OWL Research & Innovation

RISING Research Wave

DR. JAMES GALVIN —
A Beloved Grandfather
Inspires a Career Path

ENTREPRENEURIAL ECOSYSTEM
Build It And They Will Come

OCEANS OF DISCOVERY
Expeditions Unlock
Underwater Mysteries

FAU
DIVISION OF RESEARCH
Florida Atlantic University

OWL Research & Innovation

Owl Research & Innovation is published by the Division of Research at Florida Atlantic University.

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President's Message

New Frontiers in Research

An exciting new day is dawning at Florida Atlantic University as we embark upon "the race to excellence" that defines our 2015-2025 strategic plan. This plan, a year in the making, aims to advance FAU to a position of national prominence in the coming decade. It is based upon *Pillars* and *Platforms*. Pillars are institutional programs focused on creating knowledge that benefits society. The plan's Pillars, rooted in programs already under way at FAU, are:

- **Healthy aging**
- **Neuroscience**
- **Ocean science and engineering/environmental science**
- **Sensing and smart systems**

Platforms describe scholarly activities that relate to and support the Pillars. They include:

- **Big data analytics**
- **Community engagement and economic development**
- **Diversity**
- **Global perspectives and participation**
- **Healthy and environmentally sustainable campuses**
- **Leadership, innovation and entrepreneurship**
- **Peace, justice and human rights**
- **South Florida culture**
- **Undergraduate research and inquiry**

Taken together, the Pillars and Platforms constitute a launch pad to the future for Florida Atlantic University. Research is an essential ingredient of this plan, and we intend to increase annual extramural research expenditures to $100 million by 2025.

Several recent developments have opened up a whole new range of opportunities to our faculty and student researchers. In March, we concluded an agreement with Scripps Florida and the Max Planck Florida Institute for Neuroscience that promises to deliver unique educational advantages to our students and tremendous economic benefits to our entire region. The agreement calls for joint faculty appointments and the shared use of all state-of-the-art laboratory facilities on FAU's Jupiter campus, which is home to the Florida operations of both internationally known research giants. Through this partnership, we will create an undergraduate honors program that will attract highly talented students from around the nation and the world. We'll be educating future scientists, propelling undergraduate research and inspiring the next generation of entrepreneurs to take their ideas from concept to commercialization. This infusion of intellectual capital will create a powerful new economic engine for South Florida.

Additionally, FAU's Charles E. Schmidt College of Medicine recently entered into an agreement with the Ruth and Bruce Rappaport Faculty of Medicine at the Technion-Israel Institute of Technology to expand scholarly ties, develop student programs and promote international and inter-cultural understanding. A first for Florida, this partnership places FAU's College of Medicine among a handful of medical schools in the U.S. that have established partnerships with the Technion, Israel's leading science and technology university.

Another notable collaboration established this year links FAU with the internationally renowned Nansen Neuroscience Network (NNN) in Norway. NNN is an umbrella organization that brings together Europe's premier neuroscience research institutions. FAU's partnership with NNN further expands research and education opportunities in brain science.

In neuroscience and a host of other critically important disciplines, FAU is poised to take giant leaps forward. This report describes some research initiatives currently under way in many fields. We take great pride in the achievements of our dedicated faculty and student researchers and look forward to the important accomplishments that lie ahead.

John W. Kelly

President
Florida Atlantic University

NEWS BRIEFS

Dolphin Study Raises Awareness of Possible Public Health Hazard

Residents living along the Indian River Lagoon on Florida's Atlantic coast who eat locally caught seafood at least once a day are nearly four times more likely to have a mercury concentration above the Environmental Protection Agency's recommended daily dose for human health, according to research by scientists at Florida Atlantic University's Harbor Branch Oceanographic Institute (HBOI).

To measure mercury concentrations, the FAU scientists analyzed hair samples of 135 people who live along the 156-mile lagoon. The researchers began their study after finding high levels of mercury in Indian River Lagoon Atlantic bottlenose dolphins — considered a sentinel species because of their life span, defined home ranges and consumption of some of the same fish species as humans eat.

"The dolphins were a sort of a 'canary in the coal mine' for us. This study shows how a sentinel animal can help identify a public health hazard."

— Adam Schaefer, FAU's Harbor Branch Oceanographic Institute

"The dolphins were a sort of a 'canary in the coal mine' for us," said Adam Schaefer, an FAU epidemiologist and one of HBOI's lead scientists on the project. "This study shows how a sentinel animal can help identify a public health hazard."

Mercury is a global environmental pollutant that causes adverse health effects, particularly on fetal neurodevelopment. Human exposure to mercury comes primarily from consumption of fish and shellfish. In Florida, adults consume significantly more seafood on average when compared to the general population of the United States.

Public health officials can use this information to help reduce exposure to the toxin among high-risk groups, particularly pregnant women. Armed with studies such as this one, they can develop guidelines for seafood consumption and identify specific species of fish that should be avoided during pregnancy. The peer-reviewed study was published in the *International Journal of Environmental and Public Health*.

Dolphins' Social Networks Influence Behavior

Scientists at Florida Atlantic University's Harbor Branch Oceanographic Institute (HBOI) recently completed a 6 ½-year study of social interactions, movement behavior and habitat preferences of bottlenosed dolphins living in the Indian River Lagoon.

The researchers' work – which found that, similar to humans, dolphins exhibit preference and avoidance behaviors in social settings – was published in the journal *Marine Mammal Science*. Dolphins form highly complex and dynamic networks of friends and cluster in communities that tend to occupy discrete core areas along the north-south axis of the lagoon system.

"One of the more unique aspects of our study was the discovery that the physical dimensions of the habitat – the long, narrow lagoon system itself – influenced the spatial and temporal dynamics of dolphin association patterns," said HBOI research biologist Elizabeth Murdoch Titcomb. "For example, communities that occupy the narrowest stretches of the Indian River

Lagoon have the most compact social networks, similar to humans who live in small towns and have fewer people with whom to interact."

The novel study – which used intensive photo-ID surveys – offers scientists a new way to understand how dolphin populations perceive and use their environment. It could also potentially provide insights into breeding behavior and disease transmission.

Working to Prevent a Leading Cause of Blindness

The prestigious scientific journal *Proceedings of the National Academy of Sciences* has published findings by researchers at FAU's Charles E. Schmidt College of Science and the Charles E. Schmidt College of Medicine that the anti-inflammatory drug sulindac may aid in the prevention of age-related macular degeneration. The publication is the official journal of the United States National Academy of Sciences.

Age-related macular degeneration is the leading cause of vision loss and blindness among Americans age 65 and older. The researchers found that the sulindac protection of the retina against oxidative damage, which could occur in age-related macular degeneration, is by a mechanism that is independent of its anti-inflammatory activity.

High concentrations of oxygen radicals — the cause of oxidative stress — may be the impetus for more than 70 widespread diseases, such as cancer, heart disease, neurodegenerative diseases and eye diseases, including macular degeneration.

Oxidative stress can damage the retinal pigmented epithelial (RPE) cells, which are essential to nourishing the retinal cells, said Herbert Weissbach, Ph.D., Distinguished Research Professor in the Center for Molecular Biology and Biotechnology.

"Our studies show that sulindac can protect RPE cells in culture against oxidative damage, suggesting that it could be an inexpensive and relatively non-toxic therapeutic approach for treating age-related macular degeneration," he said.

Age-related macular degeneration affects the macula, the part of the eye that allows you to see fine detail. The condition gradually destroys sharp, central vision, which is needed for seeing objects clearly and for common daily tasks such as reading and driving. Currently, no cures exist for the majority of age-related macular degeneration cases.

Groundbreaking Nicotine-Withdrawal Study

A Florida Atlantic University associate professor of clinical biomedical science is a lead author of a first-of-a-kind, across-species study measuring the responses of humans and rats to rewards during nicotine withdrawal. The study's findings were published in the *Journal of the American Medical Association-Psychiatry.*

Michele Pergadia, Ph.D., of FAU's Charles E. Schmidt College of Medicine conducted the human study while at Washington University School of Medicine. She and researchers from the University of California San Diego and Harvard Medical School found that nicotine withdrawal similarly reduced reward responsiveness in human smokers — particularly those with a history of depression — and in nicotine-treated rats.

Pergadia notes that replication of experimental results across species is a major step forward because it allows for more reliable ways to identify and understand the complicated behavior of nicotine withdrawal in humans addicted to tobacco. She and her colleagues plan to pursue additional research that includes studying depression and how it relates to withdrawal-related reward sensitivity.

The researchers' ultimate goals are to improve nicotine withdrawal treatments and increase the success rate for people trying to quit, Pergadia said.

"The fact that the effect was similar across species using this translational task not only provides us with a ready framework to proceed with additional research to better understand the mechanisms underlying withdrawal of nicotine, and potentially new treatment development, but it also makes us feel more confident that we are actually studying the same behavior in humans and rats as the studies move forward," she said.

Pioneer in Cardiovascular Disease Honored

In recognition of his seminal work on smoking and heart disease, world-renowned medical researcher Charles Hennekens, M.D., Dr.Ph.H., was recently named the 29th recipient of the prestigious Alton Ochsner Award.

Hennekens is the first Sir Richard Doll professor and senior academic advisor to the dean in the Charles E. Schmidt College of Medicine at Florida Atlantic University. Doll was a British physician who became the foremost epidemiologist of 20th century for pioneer work linking smoking with lung cancer and was an early recipient of the Ochsner Award.

The honor recognizes outstanding scientific achievements that have reduced premature deaths from cigarette smoking and is named for Dr. Alton Ochsner, who first suggested that smoking causes lung cancer.

Hennekens received his M.D. from Cornell University Medical College and was an Epidemic Intelligence Service medical epidemiologist with the Centers for Disease Control and Prevention. He later received a doctor of public health in epidemiology from Harvard University. He was the first to discover that aspirin prevents a first heart attack and reduces the death rate when given during and after a heart attack.

He was among the first to demonstrate that women who use oral contraceptives and smoke cigarettes have a 39-fold increased risk of a heart attack and that, even among the elderly, it is never too late to quit to prevent heart attacks and never too early to prevent cancer.

From 1995-2005, Science Watch ranked him as the third most widely cited medical researcher in the world and five of the top 20 were his former fellows and/or trainees, and Science Heroes in 2012 ranked him No. 81 in the history of the world for having saved more than 1.1 million lives.

Based in part on the seminal work of Hennekens, President John Kelly has adopted a tobacco free policy for FAU that went into effect in January 2015.

Preparing Next-Generation Educators

A $4.3 million state grant to FAU's College of Education will help prepare future K-5 teachers by bolstering training in core subject areas and providing collaboration opportunities and field experience with Broward and Palm Beach County public schools.

The Collaborative Transformation: Establishing Excellence in Elementary Preparation grant will establish the Center of Excellence for Elementary Teacher Preparation at FAU. The center will combine university coursework with clinical experiences as well as offer expanded training in mathematics, science, social studies and English language arts.

The grant supports an innovative partnership linking the College of Education, the Charles E. Schmidt College of Science, the Harriet L. Wilkes Honors College, Learning Sciences International and the New Teacher Center.

Broward County Public Schools and the School District of Palm Beach County are partnering with the College of Education to enhance field experiences for undergraduate elementary education majors to better prepare them for classroom success. The teachers-in-training will receive 832 hours of practical experience in a variety of classroom settings. The coursework will be aligned with the school districts' requirements for employment.

The Palm Beach County school district is the 11th largest in the nation and the fifth largest in Florida. Its 185 schools serve more than 183,000 students who speak 150 languages. It's estimated that the district will need 6,000 new teachers over the next five years.

Broward County Public Schools is the country's sixth largest school district and the second largest in Florida, with 238 schools, 102 charter schools and a student population 260,000. Broward public schools serve students from 204 countries who speak 130 languages. The district will need to hire approximately 5,300 new teachers over the next five years.

Searching the Seas for Cancer and Addiction Treatments

A Florida Atlantic University researcher has discovered that the venom of a species of cone snails — found throughout the Florida coast — can help detect, and possibly treat, some cancers and addictions.

"The venom produced by these animals immobilizes prey, which can be worms, other snails and fish, and it is an extraordinary complex mixture of compounds with medicinal properties," said Frank Marí, Ph.D., a professor in FAU's Department of Chemistry and Biochemistry."

The Journal of Biological Chemistry recently published one of Mari's latest research contributions. His team found one class of venom components — conotoxins — target nicotinic receptors that are centrally implicated in a range of diseases, such as Alzheimer's disease, schizophrenia, tobacco addiction and lung cancer.

Mari's team and his collaborators found that the venom of the Conus regius species of cone snails is particularly rich in -conotoxins, one of which contains a compound that potently blocked a nicotinic receptor associated with lung cancer and nicotine addiction.

"Our aim is to open new avenues for cancer and addiction research inspired on compounds from marine animals," Mari said. "We have explored the Florida coast using scuba equipment and even deep-water submarines for over a decade looking for these remarkable venomous creatures and found a variety of promising compounds for the treatment of a range of ailments" Mari said.

The study was done in collaboration with Australian researchers David Adams, Ph.D., of the Royal Melbourne Institute of Technology and Richard Clark, Ph.D., from the University of Queensland. The National Institutes of Health and the Australian Research Council funded the research.

Global Collaborations Extend FAU's Neuroscience Reach

FAU and the Nansen Neuroscience Network in Norway, a premier network of organizations dedicated to neuroscience research throughout Europe, have signed a memorandum of understanding for cooperative research and education in the areas of neuroscience and brain health.

Nansen and FAU plan to share specialized scientific equipment, physical facilities and support services to provide more cost-effective research and education for both organizations.

"We expect our collaboration with Florida Atlantic University to ultimately lead to better brain health and ideally enable us to help more patients," Nansen CEO Bjarte Reve said.

Neuroscience is one of the fastest developing areas of medical research and requires a multi-pronged approach in sub-disciplines ranging from gene regulation and synaptic biology to neural systems, bioinformatics, biobanks, medical imaging, psychiatry and behavioral studies.

The collaboration with Nansen adds to FAU's relationships with other leading scientific institutions, including the Max Planck Florida Institute for Neuroscience, Scripps Florida, the Torrey Pines Institute for Molecular Studies and the Vaccine and Gene Therapy Institute. FAU, Max Planck and Scripps recently unveiled plans to transform FAU's John D. MacArthur Campus in Jupiter into a neuroscience and life science hub.

Nansen is devoted to basic and applied research in neuroscience that includes brain imaging, neurological and neuropsychiatric diseases, dementia and normal brain aging.

FAU is home to the Center for Complex Systems and Brain Sciences and offers three Ph.D. programs in neuroscience. In 2012, FAU and Max Planck initiated a joint graduate program in integrative biology and neuroscience.

FAU researchers are involved in studies investigating various neurodegenerative disorders such as Alzheimer's and Parkinson's disease as well as addiction, epilepsy, stroke, and mental illness as a risk factor for obesity, diabetes and death.

"We expect our collaboration with Florida Atlantic University to ultimately lead to better brain health and ideally enable us to help more patients."

— Bjarte Reve, Nansen Neuroscience Network CEO

Pipeline to a High-Tech Degree

The Florida Board of Governors recently awarded Florida Atlantic University, Palm Beach State College and Broward College a joint $3.5 million competitive grant to increase the number of graduates in the high-wage, high-tech fields of computer science and computer engineering. The cooperative project goes by the name of Computer Accelerated Pipeline to Unlock Regional Excellence (CAPTURE).

The three-way partnership was developed in response to the Board's effort to align university and college degrees with Florida's rapidly developing workforce needs. The CAPTURE program creates a fast track to a bachelor's degree in computer science or computer engineering.

Students can enter the pipeline from any of the three partner institutions, from the ranks of employees in local companies or from graduating high school classes in Broward and Palm Beach counties.

The innovative curriculum will be taught by leaders in the computer technology field. To give students exposure to real-world settings, internships will be offered in addition to classroom and laboratory instruction. About 400 new students will benefit from the program's superior learning and professional development opportunities.

The CAPTURE program is expected to significantly increase the number of bachelor's degrees in computer science and computer engineering awarded by FAU's College of Engineering and Computer Science. PBSC and BC will offer seamless transition for students who choose to continue their education at FAU. The three institutions will work with high schools and businesses in Broward and Palm Beach counties to attract students who seek careers in computer science, computer engineering and information technology.

The Computing Revolution is Happening at FAU

There are many terms to describe the computing revolution that's unfolding at Florida Atlantic University: Big Data, Cloud Storage, The Internet of Things, Hyperconvergence, Service-Oriented Architecture. Whatever it's called, it could change how we live in the near future.

Imagine a time when doctors will be able to deliver a prescription to a patient based on real-time information – such as body temperature, the previous night's number of hours of sleep, personal habits, reactions to medicine and other symptoms – and do so confidently, without guesswork. What will allow doctors to make accurate diagnoses so quickly?
The answer lies in the creation of big data centers that can gather, organize and analyze information for real-time consumption. That vision is guiding the efforts of FAU researchers.

Taghi Khoshgoftaar, Ph.D., a professor in the Department of Computer and Electrical Engineering and Computer Science in the College of Engineering and Computer Science, received a National Science Foundation grant of $600,000, with a matching grant of $257,000 from FAU, to build a Big Data Training and Research Laboratory on the Boca Raton campus. The state-of-the art lab will address the need for processing and managing extremely large quantities of information. Students will gain first-hand experience with big data and graduate from FAU knowing that their training in this emerging field will propel them along their career paths.

The benefits of big data apply to many fields, including biomedical analysis in the study of cancer and other diseases, social media fraud detection, crime prevention, business identity protection – and the list goes on. The new lab will transform the way research is carried out by faculty and students at FAU and create a foundation for a wide variety of entrepreneurial endeavors.

FAU Engineer Posthumously Named to Florida Inventors Hall of Fame Inaugural Class

A Florida Atlantic University professor whose innovations helped develop both the high-definition television and medical ultrasound industries is one of six members of the inaugural class of the Florida Inventors Hall of Fame.

William E. Glenn, Jr., Ph.D., who died in 2013, taught and conducted research in the Department of Computer and Electrical Engineering and Computer Sciences. He joined the FAU faculty in 1989 as the Motorola Endowed Professor and served as director of both the Imaging Technology Center and the FAU-based NASA Imaging Technology Commercial Space Center.

Glenn's career began at General Electric Research Laboratories, where he developed two types of electro-optical imaging systems. He went on to become vice president and director of research at CBS Laboratories, where he worked on systems using holographic techniques, including early forms of ultrasound imaging. While at CBS, he pioneered developments in laser optical imaging systems employing orbital satellites for instant worldwide communication.

Recognized as one of the world's foremost imaging researchers, Glenn held more than 137 U.S. patents and published more than 105 technical articles.

An Atlanta native, Glenn received a bachelor's degree in electrical engineering from the Georgia Institute of Technology and master's and doctoral degrees in the same field from the University of California Berkeley.

In addition to Glenn, the inaugural Hall of Fame class includes Thomas Edison, Gatorade inventor Robert Cade, air conditioning innovator John Gorrie, next-generation liquid crystal inventor Shin-Tson Wu and Shyam Mohapatra, whose nano-HIV detection kit provides a diagnosis in 20 seconds.

FAU's Medical School Graduates Ace First Match Day

All members of FAU's first graduating class of medical students won residency positions on National Match Day, some of them at top-ranked medical facilities.

The first 52 students to earn M.D. degrees from FAU's Charles E. Schmidt College of Medicine competed for highly sought after residency positions in specializations including neurosurgery, radiation oncology, radiology, emergency medicine, otolaryngology, obstetrics/gynecology, internal medicine, psychiatry, pathology, pediatrics, family medicine and anesthesiology.

They will continue their medical training at institutions that include Massachusetts General Hospital (Harvard University), New Haven Hospital (Yale University), Rhode Island Hospital (Brown University), Tufts Medical Center, Jackson Memorial Hospital, Miami Children's Hospital and the University of Florida's Shands Hospital.

The graduates learned of their appointments on National Match Day, held annually on the third Friday of March. On that day, all allopathic (M.D.-awarding) medical schools in the U.S. announce the results of the National Resident Matching Program.

Medical students list, in order of preference, the residency programs they would like to join and each residency program ranks its applicants in order of preference. A computer algorithm is used to match the students with the programs. The 2015 National Match Day was the largest ever, with 41,334 applicants vying for 30,212 residency spots.

The Charles E. Schmidt College of Medicine welcomed its inaugural class in August 2011, and now has a full enrollment of 256 students.

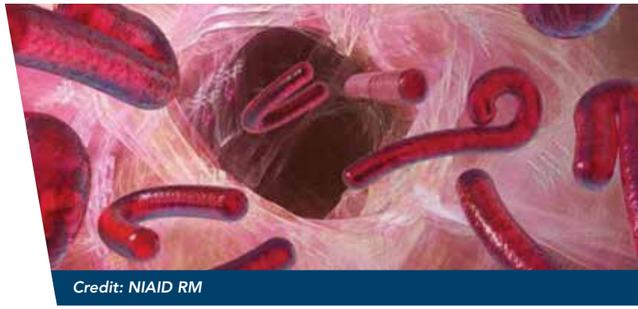
FAU Professor Mining Human Genome for Ebola Virus

A Florida Atlantic University professor's bioinformatics research to identify Ebola-associated genes has been published in the *Journal of Proteomics and Bioinformatics*. Bioinformatics combines computer science, statistics, mathematics and engineering to study biological data.

Key genes in the body's cells could be used to develop drugs for the deadly Ebola virus, said Ramaswamy Narayanan, Ph.D., professor in the Charles E. Schmidt College of Science. Ebola is a fatal disease that can infect humans and non-human primates such as monkeys, gorillas and chimpanzees.

"Bioinformatics is a powerful tool to help us understand biological data," said Narayanan. "We are mining the human genome for Ebola virus association to develop an understanding of the human proteins involved in this disease for subsequent research and development, and to potentially create a pipeline of targets that we can test and evaluate."

Researchers are hastening to develop vaccines and treatments to cure the virus, which has ravaged large populations in Africa. Currently, there are no FDA-approved drugs available to combat it. Developing vaccines or antibodies and testing them in clinical trials is an arduous process that takes considerable time.



Credit: NIAID RM

Narayanan's work has helped identify numerous FDA-approved drugs already used for many other diseases, including anti-inflammatory drugs, anticoagulants, statins and hormones, which could potentially help patients suffering from Ebola.

"With the high mortality rate of this disease, the world urgently needs new ways to treat patients," he said. "The ability to use drugs that are already approved by the FDA could provide clinicians with more options to treat Ebola patients, rather than just relying on supportive measures like fluid replacement or antibiotics."

"We are mining the human genome for Ebola virus association to develop an understanding of the human proteins involved in this disease for subsequent research and development, and to potentially create a pipeline of targets that we can test and evaluate."

— Ramaswamy Narayanan, Ph.D., Charles E. Schmidt College of Science

Graduate Student Discovers Novel Pathways for Eye Lens Formation

FAU doctoral student Daniel Chauss recently discovered novel genetic pathways at the cellular level that regulate the ability of immature eye lens cells to mature. The genes and pathways that he and his colleagues in the Charles E. Schmidt College of Medicine identified provide tools to understand how to control the growth and maturation of eye lens cells. It also allows them to understand what specific genes are required to keep the lens transparent and prevent the formation of cataract, which is the clouding of the eye lens – and the leading cause of blindness worldwide.

Chauss and his research colleagues in the lab of Marc Kantorow, Ph.D., published the first analysis of the entire spectrum of gene changes that occur during the growth of the eye lens in the journal *G3: Genes, Genomes and Genetics*. The team sequenced and analyzed more than 16,000 genes that change during lens growth.

Chauss, Kantorow and research associate professor Lisa A. Brennan, Ph.D., are building on these findings by testing functions of the genes and cellular pathways they identified in the growth and maintenance of both lens and retinal cells. Their efforts could lead to the development of therapies for cataract, macular degeneration and other devastating eye diseases linked to aging.

Smarter Signals Adjust to Real-Time Traffic

FAU's College of Engineering and Computer Science has received a $100,000 grant from the City of Miami Beach to test "smart" traffic lights that allow intersection signals to adjust to real-time traffic conditions such as accidents, road construction and the weather.

Unlike conventional, pre-programmed traffic signal systems, smart traffic lights — technically known as adaptive control systems — can adjust the timing of red, yellow and green lights to accommodate changing traffic patterns.

Researchers in FAU's Laboratory for Adaptive Traffic Operations and Management will test two adaptive traffic signals that are being considered for one of Miami Beach's busiest corridors — Arthur Godfrey Road (41st Street).

"While better management of traffic signals won't reduce the number of cars on our streets, we can do a much better job of adjusting signals to work more efficiently," said Aleksandar Stevanovic, Ph.D., the FAU traffic lab's director and an associate professor in the Department of Civil, Environmental and Geomatics Engineering.

The U.S. Department of Transportation reports that outdated traffic signaling accounts for more than 10 percent of all traffic delays. Though adaptive signal control technologies have been around for some 20 years, fewer than 3 percent of existing traffic signals in the U.S. deploy them. Florida, California and Michigan are among the states prioritizing traffic signal improvements.

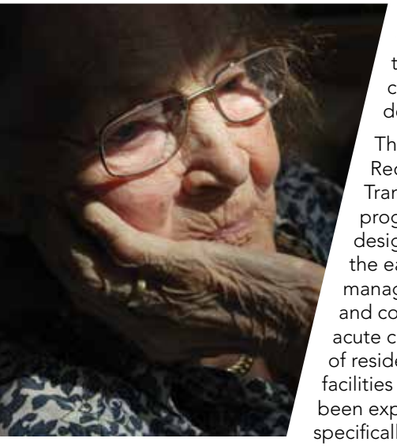
With conventional traffic signals, a light's duration is programmed based on an intersection's recorded traffic patterns in conjunction with surrounding intersections. Adaptive traffic control systems determine light durations by using wires embedded in city streets or other forms of detectors that sense changes in traffic demands and patterns.

"... We can do a much better job of adjusting signals to work more efficiently."

— Aleksandar Stevanovic, Ph.D., College of Engineering and Computer Science

Keeping Seniors in Assisted-Living Out of the Hospital

A Florida Atlantic University professor is behind a recently launched program aimed at reducing unnecessary emergency department (ED) visits and hospital admissions among assisted-living facility (ALF) residents that could save the health care system billions of dollars.



The Interventions to Reduce Acute Care Transfers ("INTERACT") program was originally designed to improve the early identification, management, documentation and communication about acute changes in the condition of residents at skilled nursing facilities (SNFs). It has now been expanded to include tools specifically for ALF providers.

"The INTERACT program is focused on improving the quality of care for vulnerable older people who have an acute change in condition," said Joseph Ouslander, M.D., senior associate dean for geriatric programs in FAU's Charles E. Schmidt College of Medicine. "The basic clinical aspects of the INTERACT tools and strategies to improve recognition, evaluation, communication, documentation, and management of these changes are the same across healthcare settings."

Hospitalization is disruptive to older people and puts them at greater risk for hospital-acquired complications such as infections. Trips to the hospital also increase the likelihood of reduced functioning after returning to an ALF. Beyond the potential negative physical, emotional and psychological impacts on ALF residents, unnecessary emergency department visits and hospitalizations cost the Medicare program billions of dollars.

The INTERACT Program was developed by Ouslander and has been refined over the last several years with input from an interdisciplinary team and direct care providers. After several years of INTERACT use in SNFs, tools for ALFs were developed through the support of a Centers for Medicare and Medicaid Services Innovation Grant.

FAU Develops Model Music Archiving System at Wimberly Library

When Jerry Glantz, son of legendary cantor Leib Glantz, approached the Recorded Sound Archives in FAU's S.E. Wimberly Library with a request to make his father's recordings and sheet music available on the web, there was one problem: the technology to do that didn't exist.

But that didn't stop Glantz or archives officials. With the help of two FAU alumni, Glantz saw his wish come true. Yom Chouloute, a 2005 graduate with a bachelor's degree in computer engineering and computer science and now a computer applications coordinator in the Wimberly Library, developed the software application. He worked with Alethea Perez, who is working toward a B.A. in graphic design at FAU. She parlayed her Photoshop and web development hobbies into a position as the library's operations and website coordinator.

Chouloute and Perez work collaboratively at the archive's Research Station, an interactive, mobile-friendly, extensive music library for students, teachers and scholars. The station provides meta-data, images and digitized streaming-audio tracks from the archive's vast collection of original recordings using the latest content management system platform.

Perez guided the development of a media management system to handle all the station's audio, text and images, while protecting these assets from loss or hacking. This innovation places FAU at the forefront of academic libraries in creating contemporary Internet tools for researching recorded music. A $20,000 grant from the Nathan Cummings Foundation funded creation of a new online delivery system for music studies. The software was successfully pilot-tested thanks to a $40,000 donation from Beatrice Cummings Mayer.

Simultaneous presentations of sound recordings and matching sheet music are now possible with Sounds n' Scores, the archive's prototype software program. This program is unique among all academic libraries, said Maxine Schackman, who recently retired as archive director. Through The Leib Glantz Project, a privately funded effort, the younger Glantz donated the materials for this model project.

"Sound n' Scores showcases what we are capable of and gives us direction for scholarly research on music," Schackman said.

"Sounds n' Scores showcases what we are capable of and gives us direction for scholarly research on music."

— Maxine Schackman, former Recorded Sound Archives director

A Breakthrough to Limit Texting While Driving

A Florida Atlantic University professor has developed technology to disable a driver's cellphone from sending and receiving text messages — a potentially life-saving breakthrough that could limit driver distractions. The software is the creation of Daniel Raviv, Ph.D., of the Department of Computer and Electrical Engineering and Computer Science.

"It blocks the driver only and allows passengers to continue to text," Raviv told the *Sun Sentinel*. "If we save one person's life, this is worth it, most definitely."

Control of cellphone texting can be coordinated using geo-referencing of spatial data so the device a person is using can be monitored at an exact location. Travel by train, bike or at an amusement park would be distinguishable by using location features and patterns of speed. The technology is precise enough to disable the driver's phone, but not the phones of any of the car's passengers.

The technology does not require software to be downloaded and is handled by the phone service provider through the customer's account.

"It blocks the driver only and allows passengers to continue to text. If we save one person's life, this is worth it, most definitely."

— Daniel Raviv, Ph.D., College of Engineering and Computer Science

Shedding Light on Inflammation and Cancer Metastasis

Research conducted on mice at the Charles E. Schmidt College of Medicine found mounting evidence of a nexus between chronic inflammation and an increased risk of developing cancerous tumors.

The study's findings, published in the *Journal of Leukocyte Biology*, suggest that inflammation raises the level of the cancer biomarker chitinase-3-like-1, or CHI3L1, leading to increased metastasis and faster cancer growth in that tissue. Metastasis is responsible for 90 percent of breast cancer deaths despite significant improvements in diagnosis and treatment.

"In this study, we found that CH13L1 was an important inflammatory protein that promoted tumor growth and metastasis, providing the necessary 'soil' or the proper environment for the 'seeds,' that is the circulating breast tumor cells," said Vijaya L. Iragavarapu-Charyulu, Ph.D., the study's principal investigator and an associate professor of biomedical science in the Charles E. Schmidt College of Medicine. "We are encouraged by the results of our study and hopeful that it will help us to better develop targeted therapeutics to treat cancer."

The researchers used two groups of mice, one that was genetically modified to be unable to produce the CHI3L1 glycoprotein. They induced both groups of mice to become asthmatic and then introduced breast cancer cells. After four weeks, the mice lacking CHI3L1 showed less inflammation and their tumors grew more slowly. Those mice also had less metastasis to the lungs.

The study could serve as a starting point for future research on how other inflammatory diseases may predispose patients for increased metastasis, Iragavarapu-Charyulu said.

The National Cancer Institute, the National Center for Research Resources of the National Institutes of Health and contributions from Jack Laub, a private donor, supported the study.

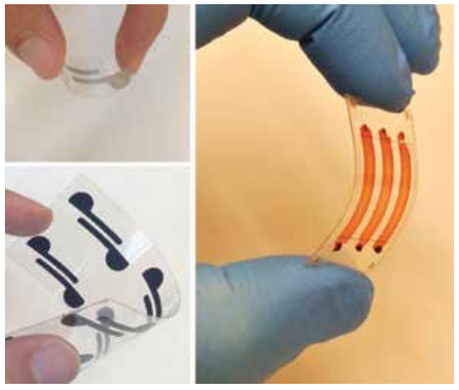
"We are encouraged by the results of our study and hopeful that it will help us to better develop targeted therapeutics to treat cancer."

— Vijaya L. Iragavarapu-Charyulu, Ph.D., Charles E. Schmidt College of Medicine

Biosensing Advance Could Revolutionize Healthcare in Developing Countries

A Florida Atlantic University engineering professor is part of a team of researchers who have identified a biosensing device to remotely detect — and determine treatment options — for HIV, E-coli, Staphylococcus aureas and other bacteria.

Waseem Asghar, Ph.D., assistant professor of electrical engineering in the College of Engineering and Computer Science, and a group of research associates identified a rapid, cost-effective way of diagnosing diseases and monitoring treatment in point-of-care settings that requires just a finger prick to detect pathogens in whole blood and plasma.



Asghar is the first co-author of the study. He collaborated with medical and engineering researchers from the Brigham and Women's Hospital, Harvard Medical School and Stanford University School of Medicine. Their findings were published in *Nature Scientific Reports*.

The biosensor's lightweight, flexible materials would eliminate the need for expensive infrastructure and skilled personnel, potentially solving real-world healthcare problems in both developed and developing countries.

The scientists used the same technology to develop a phone app that detects bacteria and disease in the blood using cellphone images that can be analyzed remotely.

"There is a dire need for robust, portable, disposable and inexpensive biosensing platforms for clinical care, especially in developing countries with limited resources," Asghar said.

FAU Joins Forces with Israel's Technion in a New Partnership

Florida Atlantic University's Charles E. Schmidt College of Medicine and the Technion-Israel Institute of Technology's Ruth and Bruce Rappaport Faculty of Medicine have entered into a partnership to advance medical and scientific initiatives between Florida and Israel. The affiliation provides unique research, academic and clinical opportunities for students and faculty at both institutions.

"We look forward to putting our plan to work and tapping into our combined resources and expertise to fuel the creation of new and innovative programs for students and faculty," said David J. Bjorkman, M.D., M.S.P.H., dean and executive director of medical affairs at the Charles E. Schmidt College of Medicine. "This collaboration will benefit so many individuals across our globe for decades to come."

FAU and the Technion will explore developing dual-degree programs for students who want to pursue an M.D. degree from FAU concurrently with a master's or Ph.D. degree from the Technion on an accelerated basis, integrating curricula from programs at both institutions.

FAU students will go to Technion through the Technion American Medical School (TeAMS) Program, which offers qualified American and Canadian college graduates the opportunity to live in Israel while completing their medical studies.

FAU's Charles E. Schmidt College of Medicine is one of 141 allopathic (M.D.-awarding) medical schools in the U.S. The college's inaugural class graduated in 2015. Small class sizes provide a personalized setting with emphasis on self-directed and problem-based learning.

Founded in 1912, the Technion is Israel's oldest university and the country's leading science and technology institution. With Nobel Prize winners on the faculty, it has a well-deserved reputation for academic excellence.

Advancing Laser Technology in the Fight Against Skin Cancer

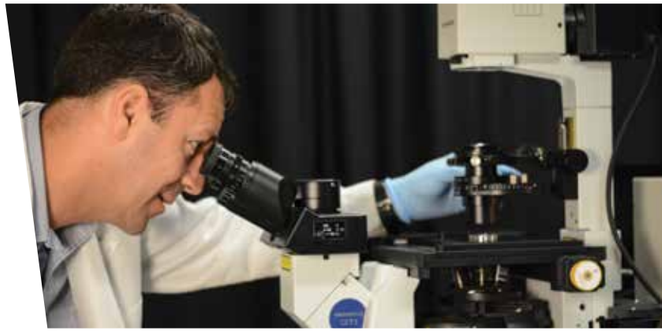
Laser technology pioneered at Florida Atlantic University has successfully detected cancerous tissue following laser ablation, setting the stage for the technique to be used as a guide during laser surgery.

Scientists and physicians in the Charles E. Schmidt College of Science have broadened the applicability of Raman spectroscopy by showing that it can be used to distinguish normal skin tissue from cancerous tissue following high-powered laser ablation. The results of their work appear in the *Lasers in Surgery and Medicine Journal*.

Cancer cells are often impossible to visually distinguish from normal tissue. With this novel approach, cancerous tissue is diagnosed using a Raman laser and then removed in a very precise, localized fashion using an ablation laser. This type of Raman-based technique for skin cancer diagnosis and treatment, although not yet fully developed, may one day replace more costly and time-consuming treatments, such as Mohs micrographic surgery.

Mohs micrographic surgery is the current gold standard for skin cancer removal because it provides high cure rates while removing the least amount of healthy tissue. However, it's time consuming and resource-intensive, and, because the excised tissue is evaluated during the procedure, the results are subjective. During Mohs surgery, the doctor serves as surgeon, pathologist and reconstructive surgeon and relies on the accuracy of a microscope to trace and ensure the removal of skin cancer down to its roots.

"I think the most important finding of this study for dermatologists and their patients is that it demonstrates the feasibility of a potentially much faster and more accurate mode of skin cancer treatment based entirely on laser technology," said Andrew C. Terentis, Ph.D., the study's lead scientist and an associate professor of chemistry and biochemistry in the Charles E. Schmidt College of Science.



NEW FACES

From Fruit Flies to Breast Cancer Breakthroughs to Leading FAU's Research Enterprise

Daniel C. Flynn, Ph.D., a renowned breast cancer researcher, was recently named Florida Atlantic University's vice president for research. He came to FAU from the University of Delaware's College of Health Sciences, where he was associate dean for research. His career has taken him to stops at the Commonwealth Medical College in Scranton, Pennsylvania, where he was associate dean for research and economic development, and West Virginia University, where he held numerous leadership roles, including director of cancer cell biology research and head of graduate training programs at the health science center.

We asked Dr. Flynn about his sources of inspiration, his career and his vision for research at FAU.

Q. How did you first become interested in pursuing a career as a scientist/researcher?

A. In seventh grade, we were introduced to the concept of DNA and Mendelian genetics. I was one of three students chosen to conduct a year-long experiment in Mendelian genetics, crossing red-eye and white-eye fruit flies with each other. The experiment demonstrated dominant and recessive gene inheritance. This started my interest. My uncle, who was a clinical scientist at Duke University, fostered that interest. He let me work in his lab one summer during my high school years.

Q. What led you to focus on cancer research?

A. I studied viruses in graduate school and became interested in how cells respond to viruses. This led me to take a post-doctoral fellowship to study retroviruses, which cause cancer in certain kinds of cells. While studying the basic mechanism by which viral genes can cause cells to become cancerous, I discovered a family of genes that were important for cancer progression, and suddenly we came to realize that they were important for breast cancer progression. Thus, I simply followed the trail of my basic research project and it led me to breast cancer.

Q. Tell us about the highlights and impact of your research.

A. From a research perspective, I believe our lab made some important contributions to demonstrating how cancer cells might invade and cross tissue barriers. We also discovered a family of three genes and we named them. They are relatively well studied and we were able to learn a lot about them, including knocking one of the genes out of mice and showing an important effect on breast physiology.

Q. How did you make the transition into research administration?

A. Early in my career, I was empowered by my superiors to build research teams. From this, I was able to leverage large grants that supported the work of others, something I'm very proud of. During this phase of my career, I started a biotech company, which stimulated my interest in applying knowledge from the lab to solve real-world problems. Ultimately, I became very interested in the business of science and had the good fortune to work for some great people who mentored me and helped prepare me to be a vice president for research.

Q. Beyond lack of funding, what are the biggest challenges scientists face today and how do you think they can be overcome?

A. I think the biggest obstacle is access to advanced technology and research teams that can help scientists discover new knowledge. My biggest fear is that reduced funding and lack of access to technology might influence very talented students to pursue other careers instead of science. This will create a shortfall of much needed talented scientists in the future.

Q. Can you describe your vision for the future of research at FAU and how you plan to move in that direction?

You have to have a good business plan, talented people and access to resources. At FAU, we need to form research teams (which we call "pillars") that encourage collaboration. We need to partner effectively with our peers in the region [Scripps, Max Planck, Torrey Pines, the Vaccine & Gene Therapy Institute]. We also need to put processes in place that can promote the ability of our faculty to secure the grant funding they need in order to conduct their research. We're putting these processes in place and already are seeing some early signs of success.

Q. What have been the most interesting, most exciting and funniest things about your transition to South Florida?

A. The most exciting thing was getting here in early January and enjoying the great weather. The most interesting things are the challenge of helping President Kelly build a great university. The funniest thing was when I went to a nursery to buy my tomato plants in mid-May (as any Northerner would) and was told we do that in February and March down here.

Q. What advice do you give junior (or senior) faculty as they pursue their research careers?

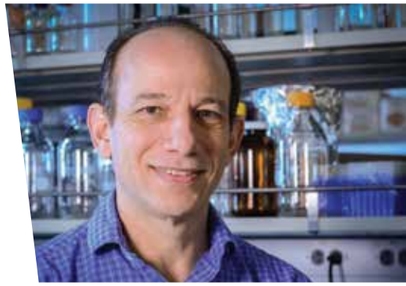
I like to encourage and help people, and I believe the faculty knows that I want to help, can help and know the challenges they face. At the same time, I'm kind of "old school" in that I never let up. When a faculty member gets a big grant, I usually say: "Celebrate today, then tomorrow, start thinking about your renewal." Science is a tough business. But it's the most exciting endeavor in the world.

A Practical Approach to Science Leads to Sky-High Achievement

Like many scientists of his generation, Gregg Fields, Ph.D., was inspired by NASA's moon missions. To him, they were the epitome of scientific achievement.

That child watching rockets roar into space has turned into a leading scientist who recently was named a Fellow of the National Academy of Inventors. It's a distinction given to academic innovators who have played a key role in creating inventions that have a tangible impact on quality of life, economic development and the welfare of society. Fields is chair of the Department of Chemistry and Biochemistry in the Charles E. Schmidt College of Science and director of the Center for Molecular Biology and Biotechnology.

Fields' research focuses on the use of chemical approaches to better understand how protein three-dimensional structures influence cellular and enzymatic behaviors. He holds seven U.S. patents and has authored more than 250 scientific publications.



"One of the goals of scientists should be the practical application of basic research," Fields said. "The inspiration behind the innovations was the desire to see my laboratory's basic research have practical utility."

In becoming a Fellow of the National Academy of Inventors, Fields joined an elite group that includes 61 presidents and senior leaders of research universities and nonprofit research institutes and 21 members of the National Inventors Hall of Fame.

"One of goals of scientists should be the practical application of basic research."

— Gregg Fields, Ph.D., Charles E. Schmidt College of Science

Sensors Shine Light on the Invisible

When Jason Hallstrom, Ph.D., was 10 years old, he really wanted a Nintendo game system for Christmas. Snooping around a closet, he found an Atari 800 computer – one of the first personal computers – instead of a video game. While that gift disappointed him as a boy, it set Hallstrom on a course that has brought him to FAU as director of the Institute for Sensing and Embedded Network Systems Engineering (I-SENSE@FAU).

"It was like playing on a big electronic Lego set," Hallstrom said of his first computer programming experience.

Now he and his team play on the global stage with small wireless computing devices, ranging from the size of a matchbox to the size of a dime, that will change the way Florida monitors its water quality, sea level rise, hurricanes, agriculture, aquaculture, and even its aging senior population.

The sensing devices being developed by I-SENSE@FAU can collect information about the surrounding environment and transmit that information to cloud-based computing systems that can store, analyze and present it to educators, researchers and decision-makers. Deployable at massive scales, the technology represents a paradigm shift in how our world is observed and managed.

"Applied sensing and the emerging 'Internet of Things' provide endless possibilities for making the 'invisible' visible, both in the small and in the large," said Hallstrom. "At FAU, we will be developing technologies for a broad spectrum of applications and uses, ranging from monitoring physiological changes in senior patients to support aging in place, to mitigating natural and man-made disasters, such as hurricanes and biological threats."

Sensor networks can allow emergency responders to monitor wildfire conditions or assess the structural integrity of buildings and roads. In the event of a man-made or natural disaster, these "sensing fabrics" can provide near instantaneous feedback on the type, degree and location of damage. Emergency management decisions can then be made quickly to commit personnel and resources to where they are needed most.

"Applied sensing and the emerging 'Internet of Things' provide endless possibilities for making the 'invisible' visible, both in the small and in the large."

— Jason Hallstrom, Ph.D., Institute for Sensing and Embedded Network Systems Engineering

A Passion for Social Justice Ignites Research Path

John R. Graham, Ph.D., originally went into social work to make a political statement, prompted by his desire to promote social justice for all people.

"Prior to doing the Ph.D., I worked in a food bank, I rehabilitated ex-convicts and I worked as a psychiatric social worker," he said. "Once I hit graduate school, I realized research was my principal passion."

That passion led him to FAU, where he is a professor of social work and director of the School of Social Work in the College for Design and Social Inquiry. Under his leadership the school recently established an Office of Substance Use Disorder, Mental Health and Recovery Research on the Boca Raton campus. The office will serve as an important hub of South Florida's research on alcohol and drug abuse prevention and recovery, and it will foster internationally recognized research to better understand and reduce the impact of substance use both locally and globally.

Following announcement of a $100,000 gift from Life of Purpose Treatment, an addiction treatment facility in the Research Park at FAU, several additional companies stepped forward to help. KIPU Systems, Lumiere Detox Center, Sober Living Outpatient, Sober Living in Delray, Guardian IOP, Boca Detox, The Hartman House and Infinity Behavioral Health Services are collaborating with FAU and Life of Purpose on this initiative. They're working toward the goal of raising $3 million to enable FAU to establish an endowed chair for a leading researcher, who will spearhead the program.

For Graham, the new office aligns with his career and research focus. "I go where the interesting questions lead me," he said. "Usually it's a combination of community engagement, an obvious gap in the literature and the potential to improve social service delivery."

Addiction Expert Tackles Public Health Problems With Multidisciplinary Approach

Michele L. Pergadia, Ph.D., found her ideal career path as an academic health psychologist: a combination of scientist, clinician and teacher.

"I am very invested in using multidisciplinary approaches to inform my work, really pulling from different disciplines at once to inform public health problems," Pergadia said.

Pergadia recently joined the Charles E. Schmidt College of Medicine as an associate professor of clinical biomedical science and director of health behavior research. Her scientific track record includes serving as principal investigator, co-principal investigator or collaborator on nine National Institutes of Health or foundation grants for research on addiction and tobacco cessation.

Pergadia provides training and develops teaching assignments, in addition to pursuing her own research interests in the field of addiction. She spent more than decade at the Washington University School of Medicine, where she rose through the ranks to associate professor of psychiatry. There she conducted research on addiction and tobacco cessation. Most recently, she led a research study published in the *Journal of the American Medical Association-Psychiatry* on nicotine's role in responding to rewards.

In that study, Pergadia and research associates from Harvard Medical School and the University of California San Diego, showed that nicotine withdrawal reduces response to rewards across both humans and animals. In other words, nicotine withdrawal may make it more difficult for people to stay away from cigarettes because their response to "natural rewards" is diminished. Learning about withdrawal and difficulty quitting can lead to more effective treatments to help smokers quit.

"I am very invested in using multidisciplinary approaches to inform my work, really pulling from different disciplines at once to inform public health problems."

— Michele L. Pergadia, Ph.D., Charles E. Schmidt College of Medicine

"When a book is written on environmental sustainability efforts in the early 21st century, I bet they'll rank South Florida as a national if not global leader for bringing together scientists, community groups, citizens and public officials to problem-solve."

— Colin Polsky, Ph.D., director, Florida Center for Environmental Studies

Taking Research and Education Collaboration To New Levels

Since becoming director of the FAU-based Florida Center for Environmental Studies (CES), Colin Polsky, Ph.D., has been working on increasing its research partnerships both within the university and beyond.

The center has forged new links with education, urban planning, journalism, computer engineering and humanities faculty at FAU while also strengthening its existing links with biology, geosciences and civil engineering colleagues. In the past few decades, the goal of launching such a pan-university collection of research and education collaborations has become a common refrain in many U.S. universities. Yet establishing and maintaining these relationships is difficult to accomplish.

Interdisciplinary approaches are needed for answering many key questions, such as how will South Florida's growing metropolitan area maintain and improve its quality of life in the face of substantially changing environmental conditions? The answer involves understanding – and linking – dynamics from the Everglades to the Atlantic and everything in between. For example, Xavier Comas, Ph.D., examines how climate change may affect carbon gases in Everglades peat soils over space and time. Fred Bloetscher, Ph.D., and Diana Mitsova, Ph.D., are mapping high-risk zones for human health problems linked to standing water from sea-level rise.

"When a book is written on environmental sustainability efforts in the early 21st century, I bet they'll rank South Florida as a national if not global leader for bringing together scientists, community groups, citizens and public officials to problem-solve," Polsky said.

As Polsky continues to advance the center's research and outreach missions, he's also ramping up its focus on training FAU students to deal with environmental issues. The center is developing an introductory environmental science course geared toward non-science undergraduate majors. Also in development is a regionally focused course on sea-level rise and society and another aimed at helping students understand common misconceptions about climate change causes, consequences and responses.

Aquaculture Adds Vital Food Supplement

Nature cannot produce enough fish to keep up with the consumption demands of the world's growing population, and so the role of aquaculture in feeding humans can only continue to grow.

This solution, however, creates another challenge: Given that fish tend to like to eat other fish, how can aquaculture be sustainable over the long term? Fish nutritionists are trying to answer to this question. FAU Harbor Branch's Aquaculture and Stock Enhancement Program recently welcomed research professor Marty Riche, Ph.D., to help advance this work.

"Protein is a primary nutrient to replace, and we have soy and other vegetable proteins for that," Riche said. "But growth rate is only one concern. We need to produce fish that are healthy, safe and – especially – pleasing to eat."

Before joining the Harbor Branch staff, Riche was with the U.S. Department of Agriculture's Agricultural Research Service for more than 13 years. For much of that time he was based at Harbor Branch, working on a long-term, collaborative research project to improve efficiency and sustainability of low-salinity marine aquaculture.

COVER STORY

Renowned Neuroscientist Brings His Extensive Research and Clinical Portfolio to FAU

When he entered medical school, James E. Galvin, M.D., M.P.H., knew he might be interested in pursuing a career in neurology. An inspiring first-year professor and a desire to learn more about the Parkinson's disease that took his grandfather's life solidified the decision.

"During the 12 years of (my grandfather's) illness, I kept thinking that the neurologist should have been able to do more for him and my grandmother," Galvin recalls. "I knew that it would become my job to do more for my patients so that other families would not have to go through the same experiences."

Galvin, who went on to become an award-winning neuroscientist and a leading international expert on a specific form of dementia, recently joined the staff of Florida Atlantic University as a professor of clinical biomedical science in the Charles E. Schmidt College of Medicine with a joint appointment as a professor in the Christine E. Lynn College of Nursing.

He also serves as the associate dean for clinical research in the Schmidt College of Medicine and medical director of the Louis and Anne Green Memory and Wellness Center as well as an administrative and clinical appointment as director of the Toby and Leon Cooperman Center for Memory Disorders and Alzheimer's disease at the Marcus Neuroscience Institute at Boca Raton Regional Hospital.

Before joining FAU, Galvin held concurrent positions at New York University's Langone School of Medicine, the university's Steinhardt School of Culture, Education and Human Development and its college of nursing. Previously, he held faculty positions at Washington University in St. Louis and at Hahnemann University in Philadelphia.

FAU President John Kelly characterized Galvin's arrival at FAU as a "game-changer" for the university.

"Dr. Galvin is one of the most prominent neuroscientists in the country," Kelly said. "He brings to FAU a research portfolio that is both broad and deep, and immediately elevates our neuroscience initiatives to a national level.

He is exactly the caliber of faculty we are now recruiting here."

Galvin has published more than 150 scientific manuscripts and three textbooks on Alzheimer's disease and dementia and is an internationally renowned expert on Lewy body dementia, a condition in which patients simultaneously experience losses in cognitive function, mobility and behavior.

He also has generated millions of dollars in research funding from the National Institutes of Health, Centers for Disease Control and Prevention, Alzheimer Association, Michael J. Fox Foundation, local and state departments of health and private foundations.

In his new roles at FAU, Galvin will work in two key areas: building a clinical research infrastructure that will rapidly test new therapies and accelerate these innovations to market; and creating a novel clinical component that will develop comprehensive approaches of care to improve the quality of life for patients and families afflicted with Alzheimer's disease and dementia.

Galvin said his team will work on creating more effective ways to provide early diagnosis, delivering appropriate treatment to patients that improves their quality of care, providing support for family caregivers and reducing healthcare costs. These efforts will complement an active research program developing and testing new medications and diagnostics.

"These can be devastating diseases," Galvin said. "We will work on how to detect the diseases as early as possible, make the most accurate diagnoses, and initiate treatment at first sign of detection. That's how we can do the most for people."

"We're not necessarily making people live longer," he continued. "We're hopefully making them live better by improving their quality of life while they're alive."

"He brings to FAU a research portfolio that is both broad and deep, and immediately elevates our neuroscience initiatives to a national level. He is exactly the caliber of faculty we are now recruiting here."

— FAU President John Kelly

In His Own Words

As with many of us, early influences were critical in Dr. Galvin's path to becoming a prominent neuroscientist. We asked him to tell us a little about how he first became interested in pursuing his chosen career path. Here's what he told us.

So many questions …

I think I have always been fascinated by how things work and why sometimes they stop working. As far back as I can remember, I liked to conduct experiments, whether mixing different chemicals together to study their reaction, looking at things under a microscope, taking things apart and trying to put them back together in new and different ways (BTW — this rarely worked, I always seem to have "extra" pieces left over), or reading about some famous scientist tackling what seemed at the time to be an unsolvable problem.

Around high school, my interest in science evolved to more specifically focus on neuroscience. So many questions to be answered, the brain was a mystery that greatly intrigued me, and still does. As I entered medical school, I thought about a career in neurology but wasn't sure.

A young Dr. James E. Galvin and his grandfather Edward Martin.

In my first year, we had a mini-semester of clinical neurosciences taught jointly by basic and clinical science faculty. While I found the class simply fascinating, one professor in particular, George Zito, had a deep influence on me — not only an excellent clinical neurologist, he had a way of explaining complex neuroscience issues so that everyone could walk away at the end of the lecture with a full, if not comprehensive grasp of the topic. I knew for sure, at that time, that I wanted to become a neurologist and a neuroscientist.

A turn toward a specialty

I was fortunate to grow up in a two-family home with my parents and maternal grandparents. I was very close to my grandfather. Frequently, he would drive me to the bus stop in the morning and occasionally pick me up after swimming meets. One evening during my junior year in high school, we were driving home and he made what seemed like the world's slowest left turn across a major

Dr. Galvin evaluating a patient at the Christine E. Lynn College of Nursing Louis and Anne Green Memory and Wellness Center.

intersection — apparently it was too slow as we were broadsided by oncoming traffic.

Luckily no one was injured but I asked him why he made the turn so slow — he said he didn't know. Later that year while at work, he fell off a ladder and broke several ribs. In the emergency room, the doctor noticed that he had a tremor in his hand and referred him to a neurologist. He was diagnosed with Parkinson's disease.

For the first several years, his medications seemed to help and we were still able to do things together. As I finished graduate school and was entering medical school, I noticed that he seemed to have more blank expressions and was forgetful. This forgetfulness continued to progress — at that time, there was nothing the neurologist could offer him.

I finished medical school and started my residency and my grandfather's memory and movement problems got increasingly worse. He always recognized me but his timeline was "stuck" with me still in college and he did not recognize my wife and children. He started having visual hallucinations and frequent fluctuations in his level of alertness and attention.

During my fellowship, he was sitting immobile in his chair watching a football game with my father when he jumped out his chair, probably in response to a hallucination, fell and broke his hip. He had surgery but never recovered, dying one night in the rehab hospital.

A measure of success

What I enjoy the most is the mix of activities that keep each day fresh and new. I get to work with medical students, residents, and fellows contributing to their education. I have had the honor to serve as the primary or secondary mentor for more than 20 individuals who have gone on to have successful careers in medicine, health and/or neuroscience.

> *"During the 12 years of (my grandfather's) illness, I kept thinking that the neurologist should have been able to do more for him and my grandmother. I knew that it would become my job to do more for my patients so that other families would not have to go through the same experiences."*
>
> *— James E. Galvin, M.D., M.P.H., FAU neuroscientist*

To me, the greatest measure of success is not what I accomplish, but rather the accomplishments of those who I helped to train and inspire. I have been fortunate to recruit an outstanding team of individuals to help with my research developing and testing new diagnostics and therapeutics for neurodegenerative disease, some of who followed me to FAU from New York. And most importantly, I have the opportunity to provide comprehensive clinical care to older adults and their families utilizing a transdisciplinary team of clinicians and health educators.

I have taken my extensive basic science background to transform my clinic into a real world laboratory where we can apply new evidence-based knowledge in the care of patients and test for safety, efficacy and long-term outcomes. The ability to continue to grow and expand this combination of academic activities is one of the main reasons I joined the faculty at FAU.

Lab Ready to Characterize First Snowbirds

An archaeological excavation is under way in Vero Beach that could help explain how long humans have been coming to Florida to escape the cold. FAU's Harbor Branch Oceanographic Institute, located just 10 miles south of the site, has an important role to play in this study.

Through an agreement with the Mercyhurst University Archaeological Institute, the Harbor Branch Ancient DNA Laboratory will help process any bones recovered from the site. Mercyhurst was selected to conduct the excavation by the Old Vero Ice Age Sites Committee, a non-profit organization formed in 2010 to re-engage study of a site that first made headlines 100 years ago.

Although laboratories equipped to conduct DNA analysis have become somewhat commonplace, the Harbor Branch lab is one of only two in Florida qualified to handle ancient DNA (aDNA). Three-chambered "clean room" laboratory design and protocols are required to minimize the chance of any modern-day DNA contaminating the material under investigation, which is always limited in quantity – sometimes extremely so – and typically degraded in quality. Researchers use hand-held drills to penetrate bone fragments or teeth to obtain material that hasn't been exposed to elements that degrade DNA.

"The drilling can take all day because of the care it requires," said Research Biologist Sarah Rodgers of the Harbor Branch Population Biology and Behavioral Ecology Program (PBBE). "Our goal is to produce a fine powder that we combine with reagents to extract the DNA from the cells."

The Harbor Branch aDNA Laboratory was established in 2011 under the direction of Greg O'Corry-Crowe, Ph.D., PBBE principal investigator and research professor, whose research interests extend north to the polar circle and include population structure and adaptation. Projects using the aDNA laboratory have included studies of the Steller's sea cow, a northern cousin of the manatee that was hunted to extinction in the 18th century, and beluga whale migratory patterns.

Interest in the Vero Beach site dates to 1915, when workers dredging a flood-control canal first noticed bones in the walls of the dig area. The skeletal remains were human as well as from a variety of animals from the Late Ice Age, including mammoths, mastodons and giant saber-tooth tigers. The Florida state geologist of that era hypothesized that the humans and animals coexisted more than 14,000 years ago, which defied the then-commonly-held belief that humans had arrived in North America no earlier than 6,000 years previously. The published work was disputed by the curator of the Physical Anthropology department at the Smithsonian Institution National Museum of Natural History. The human bones were somehow lost before carbon dating technology became available in the 1950s.

Contemporary interest in the unsolved mystery can be attributed to municipal plans to build a storm-water treatment facility on the site, as well as the emergence of a bone fragment found in the area by an amateur collector that bears an etching of a mastodon or mammoth dating back at least 13,000 years – purported to be one of the oldest pieces of prehistoric art in the Western Hemisphere.

"In addition to perhaps verifying how long humans have been on this continent, we hope to learn more about their origins, and about the lives of these first Americans, the ecosystem they were a part and the climatic conditions they experienced," said O'Corry-Crowe. "It's very exciting to be able to peer back into pre-history like this."

Building an Entrepreneurial Ecosystem

Kimberly Gramm likens FAU's Tech Runway to gaining 20 years of experience in weeks.

"We're creating an ecosystem that provides a web for support," said Gramm, associate vice president and co-founder of the business accelerator. "What makes us special here is that our mentors are people who have exited successful companies and/or have been in C-level positions and want to give back. The expertise we have access to is unprecedented."

After a rigorous selection process — approximately 100 startups applied to be Tech Runway's second round of Venture Vintages companies — entrepreneurs complete a 16-week boot camp, meeting once a week for three hours, then spend the remainder of the year working closely with their mentors, developing their businesses, building their teams, seeking funding and readying their launches.

"Ultimately, we're trying to build the legacy in our entrepreneurial community," said Gramm. "The value proposition here for us as a university is that we're doing something that's very, very meaningful that will make an impact in the community we live in, and that we're driving success to the marketplace.

"When you see the success of these entrepreneurs, there's nothing quite like it. They will forever feel like they're indebted to us, because we do that much for them."

Meet Tech Runway's second class of entrepreneurs:

Honorlock

Bob Nelson, director of Tech Runway's mentor program, told Adam Roth and Elena Soboleva they had one of the worst business plans he'd ever read. Then he offered some advice.

"You guys are really onto something. Quit school and focus on this full time. This is a home run."

That encouragement, and their $6,500 second-place prize in the Business Plan Competition hosted by the Adams Center for Entrepreneurship and the College of Business, helped propel Roth and Soboleva into Tech Runway's second round of Venture Vintages companies.

Their startup company, Honorlock, will offer cloud-based software to help professors monitor online test-takers for academic cheating. But without Tech Runway, many important doors would have been a lot harder to open.

"Professors were telling us, 'We have our own system here. Get out of the way," Soboleva remembered. "But once we got into Tech Runway, we got a meeting with President Kelly, and those doors are opening for us."

Tech Runway gave Roth and Soboleva the motivation — or perhaps the courage — to follow their dream.

"All of our friends think we're crazy," Roth said. "We turned down pretty big jobs. Those are decisions we never would have made without Tech Runway.

"The mentors are always telling us, 'Back in the day, here's how we did things,' and other entrepreneurs in boot camp with us are telling us how they've just gone through the same things we're going through. It's very useful."

candidate.GURU

Chris Daniels and his partners are no strangers to startups. Yet when they looked to develop and launch new executive-recruiting software — a system to find the best "cultural fit" between potential candidates and companies and hiring managers — they didn't approach it as know-it-alls.

"We looked at (Tech Runway) as an augmentation of our team — the mentorship, the training and development, the exposure," Daniels said. "Life in these businesses is a journey of continuous learning. When you believe you know it all, that's when businesses fail. When I met Kim Gramm and spent three or four months being mentored by Bob Nelson, I saw a tremendous amount of knowledge that the mentor program and the mentors bring."

Candidate.Guru's needs from Tech Runway are different from what younger startups need, Daniels concedes. Less-experienced entrepreneurs are learning the fundamentals from mentors and from fellow boot-camp participants. But Daniels' team still sees the benefits.

"I think the brain trust that exists here — dozens of people who have built things or sold businesses, and a lot of the training and development in areas where we had weaknesses, like intellectual property ... that's good educational stuff."

Having Tech Runway rooted in academia is a strong qualification as well, he said.

"They have experts who understand how to get into the heads of executives and help them figure out how to prioritize."

Tech Runway, he says, already is distinguishing itself among South Florida's business accelerators.

"I don't think there's another one in this region this well thought-out, this sophisticated with this type of mentorship base of business professionals," said Daniels. "I think it's absolutely the best program in the region."

Tone-y-Bands

Janice Haley was well on her way to the rollout of her product, Tone-y-Bands, when she discovered Tech Runway.

"We'd gone through prototype development, the first production run and test marketing. But there's a lot of uncertainty at that point in a business, right before you pull the trigger to go to market."

What she found in Tech Runway was the guidance and the support to keep moving her business forward.

She'd been test marketing her product — adjustable, wearable wrist weights designed to tone arms, burn calories and build core strength — and had just opened a kiosk in Town Center Mall when she began Tech Runway boot camp.

"I'd learn something in class and I'd have a place to test it. I would change my signage, change delivery. I applied what I was learning."

She also learned that it's OK to make mistakes.

"You get to the mistakes faster," she said with a chuckle, "and you learn not to be afraid of change. I really moved through that get-to-market phase much faster than if I hadn't gone through boot camp.

"I know what incubators are like, and that hasn't been here in South Florida," says Haley, who previously lived in Boston and worked in the software industry. " But I saw a spark of it here. I want to do everything I can to support it. I want to be part of it as a professional, but this also is something I want to leverage for myself and my company."

TIGHT TALK

Mark Larman was employed at software giant Citrix Solutions in Fort Lauderdale when he heard noted South Florida tech entrepreneur Manuel Medina take part in a panel discussion. Medina — like Larman, an FAU alumnus — mentioned Tech Runway as a resource for startups.

"That's all I needed," said Larman, who had been nurturing his startup, TightTalk Electronics, and its breakout product, the EarDrive. The thumb-drive-like gadget will allow users to record cell phone calls and other audio while an app translates and transcribes a conversation.

Larman had just gotten his prototype and was about to launch. "My world was just spinning, going 100 miles a minute," he recalls. "But when I found Tech Runway, I found the holes, the pieces to the puzzle that I didn't know."

He had expectations to learn about logistics and manufacturing, but already has gotten a lot more from Tech Runway's 16-week boot camp. Now, he's perfected his pitch and has a new perspective about launching his product.

"You get so many different points of view. Every single one has brought new ideas to my mind. It's all really changed how I position things within the business, down to what are we going to sell, how are we going to sell it, who's going to sell it for us and what are our channel models."

By the end of boot camp, Larman and TightTalk hope to be well on their way.

"I hope we've already spoken to initial customers and prospective partners, we have our lines mapped out and we're making sales. I expect us to be in the market."

Cyber-security Program Meeting Urgent Need

Florida Atlantic University's recent designation by the National Security Agency (NSA) and the Department of Homeland Security (DHS) as a National Center of Academic Excellence in Information Assurance/Cyber Defense Research places it in an elite class of institutions in this emerging field. The designation is for the academic years 2014 to 2019.

The university's Center for Cryptology and Information Security (CCIS), founded in 2003 by Spyos Magliveras, Ph.D., who served until 2013 as its first director. The center conducts cutting-edge research in information assurance and education and provides training to student researchers and information technology professionals. Cryptology involves the encoding and decoding of information or messages.

In addition to carrying out original research, the CCIS acts as a conduit linking professionals working in the cyberspace and information security fields, said Rainer Steinwandt, Ph.D., the center's director and a professor of mathematical sciences in FAU's Charles E. Schmidt College of Science.

Institutions applying for the academic excellence designation are required by the NSA and DHS to meet a host of stringent criteria that include employing faculty who specialize in certain areas and have published in peer-reviewed research journals focused on information assurance, cyberdefense and cybersecurity. The designation will help expand FAU's strong presence in cybersecurity research and generate further interest in the field, Steinwandt said.

"Graduates from FAU are prepared to take on important roles in government, industry and academia, meeting the increasing and urgent need for protecting critical information infrastructure," he said.

Faculty working at the CCIS include information assurance specialists from four FAU colleges: the Charles E. Schmidt College of Science, the College of Business, the College for Design and Social Inquiry and the College of Engineering and Computer Science. Center faculty are pursuing research across a diverse spectrum of topics, ranging from cryptology, cybercrime, and secure systems to interdisciplinary and social perspectives of information security.

Work currently under way includes an ongoing NATO-funded research project with partners in France, Israel, and Slovakia. This work looks at how to securely implement encryption technology when facing an adversary with access to advanced technology – quantum computers. Other aspects of how quantum technology can secure communications is the focus of a project funded by the U.S. Air Force Research Laboratory, which is hosted jointly by FAU's departments of mathematical sciences and physics.

"Graduates from FAU are prepared take on important roles in government, industry and academia, meeting the increasing and urgent need for protecting critical information infrastructure."

— Rainer Steinwandt, Ph.D., Center for Cryptology and Information Security

NSA launched the initial program in 1998 and DHS partnered with the agency in 2004 in response to President George W. Bush's 2004 National Strategy to Secure Cyberspace. In 2008, the Centers for Academic Excellence added a designation for research in information assurance to encourage university students to pursue doctoral research in the development and innovation of information assurance and cybersecurity.

The NSA created the program to prepare more professionals in the field to meet the growing demand to reduce vulnerabilities in the nation's networks.

A Solid Business Plan in Food Waste and Worms

Melissa Corichi and Cynthia Moss were fighting an uphill battle. They were told that they either could help people make a difference in the world or they could start a business that made a profit, but they couldn't do both. The pair set out to prove all the naysayers wrong — with the help of thousands of worms.

Today they're the entrepreneurial energy behind Let it Rot, a startup that aims to ultimately take 80,000 pounds of food that otherwise would be thrown away by the Palm Beach County Food Bank and compost it — using worms — into nutrient-rich compost fertilizer and sell that fertilizer, with proceeds going back to the food bank.

"My big vision behind this little plan is being able to prove that worm compost works better than traditional fertilizer would."

— Melissa Corichi, co-founder, Let it Rot

"My big vision behind this little plan is being able to prove that worm compost works better than traditional fertilizer would," said Corichi, 25. "That, in turn, can save exhausted soil and farming operations that haven't been able to produce the same yields they could way back when, because farmers aren't revitalizing the soil, just supplementing it."

Corichio's interest in composting and organic farming stem from her diagnosis 16 years ago with Crohn's disease, a digestive disorder that forced her into a "constant battle" to find the right foods and the right diet. That led her to growing much of her own food and to composting as an effective method of creating the best soil to cultivate for the best crops.

When her Kenan Social Entrepreneurship and Engagement class toured the food bank and learned how much donated produce already is too ripe to distribute, her class project was obvious.

Corichi and Moss are off to an impressive start. Making the 16-team cut in FAU's Business Plan Competition — hosted by the Adams Center for Entrepreneurship and the College of Business — they won the Social Entrepreneurship Award and the 90-second Elevator Pitch Event. Add two grants from the Kenan Trust, and Let it Rot is launching with about $24,000 in seed money.

"Melissa is an energetic and creative young woman, and I was intrigued with her idea of a project to essentially turn a portion of our product waste … into compost," said Perry Borman, food bank executive director. "We look forward to working with her to get the program off the ground."

Let it Rot aims to begin with one composting bin at the food bank, which should process up to 7,000 pounds of discarded food a year. Corichi now lives at Passion Vine Farm, an urban-farming cooperative in Lake Worth where she'll compost more of the food bank's discards with the help of some 4,000 worms.

Corichi hopes to return at least $5,000 to the food bank in her first year. By year two, she hopes to have the capacity to take all the food bank's produce waste and turn back even more money. Her ambitious goals are to design her own automated bin system, scale her business even larger, sell it to the Palm Beach County Solid Waste Authority, move to a new area and recreate Let it Rot to benefit another nonprofit organization.

"It's very, very, very against the norm," Corichi admits. "But I've made friends all over the country who are farmers and environmental activists and businessmen who all want to see this company become something."

SUMMER UNDERGRADUATE RESEARCH FELLOWS

STUDENT: Alex Garcia

FACULTY: Dr. Xavier Comas, Charles E. Schmidt College of Science

RESEARCH PROJECT: Using Capacitance Probes to Monitor Biogenic Gas Releases in Peat Soils

STUDENT: Aya Gare

FACULTY: Dr. Yunqing Kang, College of Engineering and Computer Science

RESEARCH PROJECT: Micro-Engineered Cell-Laden Hydrogels for Bone Tissue Regeneration

STUDENT: Evan Latshaw

FACULTY: Dr. Oscar Curet, College of Engineering and Computer Science

RESEARCH PROJECT: Understanding the Effect of Morphology in a Bio-Inspired Propulsion System

STUDENT: Louis Lee

FACULTY: Dr. James VanZwieten, College of Engineering and Computer Science

RESEARCH PROJECT: Analysis of Ocean Current Turbine Wakes Using Computational Fluid Dynamics

STUDENT: Doren-Elyse Marquit

FACULTY: Dr. Susan Dyess, Christine E. Lynn College of Nursing

RESEARCH PROJECT: Meditation Practice for Nurse Leaders: What is the Impact of a Systematic Personalized Practice on Stress, Mindfulness, Locus of Control, Self-Esteem and Patient Satisfaction?

STUDENT: Brandy Mcelroy-Wright

FACULTY: Dr. Viktor Kharlamov, Dorothy F. Schmidt College and Arts and Letters

RESEARCH PROJECT: Perception of Consonantal Voicing by Bilingual English-Spanish Speakers: The Role of Language Dominance

STUDENT: Ashley Ostroot

FACULTY: Dr. Ann Branaman, Dorothy F. Schmidt College and Arts and Letters

RESEARCH PROJECT: Constructing Adulthood in Contemporary Societies

STUDENT: Shalondria Sears

FACULTY: Dr. Ewa Wojcikiewicz, Charles E. Schmidt College of Medicine

RESEARCH PROJECT: Characterization of PfEMP1 Domain Interaction with Monocytes Using Single Cell Force Spectroscopy

STUDENT: Kelsey Willis

FACULTY: Dr. Clifford Brown, Dorothy F. Schmidt College and Arts and Letters

RESEARCH PROJECT: Archaeological Ceramic Analysis in Nicaragua

Undergraduate Research and Inquiry Reach New Heights

Students journeying overseas to conduct cutting-edge research may sound too good to be true. But that's exactly what geosciences major Carly Wagner did recently. Wagner researched the water salinity of canals in Venice, Italy, during an FAU summer program.

Inspired to conduct a geographic information survey analysis of the Venice salinity levels upon her return, Wagner presented a poster on these findings at the Florida GIS Expo, landing second prize. Prior to jet-setting to Italy, Wagner took several courses related to a faculty curriculum research-enhanced project.

"This is a great example of the effect from the first year of the faculty research curriculum grants, and a great example of teamwork by multiple FAU colleges and faculty, said Charles Roberts, Ph.D., Associate Dean of Graduate Studies in the Charles E. Schmidt College of Science."

Students seated from left to right: Doren-Elyse Marquit, Aya Gare, Shalondria Sears, Ashley Ostroot, Evan Latshaw and Louis Lee

An expanding culture of dynamic undergraduate research is afoot at FAU. Nine student-faculty pairs collaborated on intensive research projects as part of the inaugural Summer Undergraduate Research Fellowship. The first Excellence in Undergraduate Research Mentoring award went to Dan Meeroff, Ph.D., professor and associate chair of Civil, Environmental and Geomatics Engineering in the College of Engineering and Computer Science. In addition, nine Undergraduate Researchers of the Year were named, one in each college.

"We have amazing, brilliant faculty who will impact all students they mentor, providing needed core skills," said Donna Chamely-Wiik, Ph.D., director of FAU's Office of Undergraduate Research and Inquiry (OURI). "In many cases, faculty leave students inspired, with a sense of accomplishment and a portfolio to be reckoned with."

Faculty mentoring and curriculum grants are cornerstones of OURI's work.

Ann Branaman, Ph.D., associate chair of the Sociology Department, is using her $5,000 curriculum grant to infuse the sociology curriculum with research. Chamely-Wiik attributes the increase in student interest in research – even among freshmen – to these grants. Otherwise, most undergraduate students wouldn't know about engaging in research.

NOAA, Harbor Branch Collaborate and Innovate to Open the Oceans

Coral reefs often are likened to rainforests because of the dense biodiversity – and associated potential to produce life-saving drugs – they harbor, but one key difference is that while destruction of rainforests is an intentional act, reefs can be destroyed before anybody realizes they're there. Coral reef ecosystems also are essential for seafood production, which further underscores the need to explore our oceans and know where reefs are located.

FAU's Harbor Branch Oceanographic Institute is home to the National Oceanic and Atmospheric Administration's (NOAA) Cooperative Institute for Ocean Exploration, Research and Technology (CIOERT), which devotes much of its effort to finding and studying coral reefs. One major recent highlight was discovery of a significant area of high coral cover near the Gulf of Mexico's Pulley Ridge that had not been encountered in the previous five years of surveys and mapping.

"We use depth charts to help us decide where to look, and at first this area didn't look promising," said Research Professor Dennis Hanisak, Ph.D. "But science is about testing assumptions, and as soon as the remotely operated vehicle reached bottom, we saw we'd found something amazing."

CIOERT, one of 16 NOAA Cooperative Institutes located at universities and research institutes to help advance the agency's research agenda, is charged with increasing the pace, scope and efficiency of undersea research. The University of North Carolina Wilmington (UNCW) serves as FAU's co-managing partner of CIOERT, which also includes the University of Miami (UM) and SRI International in St. Petersburg, Florida. The consortium has been awarded more than $7.8 million in research funding since it was established in 2009 under a five-year cooperative agreement with NOAA. Based on the strength of its results, CIOERT has been renewed for a second five-year period.

The 2014 Pulley Ridge cruise aboard UM's R/V Walton Smith was part of a multi-year effort to define what role Pulley Ridge reefs may play in replenishment of fish species, corals and other organisms in the downstream reefs of the Dry Tortugas and Florida Keys. This work is continuing with other expeditions to survey and discover new reef habitat and to document the health, distribution and abundance of mesophotic corals, which are those at lowest depths of light penetration.

Other recent research cruises conducted or supported by CIOERT focused on the West Florida Escarpment and Flower Garden Banks National Marine Sanctuary, which also are in the Gulf of Mexico, and the Atlantic Ocean marine protected areas from South Florida to North Carolina. Coral reef discovery and conservation advocacy efforts by Research Professor John Reed, M.Sc., were instrumental to the creation of these protected areas, and current work is focused on assessing the effects of these areas' fisheries restrictions on fish populations.

> *"Science is about testing assumptions, and as soon as the remotely operated vehicle reached bottom, we saw we'd found something amazing."*
>
> — Dennis Hanisak, Ph.D., FAU's Harbor Branch Oceanographic Institute

Bringing the Ocean Ashore

Also central to the CIOERT mission are promoting ocean literacy and building the technical and scientific workforce of tomorrow. The organization recently gained an outstanding tool with the launch of the CIOERT Exploration Command Center (ECC) at Harbor Branch. NOAA has been developing such centers to provide a means of viewing and participating in research cruises from remote locations, a concept known as telepresence-enabled ocean exploration. A broadband connection between the ship and the center provides high-definition video feeds of remotely operated vehicle dives and enables researchers to communicate with the ship during the dives. The command center might host, for example, scientists with expertise in corals, sponges and marine drug discovery, any of whom could help direct

Scientist Co-Chairs Seminal Report on Ocean Research Priorities

Harbor Branch has been an oceanographic leader for more than four decades, so it's fitting that FAU's executive director of the National Oceanic and Atmospheric Administration Cooperative Institute for Ocean Exploration, Research & Technology Shirley Pomponi, Ph.D., was chosen to co-chair a National Research Council report that identifies ocean science research priorities.

"Sea Change 2015-2025 - Decadal Survey of Ocean Sciences" articulated oceanographic focus areas and assessed the infrastructure needed to support this research. Among the priority areas are the rate and impacts of sea-level rise, climate change effects on marine ecosystems and better methods for forecasting geohazards such as tsunamis.

The report provided guidance to the National Science Foundation, the leading funder of ocean science basic research. It will help transform how we commit our national resources and further develop infrastructure for ocean science research.

the operator and identify species that appear on screen, thereby optimizing the scientific output of the expedition.

The ability to broadcast video from the ocean's depths also makes telepresence-enabled exploration a powerful vehicle for education and outreach. NOAA provided public access to live feeds of the West Florida Escarpment dives via its website — attracting more than 700,000 visits — along with complementary curricula developed for grades 5 through 12. At the Harbor Branch command center, graduate students assisted in data gathering and documentation for each dive with the help of a specialized system developed to facilitate this type of work.

"In terms of involving students in research expeditions, the ECC really provides new opportunities," said Shirley Pomponi, Ph.D., CIOERT executive director and research professor. "There's never enough space on a ship for all who want to go, and to be able to share the excitement of discovery like this is the next best thing."

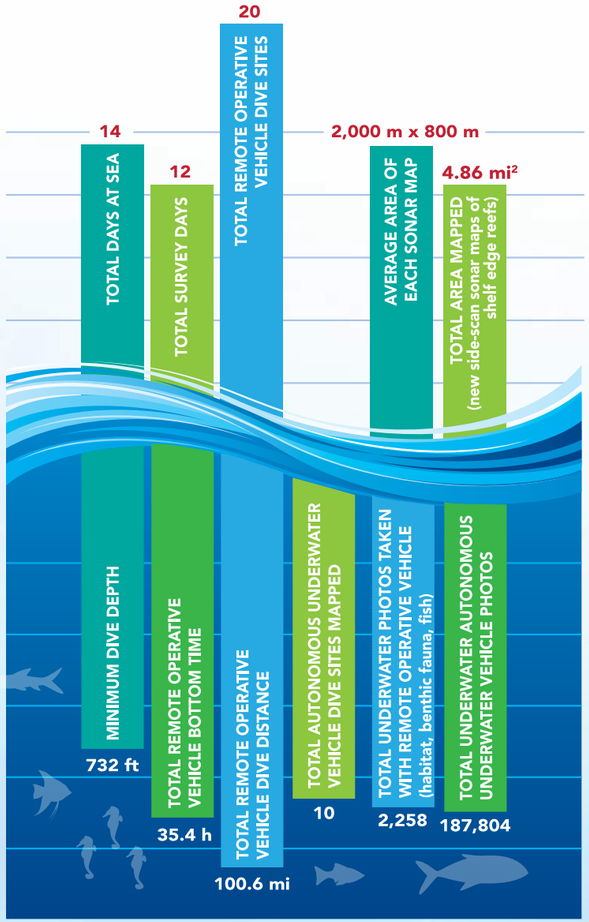
Big Data Reduction

For those who regularly engage in ocean exploration, however, the thrill of discovery is balanced by the meticulous documentation it requires. To properly characterize an area of interest, experienced eyes are needed to describe the geographic features and to identify the living things there. These data must be systematically recorded together with geographic coordinates to provide reports that both catalog and summarize the information. The data are important for managers and scientists within state and federal agencies, including NOAA and its Fisheries Management Councils, and may be used to better understand the long-term health and status of shallow and deep reef ecosystems. It's a labor-intensive process, and the demands grow with the size of the exploration area.

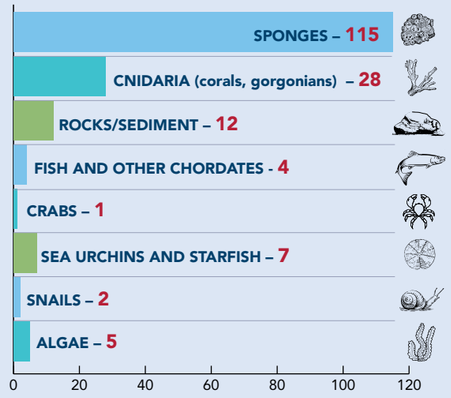
Armed with a science background and keen aptitude for data management, CIOERT Biological Research Specialist Stephanie Farrington has developed a database program that slashes the effort required to document and generate reports for exploratory expeditions. For example, a report that might have taken months to create now can be produced in weeks. In addition to being faster, the system's automation significantly reduces the risk of human error while producing superb customized reports and maps.

She started thinking about the system not long after joining Harbor Branch in 2010 to work with Reed, a central figure in the institution's four decades of ocean exploration. His guidance and encouragement included recommendation of a programmable keyboard that simplifies entry of complex information into single keystrokes. Although Farrington developed the system primarily to simplify her work, NOAA has recognized its power and potential, and selected her to serve as a science co-lead on the 2014 West Florida Escarpment expedition. She continually assesses and improves the system based on project needs, yielding a true innovation in a field where efficiency is increasingly important.

Here's what kept scientists, engineers and staff busy while aboard FAU's Cooperative Institute for Ocean Exploration, Research & Technology cruise off southwest Florida's coast. Team members explored and mapped previously unchartered deep water coral reefs and essential fish habitats.



Total samples collected with remote operative vehicle (with the new tool sled designed and manufactured at Harbor Branch) – **174**

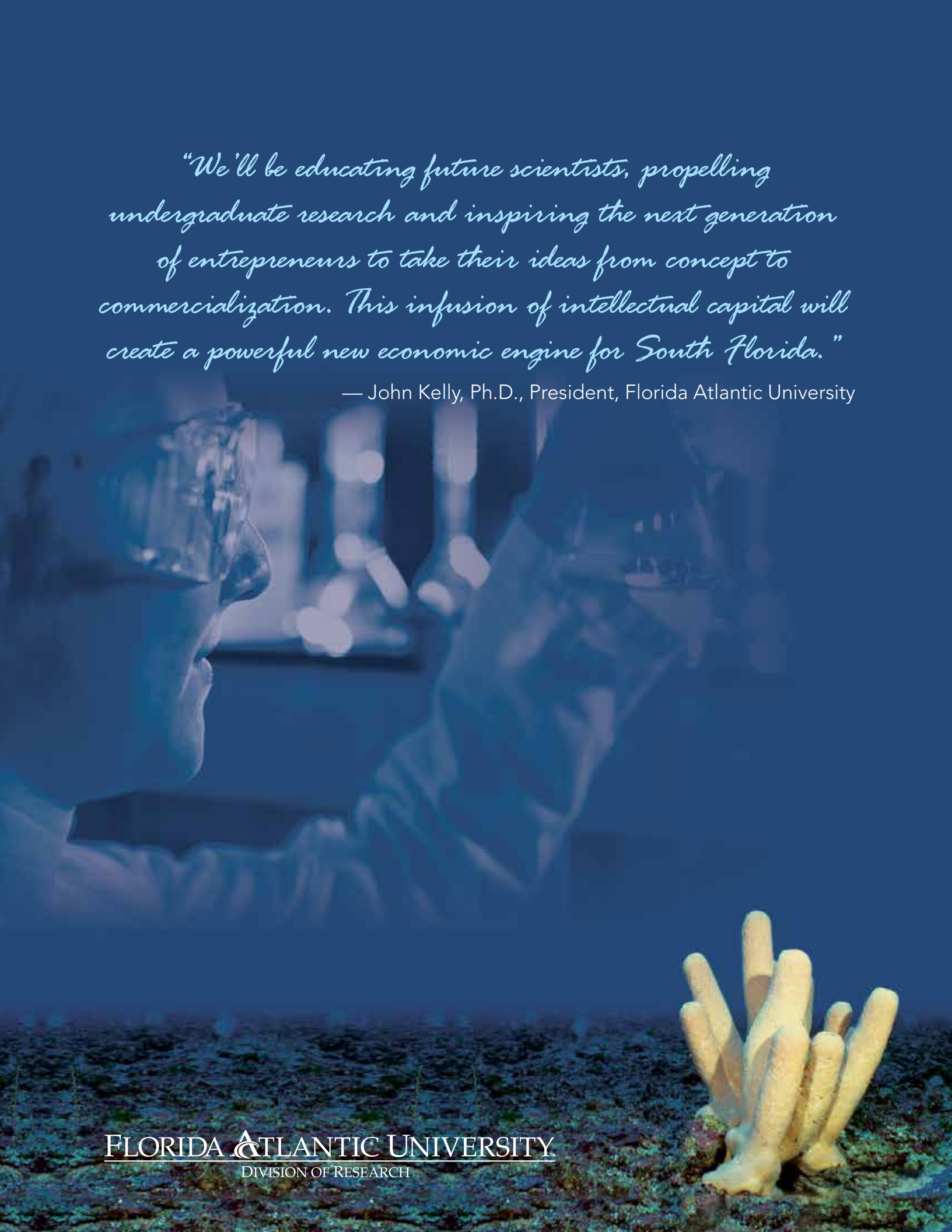


Number of samples collected for marine biomedical research at FAU Harbor Branch – **51**

Number of sponge species for which cells and explants were cryopreserved for biotechnological research at FAU Harbor Branch – **16**

"We'll be educating future scientists, propelling undergraduate research and inspiring the next generation of entrepreneurs to take their ideas from concept to commercialization. This infusion of intellectual capital will create a powerful new economic engine for South Florida."

— John Kelly, Ph.D., President, Florida Atlantic University



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