and *LSU Alumni Magazine* curated a selection of abstract art produced by researchers as part of their cutting-edge work at LSU and feature these unique visuals here.



Canine immune system

by Shannon Dehghanpir and Amy Grooters, LSU School of Veterinary Medicine

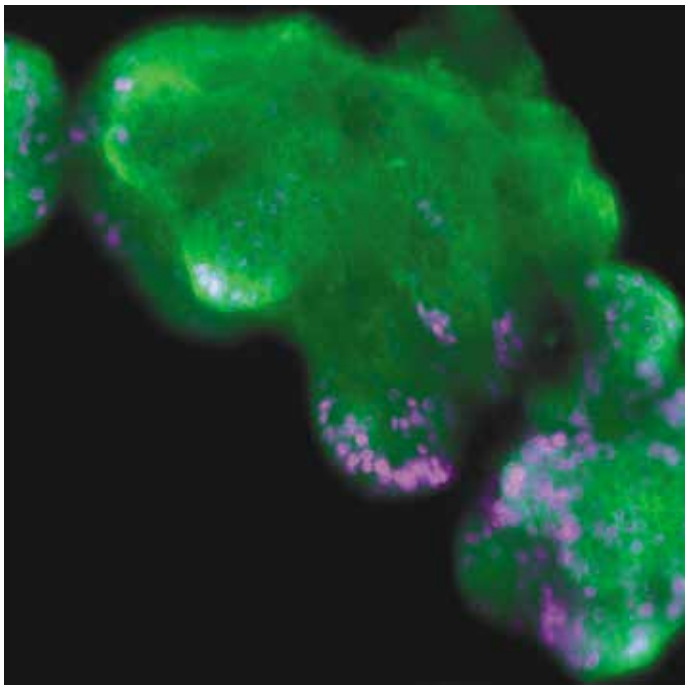
A photomicrograph shows the canine immune system responding to infection caused by the opportunistic fungal pathogen, *Pseudallescheria boydii*. Current work at the LSU School of Veterinary Medicine is aimed at utilizing cytomorphology to facilitate prompt, specific, and successful treatment of fungal infections in veterinary medicine.



Dandelion

by Sophie Warny, LSU Department of Geology & Geophysics

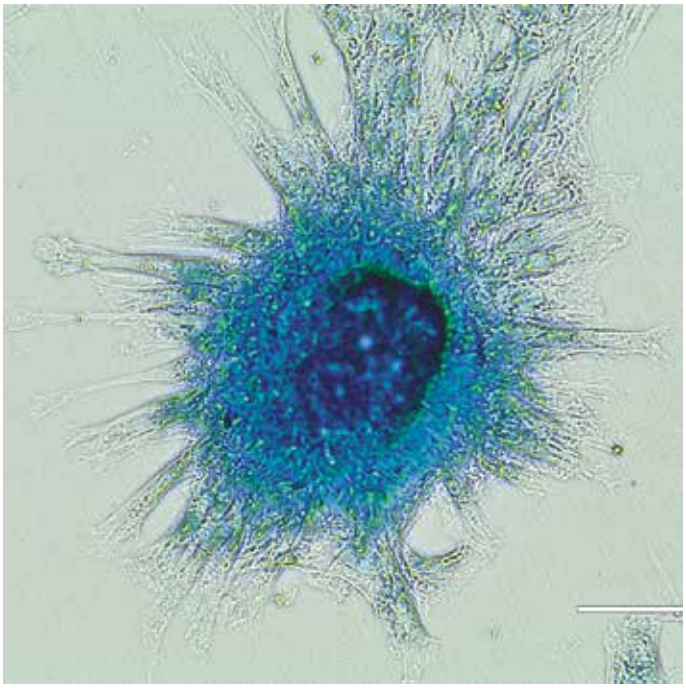
Dandelion pollen photographed and analyzed at the Center for Excellence in Palynology, or CENEX, at LSU.



Ovis aries

by Robin Powell, LSU School of Veterinary Medicine

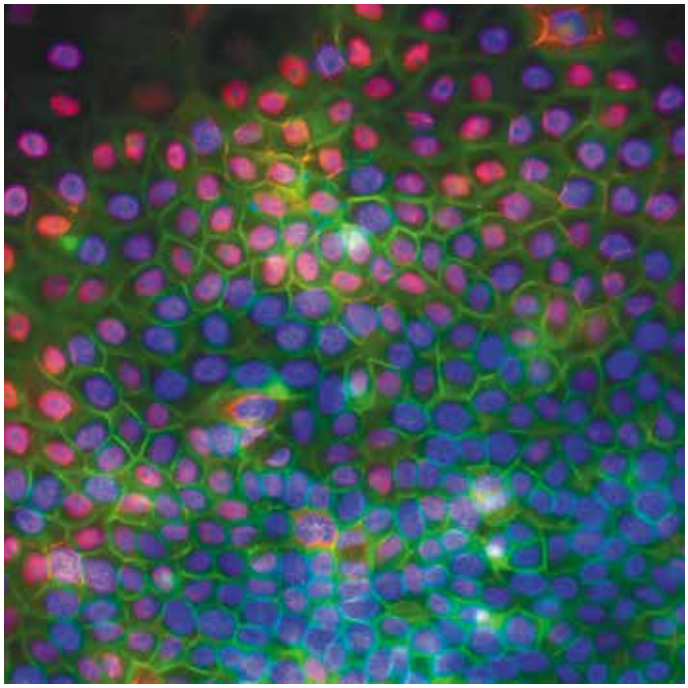
Sheep small intestine organoid, or mini-gut, composed of cells in green that form crypt-like regions of active cell growth shown in pink.



Chondrogenesis

by Britta Leise and Alvaro Oliveira, LSU School of Veterinary Medicine

Equine adipose-derived mesenchymal stem cells grown in media to promote chondrogenesis where the cells have been stained with Alcian blue to demonstrate the production of proteoglycans shown in blue by chondrocytes.



Luminal side of *Felis catus*

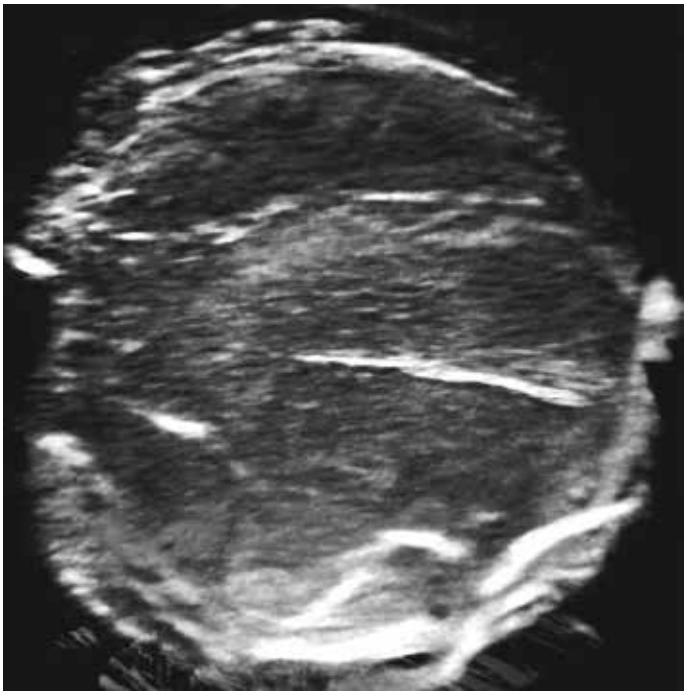
by Sarah Bergeron, LSU School of Veterinary Medicine

Cat small intestine cells grown as a monolayer on transwell inserts show epithelial cell nuclei in blue and red and are ringed by membrane shown in green.

Flame structures

by Carol Wilson, LSU Department of Geology & Geophysics

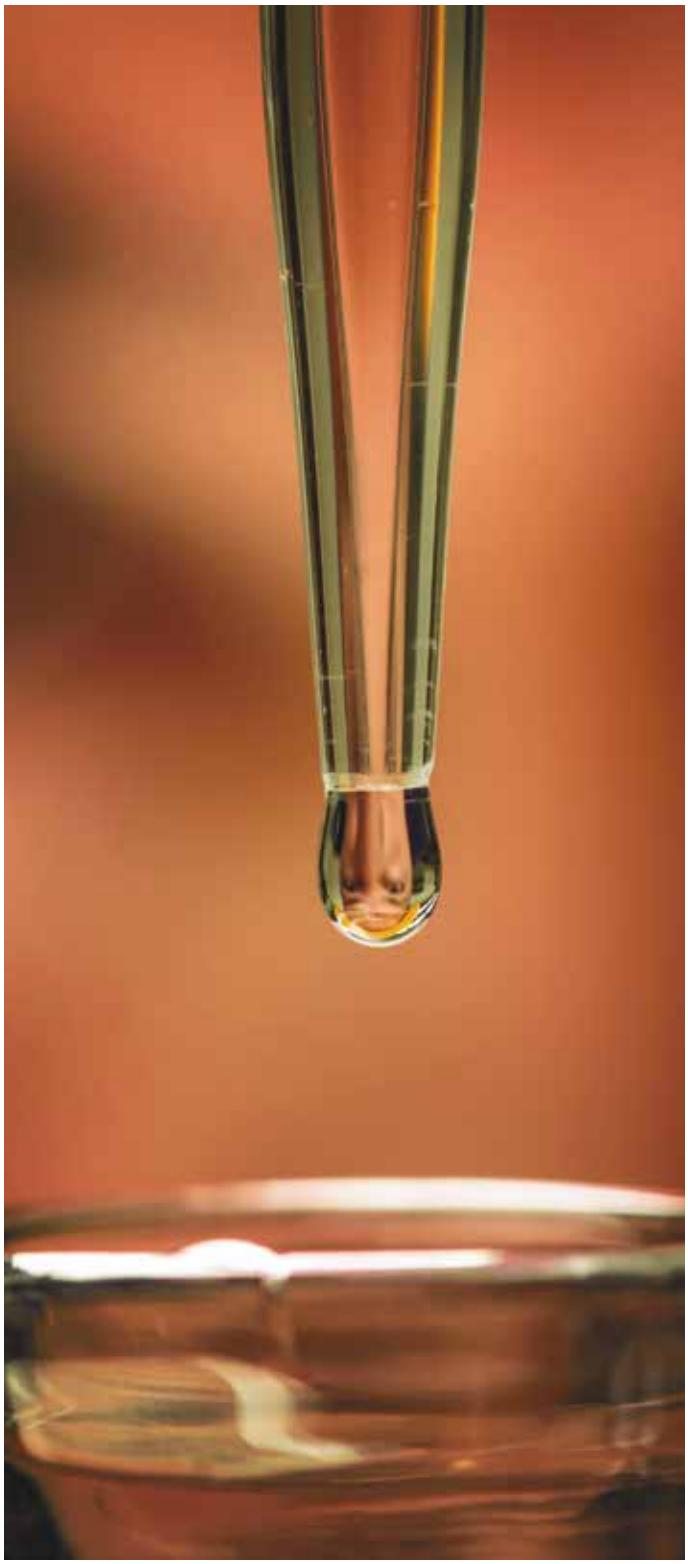
Undulating patterns called flame structures are common in freshly deposited sediment. Loading of water-saturated mud layers, which are less dense than overlying sands, are squeezed upward and sometimes horizontally by drag. The islands in the Ganges-Brahmaputra river mouth in Bangladesh can have more than a foot of sediment deposited over one monsoon season.



Peppercorn

by Kyungmin Ham, LSU Center for Advanced Microstructures & Devices

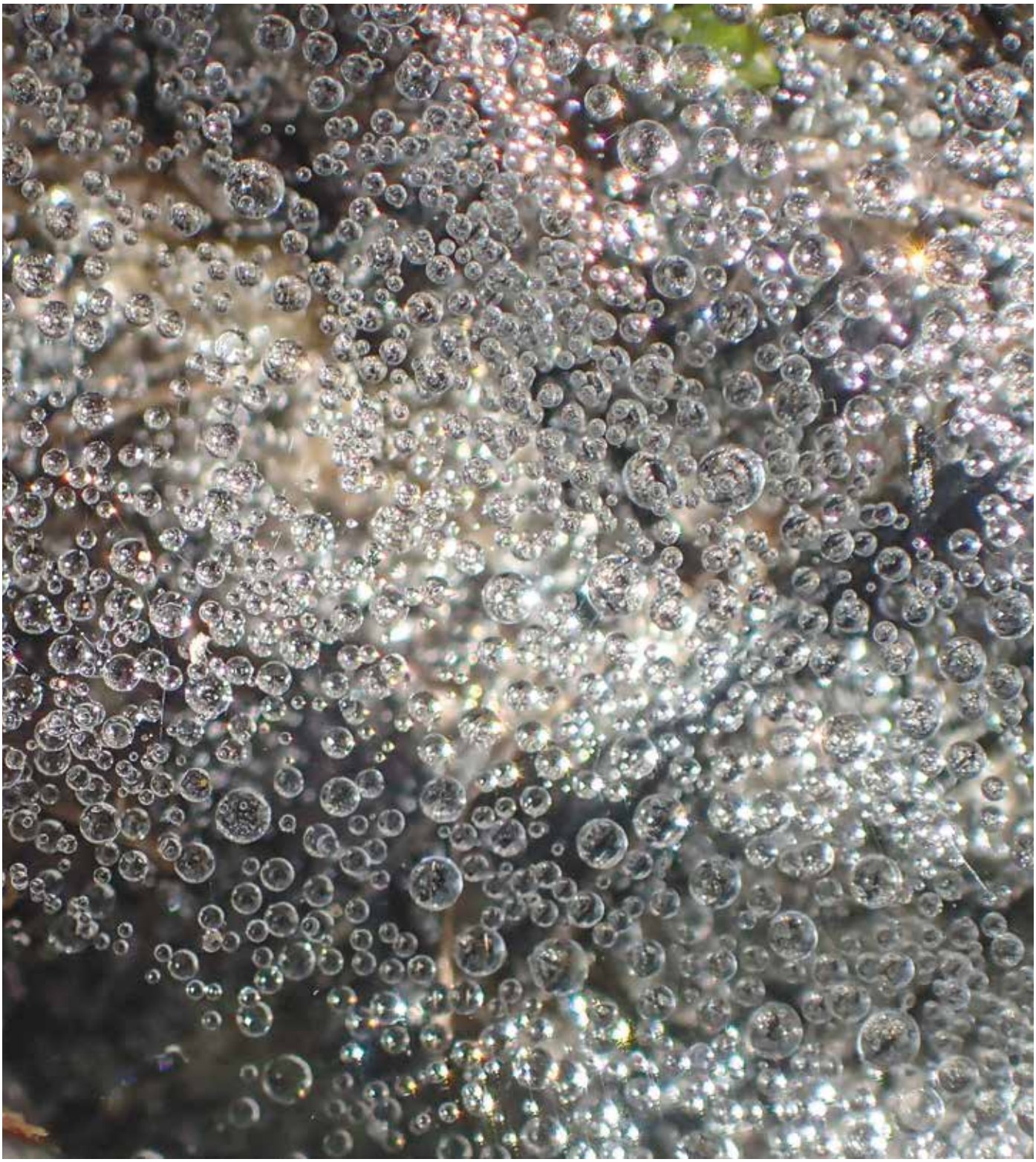
X-ray interferometry and tomography image of an organic peppercorn from Whole Foods taken at the LSU Center for Advanced Microstructures & Devices.



Titration

by Anne Power Donnarumma, LSU Department of Chemistry

LSU Department of Chemistry Post-doctoral Researcher Fabrizio Donnarumma demonstrates an acid-based titration as performed in the General Chemistry teaching labs.



Spider web

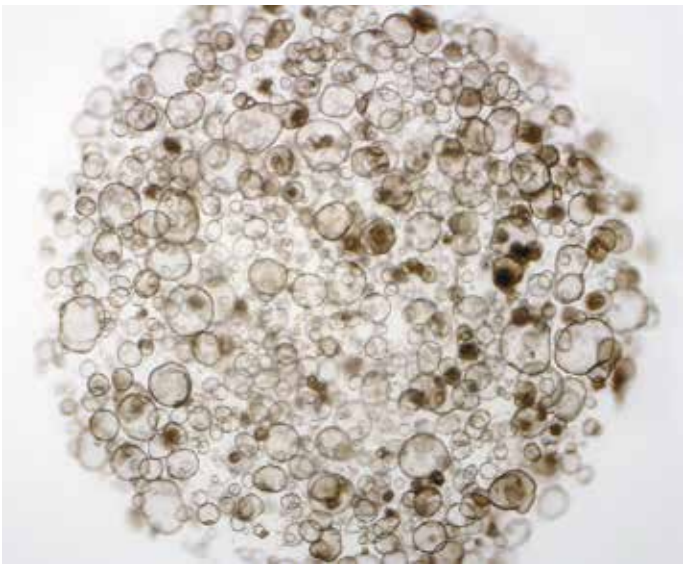
by William G. Eberhard, LSU Museum of Natural Science

Tiny water droplets throng on a spider's web on the ground in a bog and remain during most of the day. The droplets may help the spider capture its prey, which become covered in large drops when they struggle in the web. The spider, however, runs through the dense cloud of droplets dry.

Tidal channels

by Carol Wilson, LSU Department of Geology & Geophysics

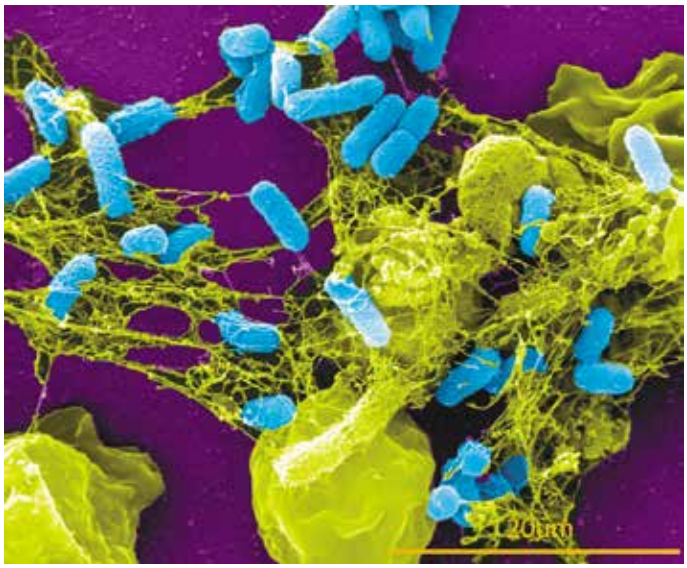
When tidal channels erode in Bangladesh, the undulating patterns of sediment deposited from the tides is revealed. Some regions in southwest Bangladesh have experienced more than 500 meters, or one-third of a mile, of shoreline retreat over the past 20 years, eroding away local habitat and forcing human migration.



Felis catus

by Sarah Bergeron, LSU School of Veterinary Medicine

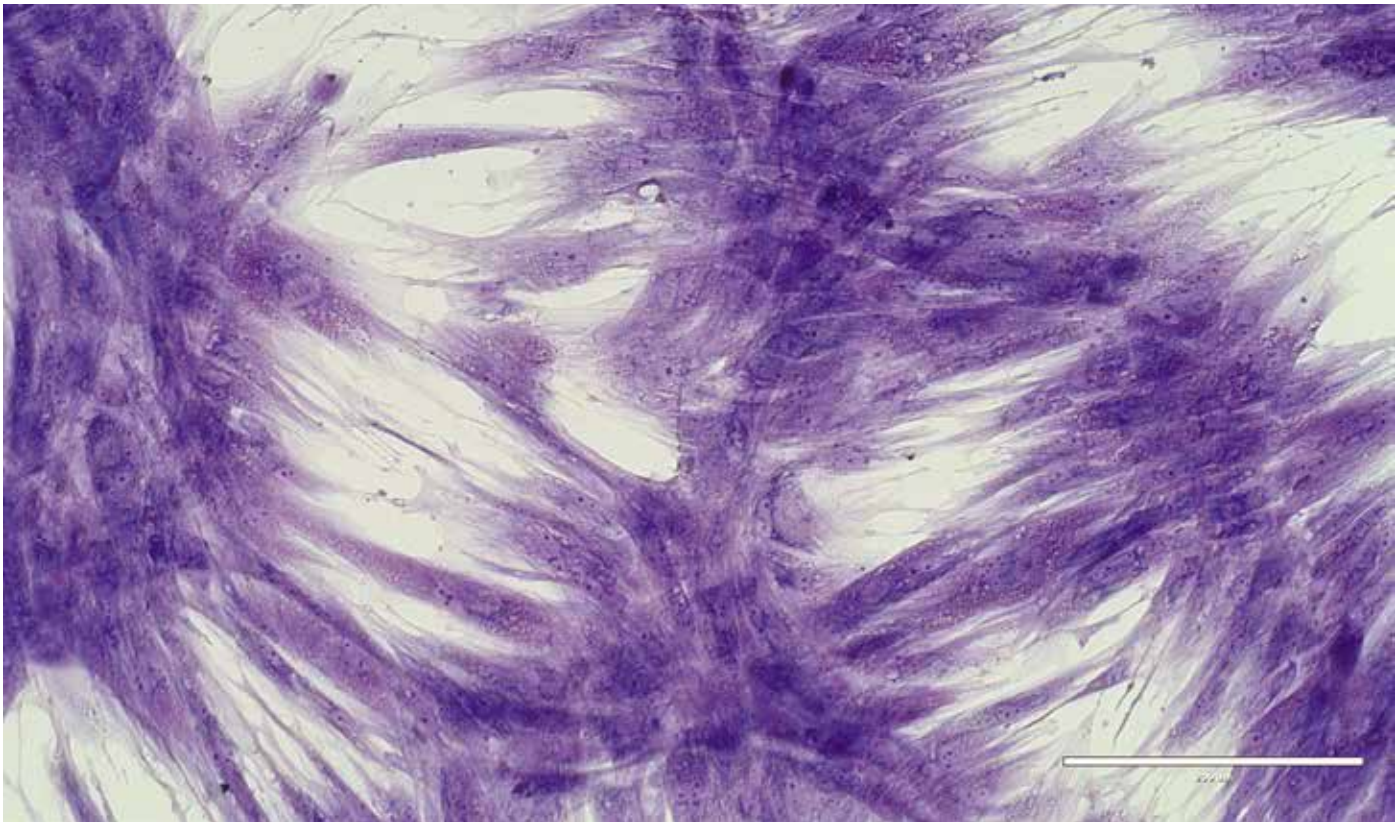
Cat small intestine organoids, or mini-guts, grown in 3D Matrigel matrix.



Mouse

by Liliang Jin and Samithamby Jeyaseelan, LSU School of Veterinary Medicine

Mouse Neutrophil Extracellular Traps, or NETs, capture bacteria, *Klebsiella pneumoniae*.



Equine bone marrow

by Britta Leise and Alvaro Oliveira, LSU School of Veterinary Medicine

Equine bone marrow-derived mesenchymal stem cells growing in monolayer culture.

Research Works

As a leading public research university, LSU faculty focus on finding solutions to some of the greatest challenges of our time.

Their expertise spans a wide range of topics from chronic disease to coastal land loss. Through science, engineering, scholarship, and discovery, our faculty and students use the latest tools and technology to advance knowledge and improve quality of life.

In the following pages, you will get to meet four LSU professors who conduct large-scale research that can be applied to disaster-resilient housing, air quality and environmental health, safer cities, and the future of our coast.

LSU AR

Download the LSU AR app in the App Store.

Hover your phone or mobile device over the page to access additional augmented reality content about LSU research.

Research Works for

THE COAST

Credit: LSU.

Students grow and plant dune grass to learn about coastal land loss through the Coastal Roots program.

The Coastal Crusader: Pam Blanchard

By Tiffany Davis

Born and raised in Port Arthur, Texas, Pam Blanchard was never a stranger to complex coastal issues. That knowledge has followed her throughout her career.

"I've always had that coastal thread in what I'm doing," Blanchard said.

The Coastal Roots Program is a hands-on environmental stewardship project, which is literally a ground-altering way to incite positive changes on a coast that is eroding faster than any other U.S. coastline due to the complex challenges of sea level rise and engineered environments. Blanchard and co-director Ed Bush, a professor in the LSU School of Plant, Environmental, & Soil Sciences, facilitate elementary, middle, and high school students and teachers in 59 schools in Louisiana and Chile.

Local students grow dune grass, such as bitter panicum, and native trees like cypress and nuttall oak. The students in Chile grow native soap bark and quillay trees.

Blanchard is hoping to expand to Puerto Rico, the U.S. Virgin Islands, and Belize in the near future. Similar to Louisiana, these areas also face a coastal crisis due to sea level rise and habitat degradation. Blanchard believes in empowering students in response to what may seem like overwhelming and amorphous issues such as sea level rise and coastal erosion.

"What I really want the kids to do is to have a good experience doing something positive for a portion of our coastal plain and to remember that experience so that when they become voting adults, they will be advocates for all of our natural resources," Blanchard said.

90% of Louisianians believe that **LSU's COASTAL RESEARCH** and involvement is **VITAL TO THE STATE.**

After graduating with an undergraduate degree in liberal arts, Blanchard taught middle school science and math. She taught for more than eight years before pursuing another undergraduate degree and then her Ph.D. in geology.

"I liked being outside. And, I was fascinated with the stories rocks can tell us," Blanchard said.

She studied micropaleontology at LSU and conducted her dissertation research on the Caribbean coast of Costa Rica in conjunction with the Smithsonian Tropical Research Institute.

In 1998, she joined the Louisiana Sea Grant College Program to pursue her passion in science education. While there, she connected with partners to help create Ocean Commotion, an annual hands-on ocean science education event for elementary and middle school students, and the LSU Coastal Roots Program in 2000.

"Louisiana has this huge coastal crisis, but people who aren't scientists don't understand what's going on and why it is happening," she said. "I decided that there must be something I could do to help people—kids, in particular—understand what is going on."

"We need to all be environmental advocates. We need to pay attention to what's going on around us, whether it's on the beach or in our coastal forests. There are a lot of pressures on these areas. If we want to preserve what we have—natural resources and cultural resources—we need to pay attention and teach our children," Blanchard said. ■

COASTAL ROOTS BY THE NUMBERS

(since 2018)

23,003 students

168,567 plants

430 trips

1,508 teachers

3,284 chaperones

Research Works for

NATURAL DISASTER RESILIENCE

Housing's Humanitarian: Carol Friedland

By Tiffany Davis

Before pursuing a career to improve housing standards, Carol Friedland grew up in Wyoming.

"I knew I loved math, science, and being outside," said Friedland, who is the Cajun Constructors associate professor in the Bert S. Turner Department of Construction Management at LSU.

This drove her to earn a bachelor's degree in civil engineering at the University of Wyoming. After earning her degree, she worked as an engineering consultant, but soon realized she wanted more variety and challenge in her work. So, she ventured into the field of construction. She took on several industrial construction projects around the country including Nebraska, Missouri, Alabama, and Louisiana, where she worked on building power stations.

In Louisiana, Friedland realized she wanted to further her education—earning her master's degree in 2006 and her Ph.D. in 2009 from LSU, both in civil engineering. As a graduate student, she taught classes in construction management. She taught structural technology and materials and methods for industrial and heavy civil construction, like highways and levees.

"Even though my degrees are in civil engineering and I focused more on structural engineering in my Ph.D., my work and research areas and job experience have always been in construction," Friedland said.

Credit: LSU.

LSU Cajun Constructors Associate Professor Carol Friedland in the Bert S. Turner Department of Construction Management provides her expertise to national media including Discovery's Science Channel.

Her research initially focused on the vulnerability of industrial facilities to hurricanes, but after Hurricane Katrina, her focus shifted. Her research began to focus on the resilience of housing structures to natural hazards, specifically to wind and flood. Working with the State Hazard Mitigation Plan, she and other researchers look at all of the hazards that affect the state. She and representatives from agencies across the state specifically work on risk assessment and prioritize mitigation opportunities based on capability, cost, effectiveness, and a number of other criteria.

"The ultimate goal of my research in hazard resistant construction and mitigation is to improve the quality of life for people who live in Louisiana, the nation, and the world."

Carol Friedland
LSU Cajun Constructors Associate Professor in the Bert S. Turner Department of Construction Management

After the massive floods surrounding Baton Rouge, Louisiana, in 2016, Friedland took an even more tenacious approach to not only solving the consequences of flooding, but preventing them. She has addressed issues with current building codes and what can be done, such as increasing elevation of homes during construction.

"Rather than spending thousands of dollars to mitigate damage within existing homes, it would be much better to spend the time and money on constructing homes to a more stringent and resilient standard," Friedland said.

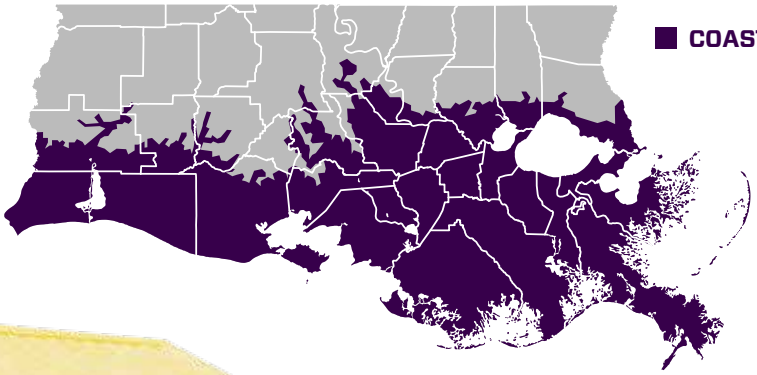
If houses are built to standards beyond what is required by the current code, it could dramatically decrease the risk of losing everything to a flood or other natural disaster.

Residents can also educate themselves about their flood risk by visiting LSU AgCenter's Louisiana Flood Map portal. By visiting the flood map portal, people gain access to a detailed map highlighting where the flood zones are in Louisiana, down to their approximate ground elevations.

"The hazard will occur," she said. "To me, it's a question of if we're able to resist it, then it won't become a disaster."

In the future, Friedland is working to provide concrete, quantitative data to the appropriate audiences and ensuring that change occurs for all who live in flood-prone areas, which includes many places in Louisiana. If disaster can be prevented on the front end, the state and homeowners can be spared from its toll. ■

OVER 20% OF THE MOST INTENSE U.S. MAINLAND HURRICANES ON RECORD **MADE LANDFALL IN LOUISIANA**.



■ **COASTAL ZONE AND EXTREME STORM SURGE POTENTIAL ZONE**

OVER 2 MILLION PEOPLE LIVE IN LOUISIANA'S COASTAL ZONE.

THE EXTREME STORM SURGE POTENTIAL ZONE **FACES STORM SURGES OF OVER 9 FEET FROM EVEN A CATEGORY 3** HURRICANE.

Research Works for

OUR HEALTH

Environmental Health Scientist: Stephania Cormier

By Alison Lee Satake

Pollutants and hazardous substances released into the air we breathe are detrimental to our health. LSU Superfund Research Center Director Stephania Cormier studies how airborne pollutants such as particulate matter and environmentally persistent free radicals, or EPFRs, affect our health. Her research has shown that exposure to environmental pollutants with free radicals can lead to a whole host of health problems including heart and lung disease, more prolonged and severe cases of pneumonia resulting from respiratory infections, and an increased risk for obesity.

Exposure to these pollutants can also lead to severe asthma, especially among infants and children whose lungs and immune systems are still developing. Challenges faced during the critical developmental stage of infancy can lead to long-term health problems.

Credit: LSU.

4-H students catch bottom-dwelling aquatic insects to measure water quality at Camp Grant Walker with LSU Superfund Research Center Coordinator Jen Irving.

> "I study all of this in infants because I want to know what we can change in the environment to prevent children from developing long-term lung diseases like asthma."
>
> Stephania Cormier
> LSU Superfund Research Center director, LSU Department of Biological Sciences Wiener chair and professor, and LSU School of Veterinary Medicine Comparative Biomedical Sciences professor

Asthma affects about 235 million people worldwide, according to the World Health Organization. It is the most common chronic disease among children. Cormier's research has found that infants and young children exposed to particle pollutants with free radicals have a higher risk of developing asthma including severe asthma that is resistant to steroid therapy. Her research has also shown that exposure to these pollutants can increase mortality from infections like the flu.

"In infants, the immune system is still being 'educated' and the lungs are still developing. Exposure during this critical window can alter the lungs' structure resulting in long-term dysfunction that can affect the developing immune system altering response to infections. It's like a double whammy to be hit at that critical point in time—infancy," said Cormier, who has been conducting research on how exposure at critical points in development leads to long-term biological changes since her post-doctoral fellowship at the Mayo Clinic after receiving her doctorate at the LSU Health Sciences Center in New Orleans. She joined the faculty at LSU in 2003.

Her research has also shown that mothers who are exposed to these particle pollutants are more likely to have children with childhood asthma. Those offspring are also more predisposed to obesity, especially when consuming a high fat diet, than offspring from mothers who are not exposed.

The LSU Superfund Research Center has found EPFRs in a variety of places including contaminated soil at Superfund sites, in the air after electronic waste is combusted, in the wetlands after the burning of oil from the Deepwater Horizon oil spill, as well as in e-cigarette vapor. EPFRs have also been found in soot, coal, ash, and cigarette smoke. EPFRs do not easily decompose and can linger in the air up to a few months, which increases our exposure to them.

Because we have little control over the free radicals found in our environment, Cormier suggests boosting our immune systems with foods rich in antioxidants such as green tea, blueberries, blackberries, vitamin C, and red wine. Antioxidants are molecules that can protect the body from damage from free radicals.

"When you do get sick, antioxidant supplementation can lessen the amount of infection and help your body clear it from your system. We've seen this for both viral and bacterial infections in the lungs in the setting of EPFR exposure," Cormier said.

To help protect yourself, she recommends antioxidants and eating a low fat diet. ■

Research Works for

SMART CITIES

Credit: LSU.

LSU Division of Computer Science & Engineering Dr. Fred H. Fenn Endowed Professor Jay Park and LSU Center for Computation & Technology Director J. "Ram" Ramanujam.

Big Data Connector: Jay Park

By Alison Lee Satake

Seung-Jong "Jay" Park was a computer scientist working in Seoul, Korea, for many years before coming to the U.S. He was 30 years old when he immigrated here to pursue his Ph.D. at the Georgia Institute of Technology, where he developed software. At the time, Georgia Tech did not have a supercomputer. However, the LSU Center for Computation & Technology's supercomputing power impressed Park so much so that he joined the faculty in 2004. Now, as a jointly appointed professor in the computer science department and the Center for Computation & Technology, or CCT, Park develops numerous types of software that span the disciplines and tackle some of the biggest problems we face today—from improving cancer detection to flood resilience. Currently, he is working with the city of Baton Rouge to develop software to address traffic, crime, and blight.

"Data is the key," Park said. "And, I enjoy collaboration."

This collaboration is part of an international trend of "smart cities." From London to Chicago, cities around the world are leveraging technology to improve infrastructure, environmental health, safety, and security.

"The pattern of crime and traffic are similar among cities," Park said.

Thousands of traffic cameras capture video footage and data along all of the highways and major roads throughout Louisiana. This real-time data currently helps emergency responders and law enforcement. Park is developing software that can expand the use of this video footage and help planners identify traffic patterns, such as the number and frequency of 18-wheel trucks that cross the bridge over the Mississippi River. With higher resolution information, the city will be able to plan roads and transportation based on more accurate traffic patterns. He also sees a need for being able to identify every vehicle's make, model, and year in order to assist with Amber Alerts.

Similarly, he and colleagues are exploring ways to use satellite imagery and data to identify areas that are on the verge of becoming blighted. The advantage of a mid-sized city such as Baton Rouge is that systems and technology can be deployed more quickly than in a large metropolis.

However, Park is sensitive towards privacy concerns.

"We need to delete personal information and only extract the metadata," he said.

It is a fine line. This is especially true when it comes to addressing communities and violence prevention. He believes community engagement is a critical factor. The smart city committee plans to meet with community stakeholders.

> "We want people to understand how this technology works to reduce crime and protect privacy."
>
> Jay Park
> LSU Division of Computer Science & Engineering Dr. Fred H. Fenn Endowed professor

He has grown into the role of facilitator.

"When I was a new assistant professor, I could not work with faculty outside the computer science department, because I could not understand their disciplines. I needed to learn their research language first," he said.

Now, he serves as the conduit between social scientists and computer scientists.

"My role is to integrate these two groups together," he said. "It's a rewarding challenge." ■

CITY OF BATON ROUGE

Data Source: American Community Survey and Louisiana Department of Transportation & Development

225,374 population

$39,969 household income

76 traffic cameras

30 median age

African American **54.5%**

White **39.4%**

Latino **3.3%**

Asian **3.3%**

Research Works for

LOUISIANA'S ECONOMY

By Stephen Barnes, Elly Bringaze, Dek Terrell, and Stephanie Verget
LSU Economics & Policy Research Group at the E. J. Ourso College of Business

The reputation of LSU draws many students and faculty to its ranks as it continues to receive national recognition in various areas. LSU is the largest institution of higher education in the state and the only public Carnegie-designated Research Extensive University in Louisiana. Additionally, LSU was selected for the top tier of "Best National Universities" in the 2018 edition of *U.S. News & World Report* college rankings and ranked 63rd amongst public universities, the highest ranked public university in the state. The E. J. Ourso College of Business's Flores MBA Program placed in the top 20 percent of graduate business programs in the 2018 report and LSU ranked seventh in the nation for Petroleum Engineering. More generally, LSU has taken the necessary steps to provide the future workforce of Louisiana with the only public medical schools in the state and regional campuses providing a high quality education to meet the needs of local businesses. These accomplishments make LSU and its surrounding areas an attractive destination to study, work, and live.

LSU is not only a source of new residents, but a source of marginal investment and revenue streams for the state. Professors and students work to obtain grants to conduct research in their fields with more than 2,000 sponsored research projects underway at any given time. The grant application process is extremely competitive, but LSU faculty attracted roughly $148 million in new federal grants last fiscal year alone. A professor's success in receiving a grant for research is not only a feat for that faculty member, but also for the state's economy. By receiving federal funding for research, LSU is directing monies from outside the state into Louisiana. The LSU AgCenter and the Pennington Biomedical Research Center are both responsible for bringing in numerous federal grants and projects into the region. Beyond those acute economic benefits, there is a wide array of benefits that LSU provides to each of the parishes throughout the state. LSU contributes substantially to the local workforce by educating future business and community leaders, and the skilled workforce that LSU provides also creates an incentive for businesses to relocate to the area. For example, in November 2017, Louisiana Governor John Bel Edwards announced that DXC Technology will develop a "digital transformation center" in New Orleans, bringing about 2,000 jobs to the area

between 2018 and 2024. Consequently, LSU is partnering with the state to expand STEM-related educational programs including computer science, management, science, technology, engineering, and math to meet the new workforce demands that the DXC investment will bring.

LSU also serves as a catalyst for long-term economic growth by cultivating entrepreneurship and technical expertise across the state. Even beyond economic impacts, LSU serves as a beacon for artistic and cultural activities that promote a better quality of life and also serves its community by promoting educational opportunities for children. These additional contributions to the local community represent important benefits in both economic and non-economic terms.

The pure magnitude of LSU as an institution implies that its operations are quite important to the state's economy. Although the institution's large expenditures and number of employees represent a substantial amount of economic output, they only represent the direct impact of the university. In order to determine the full economic impact of LSU operations, the indirect and induced impacts must also be considered. To use an analogy, imagine the Louisiana economy as a large pond. If a large rock (i.e., LSU) were suddenly dropped into the pond, it would make a big splash. However, the rock would also create ripples that extend to the outer edges of the pond. For example, when LSU pays its employees, they will spend their paychecks at local retail stores and restaurants, for services, on housing, etc. Their purchases generate sales, earnings, and jobs at stores and other businesses throughout the local area, which in turn ripple across the entire state.

With more than 45,000 students, 20,000 full time employees, and $3.0 billion in expenditures and student spending, it should come as no surprise that LSU's institutions and facilities have a large impact on Louisiana's economy. The results indicate that LSU's presence supports more than $5.1 billion in economic output across the state of Louisiana. In terms of jobs and earnings, over 41,000 jobs and approximately $1.9 billion in earnings are supported by LSU in Louisiana. ■

LSU'S ECONOMIC IMPACT AROUND THE STATE:

During the 2017 fiscal year

New Orleans $1 billion

Shreveport $682.9 million

Eunice $104.3 million

Alexandria $84.4 million

The full economic impact study can be viewed at: **lsu.edu/economic-impact**.

The Healing Power of Nature

By Tiffany Davis and Tamara Mizell

In the normal hustle and bustle of 21st century life, it is easy to get caught up in what needs to get done, checking tasks off our ever-growing lists to the point that we overlook the symbiotic connections around us. Yet our intrinsic relationship to nature cannot be ignored. Time spent in the great outdoors has its advantages; it can contribute to holistic health and gives a person exposure to necessary vitamins and nutrients through sunlight.

In Japan, the concept of "forest bathing," or spending time taking in nature's sights, sounds, and smells on a leisurely walk through the forest, has been shown to lower stress and provide health benefits. However, since many of us spend the bulk of our time indoors, can we transfer those benefits inside as well?

"Biophilic design explores exactly this ideal. It begins with acknowledging the benefits of our innate connection to the natural world," said Marsha Cuddeback, who serves as the director of the LSU School of Interior Design and the Ruth Z. McCoy Professor in interior design.

Biophilia means love of life or desire to be close to nature. Cuddeback's research and practice of biophilic design focuses heavily on integrating natural elements into built environments to ultimately strengthen the age-old relationship between society and the natural world, while also enhancing human health and well-being and fostering greater appreciation for the natural environment.

While biophilic design may be a fairly new term, it is not a new practice. Incorporating natural elements indoors for the purpose of well-being occurred from the time humans first created intentional, built environments. The specific language, concepts, scientific evidence, and measures of biophilia became more prominent in the late 20th century, popularized by the American biologist and Professor Emeritus at Harvard University Edward Wilson. In his memoir, *Biophilia*, he defined it as "the connections that human beings subconsciously see with the rest of life."

In 1993, Wilson and Stephen Kellert collaborated to edit a collection of essays, *The Biophilia Hypothesis*, which refined the concept of biophilia on the tenet that humans instinctively affiliate and seek connections with nature. This collection of essays laid the foundation for other researchers to build on.

Several designers have written about how biophilic design can be integrated into various environments. For example, both visual and nonvisual connections with nature such as thermal and airflow variability; the presence of water; dynamic and diffuse light; and biomorphic forms are suggested in environmental consulting firm Terrapin Bright Green's *14 Patterns of Biophilic Design*. However, others discuss the concepts of a direct experience with nature that features light, air, water, plants, landscapes, and ecosystems compared to an indirect experience that uses imagery, materials, color, information richness, and natural geometries. Still, the concept can also incorporate the experience of space and place. Creating opportunities to see into spaces and to the outdoors as well as offering refuge for privacy and the transition spaces in-between are all important. Also at the designer's disposal is utilizing cultural and ecological attachment to place.

> "To fully integrate biophilic design, I believe that designers must begin by learning to think in systems and apply this learning to design."
>
> Marsha Cuddeback
> LSU School of Interior Design director

Credit: LSU.

LSU Hilltop Arboretum

Credit: LSU

The LSU Student Union has biophilic design elements that incorporate the natural surroundings into the architecture.

"A systems approach—thinking in terms of relationships, context, and connectedness—to biophilic design offers greater potential for successful design projects that improve human well-being and the condition of our natural environment," she said.

Studies have shown that biophilic design improves comfort, productivity, and concentration; decreases anxiety; improves test scores and graduation rates; and reduces hospital stays and pain medication needs while lowering blood pressure. One landmark study, by Roger Ulrich published in the journal *Science*, indicated that patients recovered more quickly and needed less pain medication if they could simply see trees outside their hospital room window.

With its societal advantages in mind, Cuddeback has worked to increase integration of biophilic design into course work at LSU. She developed the first such elective, Principles of Sustainability, and beginning in fall 2019, her Design for Health and Well-being class will be required for all interior design students. The revised curriculum for the program places a greater emphasis on interior design's role in creating healthy and productive interior environments.

She also shares the gospel of biophilic design beyond the boundaries of campus. In the summer of 2018, she gave a lecture on Systems Thinking and Biophilic Design as part of a one-week workshop she facilitated for undergraduate students studying Environmental Arts at Hunan Normal University, Fine Arts Academy in Changsha, Hunan, China. The goal of the workshop was "to encourage students to consider how benefits from our innate connection to the natural environment provide opportunities for creating environments that support human health and wellness; serve to reconnect us with the natural environment; and as designers, find opportunities to heal the damage to our natural environment created by traditional anthropocentric attitudes."

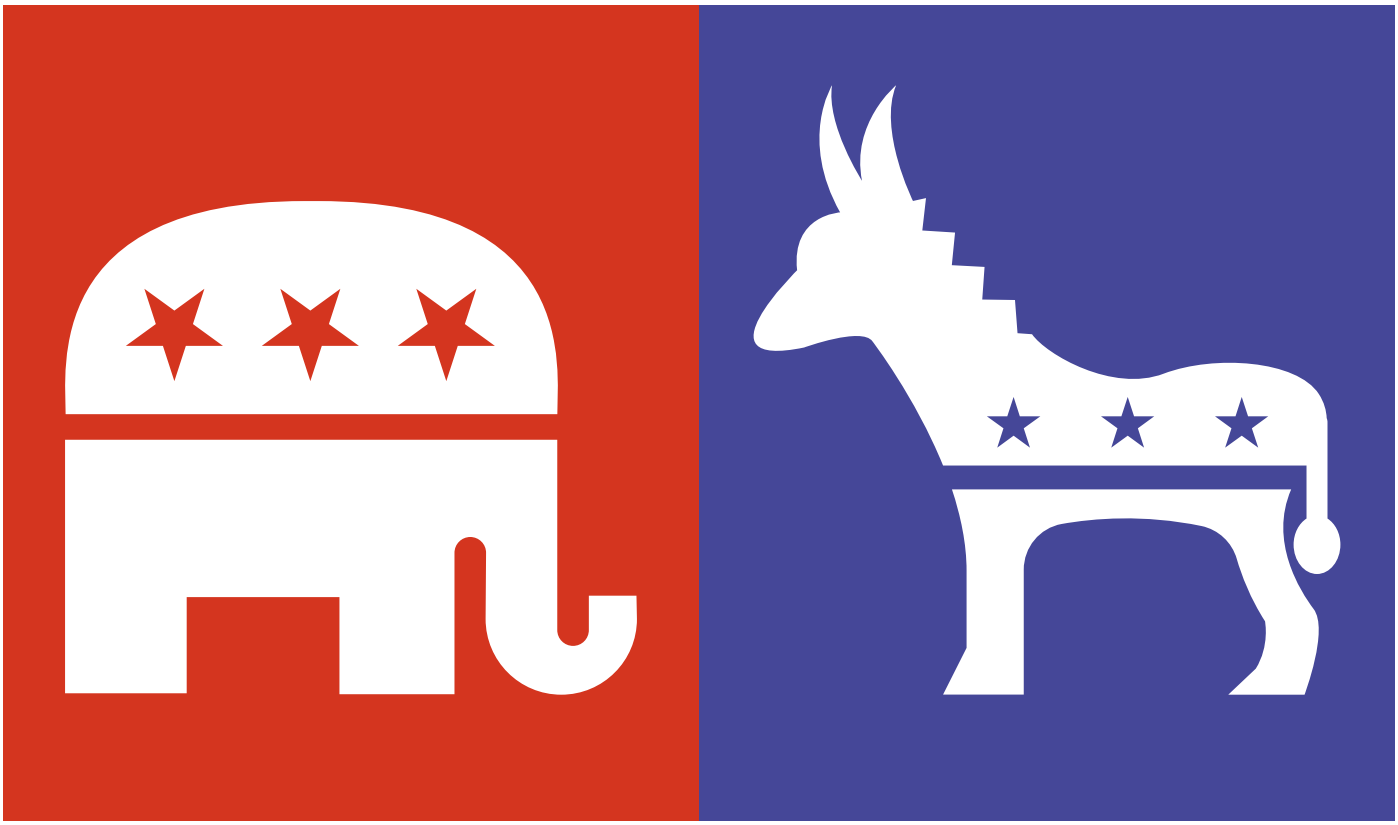
According to Cuddeback, the most significant example of biophilic design on LSU's Baton Rouge campus is the Student Union, which was designed by John Desmond and completed in 1964. The site selected for the Union was within a grove of live oaks dedicated to Louisiana war veterans and the building had to be designed to preserve all of the trees, prioritizing the natural surroundings.

"The great room, which includes the cafeteria and student lounge, was raised above the ground. And the roof supported by interior columns that evoke the reaching limbs of the oaks surround the glass enclosure."

Marsha Cuddeback
LSU School of Interior Design director

"These features and elements create visual and nonvisual connections with nature; provide both dynamic and diffuse light conditions; increase awareness of seasonal changes; integrate biomorphic forms; and support spatial conditions that offer unimpeded views connecting the interior space with the immediate surroundings and Parade Ground," she said.

Biophilic design is being increasingly implemented in workplaces and integrated into course work for designers, but we can also reap benefits at home or work by bringing plants into our space; opening the blinds or curtains during daylight hours; opening the windows on a breezy day; putting a small indoor fountain on a desk or tabletop; or taking a moment to pause and reflect on our connection to the natural surroundings whenever we are outdoors. ■



Polarization at the Polls

By Beth Carter

The gap between partisan politics and values has doubled in size over the last 25 years and continues to grow, according to the Pew Research Center. Particularly since the divisive 2016 presidential election, American politics may have never seemed so bitter and partisan. However, mass communication and political science scholar Nathan Kalmoe has a fresh interpretation of this phenomenon. In his new book, *Neither Liberal Nor Conservative: Ideological Innocence in the American Public*, Kalmoe argues that the real problem lies in Americans' lack of deep ideological consistency; Americans aren't necessarily more polarized, but they are definitely more partisan.

"Most people identify with a party—but ideology is more abstract, and those concepts don't always connect to the identities of the parties," said Kalmoe, who is an assistant professor in the LSU Manship School of Mass Communication and the Department of Political Science. To understand Kalmoe's argument, it's important to first make a clear distinction between what exactly ideology and partisanship are. Ideology is a set of beliefs about the order of the world that can lead people to make certain political decisions. It can be related to politics, but it's a broader concept on how people view society, values, and the way the world works.

Partisanship, on the other hand, is a distinct political phenomenon that is directly related to political parties, organizations, and officials. Though party and ideology sometimes overlap, especially in the way they are covered by the media, the two constructs serve different purposes that sometimes contradict each other.

Kalmoe and University of Michigan colleague Don Kinder researched the gaps between Americans who identify as liberal versus those who identify as conservative as well as what happens to the portion of the public who do not identify with either ideology. They analyzed survey data from the American National Election Studies to see where citizens place themselves ideologically. They found that nearly one out of four Americans don't place themselves on an ideological scale at all. Since 1972, the largest group of respondents self-selected the "don't know; haven't thought" category. The next highest responses have been "moderate" followed by "slightly" liberal and conservative.

Only very politically knowledgeable individuals, like activists or people who are actively interested in politics, actually identify themselves as liberal or conservative.

Forming a strong political ideological belief, such as economic equality, requires time and effort. Researching policies and positions takes time, and most Americans do not prioritize this unless politics is already a large part of their lives.

> "Ideology is abstract and complicated, and it's not reinforced the same way or to the same extent as partisanship is in terms of elections and how people talk about politics."
>
> Nathan Kalmoe
> LSU Manship School of Mass Communication and Department of Political Science assistant professor

Party identification is an easier default when it comes to political identification, because parties serve as heuristics, or mental shortcuts, for how people view specific issues. Political identification is much less time-consuming than deeply researching ideological issues. Political parties are also much more familiar because they are prevalent in the media.

"When you're in the voting booth on an election day, you see a Democrat and a Republican listed, not a liberal or a conservative," Kalmoe said. "And when you're paying attention to political communication, it's easy to identify the Democratic and Republican leaders."

Although Kalmoe and Kinder's book focuses mainly on American politics, it draws on similar findings from European politics, suggesting that ideology among only the most politically engaged is a worldwide trend.

The relationship between parties and ideology is a two-way street. Sometimes the parties dictate the ideological framework in which certain policies are handled, and sometimes ideology drives the parties' views on those policies. The strength of the ties between parties and ideology varies depending on the issue.

In order to pass certain laws or sell the political base on a policy, Republicans and Democrats bend the ideological lens to find some principle on which to base their argument. For example, the conservative belief in a limited government with minimal intrusion into people's lives contradicts some Republican beliefs for a nationwide abortion ban. Likewise, traditional liberals champion the working class while many of the most influential Democrats are wealthy.

"Sometimes the ideology and the party go together and those issues can kind of align themselves, but sometimes they don't," Kalmoe said. "Even at the elite level of party politics, the people who have the most knowledge on the principles of political ideology often have extremely inconsistent policies."

Kalmoe and Kinder found that only half of the public chooses to identify themselves as liberal or conservative. If they have an ideological identification, they often describe it as "slight" or "moderate." More than 90 percent of Americans, however, identify as either a Democrat or a Republican or consistently lean towards one party. Party identifications are easily influenced by religious affiliations, social groups, and family.

When it comes to elections, it's no surprise that partisanship matters immensely. Ideology, on the other hand, is not as big of a factor. In part, this may be because elections are naturally a party-driven concept; elections are more likely to be fought through the Democrat and Republican party platforms than by scrutinizing each candidate's individual ideological attachment to specific policies.

"The root of public opinion is not ideological issue preferences that then feed into the party system, as some may think," Kalmoe said. "It starts in social groups, and those group-based identifications and attitudes are more impactful, in terms of how someone makes political choices, than individual ideology."

This means elections matter in the margins. The undecided voter, which is about 10 percent of the electorate, is a key component to a candidate's victory. Another key voter bloc are those with weak partisan ties, who historically will be more likely to favor Democrat candidates during the midterm elections later this year.

"Even setting aside all of the weirdness of the contemporary political landscape, the consistent pattern throughout history is that during midterm elections, the president's party usually loses seats," Kalmoe said. ■

LSU Media Effects Lab is one of the only research facilities in the region equipped to study the effects of media.

Credit: LSU

How Does the Media Affect You?

By Mary Chiappetta

Since the dawn of cinematic history, scientists, parents, and the public have questioned the benefits and potential danger of exposure to media. Every generation and each emerging technology brings with it the same anxiety: what does the media do to us? At LSU, the Media Effects Lab, also known as MEL, provides researchers with cutting-edge technology to seek answers for this perennial question.

MEL is one of only a handful of facilities in the region with a diverse array of media effects resources. It offers a variety of tools to track how people respond to media, from YouTube videos and commercials to video games. Researchers at MEL measure emotional intensity by tracking how skin and sweat glands respond to media stimuli. They also use eye motion trackers to measure how and where the eyes skim and rest around a stimulus screen. The researchers use facial expression analysis software to pinpoint emotions such as joy, anger, and surprise from 42 face muscle, eye, and head movements.

These cutting-edge biometric technologies and MEL's participant pool, composed mostly of undergraduate students from the Manship School of Mass Communication and the Political Science Department at LSU, facilitate groundbreaking media effects discoveries.

Using these technologies, recent research observed emotional flow, an elusive phenomenon that previously was the stuff of theory alone. Emotional flow occurs when a media consumer experiences emotional changes in response to media. MEL Director Meghan Sanders, who is an associate professor at the Manship School of Mass Communication at LSU, conducted research with colleagues at Florida State, Penn State, and Chapman universities that demonstrated emotional flow.

In this groundbreaking research, feelings of sadness, disgust, or contempt give way to feelings of awe and transcendence, or what we perceive as inspiration.

"It seems like it's this blend of anger and sadness, fear and contempt, not very much joy until you get to some kind of resolution. Then, the joy seems to supersede everything else that a person may have been feeling earlier. And that's why inspiration makes you feel so good," Sanders said.

Prior to this research, emotional flow was a hot topic among scholars that had been theorized but never demonstrated.

> "When we looked at our data, we said, 'wait a minute, we think we found it!'"
>
> Meghan Sanders
> LSU Media Effects Lab director and LSU Manship School of Mass Communication associate professor

Now, researchers can "tear apart the anatomy of a particular emotion" to delve more deeply into the psychological underpinnings of emotional responses to media and to begin to identify more precisely what it is about certain content that moves and inspires us.

MEL also helps researchers shed light on the emotional role the media plays in people's lives. Sanders researches "parasocial" interactions, a concept defined as the one-sided emotional relationship people develop with their favorite fictional characters. She has found that these emotional ties can serve as a coping mechanism that helps people with their own struggles.

"As trivial as it may sound, [the relationship with fictional characters] actually becomes a really big deal," Sanders said.

In its nine-year history, MEL has produced an astounding 215 studies that include the participation of more than 7,500 students. These studies have explored a diverse range of topics, such as research by James Byo, LSU School of Music director and the Carl Prince Matthies Memorial Professor of Music Education, who used MEL's eye tracking suite to better understand musical sight reading. Another team used this technology to analyze native advertising, content that advertisers produce to mimic the appearance and informative function of the primary content on a website. This research reveals what areas of the screen get the most attention and therefore deserve premium pricing and content.

MEL's emerging research appeals by virtue of its relevance alone, but Sanders cites a deeper underlying motive for the passion and drive that informs her work. MEL, she believes, provides an invaluable service both to the public and media practitioners: it serves as a much-needed source of media literacy for the public by providing data-driven information and context to our reactions to media.

Credit: LSU

LSU Media Effects Lab

"We can help people better understand the impact that media are having on them," Sanders said.

Research at MEL also serves to inform media practitioners by reminding them of their responsibility toward their audiences as people.

"Everything that we do as advertisers and content creators influences people," Sanders said. "It's going to have some type of effect on a person—on how they operate, on what they think, on what they choose to buy, on what they choose to believe. And so a lot of research and the features that we offer here are designed to better help us understand human beings, to make some aspect of human life better." ■

Research for a Sustainable Tomorrow

By Mary Chiappetta

Our world today faces grave changes ranging from population growth to potential future energy shortages. At LSU, researchers are working toward solutions that may help sustain modern human life.

Credit: LSU.

Food Security

Food production must increase by 70 percent by 2050 in order to meet the needs of a global population expected to reach 9.1 billion, according to a report by the United Nations Food & Agriculture Organization. Historically, agricultural techniques designed to maximize crop efficiency and output have enabled food production to keep step with population growth, but plants grown using these methods are fast approaching their biological limits. This leaves a gap between the level of expected food production and projected population demand, and brings with it the very real potential that the world could face a global food shortage. To prevent a future food crisis, LSU Department of Biological Sciences Streva Alumni Professor James Moroney is exploring alternative ways to increase crop yields by expanding the biological capacities of crop plants with support from the Bill & Melinda Gates Foundation.

Part of the Realizing Increased Photosynthetic Efficiency, or RIPE, Project, Moroney plays a crucial role in one of the seven remaining projects funded by the Gates Foundation since 2012. The goal is to pass the final frontier in improving crop plant efficiency, the photosynthetic process itself.

Moroney's project operates in the small but growing field of photosynthesis research whose star is *Chlamydomonas reinhardtii*, a type of green algae that, like plants, possesses a chloroplast that enables it to produce energy through photosynthesis. Unlike terrestrial plants that have a stable supply of carbon dioxide, or CO_2, needed for photosynthesis, this algae lives in the water where CO_2 levels can vary. The algae evolved during an earlier millennium in the earth's history, one marked by warmer temperatures and vast amounts of CO_2. But when the proliferation of plants replaced much of the

atmosphere's CO_2 with oxygen, the algae was forced to adapt. It accomplished this by developing a way to concentrate CO_2 to meet its photosynthetic needs. Moroney, funded early on by the National Science Foundation and now through the Bill & Melinda Gates Foundation, has devoted his career to finding out how this works.

"The thing that always intrigued me was how can a living thing concentrate CO_2? Usually some small molecules, like CO_2, can go through the membranes of cells easily, so how do you concentrate something that's just going to leak right out?" he said.

To answer this, he and others in his field focus on a basic enzyme called rubisco, which is responsible for fixing CO_2 in the process of photosynthesis.

Unfortunately, this enzyme also interacts with oxygen, and because the product of this reaction is toxic to the plant, the indiscriminate reactions of the rubisco limit the efficiency of photosynthesis. To minimize this, Moroney's research found that the algae responds to reductions in the levels of CO_2 in the atmosphere by making a series of transporters that bring bicarbonate into the cell from outside. The bicarbonate is brought into a membrane in the chloroplast that is acidic and that helps convert the bicarbonate to CO_2 and water.

If you have you ever watched a science project volcano explode, you've seen the same reaction that holds the key to the algae's unique adaptation. In the volcano reaction, baking soda, a bicarbonate, reacts with vinegar, an acid, to produce CO_2 gas, thus powering the "explosion" we observe. In *Chlamydomonas*, the transporters bring negatively charged bicarbonate (like the baking soda in the volcano) into the isolated rubisco package, where they react with the acidic solution inside the package.

Credit: Claire Benjamin, University of Illinois.

LSU Department of Biological Sciences Streva Alumni Professor James Moroney conducts photosynthesis research that could increase crop yields and prevent a future food crisis.

This, Moroney explains, "will all go gushing to CO_2," and therefore, help compensate for the lack of CO_2 in the algae's environment.

How could this mechanism help to improve crop yields? The leaves of plants contain small apertures called stomata that open to bring in CO_2 for photosynthesis. However, when the stomata open, the plant loses about 200 or so valuable water molecules, which means the crop can grow only in wetter climates. This is where the RIPE project research comes in: if the plant could use CO_2 more efficiently, such as through the CO_2 concentrating mechanism Moroney and his colleagues study, these plants could then survive in slightly more arid climates that currently cannot bear crop plants. This would expand the area available for seeding and food production.

Moroney notes his team has already managed to insert some of the genes responsible for transporting bicarbonate into higher plants. Their success has been limited by the complexity of the process, but there are many gene combinations yet to explore.

"Our project was always the highest risk, highest reward project. If it worked, in theory, it could really increase photosynthesis," he said.

Sustainable Energy

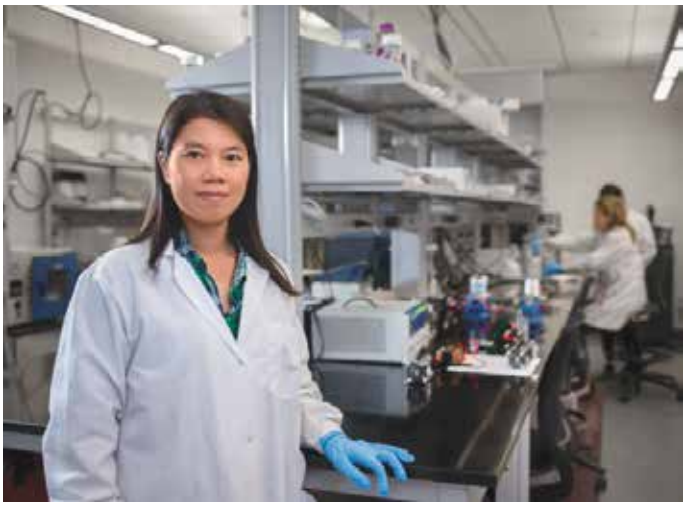
While Moroney and his team work towards cracking the code of photosynthesis, Xiuping Zhu, assistant professor in the LSU Department of Civil & Environmental Engineering, leads her team on a quest to develop sustainable energy using water in unexpected ways. Unlike traditional hydropower, which uses the force of running water to produce electricity, Zhu's team has developed a system that works to harness the latent energy found in the wastewater generated by human life and industry to produce the power needed to purify this water for disposal or reuse.

"The goal is to make water and wastewater treatments energy sustainable."

Xiuping Zhu
LSU Department of Civil & Environmental Engineering
assistant professor

About 3 to 4 percent of all U.S. electricity is currently used to treat wastewater, according to a report by the U.S. Department of Energy.

Zhu's research draws energy from the wastewater discarded by human activity using an innovative process known as



Credit: LSU.

LSU Department of Civil & Environmental Engineering Assistant Professor Xiuping Zhu is developing new ways to create sustainable energy from water.

Microbial Concentration Cell. Focusing on the first step in wastewater treatment's two-step process, Zhu and her team have found a way to treat wastewater by introducing microbes into the processing system that break down organics and larger pollutants. Zhu likens this process to the way our bodies generate energy from breaking down the food we eat.

"Just like when we eat food, the microbes degrade the organics in wastewater to separate the electrons. Once the electrons move from one electrode to the other, we can produce electricity. So at the same time, we treat wastewater and produce electricity," she said.

This microbial process prepares the water and the energy for the combined membrane processing that removes salts and recovers nutrients. In current systems, these processes typically absorb energy and output only clean water, thus operating at an energy loss. In Zhu's system, though, the microbial process generates enough electricity not only to power its own processing, but also to power the subsequent membrane process.

"So the whole system needs no energy input," Zhu said. "Microbes can produce electricity using wastewater."

In addition to recovering the energy present in wastewater, which Zhu explains amounts to six times that used annually by current wastewater treatment processes, her microbial concentration cell system also recovers nutrients such as nitrogen and phosphorous from the wastewater. These nutrients are concentrated in the middle cell of the fuel cell-like system, which she uses to treat wastewater and can be reclaimed for agricultural re-use.

This new technology also could be applied beyond Earth. Zhu is collaborating with other researchers to potentially apply this technology to process wastewater in space.

"Maybe [in the future] the recovered nutrients can be used to grow plants on the moon or Mars," she said.

Although she acknowledges that replacing the current wastewater treatment systems would be cost-prohibitive at present, Zhu sees a future for her innovative process to be implemented as the current systems age and need replacement. To prepare for that future, her research focuses on making the process more efficient and cost-friendly.

> "You can see the system has benefits, and as the development of technology in this area [continues] the cost will decrease, and efficiency will increase."
>
> Xiuping Zhu
> LSU Department of Civil & Environmental Engineering
> assistant professor

Zhu also is exploring other options for generating electricity through water.

"When rivers flow into the ocean they mix and a release of energy occurs. That energy is just wasted. So if we can use these processes to produce electricity that would be cool," she said.

She and her students have successfully captured energy by moving ions from saltwater to freshwater along a salinity gradient.

The amount of energy that can be extracted from the salinity gradient between seawater and river water globally is equivalent to 3 percent of all electricity consumed around the world, or 625 billion kilowatt hours per year. ■

Canaries in the Coal Mine

How Birds Can Indicate the Spread of Bacteria

By Christine Wendling

Birds can serve as a great indicator of the long-term public health impacts of urbanization, especially as deforestation spreads and the human population booms. Birds that nest, hunt, and reproduce in urban areas are a perfect means by which researchers can collect a variety of bacterial samples present in a specific area. This information can then be analyzed and used to predict potential outbreaks of disease. LSU Department of Environmental Sciences Associate Professor Crystal Johnson studies the relationship between birds and antibiotic-resistant bacteria.

Johnson collects bacterial samples from birds captured and later released in the Bluebonnet Swamp Nature Center in Baton Rouge, Louisiana, a 103-acre conservation park in the middle of the state capital. DNA is extracted from the bacterial samples, and its 16S rRNA gene sequences are determined by the Gene Lab at the LSU School of Veterinary Medicine.

"By collecting from the birds, we are able to get a snapshot of the types of bacteria in our environment. The fact that they are culturable means we can pick up live, active bacteria on a Petri dish and find out if they are antibiotic-resistant. Typically, any pathogenic bacteria we find are not at high enough levels to cause concern. The birds are not vectors necessarily, but more indicators of what's happening in the environment," Johnson said.

Credit: BREC's Bluebonnet Swamp Nature Center

Scientists and volunteers collect samples from wild birds such as this cardinal, which are analyzed by LSU Department of Environmental Sciences Associate Professor Crystal Johnson and her students in her lab at LSU.

Credit: LSU

While the birds are not carriers at high enough levels to be considered high risk, there is always some risk because bacteria do grow. In the past, Johnson has collected cloacal samples that contained large amounts of antibiotic-resistant bacteria. Also, microbes frequently share genetic information for antibiotic resistance, including with other species of bacteria, which further spreads antibiotic resistance.

As further urbanization continues, humans are increasing their interactions with these urbanized birds. Technically, if a bird were to carry antibiotic-resistant bacteria into a nutrient-rich environment that would allow the bacteria to grow and spread, such as a body of water, it could lead to an outbreak.

Data collection like Johnson's is the first step in how potential outbreaks are detected. While her research may not be applied enough to go directly from detection to front page news, when combined with metadata from other scientists collecting bacterial samples, it could help identify hot spots or serve as a warning flag that public health officials may want to investigate further.

However, discussing her work with others often makes people unnecessarily anxious about contracting diseases.

She tells wary students:

> "Don't freak out. There are bacteria everywhere, and your body contains more bacterial cells than human cells. They help us digest our food and fight off infection."
>
> Crystal Johnson
> LSU Department of Environmental Sciences associate professor

Your skin is colonized by good bacteria, and that allows you to fight off the bad bacteria that you encounter. Also, the more diversity you're exposed to, the healthier your microbiome, because your microbiome is your first line of defense against these incoming pathogens."

This study is made possible by an LSU Office of Research & Economic Development Faculty Research Grant and the Louisiana Bird Observatory, which is a part of the Baton Rouge Audubon Society. ■

Credit: LSU.

One Health

Connecting human, animal, and environmental well-being

By Ginger Guttner

The environment has a direct effect on health. This interconnectedness between environmental, human, and animal health is the basis for the One Health concept. According to the Centers for Disease Control and Prevention, the One Health concept formed in the 1800s when scientists saw similarities between diseases inflicting animals and humans; however, human medicine and veterinary medicine continued to be practiced separately until the 20th century. Today, scientists are championing One Health's integration of multiple disciplines to attain optimal health for people, animals, and the environment, and to understand how the health of all three are connected.

Six out of 10 infectious diseases in humans are spread from animals, and it is estimated that at least 75 percent of emerging and re-emerging diseases are either spread between humans and animals or carried from infected animals to others through insects including mosquitoes, ticks, and fleas, which is called vector-borne. Diseases are likewise affected by changes in the environment. At the LSU School of Veterinary Medicine, researchers study this intersection between human, animal, and environmental health.

Vector-borne Diseases

Mosquitoes, ticks, and fleas are vectors and can spread diseases such as spotted fevers, Lyme disease, Zika, and West Nile Virus. LSU School of Veterinary Medicine researchers study diseases that affect both people and animals, and, in some cases, can be spread from animals to people.

How biological and environmental factors influence human disease is explored in the emerging field of eco-epidemiology. LSU Department of Pathobiological Sciences Professor Kevin Macaluso examines the role that arthropod vectors play in the eco-epidemiology of bacterial pathogens, specifically looking at emerging and re-emerging infectious diseases such as tick-borne and flea-borne spotted fevers. Macaluso studies the transmission of tick-borne bacterial pathogens, particularly the agents of Rocky Mountain spotted fever, or RMSF, and related diseases. His research examines how the bacteria responsible for RMSF are transmitted from tick or flea to animal or person.

LSU Department of Pathobiological Sciences Professor Juan Martinez studies how bacteria from tick-borne diseases interact with cells in both people and animals including how the bacteria survive within cells and then move into the bloodstream. Scientists have discovered that bacteria that cause disease in mammals can survive within cells that are supposed to kill foreign particles. As a result, Martinez is investigating how rickettsia survive within the cell. He also looks at the efficacy of medications used to treat tick-borne diseases and how a medication that is FDA-approved for one purpose could be repurposed to treat tick-borne diseases. For example, a Beta blocker designed as a heart medication may help treat a spotted fever, because of the way the medication interacts with cells. The goal is to find new ways to treat tick-borne diseases in both animals and people.

Credit: Ginger Guttner, LSU.

LSU Pathobiological Sciences Research Assistant Sabrina Valdes and Professor Kevin Macaluso study how the bacteria responsible for Rocky Mountain Spotted Fever are transmitted from tick or flea to animal or person.

Additionally, LSU Department of Pathobiological Sciences Assistant Professor Rebecca Christofferson studies how disease is transmitted through and by mosquitoes. She studies Zika and chikungunya, both of which are transmitted by mosquitos. The overall goal of her research is to deconstruct the transmission cycle of viruses transmitted by arthropods like mosquitoes. Vector-borne diseases are often by definition One Health issues. Many are zoonotic and have a non-human animal reservoir. This means that there is another species that gets the virus and maintains it in that population. West Nile virus, for example, is maintained in a bird-mosquito cycle. Birds are bitten by mosquitoes, and the virus is passed from bird to mosquito to bird, and so on. People are infected when they begin to encroach on the birds' environment or the mosquitoes run out of birds to bite. So, overdevelopment can put bird species in closer contact with people or reduce the number of birds in a particular area. Either way, overdevelopment can increase the chance that people become a more readily available source of blood for mosquitoes. That's when a pathogen can get into human populations in "spill-over" events.

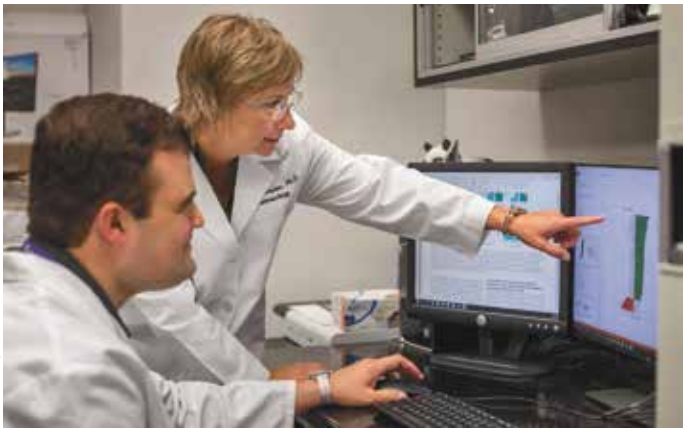
Air Quality

Outdoor and indoor air pollution are leading public health concerns. The air we breathe can have a direct effect on allergies and our weight. Pregnant women and their unborn children are a vulnerable subpopulation involuntarily exposed to environmental pollutants.

Credit: Cody Willhite, LSU

LSU Comparative Biomedical Sciences Post-doctoral Researcher Vivek Patel conducts environmental health research in Professor Stephania Cormier's lab.

LSU Comparative Biomedical Sciences Professor Stephania Cormier examines how early exposure to environmental pollutants during infancy can lead to airway diseases such as asthma. She studies environmental factors and how those factors affect health and, specifically, how they affect infants. She is conducting in utero studies looking at combustion byproducts that include cigarette smoke and electronic cigarette vapor to determine if offspring are predisposed to develop asthma when a mother is exposed to these combustion byproducts. In addition, her studies show that in utero exposure to such pollutants results in higher birth weights. When those offspring are fed a high-fat diet, they have a greater chance of becoming obese. These data suggest that air pollutants could also affect weight in humans. (See page 14 for an augmented reality video of Cormier discussing her research.)



Credit: Cody Willhite, LSU.

LSU Comparative Biomedical Sciences Professor Stephania Cormier and Ph.D. student Jeffrey Harding look over data on the respiratory virus, RSV.

LSU Comparative Biomedical Sciences Professor Arthur Penn and LSU Comparative Biomedical Sciences Assistant Professor Alexandra Noël investigate the fundamental mechanisms related to respiratory effects of inhaled environmental pollutants. Penn's research emphasis is on cardio-respiratory responses to inhalation of common combustion products. The focus of Noël's studies is production and characterization of aerosols for toxicological studies, as well as health responses to inhaled respiratory and developmental toxins. Both of these research programs fall into the One Health paradigm and help better inform policymakers, healthcare providers, and vulnerable populations.

Credit: Mandi Lopez, LSU.

LSU Veterinary Clinical Sciences Professor Mandi Lopez conducts research on problems that are shared by humans and animals such as arthritis and diabetes.

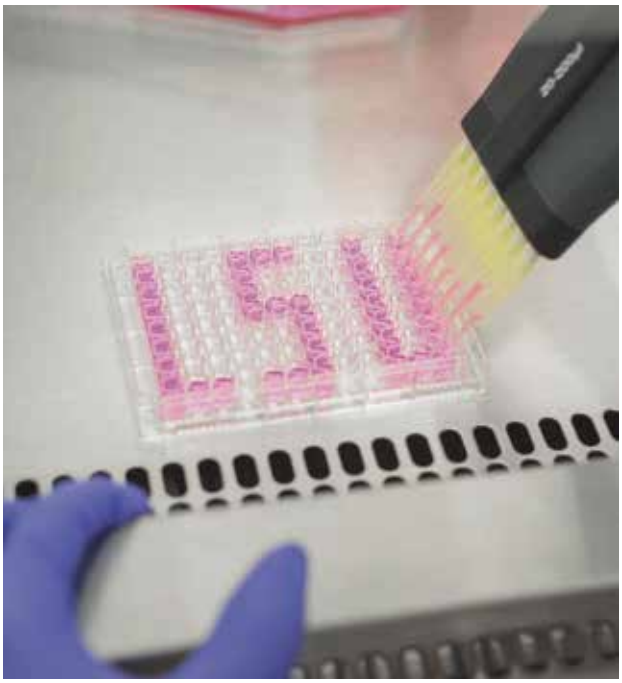
Obesity

Cats are a good model for studying obesity, because, similar to humans, they used to hunt for food but now live a sedentary lifestyle, tend to overeat, and have high-carbohydrate diets. Consequently both cats and people can become obese and are susceptible to Type 2 diabetes. LSU Veterinary Clinical Sciences Associate Professor Jon Fletcher is studying the treatment and prevention of obesity and Type 2 diabetes in cats with potential applications in people. He is researching alternative treatments and preventative strategies to treat obesity.

Stem Cells

Stem cells can be used to grow tissues that are damaged by disease or injury. Scientists can take successful practices from one species and use them as a starting point to accomplish the same results in another, which can save time in growing new tissues for different species. Bone is one example of a tissue that is similar between species. LSU Veterinary Clinical Sciences Professor Mandi J. Lopez uses stem cells to grow new tissues in the laboratory in order to design new treatments and stop tissue damage. Using much of what she has learned from growing new tissues, Lopez is studying ways to heal tissue as well as to prevent damage from aging and overuse. She works closely with colleagues in medicine on problems that are shared by humans and animals like arthritis and diabetes. Sharing information about what causes health problems and how to treat them among medical disciplines supports medical discoveries that benefit both animals and humans. The goal is the same: both veterinarians and medical doctors want to create the most effective therapies to help those suffering from disease or injury.

"LSU strongly supports the One Health initiative, and it is one of the arms of LSU's strategic plan," said Joel Baines, LSU School of Veterinary Medicine dean. ■

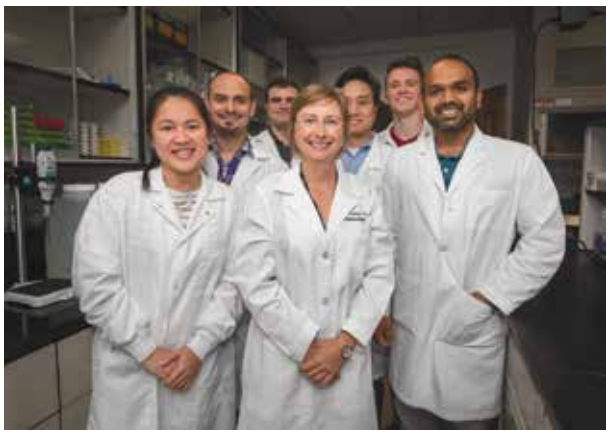


Credit: Cody Willhite, LSU.

ONE HEALTH FOR ALL

One goal of LSU's One Health initiative is to provide veterinary and medical care for underserved areas of Baton Rouge that do not have ready access to healthcare, healthy food, or places to exercise. Though still in the early planning stages, the idea is to send both medical and veterinary mobile clinics to community centers to provide health screenings for people and animals, and provide information about healthy lifestyles. Studies have shown that in low income communities, parents will seek medical care for their children and forgo it for themselves; the hope is that, by providing free care for the entire family, including pets, LSU can help to improve the health of the underserved in Baton Rouge. This initiative could provide a model for communities across the U.S.

For more information, visit **lsu.edu/vetmed/one_health**.



Credit: Cody Willhite, LSU.

Credit: Cody Willhite, LSU

At the LSU Rainmakers event were, left to right: LSU President F. King Alexander, Associate Vice President of Research & Economic Development Stephen David Beck, Campus Federal Credit Union President and CEO Dawn Harris, Associate Professor Karen Maruska, the Gregory Cannaday Burns Professor Anne Grove, Assistant Professor Chris Barrett, Professor Barry Keim, Assistant Professor Morgan Kelly, Associate Professor Brannon Costello, Associate Vice President of Research & Economic Development Gus Kousoulas, and Vice President of Research & Economic Development K.T. Valsaraj.

RAINMAKERS

As a top-tier research institution, LSU's research faculty are proven leaders in their field, performing at truly outstanding levels each day. LSU's Office of Research & Economic Development, with the support of Campus Federal Credit Union, takes the opportunity each year to acknowledge some of our many outstanding faculty with the Rainmaker Awards for Research and Creative Activity.

Faculty members chosen as Rainmakers are those who balance their responsibilities in the classroom with securing external funding for their research and broadly disseminating their findings to not only the scholarly community but to society as a whole. Exemplary representatives of LSU, who garner both national and international recognition for their innovative research and creative scholarship, while also competing for external funding at the highest levels and attracting and mentoring exceptional graduate students. Each of the following award-winning faculty members has met one or more of the criteria for high-quality research or creative activities and scholarship, which include but are not limited to publication in a high-impact journal(s); highly cited work; external awards; invited presentations at national and international meetings; high journal publication productivity; critically acclaimed book publication(s), performance(s), exhibit(s), or theatrical production(s); high grant productivity; and, for more senior candidates, outstanding citation records and high-impact invited presentations at national and international meetings. Two awards are granted at each career level including the Emerging Scholar, Mid-Career Scholar, and Senior Scholar levels.

All Rainmaker recipients receive a one-time stipend of $1,000 and a plaque in recognition of their achievements.

Emerging Scholar Award

Arts, Humanities, Social & Behavioral Sciences

Chris Barrett is an assistant professor of English and the associate chair of the Department of English. Her research and teaching interests include early modern English literature, lyric and epic poetry, critical animal studies, humor studies, and geocritical approaches to literature. She is the author of articles and essays on Shakespeare, Spencer, Milton, and the twinned history of ether and laughter. Her current book project, *Early Modern English Literature and the Poetics of Cartographic Anxiety*, explores anxieties about cartographic materials in English Renaissance literature and likens the early modern reaction to the state and surveillance uses of maps to current political, social, and judicial debates about the uses of digital mapping techniques.

Credit: LSU.

Chris Barrett

She is the recipient of the 2017 Tiger Athletic Foundation Undergraduate Teaching Award and the 2014 EGSA Graduate Faculty Award. Her research has been supported by the Council on Research, the Newberry Library, the Folger Library, and the Dumbarton Oaks Museum and Collection. Barrett is also the faculty advisor to Spectrum; the site author of RenaissanceLSU.blogspot.com, a venue for collating and sharing information about LSU's early modern studies scene; and a co-founder and co-organizer of the department's Works in Progress group.

Barrett joined LSU's English Department in fall 2012. She received her Ph.D. in English at Harvard University in 2012; she also holds a master's degree from Harvard (2008) and a bachelor's degree in English from Princeton University (2003).

Science, Technology, Engineering & Mathematics

Morgan Kelly is a marine evolutionary biologist and ecologist. Genetics of thermal tolerance, physiological responses to pH stress, and the evolution of mating systems are some of her research topics. Her research integrates fieldwork, experimental evolution, and DNA sequencing to measure adaptation to environmental stress in marine invertebrates with the goal of understanding how ecologically and economically important species will respond to climate change.

Kelly has been an assistant professor in biology at LSU since 2014. Prior to that, she received her Ph.D. in population biology from the University of California, Davis, and conducted postdoctoral research at the University of California, Santa Barbara.

Credit: LSU.

Morgan Kelly

In 2017, Kelly was rewarded the prestigious Sloan Research Fellowship.

Mid-Career Scholar Award

Arts, Humanities, Social & Behavioral Sciences

Brannon Costello is an associate professor in the Department of English and director of the Liberal Arts program. His primary research interests are in the fields of U.S. Southern Studies, Comics Studies, American literary studies, and especially in the intersections between and among those fields.

His most recent book, *Neon Visions: The Comics of Howard Chaykin*, was published by LSU Press last year. This study of an acclaimed yet controversial cartoonist whose most powerful work expanded the aesthetic, philosophical, and political

horizons of mainstream comics was selected as a notable book of the year by contributors to *The Comics Journal*.

In addition to serving on the executive boards of the Society for the Study of Southern Literature and the International Comic Arts Forum, Costello has also co-curated two exhibitions on comics and visual culture at Hill Memorial Library.

Costello joined the English Department as an assistant professor in 2004 and became an associate professor in 2010. He received his Ph.D. in English at the University of Tennessee in 2012 and also holds a master's degree from the University of Southern Mississippi (1999) and a bachelor's degree in English from Mississippi College (1997).

Science, Technology, Engineering & Mathematics

Karen Maruska is an assistant professor in the Department of Biological Sciences. Her research focuses on understanding the neural and molecular basis of natural social behaviors and the mechanisms that underlie sensory, behavioral, and neural plasticity using fish as a model organism. Her work is supported by state and federal funding and has both basic science and biomedical applications. She has more than 50 peer-reviewed publications and eight invited book chapters on diverse topics ranging from sensory physiology to neural plasticity to reproductive function, many of which have been highlighted by the press.

She received her Ph.D. from the University of Hawaii in 2007. She was a Grass Fellow in Neuroscience at the Marine Biological Laboratory in Woods Hole using chronic recording techniques in free-swimming toadfish to study neural processing of behaviorally-relevant acoustic stimuli. She was then an NIH postdoctoral scholar at Stanford University where her research focused on how an animal's social environment influences their brain and behavior.

Senior Scholar Award

Arts, Humanities, Social & Behavioral Sciences

Barry Keim is a professor in the Department of Geography & Anthropology and serves as the Louisiana state climatologist. Keim works on issues involving climate datasets, detection of climate change and its impact, statistical analysis of extremes, and probable maximum precipitation. His research focuses on climatic extremes, with particular focus on heavy rainfall, hurricanes, storm surge, and the interpretation of climate data. He has published extensively in these areas, and he currently has 70 refereed publications, two books, as well as numerous other technical reports.

Credit: LSU.

Barry Keim

As state climatologist, Keim conducts climatic research on the State of Louisiana and the broader region. He serves the community by providing climatic data to researchers, government agencies and police departments, and provides interviews to the media. He serves as the LSU director of a NOAA-funded research program called the Southern Climate Impacts Planning Program, which is a joint venture with the University of Oklahoma charged with developing stakeholder driven research across the region. Keim also manages the Disaster Science and Management program at LSU.

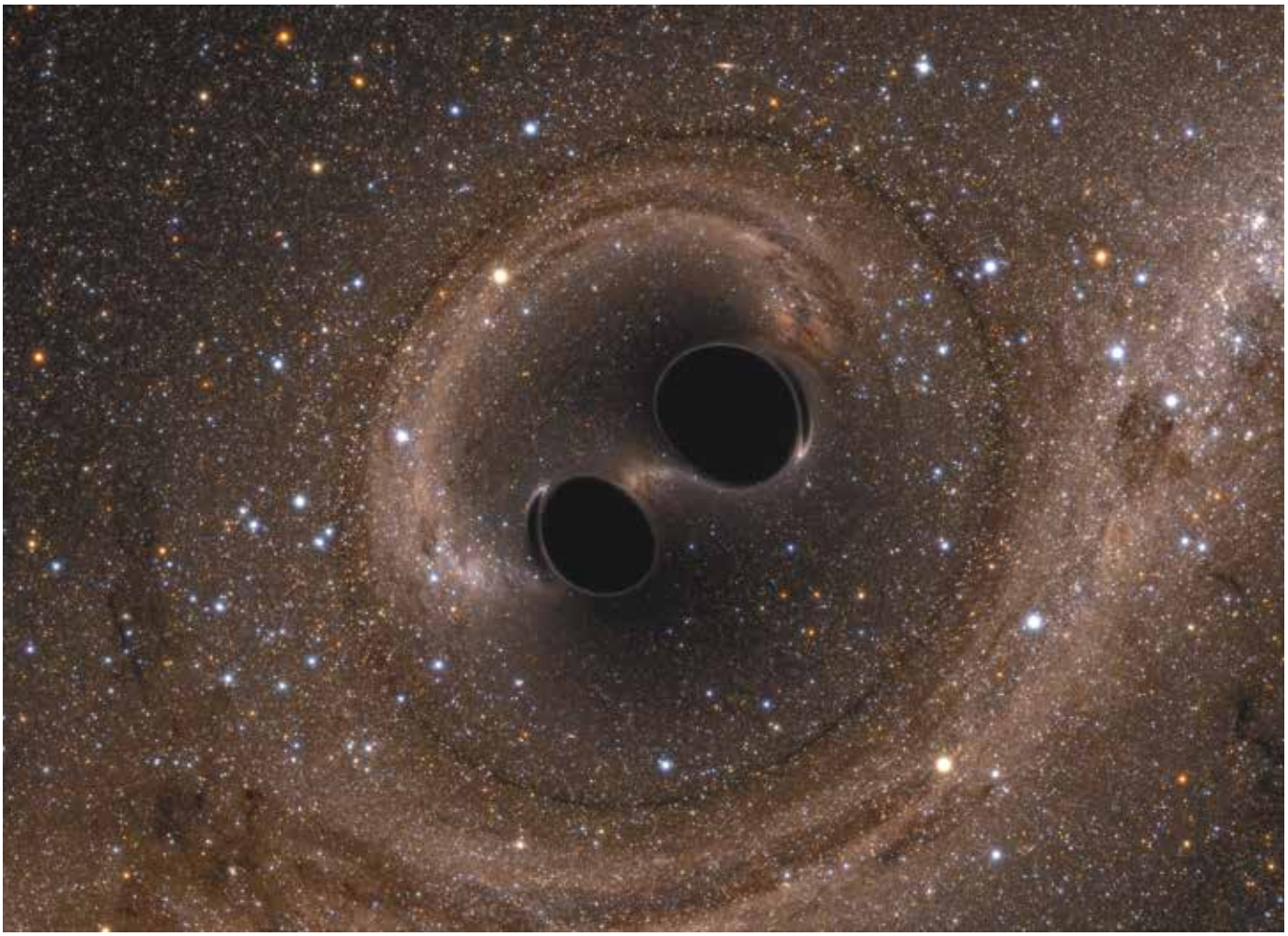
Keim previously worked in New Hampshire as the state climatologist, where he was also a member of the northeastern United States AIRMAP program.

Keim received both his Ph.D. and master's degree in Geography (Climatology) from LSU in 1994 and 1990, respectively. In 1987, he received his bachelor's degree in geography from the University of New Orleans.

Science, Technology, Engineering & Mathematics

Anne Grove is the Gregory Cannaday Burns Professor in the Department of Biological Sciences. Her research primarily concerns the changes in gene expression that occur when cells are exposed to stress. Main focus areas include the mechanisms by which bacterial pathogens subvert host defenses by utilizing host-derived signals to trigger upregulation of virulence genes as well as mechanisms by which genomic DNA is de-compacted to facilitate gene expression.

She earned her Ph.D. in molecular biology from the University of Copenhagen, Denmark, and completed postdoctoral research at University of California, San Diego, prior to joining LSU. In 2010, she joined the National Science Foundation as a rotating program director, an affiliation she maintained for three years. ■



Credit: Caltech/MIT/LIGO Laboratory.

ACCOLADES

LIGO Gravitational Wave Detection Wins Nobel Prize

The 2017 Nobel Prize in Physics was awarded to the pioneering leaders of the Laser Interferometer Gravitational-wave Observatory, or LIGO, for the first detection of gravitational waves. The detection confirmed a major prediction of Albert Einstein's 1915 general theory of relativity and opens an unprecedented new window onto the cosmos.

Einstein predicted more than 100 years ago that gravitational waves, or ripples in the fabric of spacetime, would arrive at Earth from a cataclysmic event in the distant universe. The gravitational waves from two black holes colliding over a billion light years away were detected on Sept. 14, 2015, at 4:51 a.m. CST by the twin LIGO detectors, located in Livingston, Louisiana, and Hanford, Washington. The LIGO observatories are funded by the National Science Foundation, or NSF.

LSU Adjunct Professor and MIT Professor Emeritus Rainer Weiss and California Institute of Technology professor emeriti Kip Thorne and Barry Barish were awarded the 2017 Nobel Prize in Physics. One-half of the prize was awarded to Weiss and the other half is shared by Thorne and Barish. Weiss and Thorne are co-founders of the LIGO/VIRGO Collaboration. Barish led the final design stage, construction and commissioning of the LIGO interferometers in Livingston, Louisiana, and Hanford, Washington.

The LIGO Livingston observatory is located on LSU property, and LSU faculty, students, and research staff are major contributors to the international LIGO Scientific Collaboration, or LSC.

"Of all the universities in the United States, LSU was one of the very first to take a gamble on the idea that you might find—this exodus idea Einstein had—gravitational waves."

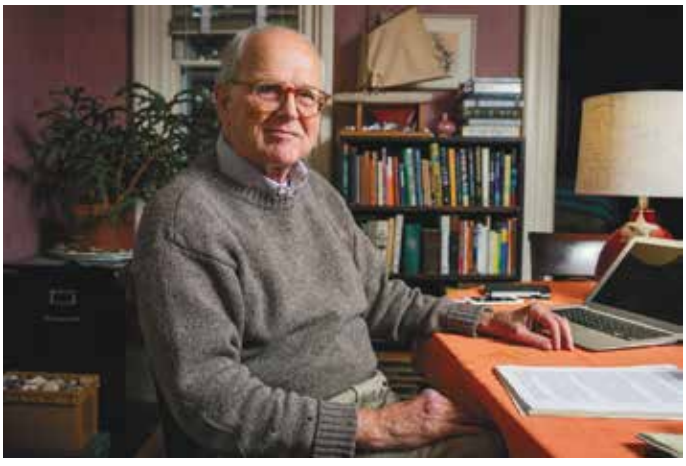
Rainer Weiss
LSU Adjunct Faculty member and Nobel Laureate

"The discovery that was made by LIGO and the discoveries that continue to be made by LIGO are your discoveries as much as everybody else's. They belong to you because you made that investment, and I'm forever grateful for it," Weiss said at the May 2018 LSU College of Science diploma ceremony.

Gabriela González, LSU Department of Physics & Astronomy professor, is the former elected spokesperson, who led the LIGO Scientific Collaboration, or LSC, during the first detection of gravitational waves. Together with other leaders and founders of the LIGO effort, González made the official statements about the historic detection on Feb. 11, 2016 at the National Press Club in Washington, D.C.

"It was an honor to be the LSC spokesperson during the momentous time of discovery," González said. "We are thrilled for Rai, Kip, and Barry to be named Nobel Laureates and are proud of the work done by many people over many decades in the LSC to support and continue their vision."

LSU's investment in gravitational-wave detection spans more than four decades, and is among the longest of the institutions contributing to the present discovery. LSU faculty, students, and scholars have had leading roles in the development of several generations of gravitational wave detectors, in their commissioning and operation as well as the collaborations formed.



Credit: MIT.

Rainer Weiss

LSU Architecture Professor Among the 13 Most Innovative Female Architects in the World

Ursula Emery McClure, A. Hays Town Professor in the LSU School of Architecture, was named on ArchDaily's list of 13 leading female architects in the world. She is the only architect in the U.S. to make the list. The article "Celebrating A Generation of Women Leaders in Architectural Practices Around the World," published April 3, 2018, recognizes innovative female architects across the globe.

Emery McClure is listed among architects from Brazil, India, Denmark, Mexico, France, Portugal, Uruguay, Argentina, and Spain.

Credit: LSU.

Ursula Emery McClure

"In the age of the ME TOO openness, it is an honor to be recognized for working against the quid pro quo."

Ursula Emery McClure
A. Hays Town Professor in the LSU School of Architecture

Emery McClure is the founding partner of emerymcclure architecture firm.

"Our research practice speculates on the role of design in the confluence of multiple, seemingly contrary systems and aspires to develop tectonics that configure their futures," she said. "Our sites are never grounded; our conditions are never predictable; and our parameters are always in flux; they exist at the edges and transformational zones. Our practice searches to define potentialities found within complex systems and to contribute to the rich and unique global traditions where sociocultural and physical contexts are entrenched in architecture."

Emery McClure has also served as the Southwest director for the Association of Collegiate Schools of Architecture. Her firm has won the Sukkah City STL competition and the 2013 Unbuilt Visions Competition. She was also awarded the 2013 ARCC Research Paper of the Year Award for her research of historical constructions along the Louisiana coast.

China's President Presents Top Foreign Science and Technology Award to LSU Professor

Credit: Earl Ward Plummer, LSU.

Earl Ward Plummer

China's President Jinping Xi presented the 2017 International Science and Technology Cooperation Award of the People's Republic of China to Professor Earl Ward Plummer, a faculty member in the LSU Department of Physics & Astronomy. Plummer was one of seven people to receive this award for his contribution to the development of science and technology in China.

Created in 1994 by the State Council, this award is presented to foreign experts or organizations that have made important contributions to China's science and technology undertaking and development. The award is presented to no more than 10 individuals or organizations each year.

"I am honored to have received this award for international collaboration," said Plummer, who is an LSU Boyd Professor.

> "In my mind, what is most significant is that in some small way, I may have played a role in the history of science and the emergence of China as a world leader in science and technology."
>
> Earl Ward Plummer
> LSU Boyd Professor in the Department of Physics & Astronomy

Plummer is a leading scientist in condensed matter physics, especially in surface science. He has been recognized as the pioneer in the spectroscopy of single atoms on surfaces; in the discovery of surface states and multipole plasmon modes of metals; and in the precise measurement of the many-body effects on surface electronic structures. His discovery of charge density waves at the metal/semiconductor interface has inspired research on critical phenomena in low-dimensional systems.

Plummer has mentored many young Chinese physicists and has actively encouraged them to return to China. In 2000, with Enge Wang and Zhenyu Zhang, he founded the International Center of Quantum Structures, or ICQS, in the Institute of Physics at the Chinese Academy of Sciences, and served as the chief scientific advisor. ICQS has produced many top Chinese physicists and fostered scientific collaborations, which has led to numerous influential research achievements. ICQS has played a critical role in promoting Chinese physicists on the international stage. Many founding members of ICQS have become leaders in the fields of science and technology in China. Other universities and institutions in China have adopted this innovative model of international collaboration.

Plummer is currently a visiting fellow in the Institute of Physics at the Chinese Academy of Sciences.

White House Announces Two from LSU as Exceptional Science, Mathematics, and Engineering Mentors

The White House has named LSU Department of Chemistry Barre Distinguished Professor Graça Vicente and the LSU Office of Strategic Initiatives as recipients of the Presidential Award for Excellence in Science, Mathematics, and Engineering Mentoring, or PAESMEM. PAESMEM recognizes outstanding efforts of mentors in encouraging the next generation of innovators and developing a science and engineering workforce that reflects the diverse talent of America.

The 41 mentors received their presidential certificates at a recognition ceremony at the Smithsonian Institution in

Credit: Zakiya Wilson-Kennedy, LSU.

Zakiya Wilson-Kennedy and Graça Vicente

Washington, D.C. The award recipients include 27 individuals and 14 organizations.

In 2007, Vicente became the LSU program director for the Initiative for Maximizing Student Development, or IMSD, which has provided research training, academic development, mentoring opportunities, and career development to students from groups underrepresented in the STEM disciplines. Since then, 82 undergraduate and graduate students have participated in the program. IMSD students develop their academic and technical skills in the research laboratories of LSU faculty mentors, and are involved in collaborative learning and mentoring. Vicente works with program staff to develop training activities, educational mentoring plans, and the creation of opportunities for the students to enhance their skills, network, and interact with each other and faculty. Her program also includes seminars, workshops, outreach, and site visits that meet the needs and interests of each student.

Vicente's mentoring is based on a progressive mentoring model and a long-term, trusting relationship that she develops with each mentee. She designs individualized mentoring plans that meet the needs and interests of each mentee, supporting and advising them through every stage of their careers, motivating, encouraging, and empowering them, and instilling in them confidence and a passion for mentoring others. She has personally mentored 71 students in her laboratory.

LSU's Department of Chemistry has become the leading producer of doctoral degrees in chemistry by African Americans in the U.S. The LSU Office of Strategic Initiatives, or OSI, has mentored 492 undergraduate students of whom 60 percent are minority students underrepresented in STEM—with 323 students graduating with a STEM baccalaureate degree. The OSI program has developed four undergraduate courses designed to provide research and leadership training needed to best guide students' metacognitive professional development as they transition from one semester to the next. As part of this coursework, each student must develop an individual development plan for navigating their undergraduate journey.

At the graduate level, the OSI has supported and mentored 137 STEM Ph.D. students since 2001 of whom 84 percent are minority students. LSU Assistant Dean for Diversity and Inclusion and Associate Professor of Research in chemistry education Zakiya Wilson-Kennedy accepted the award on behalf of OSI.

LSU has garnered six PAESMEM awards, including the two awardees mentioned above. Previous recipients from LSU include Isiah Warner, Saundra McGuire, Steve Watkins, and Su-Seng Pang.

Fulbright Awards LSU Kinesiology Professor to Conduct Research in the Czech Republic

LSU School of Kinesiology Assistant Professor Elizabeth "Kip" Webster is considered a top specialist in physical activity behaviors and motor skill competency in pediatric populations. She was awarded as a Fulbright Scholar to conduct research in the Czech Republic.

"I am very honored to have the opportunity to work as a Fulbright Scholar with the Faculty of Education at Palacký University," Webster said.

> "This is a great opportunity to share my research on early childhood motor development and physical activity with a distinguished group of researchers who share similar research interests and goals."
>
> Elizabeth "Kip" Webster
> LSU School of Kinesiology assistant professor

Fundamental motor skills are an essential component of early childhood development and are related to lifelong physical activity and health behaviors. Webster traveled to Olomouc in the Czech Republic to participate in round-table discussions with colleagues to exchange experiences in the field of education as well as future work related to primary and pre-primary teachers of physical education.

"Examining these important areas of research from a global perspective has the potential for gaining a better understanding of cross-cultural differences in motor development and increasing knowledge on programming that may effectively change health behavior in diverse groups of children," Webster said.

Her research interests focus on physical activity behaviors and motor skill competency in pediatric populations. Her research primarily examines school-based programs that target positive health-related outcomes, such as reducing childhood obesity and increasing physical activity, fitness, motor skill competency, and psychological variables related to health. Additionally, she researches the relationship between physical activity, motor skill competency, and academic achievement to promote more inclusion of physical activity into the school day, as well as school and state policies that directly relate to improving pediatric health.

As a Fulbright Scholar, she also gave two oral presentations, three practical lessons for students, and visited local primary schools. Additionally, she worked with graduate students and researchers on a fundamental motor skill assessment that systematically analyzes a variety of skills children typically learn and develop in early childhood called the Test of Gross Motor Development—3rd edition.

Credit: Kip Webster, LSU.

Kip Webster

LSU Business Faculty Member Named SAS Distinguished Professor

LSU E. J. Ourso College of Business faculty member Joni Shreve received the 2018 SAS Distinguished Professor Award.

The award is given to a professor who uses SAS software to teach statistical analysis and who fosters in students an appreciation for the software as an effective analytics tool in both industry and research.

A senior instructor in the Stephenson Department of Entrepreneurship & Information Systems, Shreve recently returned to the classroom full-time after serving as director of LSU's Master of Science in Analytics, or MSA, program from 2014 to 2017 and as practicum coordinator, managing more than 30 student-led analytics projects for approximately 20 sponsoring companies. The MSA program was established in 2011 with support from SAS.

"This honor recognizes Joni as a leader in integrating data and analytics into instruction," said Richard D. White Jr., dean of the E. J. Ourso College of Business.

> "She has been instrumental to the success of our MSA program."
>
> Richard D. White Jr.
> E. J. Ourso College of Business dean

An active member of the SAS user community, Shreve established the Student Symposium at the annual South Central SAS Users Group, or SCSUG, Educational Forum in 2013. She joined the SCSUG Executive Committee in 2014 and served as chair for the 2015 SCSUG Educational Forum. Shreve is the co-author of an upcoming SAS Certification Prep Guide, which will prepare SAS users for the Statistical Business Analyst Certification Using SAS 9 exam.

"This award is the highlight of my career," Shreve said. "I am absolutely excited and at the same time, extremely humbled, to be recognized by the leader in analytics."

Shreve's research interests include data mining and classification analysis. ■

Credit: LSU.

LSU Associate Vice President of Research & Economic Development Gus Kousoulas, LSU Vice President of Research & Economic Development K.T. Valsaraj, Dow Chemical Endowed Chair and Professor of Mechanical Engineering Michael Khonsari, T. Harry Williams Professor of American History Nancy Isenberg, and Associate Vice President of Research & Economic Development Stephen David Beck.

GOING THE DISTANCE

Distinguished Research Masters

Since 1972, the LSU Council on Research has presented the university-wide Distinguished Research Master award in recognition of outstanding faculty accomplishments in research and scholarship. The recipients are chosen by the council from nominees proposed by the university community. Each year, one recipient is chosen from the arts, humanities, social sciences and behavioral sciences disciplines, and another from the science, technology, engineering and mathematics—or STEM—disciplines.

The Distinguished Research Masters award provides winners a salary stipend and the University Medal—the symbol of exceptional academic accomplishment at LSU.

Arts, Humanities, Social & Behavioral Sciences

Nancy Isenberg, Department of History, College of Humanities & Social Sciences

Credit: LSU.

Nancy Isenberg

Nancy Isenberg is a prolific American historian whose books have been recognized on the *New York Times* Best Sellers List. She was selected as the 4th most important writer on *Politico Magazine's* Annual List of the "50 Most Important Thinkers" of 2016. She is the T. Harry Williams Professor of American History at LSU. Her most recent book, *White Trash: The 400-Year Untold History of Class in America*, was a *New York Times* best seller and was a finalist for book prizes from Pen America, Columbia School of Journalism, and the *Los Angeles Times*. Her book has gained international recognition, with editions published in Great Britain and Australia, and translations are underway in Italy, China, South Korea, and Taiwan.

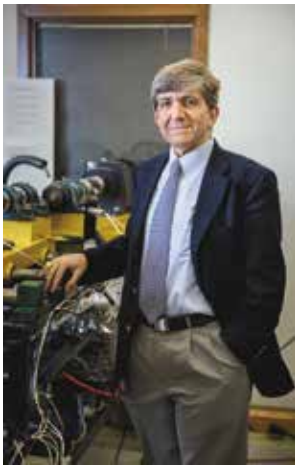
Isenberg's book *Madison and Jefferson* has also been widely praised. Coauthored with LSU Charles P. Manship Professor Andrew Burstein, it was a *New York Times* best seller among electronic books and named one of the top five non-fiction titles of 2010 by Kirkus. Her first book, *Sex and Citizenship in Antebellum America* (1998), was awarded the "best book" prize by the Society for Historians of the Early American Republic. Her second book in 2007, *Fallen Founder: The Life of Aaron Burr*, was featured by the History Book Club; won the 2008 Oklahoma Book Award for best book in non-fiction; and was a finalist for the Los Angeles Times book prize in biography. She also received the Walter & Lillian Lowenfels Criticism Award in 2016 for her editorial writing on the Broadway musical, *Hamilton*.

Isenberg received her Ph.D. from the University of Wisconsin-Madison, studying with the foremost women's historian Gerda Lerner. She has been featured on PBS NewsHour, NPR, C-SPAN *Book TV*, and is a contributing writer to Salon.com.

Science, Technology, Engineering & Mathematics

Michael Khonsari, Department of Mechanical & Industrial Engineering, College of Engineering

Michael Khonsari is the Dow Chemical Endowed Chair and Professor of Mechanical Engineering at LSU. Khonsari is also the Louisiana Experimental Program for Stimulating Competitive Research project director and associate commissioner for sponsored research and development programs at the Louisiana Board of Regents. Through these roles, Khonsari promotes Louisiana's research culture through government investments and post-secondary education.



Credit: LSU.

Michael Khonsari

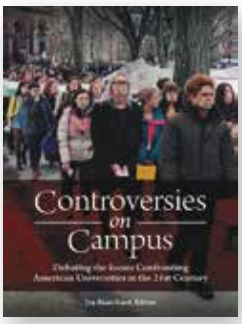
Since his arrival at LSU in 1999, Khonsari has published several technical books including three editions of *Applied Tribology* (Wiley & Sons) and *Introduction to Thermodynamic of Mechanical Fatigue* (Taylor-Francis/CRC). At LSU alone, he has supervised to completion 23 Ph.D. students, 15 M.S. students, and supervised more than 30 post-doctoral researchers and visiting scholars. He has authored more than 285 peer-reviewed journal articles and 50 book chapters and special publications. Khonsari is the principal investigator of more than $114 million in research grants and contracts. He is the holder of eight U.S. patents all obtained during his tenure at LSU. He is the recipient of the American Society of Mechanical Engineers, or ASME, Burt Newkirk Award and the ASME Mayo Hersey Award—the highest award in the field of tribology bestowed by ASME.

He is also the recipient of the STLE Presidential Award, the ALCOA Foundation award, the Joseph Danek Award, and was inducted into the Academy of Distinguished Alumni Mechanical Engineers at the University of Texas at Austin. He serves as the editor-in-chief of the *ASME Journal of Tribology* and serves on the board of eight archival journals. He is a Fellow of ASME, STLE, AAAS, and a member of the European Union Academy of Sciences.

Khonsari also has served as a research faculty fellow at the former NASA Lewis Research Center, Wright-Patterson Air Force laboratories, and the U.S. Department of Energy. Khonsari's interests include tribology, machinery performance analysis, numerical analysis, and heat transfer. Khonsari earned his bachelor's degree, master's degree, and Ph.D. in mechanical engineering from the University of Texas. Prior to LSU, he was a faculty member at The Ohio State University, University of Pittsburgh, and served as the chairman of the Department of Mechanical Engineering and Energy Processes at Southern Illinois University. ■

MEDIA SHELF

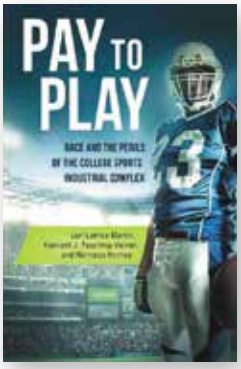
By Ellen Smith and Beth Carter



Controversies on Campus: Debating the Issues Confronting American Universities in the 21st Century

Joy Blanchard
Associate Professor of Education

In this book, Joy Blanchard examines the variety of controversies regarding today's college campuses and student bodies, including topics like tuition costs, campus rape, academic freedom/free speech, gun policies, binge drinking, "hook-up" culture, poverty-level wages of adjunct faculty, and student-athletes in the era of big money amateur sports. The book objectively examines these issues and others, presenting both up-to-date quantifiable data and impartial summaries of perspectives on the issue in question. It is a resource to learn about a wide range of issues and controversies confronting college campuses, and it offers arguments for policies and legal reforms in higher education



Pay to Play: Race and the Perils of the College Sports Industrial Complex

Lori Martin
Associate Professor of Sociology and African & African American Studies

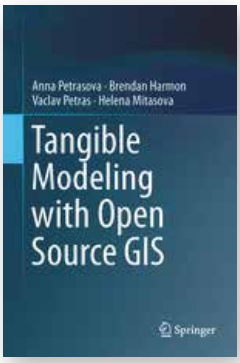
Kenneth Fasching-Varner
Shirley B. Barton Endowed Associate Professor of Education

Top-tier college sports are extremely profitable. Despite the billions of dollars involved in the amateur sports industrial complex, none of it winds up in the hands of the athletes. The longstanding controversies surrounding whether colleges and universities should pay athletes to compete on these educational institutions' behalf coincides with the increase of black athletes at predominately white colleges and universities. *Pay to Play* takes a hard look at historical and contemporary efforts to control sports participation and compensation for black athletes in amateur sports in general, and in big-time college sports programs, in particular.

Buildings of New Orleans

Co-authored by Lake Douglas
Professor of Landscape Architecture

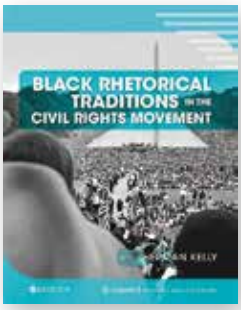
Buildings of New Orleans is a detailed guidebook to New Orleans architecture—an authoritative, comprehensive, post-Hurricane Katrina overview of buildings, neighborhoods, and landscapes. It tells a compelling and fascinating story of the city through concise descriptions of nearly 300 significant structures, open spaces, and lesser-known places, enhanced by 175 photographs and 23 maps. It is conveniently organized into 13 neighborhood tours, two road trips into nearby parishes, and three excursions up and down the Mississippi River along the historic Great River Road, and enlivened by sidebars highlighting everything from renowned authors, cuisine, and jazz to public markets, green spaces, and historic preservation.



Tangible Modeling with Open Source GIS

Co-authored by Brendan Harmon
Assistant Professor of Landscape Architecture

Tangible Modeling with Open Source GIS is the first book to introduce a tangible interface for geospatial analysis and simulations. The book teaches readers how to build their own Tangible Landscape system with free and open source software, and how to use it as a platform for developing new applications. It also explains main components of the Immersive Tangible Landscape System, and provides the basic workflows for running the applications. The fundamentals of the system are followed by series of example applications in geomorphometry, hydrology, coastal and fluvial flooding, fire spread, landscape and park design, solar energy, trail planning, and others. Its applications include design and planning purposes, scientific applications, disaster management, and educational uses.



Black Rhetorical Traditions in the Civil Rights Movement

Herman Kelly
Adjunct Instructor of African & African American Studies

The readings in *Black Rhetorical Traditions in the Civil Rights Movement* show how black voices and culture both informed and empowered African Americans during the Civil Rights Movement. The collected works highlight voices that spoke out against injustices, even in the face of great danger. It is the story of voices that would not be silenced in the face of slavery, racism, and discrimination. The black rhetorical tradition is showcased through songs, sermons, speeches, dance, and poetry. The experiences of African Americans come to life in essays on the roots of lynching, African American religion, school desegregation, African emigration, and the Jim Crow era.

Dis-Orienting Planets: Racial Representations of Asia in Science Fiction

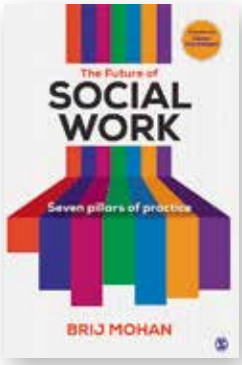
Isiah Lavender III
Assistant Professor of English

Dis-Orienting Planets amplifies critical issues surrounding the racial and ethnic dimensions of science fiction by exploring the depictions of Asia in science fiction literature, film, and fandom. The collection of essays in this book include contributors by scholars like Takayuki Tatsumi, Veronica Hollinger, Uppinder Mehan, and Stephen Hong Sohn. The book reconfigures the very study of race in science fiction and launches into political representations of Asian identity in science fiction's imagination, from the fear of the Yellow peril and its racist stereotypes to techno-Orientalism and the remains of a postcolonial heritage. The volume examines Gary Shteyngart's novel *Super Sad True Love Story*, the acclaimed film *Cloud Atlas*, and Guillermo del Toro's monster film *Pacific Rim* among others. After exploring a wide range of Asian representation in science fiction, Lavender's *Dis-Orienting Planet* determines that visions of the future must include all people of color.

Staging Women's Lives in Academia

Co-authored by Michelle A. Massé
Professor of English

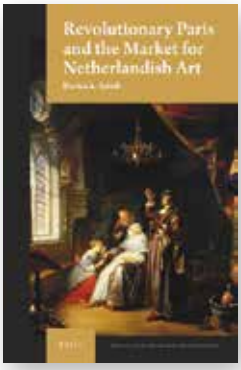
Staging Women's Lives in Academia argues that institutional change must accommodate women's professional and personal life stages. It demonstrates how seemingly personal decisions are shaped by institutions and advocates for ways that workplaces, not women, must change. Addressing life stages ranging from graduate school through retirement, these essays represent a span of institutions and women who draw upon both personal experience and scholarly expertise. The book explores the ways women in all stages of academia feel that they are always too young or too old; too attentive to work or too overly focused on family. By including the voices of those who leave, as well as those who stay, this collection signals the need to rebuild the house of academia so that women can have both their classrooms and their personal lives.



The Future of Social Work: Seven Pillars of Practice

Brij Mohan
Dean Emeritus of LSU School of Social Work

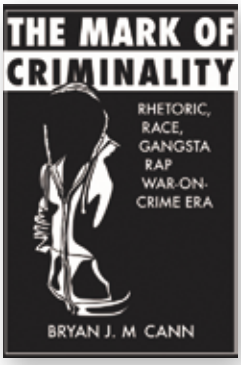
Social media and the digital revolution have fundamentally changed the meaning of "social" and "work." Social work, like all other professions, will undergo dramatic changes as apps and algorithms overtake human operations. The failure of social sciences in general and social work in particular warrants thoughtful innovations that ensure sustainable services. Mohan believes altruism is professionally unattainable until social work is completely re-founded. *The Future of Social Work* discusses seven new algorithms of social practice that challenge the existing model of social work education and offers a new perspective for radical transformation of the entire system. The book warns against academic complacency and shows how this radical transformation is necessary in order to prevent inevitable alienation, avarice, and anger in a techno-scientific world.



Revolutionary Paris and the Market for Netherlandish Art

Darius Spieth
Professor of Art History

Revolutionary Paris restores attention to the aesthetic, intellectual, and economic link between two key periods in the history of art: the Golden Age of Dutch and Flemish painting and the art of the French Revolution. It does so by revealing the dominance of Golden Age pictures in the artistic discourse and painting sales before, during, and after the French Revolution. The book explores the private lives of artists and owners of these pieces throughout the revolution as well as statistical investigations of sales transactions. *Revolutionary Paris and the Market for Netherlandish Art* is a book that shows how art, taste, economics, and history are interlinked.



The Mark of Criminality

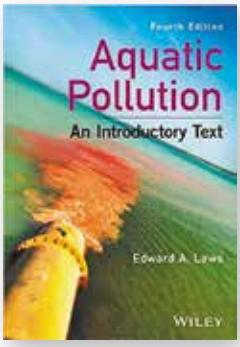
Bryan J. McCann
Assistant Professor of Communication Studies

Bryan J. McCann argues that gangsta rap should be viewed as more than a damaging reinforcement of an era's worst racial stereotypes. It illustrates the ways that the "war on crime" became conjoined aesthetically, politically, and rhetorically with the emergence of gangsta rap as a lucrative and deeply controversial sub-genre of Hip Hop. *The Mark of Criminality* positions the works of key gangsta rap artists within the law-and-order politics and popular culture of the 1980s and 1990s to reveal a profoundly complex period in American history. At the center of this era was the mark of criminality: a set of discourses that labeled members of the predominantly poor, urban, and minority communities as threats to the social order. McCann shows how public figures used the mark of criminality to implement extremely harsh penal policies that have helped make the U.S. the world's leading jailer of its adult population, and illustrates how the seeds of gangsta rap were sown during this tumultuous time.

Botox Nation: Changing the Face of America

Dana Berkowitz
Associate Professor of Sociology and Women's and Gender Studies

Botox Nation draws from engaging, in-depth interviews with Botox users and providers as well as the author's own experiences receiving the injections. The interviews reveal the personal motivations for using Botox and help unpack how anti-aging practices are conceived by, and resonate with, everyday people. Berkowitz is particularly interested in how Botox is now being targeted to younger women; since Botox is a procedure that must be continually administered to work, the strategic choice to market to younger women, Berkowitz argues, aims to create lifetime consumers. Berkowitz also analyzes magazine articles, advertisements, and even medical documents to consider how narratives of aging are depicted. She employs a critical feminist lens to consider the construction of feminine bodies and selves, and explores the impact of cosmetic medical interventions aimed at maintaining the desired appearance of youth, the culture of preventative medicine, the application of medical procedures to seemingly healthy bodies, and the growth and technological advancement to the anti-aging industry.



Aquatic Pollution: An Introductory Text

Edward Laws
Professor of Environmental Sciences

Since the publication of the third edition of *Aquatic Pollution* in 2000, there have been many major developments within the field in terms of research, regulations, and also large-scale catastrophes that have had a significant impact on the aquatic environment; the Deepwater Horizon oil spill and the Fukushima nuclear disaster have taken their toll, and research on ocean acidification has developed enormously over the last decade. Recognizing, controlling, and mitigating aquatic pollution on a global scale is one of the most important and most difficult challenges facing society today. Fully updated to reflect current understanding and discussing these major recent developments, this fourth edition of *Aquatic Pollution* covers every aspect of pollution associated with urban runoff, acid rain, sewage disposal, pesticides, oil spills, nutrient loading, and more. ■

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