FLORIDA ATLANTIC UNIVERSITY
DIVISION OF RESEARCH

SPRING 2021

OWL RESEARCH & INNOVATION

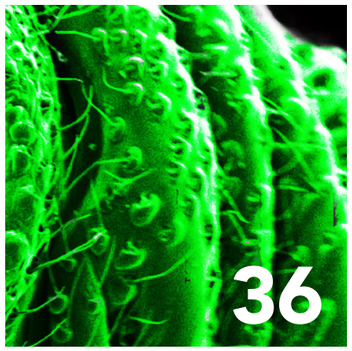
Collaboration in Healthcare

New Partnership With Memorial Healthcare System to Advance Research

BREAKING RECORDS
Research Awards Skyrocket

NAVY FUNDS DEEP DIVE INTO DAZZLING OCEAN BLUE

SPRING 2021



NEWS BRIEFS

NEW FACES

INSIGHTS

MORE

Cover: FAU celebrates its new collaboration with Memorial Healthcare System, read the story on page 31. Illustration by Shaw Nielsen.

FEATURES

FLORIDA ATLANTIC UNIVERSITY
DIVISION OF RESEARCH

OWL RESEARCH & INNOVATION

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In memoriam of Lynn Laurenti who contributed greatly to this publication. Her wordsmithing made this magazine – and us – better.

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A Burgeoning Research Powerhouse

JEFFREY THOLL

Five years ago, we set in place a 10-year strategic plan for "the Race to Excellence." It was an ambitious blueprint to put FAU on a trajectory to become a top-tier public research university. Now, at the halfway mark, we're seeing major accomplishments that are changing the course of the institution and its research enterprise.

Throughout this edition of *Owl Research & Innovation*, you'll read about the world-class researchers we're attracting to our campuses. Our students have the opportunity to work side-by-side with them — in labs, out in the field and in classrooms — providing unrivaled educational experiences. These scientists, engineers, composers and philosophers are tackling some of the grand societal challenges we face. Our students, faculty and staff are building bridges to a better future, from addressing COVID-19 to mitigating the impacts of climate change, and from understanding how artificial intelligence will shape our future to finding clinical solutions to the diseases that affect so many of us.

FAU's new partnership with Memorial Healthcare System (page 31) will further advance clinical trials in our region. Our research know-how combined with Memorial's medical expertise will bring cutting-edge treatment options to many patients much closer to home. Patients entering clinical trials will receive the very best care and access to the most innovative therapies available.

For many diseases of the mind, clinicians will be able to build on the research taking place on our Jupiter campus (page 18) with our neighbors, the Scripps Research Institute and the Max Planck Florida Institute for Neuroscience, two of the top scientific institutes in the world. A new state-of-the-art neuroscience building is under construction on our Jupiter campus (page 19) that will be home to the FAU Brain Institute and will spur even more collaborative work with our world-renowned research partners.

With a global pandemic, civil unrest, and a contentious election season, this has been a trying time for many. Through it all, we continue to build a foundation that is transforming FAU into a research powerhouse. We're proud of how far we have come, and even more excited about where we will go in the next five years.

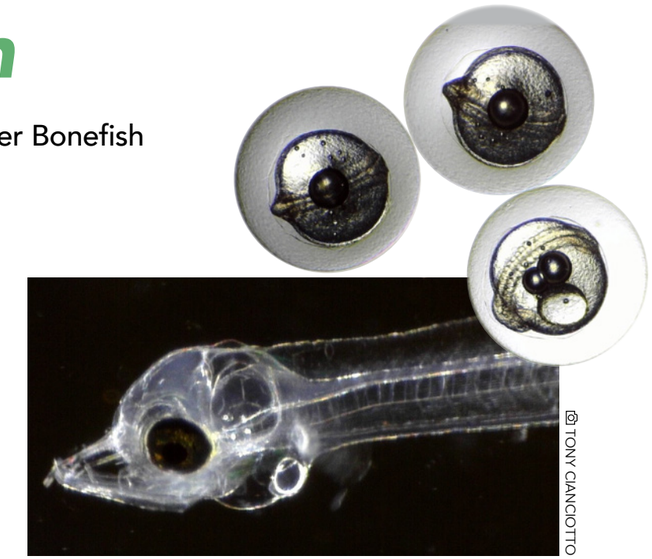
Stay safe, and Go Owls!

John Kelly
President

Baby Bonefish

Researchers are World's First to Pioneer Bonefish Reproductive Science in Captivity

In a race to solve a major challenge for conservation aquaculture, a breakthrough has been achieved by researchers at Florida Atlantic University's Harbor Branch Oceanographic Institute, in collaboration with the Bonefish and Tarpon Trust. They are the first in the world to successfully spawn bonefish in captivity – in just four years.



TONY CIANCIOTTO

The pioneering research in bonefish reproductive science has enabled scientists to successfully induce captive bonefish to spawn in aquaculture tanks.

Bonefish are an ancient group of fish, occurring in fossil records that go back 138 million years, but large gaps still exist in knowledge of their biology. Information on this "near-threatened" species, including spawning, eggs and larvae, is scarce. Understanding the bonefish life cycle is essential to formulating conservation policies, addressing threats to the fishery and contributing to restoration.

Bonefish are a core component of Florida's multi-billion dollar sport fishing industry. The fishery also is culturally important, providing jobs that are often among the best paying and passed along family lines.

Yet bonefish populations have been declining in recent years, with estimated decreases of as much as 90% in some areas. Threats include habitat loss and degradation, coastal development and urbanization, declines in water quality, and harvest by commercial, artisanal and recreational fisheries.

The project's breakthrough finding is that bonefish adults held in the laboratory can be conditioned to produce eggs and milt (semen) and then induced to spawn, entirely under controlled environmental conditions.

"Prior to this research, we didn't know the environmental cues bonefish require for spawning -- what light, temperature and salinity levels promote egg and larval development; how long it takes eggs and larvae to develop; what larvae look like as they develop; or what larvae eat," said Paul Wills, Ph.D., research professor and associate director for research who spearheads the aquaculture and stock enhancement program at FAU's Harbor Branch.

AARON ADAMS

A voracious predator, bonefish, named for the tiny little bones in their body, accelerate faster and sprint farther than any other fish on a light tackle and are considered one of the world's top fly-fishing targets.

DID YOU KNOW?

LYNDA RYSAVY

COLLEGE OF ENGINEERING AND COMPUTER SCIENCE AND INSTITUTE FOR SENSING AND EMBEDDED NETWORK SYSTEMS ENGINEERING

Air Force Funds AI Research

Researchers in the College of Engineering and Computer Science recently received a three-year, $653,393 grant from the United States Air Force Office of Scientific Research for a project titled "Data Analytics and Data Conformity Evaluation with L1-norm Principal Components."

DOUGLAS LEVRE

Dimitris A. Pados, Ph.D.

For the project, researchers will develop new theory and methods to curate training data sets for artificial intelligent (AI) learning and screen real-time operational data for AI field deployment.

The project team is spearheaded by Dimitris A. Pados, Ph.D., principal investigator, a professor and Eminent Scholar in Engineering and Computer Science in the College of Engineering and Computer Science, a fellow of FAU's Institute for Sensing and Embedded Network Systems Engineering and director of the Center for Connected Autonomy and Artificial Intelligence.

HARBOR BRANCH OCEANOGRAPHIC INSTITUTE

Life in the Lagoon

Researchers in FAU's Harbor Branch Oceanographic Institute recently published a study in the journal *Endangered Species Research* showing that white-spotted eagle rays use the deeper portions of the Indian River Lagoon (IRL) during the day and shallower portions during the night. In addition, they move faster while in the ocean and lagoonal habitats and slower in channels and inlets.

This research suggests that these rays may spend more time foraging at night in the shallow water of the lagoon than during the day. These observations revealed the rays' affinities for areas that are also important to humans for recreational and commercial purposes, such as inlets, channels and clam aquaculture lease sites close to shore. This information is valuable for managers to develop strategies mitigating impacts on the species.

In another recent study published in *Estuaries and Coasts*, Harbor Branch researchers conducted the first long-term, in-depth analysis of sharks and rays in the southern IRL, from Sebastian to the Saint Lucie inlet.

From 2016 to 2018, researchers caught 630 individuals of 16 species, including two critically endangered small-tooth sawfish. The two most commonly caught species were bull sharks and Atlantic stingrays.

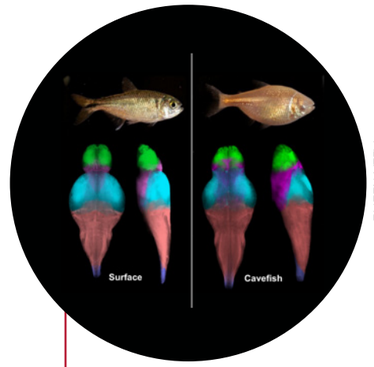
Results of the study showed that many sharks and rays use the southern IRL throughout their lives, and the area may serve as an important nursery for certain species. A record of the diversity and distribution of these animals is the first step to understanding how they may be affected by environmental change and pollution in the lagoon.

HARRIET L. WILKES HONORS COLLEGE AND CHARLES E. SCHMIDT COLLEGE OF SCIENCE

Mapping Cavefish Brains

A groundbreaking study published in *Science Advances* by neuroscientists in the Charles E. Schmidt College of Science, the Harriet L. Wilkes Honors College, and collaborators, is the first to identify large-scale differences between surface fish and cavefish populations of the tiny Mexican tetra, by comparing brain anatomy and activity across independently evolved populations.

These populations exhibit differences in behaviors related to feeding and hunting, so results from this study provide a neural basis for understanding behavioral evolution, according to Alex C. Keene, Ph.D., lead author and an associate professor in the College of Science.

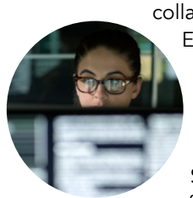


ALEX KEENE

From left, a neural image of a surface fish and a cavefish, which reveals altered landscape of brain activity.

COLLEGE OF ENGINEERING AND COMPUTER SCIENCE, CHARLES E. SCHMIDT COLLEGE OF MEDICINE, CHRISTINE E. LYNN COLLEGE OF NURSING AND CHARLES E. SCHMIDT COLLEGE OF SCIENCE

$2.4M Grant to Train in Data Science



Researchers from the College of Engineering and Computer Science, in collaboration with the Charles E. Schmidt College of Medicine, the Christine E. Lynn College of Nursing and the Charles E. Schmidt College of Science, recently received a five-year, $2.4 million grant from the National Science Foundation (NSF) to train graduate students in data science technologies and applications in three key areas: medical and health care applications, industry applications, and data science and artificial intelligence technologies.

The research team is led by Borko Furht, Ph.D., principal investigator, a professor in the College of Engineering and Computer Science, and director of the NSF Industry/University Cooperative Research Center for Advanced Knowledge Enablement.

COLLEGE OF BUSINESS, TECH RUNWAY AND FAU WAVE

Student Wins Prestigious Competition

ALEX DOLCE

Hannah Herbst

Hannah Herbst, a College of Business senior, recently won first-place honors and a $10,000 cash prize in Florida Venture Forum's Statewide Collegiate Startup Competition. This marks the first time since 2014 that a student from FAU has taken the top award.

Herbst and her company, Tiburon Technologies, LLC, invented an antibacterial, reusable bandage that prevents the migration of multiple strains of deadly bacteria into the wounds of post-operative, hospital-based patients. She said she will use the prize money to file additional patents and to move forward with an identified contract manufacturing firm.

Herbst credits her participation in the FAU Wave, I-Corps and Tech Runway programs for key instruction and mentorship in entrepreneurship.

"Hannah's success, both as a student researcher and as an entrepreneur, is a testament to the quality of the research enterprise and of the entrepreneurship ecosystem FAU has grown," said Daniel Flynn, Ph.D., vice president for Research. "Students, faculty, staff, alumni, and friends of FAU all have the opportunity to participate in a large variety of high-quality research and entrepreneurship-focused programs."

COLLEGE OF SOCIAL WORK AND CRIMINAL JUSTICE

Study Reveals Students' Preference for E-Learning

Dani Groton, Ph.D., and Christine Spadola, Ph.D., both assistant professors in the College of Social Work and Criminal Justice, recently described the results of their research on seven preferences social work students have when it comes to learning online.

The results, published in *Social Work Education: The International Journal*, identified these preferences: visuals, interactive components, asynchronous structure, the importance of "switching it up," accessibility concerns, need for applied scenarios and preferences for assessment types.

HARBOR BRANCH OCEANOGRAPHIC INSTITUTE AND INSTITUTE FOR SENSING AND EMBEDDED NETWORK SYSTEMS ENGINEERING

$2.2M to Monitor Algal Bloom

Jordon Beckler, Ph.D., an assistant research professor at the Harbor Branch Oceanographic Institute and a faculty fellow in FAU's Institute for Sensing and Embedded Network Systems Engineering, recently received a $2.2 million grant for a project titled "Harmful Algal Bloom Assessment of Lake Okeechobee." The goal of the project is to help combat Florida freshwater eutrophication and harmful algae proliferation, ultimately protecting human and ecosystem health.

This research will pinpoint problem areas prior to or early in the emergence of harmful algal blooms in Lake Okeechobee. These blooms have been linked to skin disease, respiratory distress, liver damage and liver cancer in both animals and humans.

Cheryl Krause-Parello, Ph.D.

CHRISTINE E. LYNN COLLEGE OF NURSING

Vets Walking Pets

A team of researchers led by Cheryl Krause-Parello, Ph.D., a professor and director of Canines Providing Assistance to Wounded Warriors in the Christine E. Lynn College of Nursing, recently examined the effects of walking with a shelter dog versus walking with a human on psychological stress indicators, post-traumatic stress disorder (PTSD) symptoms and perceived stress in re-integrating military veterans.

Results, published in the journal *Anthrozoös*, showed evidence that walking a dog benefits veterans, especially those with PTSD. For instance, the scientists found that walking a dog lowered levels of the stress hormone cortisol for those with PTSD.

CHARLES E. SCHMIDT COLLEGE OF MEDICINE

$1.3M NIH Grant for Stem Cell Research

Researchers in the Charles E. Schmidt College of Medicine plan to conquer a major limitation in the ability of scientists to engineer tissues for regenerative therapies for age-related and degenerative diseases.

Lisa Ann Brennan, Ph.D., a research associate professor, and Marc Kantorow, Ph.D., professor and assistant dean for graduate studies, were recently awarded a five-year, $1.3 million (total $2.7 million) grant, from the National Eye Institute of the National Institutes of Health for a research project that will help identify novel mechanisms for how immature eye cells activate genes to become mature visual cells.

CHARLES E. SCHMIDT COLLEGE OF SCIENCE AND COLLEGE OF ENGINEERING AND COMPUTER SCIENCE

Leading in the Field

Four researchers recently earned early-career awards from the National Science Foundation (NSF).

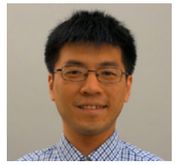
- Marianne Porter, Ph.D., an assistant professor in the Charles E. Schmidt College of Science, is the first faculty member in FAU's biological sciences department to earn this coveted award.
- Feng-Hao Liu, Ph.D., an assistant professor in the College of Engineering and Computer Science
- Waseem Asghar, Ph.D., an associate professor in the College of Engineering and Computer Science
- Behnaz Ghoraani, Ph.D., an associate professor in the College of Engineering and Computer Science

Collectively, their research includes the study of sharks' swimming abilities, cryptography, viral infection tests and tracking Alzheimer's disease by wearing a smart watch.

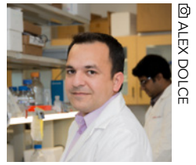
NSF's early-career award offers support to faculty who have the potential to serve as academic role models in their communities. The five-year grants to FAU faculty total more than $2 million and will support the recipients' research and education, leading to advancements in science and engineering.

ALEX DOLCE

Marianne Porter, Ph.D.



Feng-Hao Liu, Ph.D.



ALEX DOLCE

Waseem Asghar, Ph.D.

KATARZYNA BYTNAR

Behnaz Ghoraani, Ph.D.

CHARLES E. SCHMIDT COLLEGE OF MEDICINE

Parkinson's Disease Study is 'On the Nose'

Mounting evidence shows a link between inflammation of neuron cells in the nose and degenerative diseases, such as Parkinson's disease (PD). Loss of smell is one of the earliest signs of PD, though it's not clear why. It's thought that environmental toxins inhaled through the nose may induce inflammation in the brain, triggering the production of Lewy bodies that can then be spread to other brain regions. Now, FAU researchers have added weight to this theory, and identified a molecule that may be key to the domino effect kicked off by nasal inflammation.

Ning Quan, Ph.D., a professor in the Charles E. Schmidt College of Medicine and member of the Brain Institute, and a team of researchers used mouse models to demonstrate that inflammation induced in the nasal tissue by a type of molecule found in bacteria leads to toxic forms of a protein that degenerates and triggers Parkinson's-like symptoms in mice. Quan and his team found this inflammation is triggered by a single receptor protein, interleukin 1 beta. The findings were published in the journal *Brain Pathology*.

ALEX DOLCE

Michelle Edwards, a graduate student in the Marine Science and Oceanography program at HBOI.

HARBOR BRANCH OCEANOGRAPHIC INSTITUTE AND HARRIET L. WILKES HONORS COLLEGE

First Tally of Ocean Plastics

Trillions of plastic debris fragments are afloat at sea, creating the perfect environment for the colonization of microorganisms, such as bacteria. The large quantity of cells and biomass carried by plastic debris has the potential to impact biodiversity, ecological functions and biogeochemical cycles in the ocean. While numerous studies have characterized the cells on these plastic surfaces, none have quantified the total carbon in oceanic plastic debris under in situ conditions.

In a new study published in the *ISME Journal*, researchers from Harbor Branch Oceanographic Institute and the Harriet L. Wilkes Honors College, and collaborators, conservatively estimate that about 1% of microbial cells in the ocean surface microlayer inhabit plastic debris globally. This mass of cells would not exist if plastic debris were not in the ocean, constituting a disruption of the proportions of native flora in that habitat.

NEW FACES

The Technological Future

"The new Center for the Future Mind brings philosophical and social considerations together with scientific innovations 'to help humans better navigate our brave new world.'"

–Susan Schneider, Ph.D.

Recent Hire Leads New Philosophical Center for the Future Mind

By Bethany Augliere

If you could upload a microchip to your brain to give you savant-level mathematical abilities, would you do it? And if you kept enhancing your brain with this artificial intelligence (AI), at what point do you diminish your entire conscious being and no longer exist?

Florida Atlantic University plans to tackle those questions and more with its new Center for the Future Mind.

To lead the center, FAU has named philosopher Susan Schneider, Ph.D., to the position of William F. Dietrich Chair in Philosophy in the Dorothy F. Schmidt College of Arts and Letters, in collaboration with FAU's Brain Institute. Schneider studies the nature of the mind, with an interest in emerging technologies and how they will shape the future of humanity.

Answering such questions does not just require knowledge of cutting-edge research. "There are philosophical issues here that lie beneath the algorithms," Schneider said. To her, these issues require a rich understanding of the nature of the self and mind, as well as deep interdisciplinary dialogues on human flourishing. The new Center for the Future Mind brings philosophical and social considerations together with scientific innovations "to help humans better navigate our brave new world."

"The College of Arts and Letters is excited to welcome Dr. Schneider to our Dietrich Chair in Philosophy and to partner with the FAU Brain Institute to create this multidisciplinary, university-wide endeavor on the future of human cognition and its relationship to artificial intelligence," said Michael Horswell, Ph.D., dean of the College of Arts and Letters.

Schneider did not always plan to be a philosopher. She studied economics as an undergraduate at the University of California, Berkeley. But while studying abroad in a communist country, she began reading philosophers who were exploring deep issues involving the structures of authoritarian systems. When she returned to California, she continued to pursue philosophy and enrolled in graduate-level courses. After graduating, she attended Rutgers University to work on her doctorate with the AI skeptic Jerry Fodor. It was there that she began to delve into issues of AI and consciousness. "I've been very fortunate, and able to work with some of the very best philosophers in the world," she said.

Schneider comes to FAU from the University of Connecticut, where she was a professor of philosophy and cognitive science and director of the AI, Mind and Society Research Group. She is also the NASA-Baruch S. Blumburg chair and a Distinguished Scholar Chair at the Library of Congress. Her work has been featured in the New York Times, the Scientific American, the Smithsonian, the History Channel, the BBC and other leading media outlets. Her most recent book, published in 2019, "Artificial You, AI and the Future of Your Mind," explores the moral and ethical issues related to machine consciousness.

"Dr. Schneider's scholarship reminds us of the poverty of our language in describing mental states and intelligence, biological or artificial, and the serious ethical issues we face as we consider brain-machine mergers," said Randy D. Blakely, Ph.D., executive director of the Brain Institute and professor of biomedical science in the Charles E. Schmidt College of Medicine. "Neuroscience and philosophy have so much to gain from each other as we move forward."

Schneider's work has taken her to Washington, where she meets with members of Congress and gives presentations on AI and on topics such as data privacy, algorithmic bias, technological unemployment, autonomous weapons, and more. "The proper use of AI technology isn't just a matter of what we can do, it's a matter of what we should do," she said. That's why Schneider says it's important "to step out of the ivory tower" and engage with the public, as well as policymakers, about the ethical issues and future surrounding AI. That's exactly what she plans to do at the new interdisciplinary center. "I'm optimistic that we'll be able to engage the public." The center will consider both the scientific and social impacts of emerging technologies, with an emphasis on classic philosophical issues.

Schneider is currently working on a book on the shape of intelligent systems. She'll explore intelligence ranging from the octopus to the human brain, and the human brain when augmented with technology. "It's going to be really fun to write, I'm looking forward to it." ♦

Leading with a Vision for the Future

Career Youth Advocate Named Dean of Honors College

By Andrew Clark

As a scientist and counseling psychologist, Justin Perry, Ph.D., has dedicated his career to advocating for youth, their mental health and education. He plans to continue that effort as the new dean of the Harriet L. Wilkes Honors College.

Perry comes to FAU with extensive experience in academic leadership, research and grant funding. Prior to joining FAU, he served as dean of the School of Education, Ewing Marion Kauffman/Missouri Endowed Chair, and a professor of counseling and educational psychology at the University of Missouri – Kansas City (UMKC).

Under his leadership, the UMKC School of Education received a historic gift to support student scholarships, substantially grew its external research funding, and received three national accreditations. He also established innovative new partnerships with the Kansas City Teacher Residency program and Kansas City PLUS (Pathway to Leadership in Urban Schools).

Perry is the author of nearly 50 publications, many of which explore the intersections between positive youth development, mental health and urban education. He has studied the benefits of offering psychological services in grade school to the development of coping skills during school-to-work transitions. Dedicated to inclusivity, Perry served on the board of directors of Esperanza, a non-profit organization aimed at meeting the educational needs of Hispanic students in Cleveland.

"Both worlds of my professional life have enabled me over the years to creatively exercise my skills in understanding what makes people tick," Perry said. As the Honors College dean, he aims to harness the academic resources provided by a public research university like FAU to serve the greater good, including addressing needs in the community.

Ultimately, joining the Honors College has brought Perry back to his roots. He was adopted from Korea as an infant, grew up in the state of Washington, and moved to Georgia in high school. Later, he went to Tulane University in New Orleans.

The foundation for his career as a psychologist was laid during his undergraduate years through experiences that included writing a senior honors thesis and actively participating in a research lab and student clubs. "When I see what the students here get to experience and achieve, I see myself in them, paying it forward as their dean," Perry said. ♦

Justin Perry, Ph.D.

© ALDO E. FRIAS

The shallow, coastal water of South Florida is home to a previously unknown nursery ground for manta rays.

RAY OF LIGHT

FAU Graduate Uncovers First Urban Nursery Ground for Mantas off South Florida Coast

Story and Photography by Bethany Augliere

In her first semester of graduate school at Florida Atlantic University, Jessica Pate adopted a pair of feral kittens. She had no idea then, but that decision would ultimately change the course of her entire career, putting her on a path to discover the world's first urban nursery ground for manta rays. Her findings were recently published in the journal of *Endangered Species Research*.

When Pate graduated from FAU in 2014, she left her cats with her sister and spent the next 18 months sailing the ocean as a marine science instructor for an educational study abroad organization. However, when Pate's sister could no longer care for the cats, Pate knew they needed a home and moved back to Florida to care for them. Pate also knew her passion was to study manta rays.

In 2016, Pate founded the Florida Manta Project to learn more about the understudied manta rays off the coast of South Florida. "If it weren't for my cats, I might not have started the Florida Manta Project," said Pate, adding that the project is under the larger international nonprofit Marine Megafauna Foundation that protects threatened marine species and critical habitat worldwide.

Pate said she has been intrigued by rays since her days as a sea turtle biologist, watching them cruise the shoreline while she surveyed the beach for nests. She was surprised to see the rays so close to the beach, but even more surprised that there were virtually no published studies about these animals.

To study the giant rays, Pate surveys the coast from her 22-foot boat, from Boynton Beach to Jupiter looking for dark shadows at the surface. When the team spots a ray, someone carefully slips into the water to take photos and document behavior, such as rays feeding or traveling. In the last four years, the team has cataloged 59 individual rays, which can be identified by the unique markings on their bellies, like human fingerprints.

Research assistant, Trixi Gilroy, slips into the water to take underwater photo-identification images of a young manta ray. They can be identified by the unique spot patterns on their bellies, like human fingerprints.

Based on the fact that these rays are mostly juveniles and use the area over consecutive years, Pate has determined that this region of South Florida is a potential nursery ground for young mantas. To date, there are just two other published studies on existing manta ray nurseries: in the Flower Gardens National Marine Sanctuary 100 miles off the coast of Texas and in Nusa Penida, Indonesia. But these areas are remote and far from urban centers, unlike the rays that Pate studies.

In 2018, manta rays were listed on the endangered species list and the baby mantas of South Florida face unique challenges being so close to human activity, including getting hit from boats or getting caught in fishing gear. About 27% of the rays were foul-hooked or entangled in fishing line. Whenever possible, Pate and her team remove hooks and line from the rays.

Collecting information about critical habitat and movement patterns of rays is crucial for their conservation. Pate hopes that her work can help establish South Florida as a designated critical habitat for the manta rays, which means that developers would have to consult the National Oceanic and Atmospheric Administration to ensure that any activities they authorize, fund, or carry out, are not likely to destroy or negatively modify the critical habitat, she said. "As global manta ray populations decrease, it is important to protect these young manta rays from vessel strikes, fishing line entanglement, coastal development and water pollution," Pate said.

Stephen Kajiura, a shark scientist and professor of biological sciences at the Charles E. Schmidt College of Science agrees. "Because there are basically no other scientists actively studying mantas in the state of Florida, the work that Jessica does is extremely valuable to both resource managers and the scientific community," he said.

Since 2016, the project has grown in ways she could've never imagined, with full-time research interns, volunteers and collaborators. Since launching the project, she's also added aerial surveys to her field work as well as the use of drones. Yet, there are still more questions to answer, like why the rays are using this particular area and where they go as adults. "I'm very much looking forward to answering these questions over the coming years and, probably, decades," Pate said. "It has been a joy to begin to unlock some of their secrets."♦

FUN FACTS ABOUT MANTA RAYS

Manta rays – highly intelligent and highly threatened – are the largest rays in the world. The sea creatures live in tropical, subtropical and temperate ocean waters across the globe. Here's a look at some fun facts about Mantas.

Mantas are filter feeders so they swim around with open mouths to scoop up tiny little plankton in the ocean.

National Oceanic and Atmospheric Administration

Female manta rays hit sexual maturity at around eight to 10 years old and tend to give birth once every couple of years, usually to one pup, or occasionally two. Pregnancy lasts about 12 to 13 months and manta rays give birth to live pups. Babies look like smaller version of adult manta rays when born and can immediately survive without parental care.

National Geographic

Microplastics pose a significant threat to manta rays, according to a recent study. They can ingest microplastics directly from polluted water or indirectly through contaminated prey.

Marine Megafauna Foundation

Jessica Pate, founder and lead scientist of the Florida Manta Project, dives down in an attempt to remove fishing gear from a young female manta ray, called Stevie Nicks. Entanglement with fishing gear, and boat strikes, are threats to these young rays.

Manta rays have the biggest brain relative to body size of any fish in the ocean, and are surprisingly smart. They are considered by some scientists to have self-awareness because they've passed the mirror test. A 2016 study gave mantas mirrors. The rays behaved unusually, in ways that could imply self-recognition. So far, it's only been done by animals like dolphins, chimps and elephants.

Oceana, 2017

In general, there are two species of mantas: the giant manta and reef manta. It's possible the mantas found in Florida are a third species, something biologists with Marine Megafauna Foundation are studying now.

Marine Megafauna Foundation

The giant manta ray is the world's largest ray with a wingspan of up to 29 feet and can live up to 50 years.

National Oceanic and Atmospheric Administration and National Geographic

DRIVING TOWARDS DETECTION

Team Leads Efforts to Create Cognitive Early Warning Sensors

By John Tibbetts

"We want to create an early warning system that could be widely available, inexpensive and easy to use for a large number of older drivers."

–Ruth Tappen, Ed.D.

Did you know that almost 20% of older adults develop mild cognitive impairment (MCI), which may be a precursor to Alzheimer's disease and other dementias? Early detection of MCI, however, is a challenge because changes occur gradually making recognition difficult and seeking early treatment less likely – until now.

A transdisciplinary team of FAU researchers recently received a five-year, $5.3 million grant to study an in-vehicle sensor system's ability to detect cognitive changes in drivers age 65 and older.

The grant, from National Institute on Aging of the National Institutes of Health, brings together faculty from the Christine E. Lynn College of Nursing, College of Engineering and Computer Science and Charles E. Schmidt College of Science, to test and evaluate the readily and rapidly available and unobtrusive system, which could provide the first step toward future widespread, low-cost early warnings of cognitive change for this large number of older drivers in the United States.

Drivers experiencing the onset of cognitive impairment may have some difficulty rapidly processing the large amounts of complex information confronting them in many driving situations, said Ruth Tappen, Ed.D., the project's principal investigator, who is a professor and Eminent Scholar in the Christine E. Lynn College of Nursing. Tappen, who is also an expert gerontologist with extensive experience in dementia research, and the team are developing a low-cost, self-monitoring system that could help future drivers identify their own potential cognitive transitions.

"Today, screening and evaluation services are only available to test a small number of older individuals, missing many who need and want to know if they should take preventative action or if they require treatment," she said. "We want to create an early warning system that could be widely available, inexpensive and easy to use for a large number of older drivers."

The study is recruiting 750 volunteers age 65 or older with a current driver's license and insurance. Each volunteer will receive a detailed cognitive interview and an array of tests that measure capacities such as executive function, memory and visual attention. These tests are effective in detecting MCI and will provide a baseline for understanding future cognitive change.

Researchers will install, test and evaluate a package of sophisticated but unobstrusive sensors in each volunteer's vehicles. The team will design machine learning algorithms that can identify specific patterns from the huge streams of vehicle sensor data that will be produced. These patterns can provide insight into subtle changes in driving behavior and identify patterns that are specific to the sex, age and vehicle type of each person and account for adverse driving conditions such as high winds or heavy rain. Researchers will also ask for input from volunteers about the sensor system which could lead to design improvements to increase acceptability by older drivers.

"We will use the data to understand driver behavior in a way that has never been done before," Tappen said. "We want to understand when some people start to move in the direction of mild cognitive impairment, which may be the full extent of the change. But mild cognitive impairment can also convert to Alzheimer's or other types of dementia. The sooner you know about such change, the better. We can't cure dementia yet but perhaps we can slow down the progression." ♦

3@ALEX DOLCE

BLAME IT ON THE BRAIN

Triple Threat Thriving in Jupiter, Creates a Neuroscience Ecosystem With Common Mission

By Judy Gelman Myers

From Darwin to the present, scientists have shown that diverse ecosystems are productive ecosystems. This describes to a "T" the academic seedbed that's evolved on FAU's Jupiter campus, where three powerhouse institutions collectively nurture a thriving neuroscience ecosystem and conduct cutting-edge research to better the world.

The ecosystem originally took root in 2013, when a small group of researchers from the Charles E. Schmidt College of Science moved from the Boca Raton campus to the Jupiter campus. Supported by the Provost's Life Science Initiative and funds from the state of Florida, " … this group grew, flourished and provided the foundation for the much larger FAU presence that now exists in Jupiter," said Rodney Murphey, Ph.D., associate vice president for Academic Affairs in Jupiter.

Clockwise from top left: Christy LaFlamme, Harriet L. Wilkes Honors College graduate working at Scripps Research; Bebeto Amazan, Harriet L. Wilkes Honors College graduate student working at Max Planck Florida Institute for Neuroscience; Sam McGovern, left, and Carina Arnold, both graduate students in FAU's Brain Institute.

The success of the ecosystem has been driven by diversity, collaboration and a critical mass of researchers from FAU, Scripps Research and the Max Planck Florida Institute for Neuroscience. Each of the three institutions has its own scientific focus, methodology and function, yet they share faculty who collaborate on research and grant applications. Cutting-edge imaging technology owned by one is available to researchers at all three, while seminars and symposia are hosted and attended by researchers from all institutions. This high level of cooperation enables them to advocate together more effectively for funding and hiring, resulting in a large number of successful grants.

"In the scientific world, what's most significant is the level of interaction that invariably happens between our institutions. I'm really happy to see that," said Kirill Martemyanov, Ph.D., chair of the department of neuroscience at Scripps.

Individually, the three institutions ask different scientific questions.

Within FAU, the Brain Institute evaluates neurological diseases by studying molecular changes in animal models, while the Institute for Human Health and Disease Intervention, known as I-Health, takes a clinical approach.

Neuroscience Research Center Rising

Big things are happening on the FAU Jupiter campus. Soon, it will house the new, state-of-the-art neuroscience research building, providing teaching and laboratory space to support enrollment growth in the areas of science, technology, engineering and math (STEM). The $35 million building continues 20 years of progress dedicated to life science research on the Jupiter campus.

In the early to mid-2000s, the Florida governor and legislature earmarked hundreds of millions of dollars to establish a biomedical research park. The investment brought the Scripps Research Institute and the Max Planck Florida Institute for Neuroscience to Jupiter. It's the only place in the world where the two institutions sit side-by-side and collaborate with university researchers and students. Despite these additions, "we needed to grow more," said Randy D. Blakely, Ph.D., executive director of FAU's Brain Institute and professor in the Charles E. Schmidt College of Medicine.

More specifically, the building will expand research and collaborations among the three institutes in the concentrations of neuroscience, biotechnology, bioengineering, data science, and chemistry. "The building will go from molecules to man," Blakely said. The Center for Comparative Medicine will model and study the mechanisms of brain disorders, such as autism, Alzheimer's and addiction, while the Center for Cellular Neuroimaging will visualize brain cells by merging computational and virtual reality resources. Additional labs will provide space for supercomputing that examines large data sets from molecules to neural activity.

Blakely said he is excited about what this new facility means for FAU. He expects to have at least 20 principal investigators, a similar number of research faculty and postdoctoral students, and approximately 100 high school, undergraduate and graduate students per year, who will engage in state-of-the-art and technologically advanced research training. "We have a once-in-a-lifetime opportunity for a collaborative recruitment strategy," he said.

Renderings of the new, state-of-the-art neuroscience research building.

Scripps researchers focus on discovering novel genes and proteins to explore as drug targets.

Max Planck researchers study neural circuits and develop new technologies to make cutting-edge discoveries possible.

Far from hindering collaboration, diversity enhances cross-institutional research. It has yielded high-impact papers on topics as varied as signaling processes in the brain, how eating affects sleep in fruit flies, and molecules that can inhibit pathological processes leading to multiple sclerosis.

"Collaborating with people who have different areas of expertise helps you put together a much fuller picture of the problem you're investigating, making it that much stronger in terms of the depth you can put into specific problems," said Gregg Fields, Ph.D., executive director of I-Health and adjunct faculty at Scripps, whose laboratory collaborates in research on multiple sclerosis.

Such a diversity of approaches, combined with reciprocity agreements among the institutions, allows a breadth of neuroscientific study not available elsewhere. The Brain Institute oversees the Graduate Neuroscience Training Program, bringing together scientists, educators and students from FAU's doctoral programs in integrative biology-neuroscience, complex systems and brain sciences and experimental psychology, with colleagues from Max Planck and Scripps. And, FAU's Charles E. Schmidt College of Medicine and Scripps Research have established a dual medicine and philosophy doctoral degree program to provide rigorous training for talented students pursuing a clinician-scientist career path.

Because the three institutions are sited within walking distance of each other, scientists also benefit from sharing that occurs outside the lab. Each institution allows the others to use its core facilities, which are equipped with imaging technology relevant to its own scientific pursuits. That means scientists triple their access to exceptionally rare cutting-edge equipment and proprietary technology, such as Scripps's genome-wide library of synthesized DNA and RNA molecules and Max Planck's viral vector technology, which delivers specific genetic material into cells by taking advantage of a virus's natural ability to carry its genome into a host.

Knowledge sharing is just as critical. Annual events such as Synapse, a networking event for students and researchers; the Jupiter Neuroscience Retreat; and the tri-institutional postdoc seminar bring together faculty, researchers and postdocs to present their work, discuss latest findings, and find out who's doing what, where.

Meanwhile, critical mass bolsters private-sector investment, faculty hiring and grant applications. When potential investors or faculty consider their options, the wealth of opportunities afforded by Jupiter's neuroscience ecosystem weigh heavily in Jupiter's favor. "The fact that everyone's doors are open to all three partners is an extraordinary opportunity for any scientist who wants to participate in and join this community. Anytime FAU recruits, we're able to get the best of the best because of the kind of interactions and the facilities they have at their fingertips," said Ken Dawson-Scully, Ph.D., a professor of biological sciences at FAU and head of institutional partnerships at Max Planck. When one of the institutions applies for a technology grant, it can bolster its application by citing the other institutions as users.

Healthy ecosystems grow and develop. Randy D. Blakely, Ph.D., director of FAU's Brain Institute, predicts this one will too. "Scripps and Max Planck continue to invest in the future of the campus. On the FAU side, we're constructing a building to house new sciences, and there continue to be new collaborative programs. The private sector sees this critical mass and they want to invest. If we hire a scientist, their spouse may obtain an appointment in one of the other units. It's encouraging biotech companies to move into the area. We have not by any means reached a steady state," Blakely said. "I'm thinking bigger and better." ♦

3D ALEX DOLCE

Clockwise from top: The Jupiter Neuroscience Ecosystem is comprised of the Max Planck Florida Institute for Neuroscience, FAU Brain Center, and Scripps Research.

Collaboration on Mind Matters

Three months after Ning Quan, Ph.D., arrived at FAU he received a $1.7 million grant to study interactions among the immune system, the brain and behavior.

That grant, from the National Institutes of Health, foreshadowed a new program to be rolled out under the auspices of the FAU Brain Institute — the Program in Neuroimmunology and Glial Biology (PNGB). This is the institute's first named program, with Quan as director.

The PNGB seeks to build on recent developments in the field of psychoneuroimmunology. This multidisciplinary science explores the mechanisms by which the immune system engages the nervous system and produces changes in behavior and psychological disease states. The PNGB will also encompass neuroimmune research oriented to brain cancer, brain trauma and fundamental brain mechanisms that do not involve psychiatric disease, as well as research into glial cells – a major, and sometimes ignored, population of brain cells that support the function of neurons and that actively engage in neuroimmune activities.

The program, designed to engage scientists from a wide range of disciplines and institutions, will include faculty from FAU, Scripps Research and the Max Planck Florida Institute for Neuroscience, as well as their postdocs and graduate students. Initially, the PNGB will focus on areas in which FAU research is particularly strong, including underlying mechanisms supporting depression, cognitive dysfunction and pain.

The field of psychoneuroimmunology requires a broader knowledge base. Collaboration, synergy and shared resources, knowledge and tools will be the lifeblood nourishing the program as it grows.

"I speak the language of inflammatory cytokine signaling, but others in the program are more fluent in the language of synapses and circuits," Quan said. "The goals of our researchers are to learn each other's language, get out of our little boxes, educate each other and design experiments that reflect more accurately the true complexity of the brain. In this intersection of two complex fields, it sometimes seems like we each are speaking in foreign tongues, but the more we communicate, the more we see the remarkable opportunities for major advances."

ALDO E. FRIAS

On the Frontlines of a Pandemic

Pushing Ahead in the Drive to Combat COVID-19

With uncertainty surrounding many aspects of the COVID-19 pandemic, FAU researchers are tackling the challenge head-on through an array of projects ranging from developing algorithms that track the virus spread to experiments testing the effectiveness of face shields and more.

One effort involves a collaboration of the Division of Research with multiple colleges and institutes to build a comprehensive repository of information about COVID-19. The goal of this project is to ensure that data and biological samples are available to answer questions about the disease as they arise.

The Division of Research initiated the research protocol, which calls for the collection of data and specimens from people in recovery from COVID-19. Clinical data includes demographics, suspected contagion place and method, symptoms, severity, disease progression and treatment received. The study includes collecting data and samples from quarantine companions who tested positive or negative for the virus, with the objective of understanding factors related to differences in susceptibility or protection against the infection in family members or household clusters.

Faculty from the Christine Lynn College of Nursing, the College of Engineering and Computer Science, the College of Education, the Charles E. Schmidt College of Medicine and the Charles E. Schmidt College of Science are collaborating on this project, which is partially supported by FAU's Institute for Human Health and Disease Intervention and Scripps Research in Jupiter.

- Compiled by Bethany Augliere, Shavantay Minnis and Jenifer Rankin

Here's a look at additional COVID-19-related research efforts across the colleges:

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COMMUNITY EDUCATION
Melanie M. Acosta, Ph.D., an assistant professor in the College of Education, is the lead principal investigator in a study funded by the American Educational Research Association that looks at the crisis of racial injustice as a constant threat to African American education and is further exacerbated by the COVID-19 pandemic. This participatory research project focuses on strengthening the power of African American community-based educational organizing efforts through institution-building research and activities.

TELEHEALTH TECHNOLOGY
Beth King, Ph.D., assistant professor in the Christine E. Lynn College of Nursing, is the lead principal investigator on a project funded by the Health Resources and Services Administration. This research focuses on providing COVID-19 education and training, telehealth technology education and training, and the development of an infrastructure using telehealth technology to care for patients who are positive for COVID-19 at four health centers in South Florida.

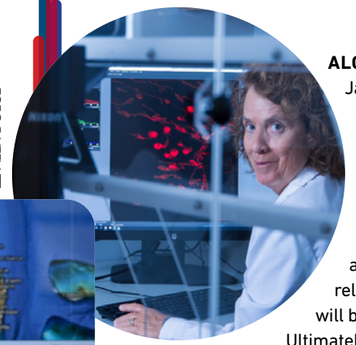
REDUCING RISK
Karethy Edwards, DrPH, associate dean of academic programs and professor in the Christine E. Lynn College of Nursing, is the lead principal investigator on a project funded by the Health Resources and Services Administration. This project aims to prevent and reduce the risk of COVID-19 through telehealth technology education and training of undergraduate nursing students at FAU, faculty and healthcare staff at the FAU nurse-led Community Health Center, and development of infrastructure using telehealth technologies at the center.

KNOWLEDGE BASE
Xingquan Zhu, Ph.D., a professor in the College of Engineering and Computer Science, right, in collaboration with the Charles E. Schmidt College of Medicine, has been awarded a National Science Foundation Rapid Grant to conduct research using social networks and machine learning, facilitated by molecular genetics and viral infection, for COVID-19 modeling and risk evaluation. The project will create a web-based COVID-19 knowledge base, as well as a risk evaluation tool for individuals to assess their infection risk in dynamic environments.

ALEX DOLCE

FLOW VISUALIZATION
Researchers in the College of Engineering and Computer Science, including Siddhartha Verma, Ph.D., assistant professor, and Manhar Dhanak, Ph.D., professor, chair of the department of ocean and mechanical engineering and director of SeaTech, used qualitative visualizations to test how face shields and masks with valves perform in impeding the spread of aerosol-sized droplets. The study, recently published in the journal *Physics of Fluids*, showed that although face shields are able to block the initial forward motion of the exhaled jet, the expelled droplets move around the visor and spread out over a large area. When testing a face mask with a valve, researchers found that a large number of droplets passed through the exhale valve unfiltered, significantly reducing its effectiveness.

In addition, flow visualization demonstrated how far a cough or sneeze can travel and how long particles and droplets linger in the air. The results revealed that significant concentrations of small particles from a heavy cough/sneeze can linger in still air for more than one minute. It took the particles only a couple of seconds to travel three feet; in about 12 seconds they reached six feet and in about 41 seconds they reached around nine feet. This research received tremendous global media attention.



ALEX DOLCE

ALGORITHM DEVELOPMENT
Janet Robishaw, Ph.D., senior associate dean for research in the Charles E. Schmidt College of Medicine, left, is conducting a study that aims to develop an algorithm to identify patterns of onset, detection, progression and recovery from COVID-19 in a targeted population of healthcare providers and trainees. The researchers will observe physiological measures, such as body temperature, heart rate, breathing rate and related measures including cough and fatigue. Samples will be used to identify COVID-19 infection and recovery. Ultimately, researchers may be better able to identify patterns that could predict the emergence and recovery from novel infections and thereby prevent and contain future pandemics.

MOBILITY INTELLIGENCE
Jason Hallstrom, Ph.D., a professor in the College of Engineering and Computer Science, above, and director of the Institute for Sensing and Embedded Network Systems Engineering (I-SENSE), and other researchers are collaborating with the city of West Palm Beach to use cutting-edge computational epidemiology to help tackle COVID-19.

Their work builds on the Mobility Intelligence Project (MIP), a first-of-its-kind mobility sensing and analytics system developed by I-SENSE. Originally designed to improve the quality of life for people in downtown West Palm Beach, MIP is being retooled to simulate virus transmission using realistic models based on how people move and interact within the city. The project can provide place-specific forecasts of disease transmission, as well as real-time insights into how mobility changes within the city could affect the local population's susceptibility to future outbreaks.

UNDERSTANDING RESILIENCE
Alka Sapat, Ph.D., a professor of public administration in the Dorothy F. Schmidt College of Arts and Letters, above, is the lead investigator on a National Science Foundation Rapid Grant project aimed at increasing understanding of the resilience of individuals and households, including their coping and adaptive capacities. The multiple challenges they face include health risks, precarious housing conditions and exposure to weather and climate hazards, within the context of rapidly evolving mandates and short-term measures (such as moratoriums on evictions).

CHERYL HALLE

CORONAVIRUS PREDICTIONS
A team of researchers, including Borko Furht, Ph.D., a professor in the College of Engineering and Computer Science, above, in collaboration with LexisNexis Risk Solutions, has been awarded a National Science Foundation Rapid Grant to use innovative big data analytics techniques to develop computational models designed to predict the spread of coronavirus. The spread patterns will be fed into a decision support system, which will calculate the probability for a social group or a given person to get infected. The project will provide quick, automatic contact tracing and is expected to help reduce the number of patients infected with COVID-19, as well as virus-related deaths.

ALEX DOLCE

SOCIAL ENGAGEMENT
Cheryl Krause-Parello, Ph.D., a professor in the Christine E. Lynn College of Nursing, is the lead principal investigator on a study funded by the Patient-Centered Outcomes Research Institute. Military veterans and key stakeholders collaborate to explore and discuss past successful interventions, dilemmas they are facing during the pandemic and methods to increase veterans' social engagement capacity. The study enlists patients as full partners in the search for chronic pain treatment interventions that are meaningful to the veteran population in times of social distancing and isolation. ♦

From left, Cheryl Krause-Parello, Ph.D., professor in the Christine E. Lynn College of Nursing, and Lyndon Villone, marine veteran and military veteran consultant for Canines Providing Assistance to Wounded Warriors (CPAWW) with Ice, canine.

Detecting the Ocean's GLOWING CREATURES

Researchers Awarded $11M Grant From the U.S. Office of Naval Research

By Bethany Augliere

Research Photography by Carina Poulin

Most of the vast ocean lacks light. Yet at times, the seascape will glow and glitter blue-green, thanks to the light-producing abilities of marine organisms, from tiny single-celled algae up to larger animals like jellyfish and squid. Called bioluminescence, this chemical process is abundant throughout the world's oceans, and it's estimated that more than 70 percent of animals in the ocean can produce their own light.

"If you want to understand how biology in the ocean works, you need to understand bioluminescence," said Mike Twardowski, Ph.D., a research professor at Florida Atlantic University's Harbor Branch Oceanographic Institute.

"Light production by organisms is incredibly common and one of the most important forms of communication in the ocean."

Now, FAU's Harbor Branch has landed an $11,179,001 four-year contract from the United States Office of Naval Research (ONR) to study this natural phenomenon using advanced technology. "For me, the most exciting thing about science is finding out things we never knew before," said Twardowski, the project's principal investigator. "In this project, the greatest potential for that is in understanding more about the behavior and the light emissions of zooplankton, because we know quite little about that now."

ALEX DOLCE

Mike Twardowski, Ph.D., and Stephanie Schreiber, graduate student in Marine Science and Oceanography program, at Florida Atlantic University's Harbor Branch Oceanographic Institute.

Plants and animals emit light for a variety of reasons, including defense, finding or luring food, and communicating with members of their species. For instance, tiny planktonic algae called dinoflagellates emit a bright blue flash when physically disturbed as a defense mechanism to startle predators trying to eat them.

While bioluminescence was well-studied in the 80s and 90s, it was limited by the equipment and available technology, said Jim Sullivan, Harbor Branch director and co-investigator on the project. "It's been 20 years since intense research has been done on bioluminescence, and we need to look at it with a fresh perspective, fresh eyes and new technology," he said.

One of the first goals of the project is to develop a compact, state-of-art bathyphotometer, which measures the amount of light emitted directly by animals and algae. These instruments suck seawater through a tube into a dark chamber where turbulence disturbs the animals and algae, causing them to produce light. The scientists can use this flash to determine how many different organisms are in the water, but also measure how much light they produce, and for how long. Additionally, by adding an imaging system to the bathyphotometer, they can identify these flashes for each individual organism to classify the unique signature of each glowing organism, Twardowski said. By deploying the bathyphotometer at different depths, Twardowski and others on the team can get a complete picture of the spatial distribution and abundance of the glowing bioluminescence critters.

Bioluminescence can be detected remotely, above water, with the naked eye or with camera systems. But no current bioluminescence measurement system has the ability to measure the full light emission potential of the organisms in the water column. "When you produce a great new piece of technology, it's like a window into the ocean that nobody's ever seen before," Twardowski said.

Using data from the bathyphotometer, the next step of the project involves modeling. When large animals like whales and dolphins move through patches of bioluminescent organisms, they disturb the water, which then triggers flashes of light. "If we know the spatial variability of the organisms, and we know how much light they emit, and we know for how long they emit it, we can use all that information in a model to predict what that bioluminescence plume will be around the whale, or other objects, and how it would be imaged from above water," Twardowski said.

The next phase of the project involves "cutting- edge imaging systems that operate above water," said Twardowski, using drones and other unmanned autonomous vehicles. Different organisms produce different colors of light. For instance, zooplankton often produce light that appears blue-green, whereas dinoflagellates — the world's primary bioluminescent phytoplankton — produce blue light. One of the imaging systems, therefore, will look at multiple colors in the visible range, which will allow the team to determine more about the kinds of organisms emitting light.

Lastly, in order to interpret all data from the bathyphotomer and the imaging systems, the team will run lab experiments to study the light emissions of the organisms under different conditions. This is the work of newly hired Carina Poulin, a postdoctoral fellow. "What I'm doing in the project is going to help us understand the smaller scale, biological mechanisms behind bioluminescence, to help develop the next generation sensors."

In general, the project includes a huge team, not only from FAU Harbor Branch, but other institutions as well, including: the University of South Florida, St. Petersburg; University of Florida, Fort Pierce; Scripps Institute of Oceanography, University of California-San Diego; Texas Christian University; Florida International University; and consultants.

"A grant like this — which is extensive — it's a lot of money over a number of years, will be a cornerstone for the type of Department of Defense sponsored research that we really want to pursue and enhance at FAU and Harbor Branch," Sullivan said. "It's just the beginning." ♦

"WHEN YOU PRODUCE A GREAT NEW PIECE OF TECHNOLOGY, IT'S LIKE A WINDOW INTO THE OCEAN THAT NOBODY'S EVER SEEN BEFORE."

–Mike Twardowski, Ph.D.

ALEX DOLCE

University Researchers See Record-Breaking Support

By Luis F. Perez

The last fiscal year ended showing excellent growth for the FAU research enterprise, with more money coming in to support it. When the new fiscal year started, metrics for the first quarter showed that the university was not just continuing that streak, but shattering all previous quarterly records.

The first quarter of the 2020-2021 fiscal year saw a whopping 92% increase in research awards when compared to the first three months of the last fiscal year. External sponsors awarded FAU faculty $38.9 million for research projects. Last year, that number was $20.2 million for the same time frame. The university's fiscal year runs from July 1 to June 30.

It's the largest first-quarter haul for FAU research ever, according to the Office of Sponsored Programs. About half of the increase can be attributed to nearly $10 million the Office of Naval Research awarded to the FAU Harbor Branch Oceanographic Institute as part of an $11.2 million project. (Read story on page 25.) Even without that grant, the first quarter broke all records, Sponsored Programs said.

"The grants awarded to FAU reflect the hard work faculty members are putting in seeking external funding to support their studies," said Daniel Flynn, Ph.D., vice president for research. "It puts the university on par with top-tier public research universities at a time when good science and technology are needed more than ever in our society."

The roll university researchers are on includes many other recently announced multi-million-dollar grant awards. Consider this:

- The Florida Department of Environmental Protection recently awarded an FAU Harbor Branch scientist $2.2 million to study harmful algal blooms in Lake Okeechobee. (Read story on page 8.)

- The National Institute on Aging awarded $5.3 million to a group of FAU scientists and engineers to test systems that can detect early warning of cognitive decline in older drivers. (Read story on page 16.)

- The National Science Foundation (NSF) awarded another group of faculty $2.4 million to train graduate students in data science technologies and applications. (Read story on page 7.)

NO SIGN OF COVID-19 SLOWDOWN

FAU's research enterprise continued its upward trajectory — even as the COVID-19 pandemic shut down the country for part of it.

Taking into account projects funded by external organizations and internal funds, FAU spent and invested $67 million on research for the 2020 fiscal year.

As the pandemic hit, researchers faced travel restrictions. Labs, equipment and supplies became scarcer or harder to access. And fewer students could work in research labs. Despite those obstacles, they kept their projects moving forward.

476 SPONSORED FUNDED PROJECTS

↑ **14%** SINCE PREVIOUS FISCAL YEAR

↑ **9%** EACH YEAR SINCE 2018

SPONSORED RESEARCH EXPENDITURES

655 SUBMITTED PROPOSALS → **$300M**

$1.5M* FEDERAL AGENCIES AWARDED

*COVID-19 research related projects

Across the board, metrics show a rise in research productivity. Sponsors funded 476 projects, up about 14% from the previous fiscal year. Faculty submitted 655 proposals, seeking nearly $300 million in funding. The number of submissions is about 6% more than the previous year and up nearly 21% from five years ago. Since 2018, sponsored research expenditures have risen at a rate of 9% each year.

Instead of being slowed by the pandemic, FAU researchers got busy studying it. Federal agencies awarded the university $1.5 million for COVID-19 research-related projects — in a period of less than six months.

While it's impressive that university scientists, engineers and scholars dug in and worked harder during the lockdown, the growth of the research enterprise stems from a strategic approach and programs put in place over the last five years, research administrators said.

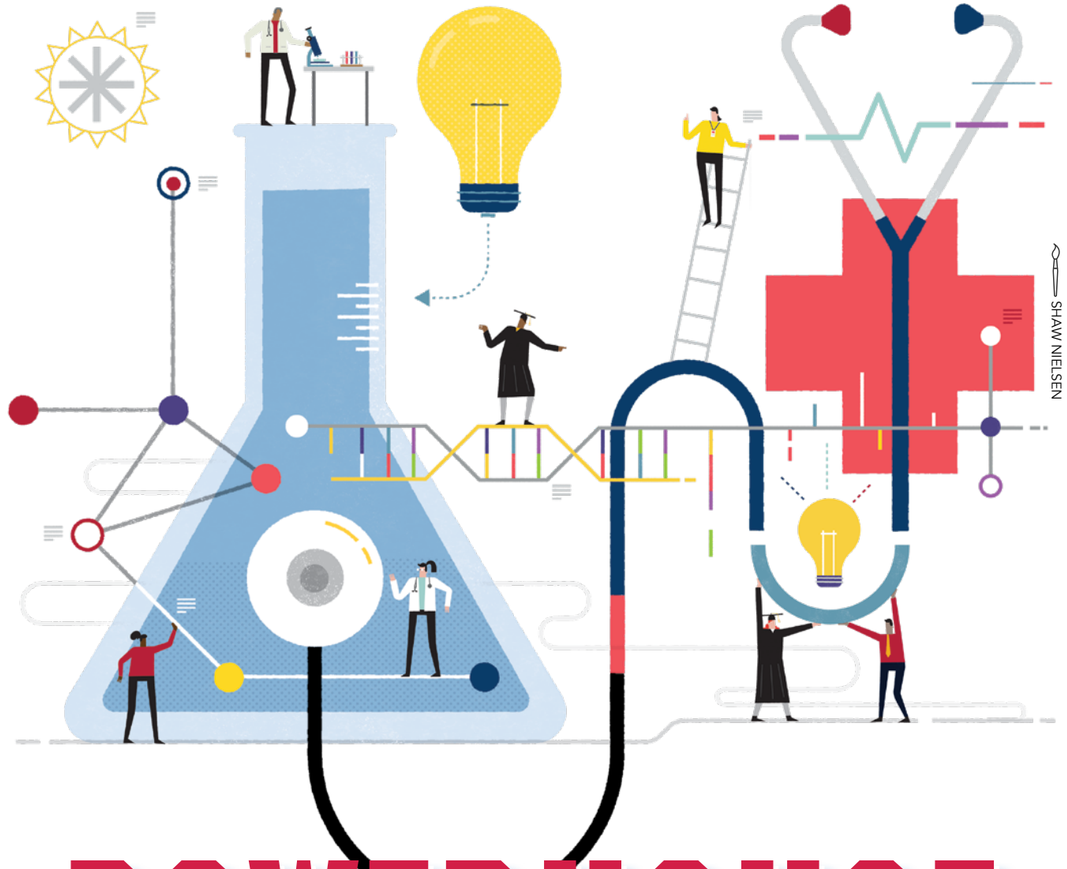
They point to President John Kelly's Strategic Plan for the Race to Excellence 2015-2025, which outlines four focus areas of research strength called pillars. Those pillars turned into university-wide research institutes. The university invested in hiring and building up the infrastructure needed to attract top-tier researchers. That investment in the institutes has paid off at a rate of $2.8 to every $1 invested, according to Daniel Flynn, Ph.D., vice president for research.

In addition, the Division of Research has created a slew of new initiatives to support FAU researchers. It established the Office of Research Development, which focuses on helping faculty write proposals and strengthen larger, institution-wide grant applications. Before the pandemic shutdown, the division also created a number of new events designed to spur collaboration and showcase FAU research. They include a public lecture series at the Boca Raton Public Library called Research in Action; the Research Café, which brings faculty from disparate backgrounds together for short talks; and the Research Showcase, which drew hundreds from both inside and outside the university to hear about FAU research. Some of these programs have now gone online and are growing on virtual platforms like Zoom. Many of them are seeing record participation.

Last year, the division launched an initiative called "We Are Your Team," targeting new faculty hires. It introduces them to the many research support services provided at the university. The research development office also started the Early Career Academy, a program focused on new faculty talent, providing in-depth support for establishing research careers. It's already had an impact. Several faculty members in the inaugural class garnered early career and first-time federal grants, such as the prestigious NFS's Early Career Award and the Gulf Research Program of the National Academies of Sciences, Engineering and Medicine.

"Our team is providing support to faculty who are on fire to do their research," said Jeanne Viviani, director of the research development office. "We are excited to help them achieve their goals."

The numbers show it. ♦



POWERHOUSE PARTNERSHIP

FAU and Memorial Healthcare System Join Forces to Take Health-Related Research to the Next Level

By Wynne Parry

Candice Sareli, M.D.

A new partnership between FAU and Memorial Healthcare System unites doctors, scientists and engineers in the fight against disease. It promises to advance research with the potential to improve healthcare and save lives in South Florida, across the state and beyond. It also aims to make the cutting-edge care accessible to patients closer to home.

The collaboration is a "win-win," according to Daniel Flynn, Ph.D., FAU's vice president for research. "As a public research university, there are certain things we do very well, and as a major hospital system, there are certain things they do very well. We are bringing together the best from both sides."

Faculty members at both institutions already conduct research, but generally in different arenas. The new affiliation agreement bridges their efforts, making it easier for university scientists and engineers to share resources and expertise with doctors seeking to better help their patients.

Studies on the university's side cover the full spectrum of research — identifying compounds with anti-cancer properties, developing new tools for making sense of data or for coping with the effects of dementia, for example. Many such projects have the potential to one day influence the care patients receive, if developed with input from doctors, nurses and others working in health care.

Memorial, which operates six hospitals plus other facilities in Broward County, strives always to put the patient first and in this spirit, encourages its doctors to take on research projects. The healthcare system's strength lies in a special class of studies: clinical trials, which test devices and drugs to see if they are safe and effective. At any given time, Memorial's Office of Human Research typically has more than 150 clinical trials underway.

By volunteering for these studies, patients can have access to therapies that they couldn't get as part of their routine care. Ultimately, the healthcare system aims to have a trial available for each one of its patients, said Candice Sareli, M.D., Memorial's chief medical research officer.

"We have become more academic, and we have done so in order to meet the needs of the growing community we serve in South Florida," Sareli said. "A true research collaboration with the university allows us to expand our reach in the academic area."

MUTUAL BENEFIT

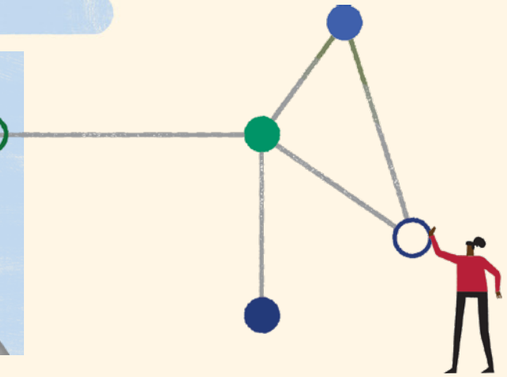
The collaboration creates new opportunities for both sides. For its part, Memorial wants to become more involved in an earlier phase of research: translational studies, which adapt the discoveries made in labs, turning them into therapies doctors can use to help patients.

The healthcare system also hopes to collaborate with computer scientists to find new ways to extract meaningful information from its extensive patient databases, and to partner with engineers to develop medical devices and software, she says.

ALDO E. FRIAS

FAU's Clinical Research Unit is housed inside the Office Building One on the Boca Raton campus.

Ximena Levy, M.D., M.P.H.



In turn, faculty at FAU are interested in collaborating with Memorial's doctors on clinical trials, as well as other types of studies. As one of the largest public healthcare systems in the United States, Memorial has ready access to potential study volunteers — a resource that's often in short supply for university researchers who need to work with people, their samples or data.

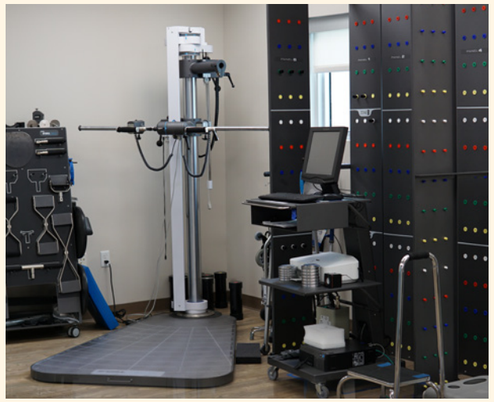
Prior to the partnership, FAU researchers found volunteers using a grab bag of tactics: reaching out to nearby hospitals and doctors' offices, setting up tables at community events, posting flyers and advertising on social media.

In these searches, they get support from the Clinical Research Unit (CRU). Located on the Boca Raton campus, the CRU helps researchers navigate the complex logistics of running these studies and provides space for them in its first-floor clinic.

"Recruitment is one of the biggest challenges in clinical research," said Ximena Levy, M.D., M.P.H., director of the CRU. While researchers will likely continue to use many means to find participants, "the partnership will help by giving them a specific population to invite to the studies," she said.

Levy estimates that, as a result, clinical research at FAU will increase by 30 to 50%.

When the partnership recently became official, some university researchers were already laying the groundwork for new collaborative projects, many on a topic of common interest to both institutions: cancer.



4 ALDO E. FRIAS

Here's a look inside corners of FAU's clinical research unit, from top, the gait and physical therapy laboratory, the dual energy X-ray absorptiometry room, infusion bays and the waiting room.

NEW BREAST CANCER RESOURCE

The laboratory in the CRU's building may become home to one such effort: a collection of specimens from breast tumors, taken from cancer patients at Memorial and elsewhere. As it fills, Levy anticipates that this repository will provide the raw material for new research on the disease.

"A resource like this is not currently available, so I think that is one of the projects that is going to be most important for both institutions," she said.

Initially, a team of FAU and Memorial researchers intends to use these samples, drawn from South Florida's diverse population, to tease out the disease's characteristics by race and ethnicity.

Such heritage appears to matter in this disease. White women, for example, develop new cancers at a higher rate, meanwhile women of African heritage are more prone to an aggressive form of the disease. Researchers want to know how these dynamics play out for Hispanic women, who can have European, Indigenous American and African ancestry.

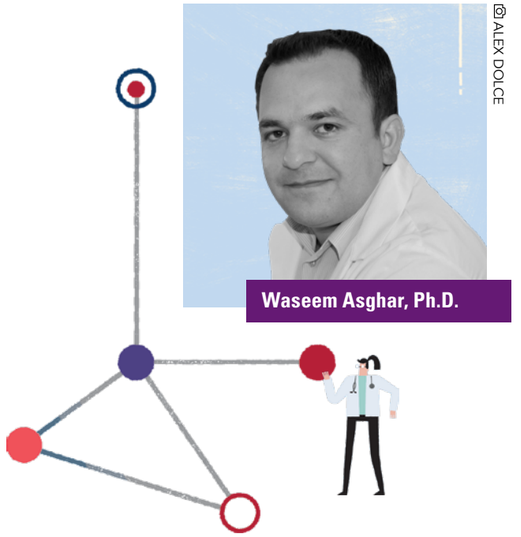
TEST THE TEST

In pancreatic cancer, tumors typically aren't identified until they spread to other parts of the body. To improve patients' prospects, biomedical engineer Waseem Asghar, Ph.D., is developing a test to detect bits of genetic material that may be present early on in the disease.

Work so far has been promising, but to see if the test really works, his team needs samples from at least 100 patients with cancer, as well as at least 100 without, said Asghar, an associate professor in the College of Engineering and Computer Science. He has begun discussions with the Memorial Cancer Institute about finding those patients.

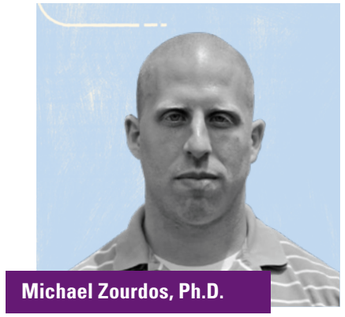
Another, even newer project focuses on COVID-19. Using magnetic beads and tiny, water-filled chambers, Asghar is devising an easy-to-use, disposable test capable of detecting the virus in a drop of saliva within 30 minutes. As with the cancer test, his team will need to validate it with samples from patients.

Having also worked on Zika, sickle cell anemia, HIV and hepatitis C, Asghar sees the partnership as a valuable resource. "There are tons of different diseases with which we'll be needing help," he said. "Every year, we have some new bug to deal with."



ALEX DOLCE

Waseem Asghar, Ph.D.



Michael Zourdos, Ph.D.

MORE SUSTAINABLE EXERCISE

Not all innovations involve molecules or devices. Michael Zourdos, Ph.D., and his graduate students have developed a way to tailor exercise specifically for cancer patients.

Cancer patients often experience rapid and dangerous weight loss known as cachexia, which can strip their bodies of muscle. They must also cope with fatigue brought on by treatment and the disease's emotional burden.

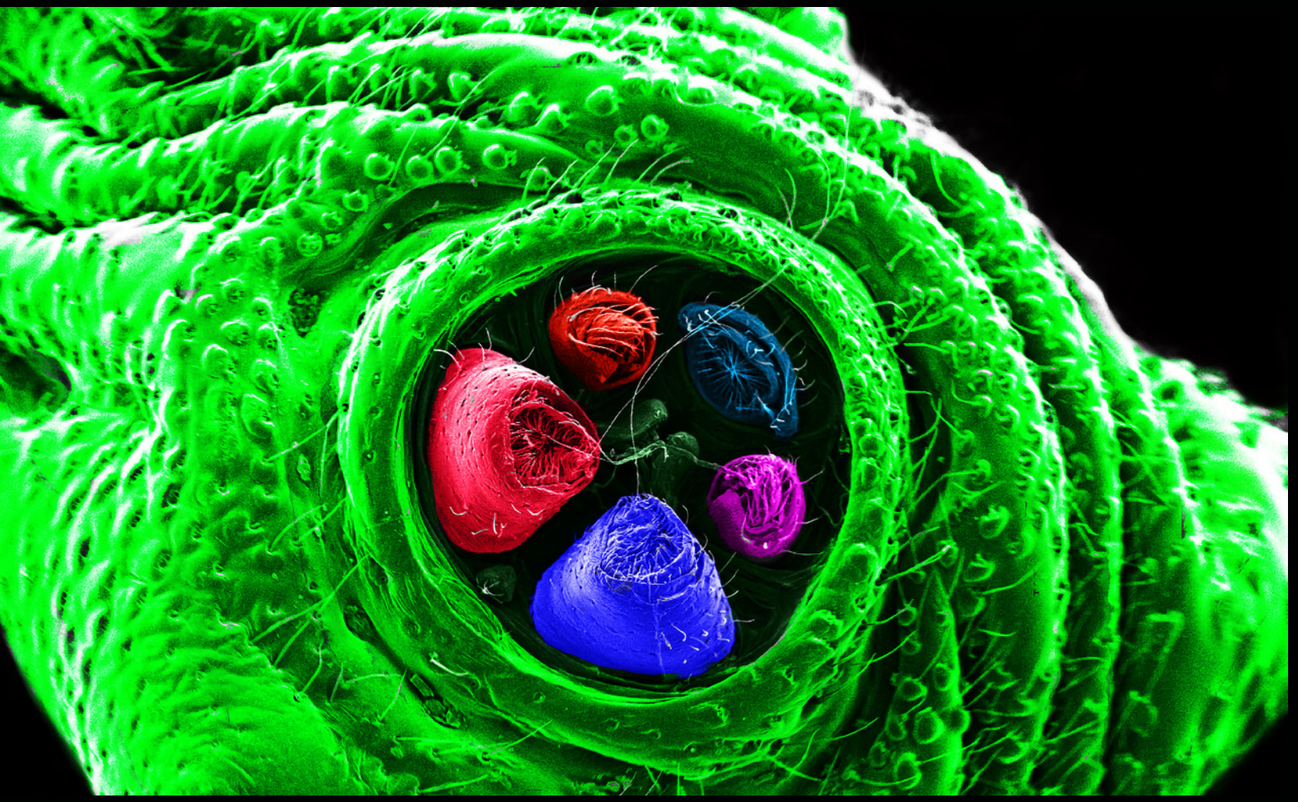
By designing a flexible strengthening regimen, Zourdos, an associate professor in the Charles E. Schmidt College of Science, and his team aim to enable cancer patients to exercise more consistently. Their goal is that patients will gain muscle, improve quality of life and better tolerate chemotherapy and radiation.

Each workout begins with an assessment of how a patient feels, and their responses determine the intensity of the exercise.

A seven-patient pilot study, conducted with colleagues from Ohio State University and Boca Raton Regional Hospital, produced promising results. Zourdos has submitted a grant application for a larger 200-patient trial, this time in collaboration with a physician at Memorial.

"It just seemed like a natural fit going forward," Zourdos said. "As soon as we reached out, they were as excited to work together as we were." ♦

ART OF SCIENCE
PHOTO CONTEST 2020



Imaging for Understanding

With her microscopic image of a spider's spinnerets, silk-spinning organs, Tricia Meredith, Ph.D., assistant research professor in the College of Education, earned first place in this year's 2020 Art of Science photography contest, hosted by FAU's Division of Research.

Thirteen judges from across the university chose Meredith's winning photograph from more than 150 submissions.

This is the second year of the successful contest, which aims to highlight the cutting-edge research across all colleges, while engaging and educating others in all the unique research, scholarship and creative activity taking place in the field, in the lab and across all disciplines at FAU.

Behind this year's top winning photograph is a partnership with the Karen Slattery Educational Research Center onsite day care, according to Meredith, also the director of research and principle investigator for FAU's onsite imaging lab.

"The lab is meant to be a collaborative research hub in exchange of mentorship for the students," Meredith said. With a sample from the voluntary prekindergarten class garden, the imaging lab technicians scanned the spider so the class could discover that there is more to the harmless spiny orb-weaver spider than just the scary exterior.

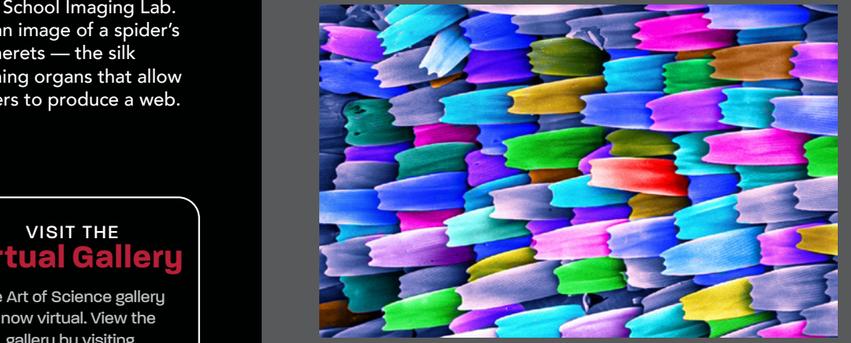
FIRST-PLACE WINNER
Web Spinner

***Image by:* Tricia Meredith Ph.D.,** *assistant research professor, College of Education and director of research, A.D. Henderson University School and FAU High School*

This image was collected using a scanning electron microscope in the FAU High School Imaging Lab. It is an image of a spider's spinnerets — the silk spinning organs that allow spiders to produce a web.

VISIT THE
Virtual Gallery

The Art of Science gallery is now virtual. View the gallery by visiting **bit.ly/2VT7aJU** or by scanning the QR code below.



SECOND-PLACE WINNER
Successful Hybridization

***Image by:* Charlene Fournier,** *graduate student, Charles E. Schmidt College of Science*

This picture represents Tamu, a male hybrid monkey born in a habituated mixed-species group between red-tailed monkeys (Cercopithecus ascanius) and blue monkeys (C. mitis). Ongoing hybridization between these two species occurs in Gombe National Park, Tanzania, which provides a natural laboratory to study hybridization in the wild. Tamu's phenotype, or physical characteristics, is intermediate between the two parental species. Amazingly, hybrids in Gombe are known to be viable and fertile, as Tamu's mother is a hybrid individual herself, which could lead to the creation of a new Cercopithecus species.

THIRD-PLACE WINNER
Butterfly Scales

***Image by:* Jasmine Coyle,** *research program coordinator, A.D. Henderson University School*

Butterfly scales imaged using the scanning electron microscope at the FAU High School Imaging Lab.

WHAT THE JUDGES SAY:

"It is so beautiful and unique. I had no idea butterfly scales looked like this, so not only was I surprised, but I learned something new."

-Gabby Barbarite, Ph.D., director of outreach and engagement, FAU's Harbor Branch Oceanographic Institute

WHAT THE JUDGES SAY:

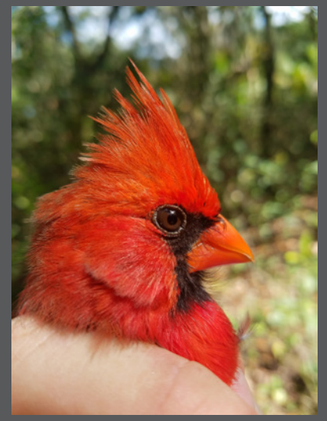
"I enjoy the image and it can be read through the lens of the research which is interesting or as an almost surreal landscape image."

-Sharon Hart, Ph.D., associate professor, Dorothy F. Schmidt College of Arts and Letters

Touching Water

***Image by:* Skylar Hooler,** *graduate student, Charles E. Schmidt College of Science*

I am a researcher in the department of geoscience focusing on hydrology. I am researching the movement of water between wetlands and canals and how canal management impacts wetland water loss. Wetlands are referred to as the Earth's kidneys because they have the ability to transform and purify water. They also are home to an abundance of animals and rare wetland plant species. However, the slightest loss in water puts wetlands at risk for loss of function and shifts in plant communities. The image above is a well we install in the wetlands to reach the groundwater. With the wells, I can retrieve water table levels, chemical parameters and water samples to track the movement of water and study interactions. Every once in a while I am met by alligators that call the wetland home!



King with Crimson Crest

***Image by:* Morgan Slevin,** *graduate student, Charles E. Schmidt College of Science*

This male northern cardinal's bright orange beak, beautiful red feathers, and even its complex song that wakes me up some mornings, may tell a lot about its quality as an individual because ornaments like these can tell a story about what's going on under the hood. But, while we know quite a lot about how these traits signal a bird's health, virtually nothing is known about how they relate to a bird's gut microbiome, which is the community of bacteria that naturally live in the intestines of every animal, including humans. My research is dedicated to testing for this relationship between microbiome characteristics and a bird's health, which can ultimately help us understand how our own human gut microbiome relates to health too. In the sample collection process I have the unique privilege of observing the natural beauty of my study subjects, like this northern cardinal.

THIS YEAR'S JUDGES INCLUDE:

Gabby Barbarite, Ph.D., *director of outreach and engagement, FAU's Harbor Branch Oceanographic Institute*

Susannah Brown, Ph.D., *associate professor, College of Education*

Austen Canonica, *assistant director of marketing and communications, Graduate College*

Zach Greathouse, *director of communications, Charles E. Schmidt College of Science*

Sharon Hart, Ph.D., *associate professor, Dorothy F. Schmidt College of Arts and Letters*

Javad Hashemi, Ph.D., *associate dean for research and professor, College of Engineering and Computer Science*

Katherine Jones, *director of communications, College of Social Work and Criminal Justice*

Dorotha Lemeh, MFA, *associate professor, Harriet L. Wilkes Honors College*

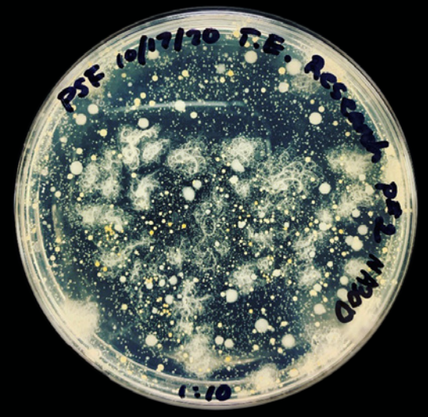
Melanie Lorenz, Ph.D., *assistant professor, College of Business*

Marlaine Smith, Ph.D., *professor, Christine E. Lynn College of Nursing*

Victoria L. Thur, *assistant dean of research and distinctive collections, FAU Libraries*

Melanie Weiss, MHA, *director of research operations, Charles E. Schmidt College of Medicine*

Qi Zhang, Ph.D., *assistant research professor, Charles E. Schmidt College of Medicine and FAU Brain Institute*



WHAT THE JUDGES SAY:

"I am drawn to the poetic title combined with the matter-of-fact research. This applies to the photograph as well — the dramatic cosmos on the plate accompanied by the grounding handwritten text. The black background works well to create contrast and harmony with the handwritten text."

-Sharon Hart, Ph.D., associate professor, Dorothy F. Schmidt College of Arts and Letters

Bacterial Starry Night

***Image by:* Peter Foerster,** *undergraduate student, Charles E. Schmidt College of Science*

My research involves the treatment of a bacterial tomato disease (tomato spot disease) with the treatment of a bacteriophage and calcium cation mixture. The image taken was of a 1:10 plant sample serial dilution plate. Fungi and bacteria can be seen on this plate, giving the illusion of a "starry night." The bacteria closely resemble stars and the fungi being stardust.

Where's Waldron?

***Image by:* Daniel Alempijevic,** *graduate student, Charles E. Schmidt College of Science*

Ph.D. student Daniel Alempijevic descends from the canopy after setting a camera trap in the Tanoé Forest of southeast Cote d'Ivoire, a country located on the south coast of West Africa. FAU is involved in an international collaboration to find evidence of the existence of Miss Waldron's red colobus monkey, which may be the first primate species to go extinct in over 500 years.

Zebra Finch

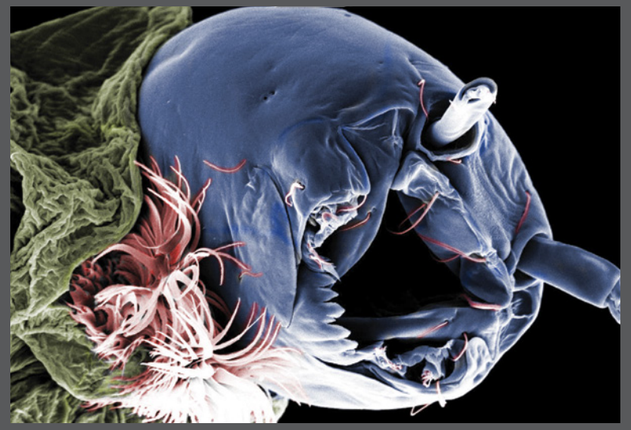
***Image by:* Emily Argueta,** *undergraduate student, Charles E. Schmidt College of Science*

This photograph depicts the musculature of a zebra finch (Taeniopygia guttata). This image was taken as part of a project created and designed by a fellow undergraduate student and I to investigate the muscle geometry of zebra finches by using direct CT imaging. The goal of the project is to create a 3D visual reconstruction of zebra finch's wing and vocal muscle to further studies of muscle biomechanics, sexual dimorphism, and formation of muscle. This zebra finch came from Dr. Rindy Anderson's songbird lab on the Davie campus and was scanned using a micro-CT scanner at the FAU High School Imaging lab.

WHAT THE JUDGES SAY:

"The use of X-ray creates a hauntingly beautiful contrast to this usually vivid bird and invites the viewer to stay and explore."

-Katherine F. Jones, Director of Communications, FAU College of Social Work & Criminal Justice



Mosquito Larvae Head

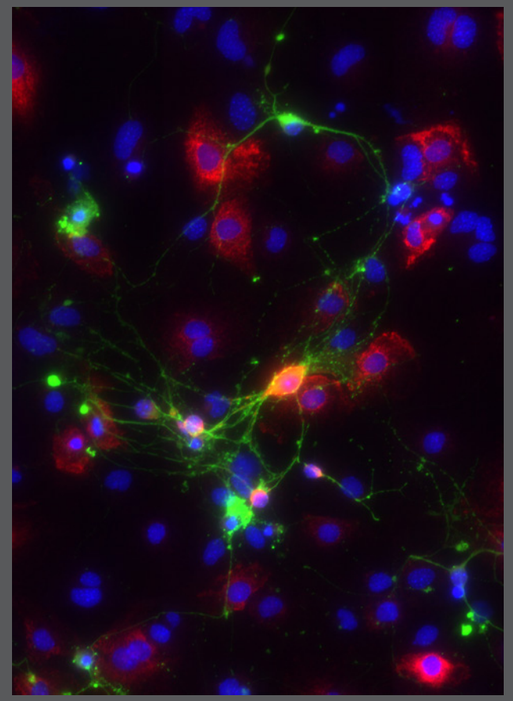
***Image by:* Braden Ruddy,** *graduate student, Charles E. Schmidt College of Science*

A mosquito larvae head imaged using the scanning electron microscope in the FAU High School Imaging Lab.

WHAT THE JUDGES SAY:

"I love how this picture captures neurons in action, and also that it looks like a tiny galaxy!"

-Gabby Barborite, Ph.D., director of outreach and engagement, Harbor Branch Oceanographic Institute



Neuron Reaching Out to Neuron

***Image by:* Christy LaFlamme,** *undergraduate student, Harriet L. Wilkes Honors College*

Primary neuronal culture from mouse cortex. Neurons are depicted reaching out to another neuron to form functional connections, known as synapses. Image was taken on an epifluorescence microscope at 40X magnification.

Mr. Bright Eyes

***Image by:* Rachel Shanker,** *graduate student, Charles E. Schmdit* College of Science

This image depicts a bar-eyed hermit crab with algae growing on its shell. This image was taken during a faunal biodiversity study at the Blue Heron Bridge in Riviera Beach, Fla.

WHAT THE JUDGES SAY:

"This is a wonderful, simply wonderful image of a bar-eyed hermit crab. I'd say this image is worthy of being featured in National Geographic. Extremely well done."

-Dorotha Lemeh, MFA, associate professor, Harriet L. Wilkes Honors College

Bugging Me

***Image by:* Gina Gruss,** *undergraduate student, Harriet L. Wilkes Honors College*

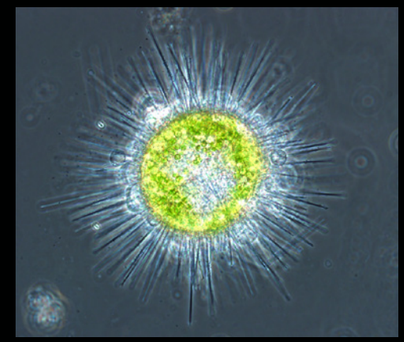
For a scientific illustration class, Audubon's Nature, I decided to walk around campus to see if I could find any exciting, local subjects for research. Thunderstorms rolled overhead; I paused, sat on one of the metal mesh tables, and debated my options. Instead, I found a red-shouldered bug, Jadera haematoloma, crawling around. I put on a macro lens, got up close, and snapped a shot just before it flew away.

This photo reminds me of the interaction between nature and humanity. The unnatural mesh coloration can be regarded like a mesh fence, keeping people (or in this case, insects,) out. In Florida especially, humans have done all they can to carve spaces for only themselves at the expense of nature that only exists here. Nature still remains, though our relationship is strained. The bug's red, striking color is a red warning light, signaling us to remember it exists — and must continue.

WHAT THE JUDGES SAY:

"The shallow depth and use of the macro lens allow the viewer an opportunity to see and appreciate this dramatic bug that we likely walk by everyday not noticing."

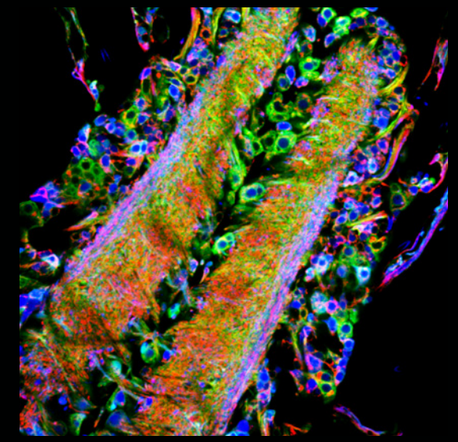
-Sharon Hart, Ph.D., associate professor, Dorothy F. Schmidt College of Arts and Letters



Green Sun

***Image by:* Hunter Hines, Ph.D.,** *visiting researcher, Harbor Branch Oceanographic Institute*

This single-celled creature is a heliozoan, known as a "sun animal." This one gets its green color from the algae living symbiotically within the organism. The spines of this tiny microbe give it a fierce appearance, despite it being a member of the bottom of the food chain. I collected this cell from a freshwater pond and imaged it with phase-contrast microscopy at 400x magnification, as part of my research at HBOI looking at microbial ecology in Florida.

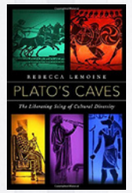


A Taste for Fruit

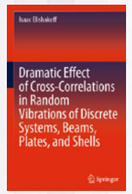
***Image by:* Gregory Macleod, Ph.D.,** *associate professor, Harriet L. Wilkes Honors College*

Not a tongue, but rather, part of the brain of a living fruit fly maggot that allows it to crawl through an apple, peach or banana. Blue reveals the soup inside each nerve cell, while red (or magenta) and green reveal two different organelles within each cell, the mitochondria and the endoplasmic reticulum. These colors represent the true fluorescent colors of the proteins labelling different structures within each nerve cell of the living animal. Our ability to genetically modify fruit flies make them invaluable in studies into the genetic basis of neurodegenerative diseases.

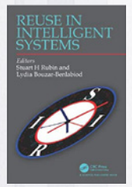
OFF THE SHELF



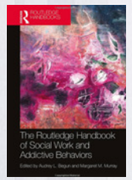
Plato's Caves: The Liberating Sting of Cultural Diversity | Rebecca LeMoine Ph.D., Dorothy F. Schmidt College of Arts and Letters | Published by Oxford University Press, January 2020



Dramatic Effect of Cross-Correlations in Random Vibrations of Discrete System, Beams, Plates, and Shells | Isaac Elishakoff, Ph.D., College of Engineering and Computer science | Published by Springer, April 2020



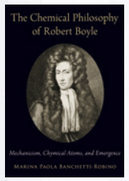
Reuse in Intelligent Systems inside the book **Experimental Studies on the Impact of Data Sampling with Severely Imbalanced Big Data** | Tawfiq Hasanin, Ph.D., Taghi M. Khoshgoftaar, Ph.D., Richard A. Bauder, College of Engineering and Computer Science | Published by CRC Press, April 2020



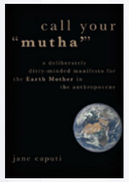
The Routledge Handbook of Social Work and Addictive Behaviors inside the book **Addictive Behaviors During Emerging Adulthood** | Christine Spadola, Ph.D., College of Social Work and Criminal Justice | Published by Routledge, April 2020

Jewfish | Andrew Furman, Ph.D., Dorothy F. Schmidt College of Arts and Letters | Published by Little Curlew Press, June 2020

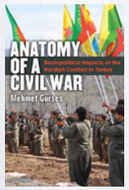
Private Lives, Public Histories | Rachel Corr, Ph.D., Jacqueline H. Fewkes, Ph.D., Harriet L. Wilkes Honors College | Published by Lexington Books, Rowman and Littlefield, July 2020



The Chemical Philosophy of Robert Boyle: Mechanicism, Chymical Atoms, and Emergence | Marina Paola Banchetti-Robino, Ph.D., Dorothy F. Schmidt College of Arts and Letters | Published by Oxford University Press, July 2020

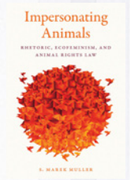


Call Your "Mutha:" A Deliberately Dirty-Minded Manifesto for the Earth Mother in the Anthropocene | Jane Caputi, Ph.D., Dorothy F. Schmidt College of Arts and Letters | Published by Oxford University Press, August 2020



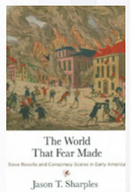
Anatomy of a Civil War: Sociopolitical Impacts of the Kurdish Conflict in Turkey | Mehmet Gurses, Ph.D., Dorothy F. Schmidt College of Arts and Letters | Published by University of Michigan Press, August 2020

Trauma-informed Care, Motivational Interviewing, Respectful Person-first Language, and Stigma Reduction inside the book **Pregnancy and Substance Use - A Harm Reduction Toolkit** | Heather Howard Ph.D., College of Social Work and Criminal Justice | Published by National Harm Reduction Coalition, August 2020



Impersonating Animals: Rhetoric, Ecofeminism, and Animal Rights Law | S. Marek Muller, Ph.D., Dorothy F. Schmidt College of Arts and Letters | Published by Michigan State University Press, August 2020

The Economic Logic of Late Capitalism and the Inevitable Triumph of Socialism | Simon Glynn, Ph.D., Dorothy F. Schmidt College of Arts and Letters | Published by Palgrave Macmillan, September 2020



The World That Fear Made: Slave Revolts and Conspiracy Scares in Early America | Jason T. Sharples Ph.D., Dorothy F. Schmidt College of Arts and Letters | Published by University of Pennsylvania Press, September 2020

Postcolonial Hangups in Southeast Asian Cinema | Gerald Sim, Ph.D., Dorothy F. Schmidt College of Arts and Letters | Published by Amsterdam University Press, September 2020

Insurgent Media from the Front: A Media Activism Reader | Chris Robé, Ph.D., and Stephen Charbonneau Ph.D., both Dorothy F. Schmidt College of Arts and Letters | Published by Indiana University Press, November 2020

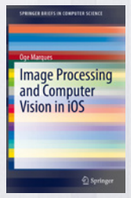
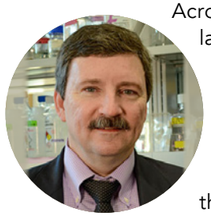


Image Processing and Computer Vision in iOS | Oge Marques, Ph.D., College of Engineering and Computer Science | Published by Springer Springer, Cham, December 2020

A Final Thought

Virtuous Research Cycle Grows



Across our campuses, we have been laying the foundation to build a thriving research institution of higher education. Over the last five years, our faculty working together with our research administrators have put in place many of the elements that will have a transformative impact on the university.

In future issues of this magazine, you can expect to read about a thriving data science program now in the planning stages with our new partner, Memorial Healthcare System. Our scientists working with their clinicians can help unlock some of the secrets in the vast stores of electronic records healthcare providers collect.

Working together, imagine the knowledge that we can extract by asking questions answered only by querying the data. For example, think about the lives that can be saved in a pandemic if we know which patients are more likely to get sicker quicker. Those patients would be put at the front of the line and receive more medical attention sooner. By interrogating the electronic health records, we just may find the answer to questions like that and many more that can impact the care we all receive now and in the future.

Another area of focus for the partnership is cancer. In the near future, we hope to be able to tell you more about an exciting research initiative the university and healthcare system are working to move forward. We're also hard at work identifying research projects in neurology that will build on one of FAU's biggest strengths and tap into the growing neuroscience ecosystem on our Jupiter campus.

We plan to build on our growing portfolio of research projects working in partnership with the U.S. Department of Defense. FAU Harbor Branch already has large research initiatives with the Office of Naval Research. We're confident that by continuing the exciting work on those projects, more opportunities will come.

Academic research institutions grow by investing in their infrastructure and recruiting top-flight faculty, which in turn bring in more research. It's a virtuous cycle. It's a cycle that FAU will continue to push forward.

Daniel C. Flynn, Ph.D.
Vice President for Research

Check out FAU's Research Daily website, where you'll find new stories every day on the latest *Owl Research and Innovation* news.

fau.edu/research/fau-research-daily.php

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ART OF SCIENCE
PHOTO CONTEST 2020

PEOPLE'S CHOICE WINNER

Cosmic Web (for the Harvard Computers)

Image by: ***Carol Prusa, MFA,*** *professor, Dorothy F. Schmidt College of Arts and Letters*

This domed painting with internal light, 60 x 60 x 10 inches, made of silverpoint and acrylic, names 14 women astronomers, like Henrietta Leavitt, who, "mapped the heavens," and contributed knowledge that changed our view of our universe. Bio-referencing forms, which are poetic forms that allude to biology, rim the center like embryos at the indifferent stages (neither male nor female) and coalesce to form a collaborative web of what is known. The mapping lines of light express desire to understand what we are made of and our location. This painting is offered as homage to the scientists who stand at the threshold of what is known while peering into the vastness of the unknown.