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NEURON

WINTER 2020

West Virginia's Journal of Science and Research

WEST VIRGINIA STATE UNIVERSITY

Fernando Rojano

WVSU researcher provides visual representation of Kanawha River's ecohydrologic processes

WINTER 2020

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ABOUT
West Virginia Science & Research, a division of the West Virginia Higher Education Policy Commission, provides strategic leadership for the development of competitive academic research opportunities in science, technology, engineering and mathematics. The office directs the National Science Foundation's Established Program to Stimulate Competitive Research (EPSCoR) in West Virginia, coordinates scientific research grants to academic institutions from federal and state agencies, and conducts outreach activities to broaden the public's understanding of science.

FUNDING
This material is based upon work supported by the National Science Foundation under Award No. OIA-1458952.

Any opinions, findings and conclusions or recommendations expressed in this material are those of the author(s) and do not necessarily reflect the views of the National Science Foundation.

Above: Fernando Rojano working at the Integrated Research and Extension Building, a facility of West Virginia State University

INSIDE THIS ISSUE

News briefings

Bethany College faculty, students awarded research grants

Eight Bethany College undergraduates and two faculty members have received research awards through the college's affiliation with NASA West Virginia Space Grant Consortium. Jeff Janovetz, Ph.D. and Karen Kormuth, Ph.D., assistant professors of biology, will receive Faculty Research Enhancement Awards that total $6,000 from the consortium. With the grant, Janovetz will research direct force measurements of prey capture in scale-feeding fishes and in ballistic tongued lizards. Kormuth will model the airborne spread of infectious disease. In addition, eight students will share $11,000 in funding for NASA Undergraduate Fellowships: Antonio Caputo, Geoffrey Foster, Rachel Gantzer, Lena Grogan, Marcus Kozloff, Jennifer Oberthur, Jacob Thornburg and Courtney Walker. Their research is made possible by a NASA West Virginia Space Grant Consortium Training Grant. Established in 1991, the West Virginia Space Grant Consortium is a NASA-sponsored organization that comprises 12 West Virginia academic institutions and nine corporate and scientific partners. The consortium is dedicated to building infrastructure for research and promoting science, technology, engineering and math education across the state. Awards from the consortium must be matched dollar for dollar from other non-federal sources.

West Virginia Science Adventures announces summer camps and science blitz events

West Virginia Science Adventures (WVSA), based out of Marshall University's College of Science, released more information about upcoming activities for students. Now in its seventh year, WVSA offers science, technology, engineering, arts and mathematics (STEAM) enrichment opportunities for the local community. This includes ACT math bootcamps for high school students, LEGO robotics teams, free festivals and annual camps. These camps give children enrichment opportunities that are typically only available in large cities with science centers. Additionally, it gets youth on Marshall's campus and into science labs to demystify college which is especially relevant to potential first-generation college students. Scholarships are available for camp attendance. The 4th annual Science Blitz takes place Saturday, April 18 while summer camps begin May 25. For more information, visit wvscienceadventures.org.

Higher Education Policy Commission renews grant funding for summer undergraduate research experiences statewide

College students will continue to gain experiences through scientific research thanks to funding from the West Virginia Higher Education Policy Commission's West Virginia Science & Research, which renewed six Summer Undergraduate Research Experience (SURE) grants. SURE grants offer undergraduate students substantial hands-on experience in ongoing science, technology, engineering or mathematics (STEM) research. SURE awardees include: Michael Norton, Ph.D., of Marshall University, Robert Warburton, Ph.D., of Shepherd University, Matthew Zdilla of West Liberty University, Michelle Richards-Babb, Ph.D., of West Virginia University, Michael Fultz, Ph.D., of West Virginia State University, and Joanna Webb, Ph.D., of West Virginia Wesleyan College.

Photo courtesy of Bethany College

FROM THE DIRECTOR: Juliana Serafin

Nice to meet you. Now, let's get to work.

Serafin

Photo courtesy of University of Charleston

Welcome to the newest issue of the Neuron! After many years of dedicated service to the Division of Science and Research, Director Jan Taylor has retired. We wish her the best. I am humbled by the opportunity to serve in her stead. I have lived in Charleston for over 30 years and am a native of Philippi.

After moving to Boston for graduate school, I was elated to find a job as a research scientist back in my home state at Union Carbide/Dow Chemical R&D. I joined the University of Charleston in 2008 to teach chemistry and physics and help undergraduate students complete their research projects. One of the most exciting parts about teaching in West Virginia's higher education institutions is watching young people blossom into professionals. I hope that these life experiences can help me in my new role here at West Virginia Science & Research.

Rivers are near and dear to my heart. In West Virginia, they serve as a primary drinking water source as well as offer numerous recreational opportunities that are important to our lifestyle and economy. It was only six years ago that those living in the Kanawha Valley found their source of drinking water contaminated by a chemical leak. As the anniversary recently passed, it seems appropriate this issue features Fernando Rojano, Ph.D., a researcher at West Virginia State University whose work includes understanding the complexities of water flow in the Kanawha River, as well as the impact of pollutants on aquatic life. Like all research, it will help us prepare for events like the contamination as well as help us optimize the use of our state's abundant natural resources.

Thank you for the opportunity to work with our brilliant researchers and students. I look forward to new discoveries today and in the years to come

Julie

Juliana Serafin, Ph.D.
Director of Science & Research
West Virginia Higher Education Policy Commission

The Science & Research Council was established by the West Virginia Legislature in 2009. The goal of the Science and Research Council is to increase the capacity of the state and its colleges and universities to attract, implement and use cutting-edge, competitive research funds and infrastructure. Members provide expertise and policy guidance regarding federal and state programs including EPSCoR, the Research Challenge Fund, and the former Research Trust Fund. Representatives of government, industry, business and academia make up the council.

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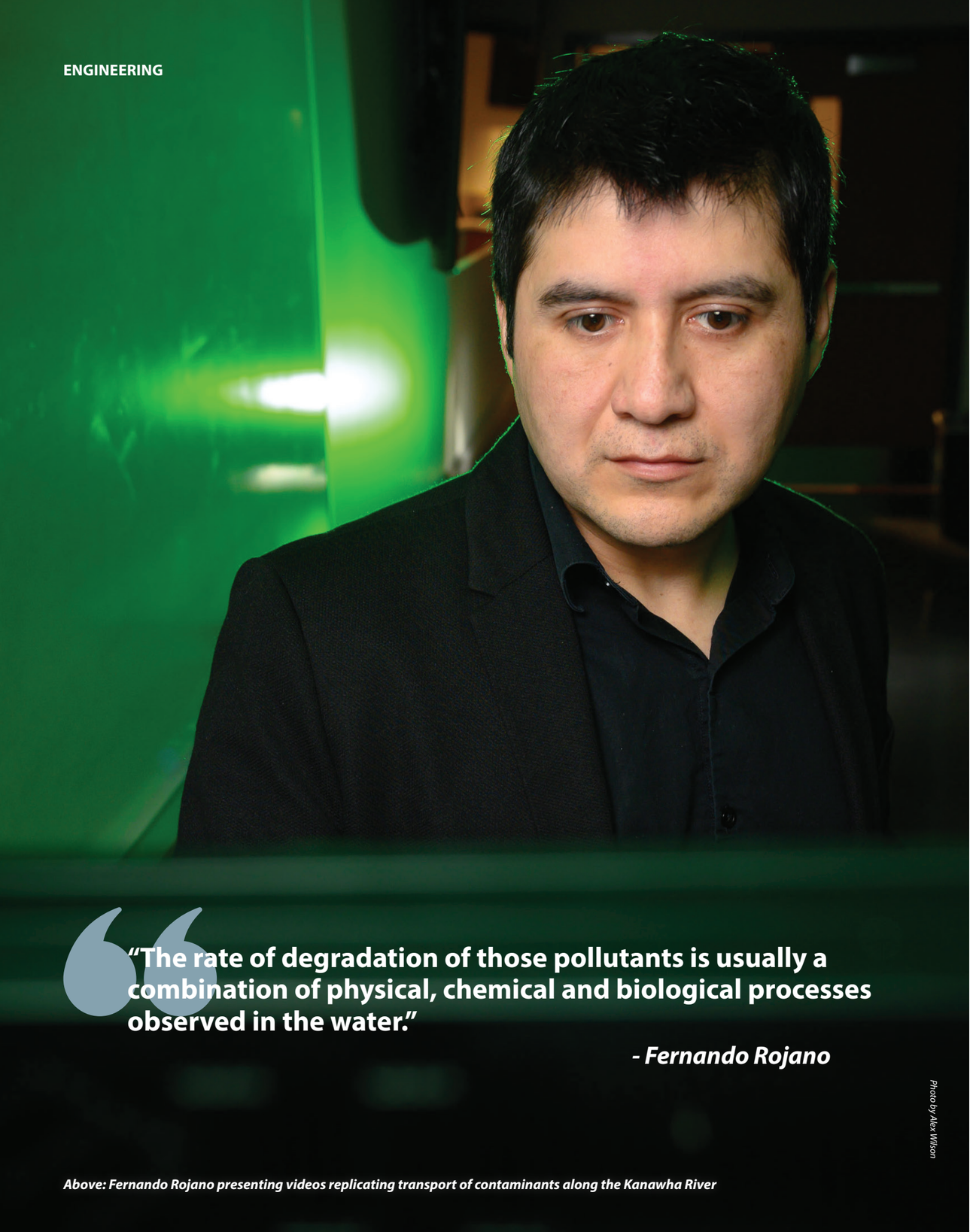


> **“The rate of degradation of those pollutants is usually a combination of physical, chemical and biological processes observed in the water.”**
>
> ***- Fernando Rojano***

Photo by Alex Wilson

Above: Fernando Rojano presenting videos replicating transport of contaminants along the Kanawha River

WVSU researcher provides visual representation of Kanawha River’s ecohydrologic processes

Written by **Angela Sundstrom**
Photos by **Alex Wilson**

Is it possible to solve a problem without actually seeing the issue? Fernando Rojano, Ph.D., brings clarity to the abstract by providing visual representation, specifically to the modeling of rivers.

Rojano, assistant research professor at West Virginia State University, was hired through the Appalachian Freshwater Initiative (AFI), a project supported by the National Science Foundation’s Established Program to Stimulate Competitive Research (EPSCoR) and administered through the West Virginia Higher Education Policy Commission’s Division of Science & Research. He has since been hired full-time.

AFI was formed in the aftermath of West Virginia’s 2014 water crisis when a chemical called crude 4-Methylcyclohexanemethanol (MCHM) leaked from a Freedom Industries storage tank into the Elk River, affecting the water supply for thousands of users in Kanawha County and beyond. Since then, a multidisciplinary research team working throughout the state has zeroed in on water quality issues.

“Mostly, my contribution is on one hand dealing with ecohydrology studies combined with hydrodynamics of the Kanawha River and on the other hand dealing with aquatic toxicology studies,” Rojano said.

Rojano

Photo by Alex Wilson

Ecohydrologic studies involve understanding how climate and land use alter water flows. This includes activities like agriculture and industry. Hydrodynamics can assist in the study of flows while revealing the transport and fate of pollutants.

“The rate of degradation of those pollutants is usually a combination of physical, chemical and biological processes observed in the water.”

This work can be accomplished by using computational tools, specifically models created on a computer capable of integrating all participating elements together. Once these tools are combined with data collected by the United States Geological Survey and the U.S. Army Corps of Engineers, a clearer picture can be seen including the identification of highly polluted areas, the rates of pollutants degradation and the overall ability of a river to restore water quality due to specific conditions in an aquatic ecosystem. Computational tools also provide the ability to assess potential scenarios including water quality changes related to storms and droughts as well as climate change.

To better understand an aquatic ecosystem, Rojano studies the effects of single and combined pollutants from acid mine drainage on microorganisms. He is particularly interested in the effects of these pollutants on both the diversity and abundance of microorganisms and their role in preserving the ecosystem.

Further research on the water quality dynamics of Appalachian rivers will benefit all West Virginians, according to Rojano, because it can establish the rivers’ ability to recover on its own while officials will be able to define management plans for improving the health of aquatic ecosystems and assessing the impact of pollution.

This type of research involves much collaboration. Rojano partners with other scientific specialists in chemistry and microbiology to effectively make predictions. This multidisciplinary approach appeals to him because it adds differing viewpoints.

"Environmental studies are commonly highly complex problems, and one perspective is not enough," Rojano said. "In that context, I have been committed to group with other researchers in this university as well as other institutions around the state to continue working on this matter."

Rojano earned his bachelor's degree in mechanical engineering from the University of Chapingo, Mexico, his master's degree in automatic control at the University of Querétaro, Mexico and his Ph.D. in biosystems engineering from the University of Arizona. He spent two years in France as a postdoctoral researcher in the Environmental Physics Lab at the Institute Agrocampus and was appointed as an academic researcher at the Institute of Ecology in Mexico.

Rojano found his way to West Virginia in 2018 after being recruited by Ulises Toledo, Ph.D., associate vice president for administration at West Virginia State University, who emphasized the need of using models to assess pollution's environmental effects.

"If you have a strategy, there is a way to improve the water quality. Whatever we do here is going to benefit many people."

"After exchanging some ideas and looking for a collaboration, I was invited for a short-term visit of six months," Rojano said. "That period was sufficient to make the decision about continuing my work on the project. I have found excellent colleagues helping to succeed in our ongoing research. I feel glad that I can contribute from the engineering perspective to the working group."

One of Rojano's prime motivations in life has been doing something for others. Preserving the environment often topped his list. Rojano believes that with proper planning and resources, real-world problems can be solved and lives improved.

"If you have a strategy, there is a way to improve the water quality. Whatever we do here is going to benefit many people."

Higher Education Policy Commission awards grants to assist faculty with equipment and curriculum improvements

Written by **Angela Sundstrom**

Faculty members at seven West Virginia colleges and universities were recently awarded approximately $150,000 in supplemental funding for scientific equipment and curriculum improvements.

West Virginia Science & Research (WVSR), a division of the West Virginia Higher Education Policy Commission (Commission), awarded six Instrumentation Grants and one Innovation Grant to eligible instructors and researchers across the state. These grants offer assistance to primarily undergraduate institutions to ensure students have the necessary modern resources for furthering their studies in science, technology, engineering and mathematics (STEM).

"Investing in our undergraduates will pay off in the future by better preparing them for graduate school and their future careers," said Jan Taylor, Ph.D., former director of science and research at the Commission.

Instrumentation and Innovation Grants are supported by the Research Challenge Fund, established by the West Virginia Legislature in 2004 to further build research capacity and competitiveness.

James Wood, Ph.D., assistant professor of biology at West Liberty University, received $19,864 to enhance aquatic ecology teaching and research in the upper Ohio River valley's streams and rivers.

Anna Edlund, Ph.D., associate professor of biology at Bethany College, received $20,000 to purchase instruments for sterilization of laboratory materials and the disposing of biohazard waste as well as training in the methodology of sterile technique.

Laura Robertson, Ph.D., associate professor of biology at Shepherd University, received $20,000 to purchase a Biolog GEN III MicroStation System to enable rapid biochemical identification and characterization of bacteria and filamentous fungi.

Matthew Scanlon, Ph.D., professor of chemistry at Fairmont State University, received $20,000 to purchase a new Nuclear Magnetic Resonance (NMR) spectrometer for the Forensic and Analytical Chemistry Technology (FACT) Center.

Kristy Henson, assistant professor of forensic science at Fairmont State University, received $12,806 for increasing engagement in forensic science curriculum with state-of-the-art technology.

Xiaoping Sun, Ph.D., professor of chemistry at the University of Charleston, received $17,000 to purchase a Fluorescence Spectrophotometer.

Hong Yin, Ph.D., assistant professor of chemistry at Concord University, received $40,000 to purchase a Nuclear Magnetic Resonance (NMR) spectrometer with capability to characterize full molecular structure.

Top row, left to right: James Wood, Anna Edlund, Laura Robertson. Middle row, left to right: Matthew Scanlon, Kristy Henson, Xiaoping Sun. Bottom Row: Hong Yin

Photos courtesy of West Liberty University, Bethany College, Shepherd University, Fairmont State University, University of Charleston and Concord University

Above: Allison Wolf, a postdoctoral fellow in the WVU School of Medicine, is investigating ways to make whooping cough vaccines more effective, for longer. One possible way is through a nose spray instead of a shot.

WVU researchers are taking the whoop out of whooping cough

Written by **Stacey Elza**

The whooping cough vaccine for babies and young kids—called "DTaP"—came to the United States in 1996. That year, people were still using dial-up internet connections to look up Spice Girls lyrics on Ask Jeeves.

Much has changed since then, but the whooping cough vaccine has not. West Virginia University researchers Allison Wolf and Dylan Boehm want to reboot it.

Using animal models, they investigated whether an update of DTaP could strengthen the immune system's attack on Bordetella pertussis, the bacteria that causes whooping cough. They also explored whether a vaccine "nose spray" measured up to a conventional injection. Their results, published in npj Vaccines, are promising.

Whooping cough—or pertussis—is a serious respiratory infection that causes violent coughing fits, and is particularly life-threatening for infants and young children. That's why the Centers for Disease Control and Prevention (CDC) recommends that babies receive their first dose of DTaP when they're 2 months old. The CDC recommends a boost of Tdap—a different version of the vaccine—when children turn 11.

Although DTaP causes fewer side effects than an even older version of the whooping -cough vaccine did, it also wears off faster. That means booster shots have to be more frequent. But not everyone who's due for a booster shot gets one on schedule, or at all.

"There is evidence that new strains of pertussis are emerging, and these strains do not have components of our current vaccine," said Wolf, a postdoctoral fellow in the WVU School of Medicine's Department of Microbiology, Immunology and Cell Biology. "That might play a partial role in the reemergence of pertussis in the United States and around the world."

To find a way around these problems, Wolf and Boehm explored an unconventional way to administer DTaP: a nose spray. After all, as Boehm said, "That's how you would encounter the bacteria in its normal infectious route." Someone would cough, and you'd inhale the germs they released into the air.

The next question is, "How long will this protection last?"

"Eleven-year-olds are required to get a Tdap, but adults aren't required to until they get a booster for tetanus or they're pregnant," said Heath Damron, Ph.D., who directs WVU's Vaccine Development Center. "Only about a quarter of adults get a boost."

This research was supported by the National Institutes of Allergy and Infectious Diseases of the National Institutes of Health and by the West Virginia University Vaccine Development Center (VDC). The VDC is funded by the West Virginia Higher Education Policy Commission's Research Challenge Fund.

Photo courtesy of West Virginia University

Marshall biological sciences graduates publish research on effects of water contaminants

Written by **Jean Hardiman**

Marshall University graduates and faculty member Philippe Georgel, Ph.D., of the Department of Biological Sciences in Marshall's College of Science have published research on the effects of emerging contaminants in major waterways, including the Ohio River. Their study, published in the journal "Water," was supported by the National Science Foundation and the National Institutes of Health.

Their research involved bioinformatics analysis to investigate the effects of endocrine-disrupting chemicals — such as insecticides, pesticides, and detergents — and the opioid buprenorphine. They found that these contaminants significantly altered expression of specific genes, representing a serious health threat to biological functions, such as reproduction as well as cellular differentiation. Their study also indicated that endocrine-disrupting chemicals were responsible for increased DNA damage, a potential cause of cancer.

"The presence of endocrine-disrupting chemicals (EDCs) in our local waterways is becoming an increasing threat to the surrounding population," said their study in "Water," an open access journal published through MDPI.

"From our study, we outlined that, in addition of the expected effects of EDCs on hormonal functions, these chemicals appear to have potential carcinogenic activity through their ability to increase DNA damage," said Georgel, a professor of biological sciences. "What our investigation did not fully delineate is the results of daily exposure to a combination of such chemicals in our water sources. It has become evident that the use of various EDCs in our daily life has some very serious ramifications on multiple aspects of human health and will require more in-depth analysis and possibly stricter regulations to avoid an ecological disaster."

The bioinformatics section of the study was initiated and spearheaded by James Kessler, who started working on this project as a freshman in Marshall's Department of Biological Sciences and is now pursuing his graduate degree in Edinburgh, Scotland. Kessler collaborated with former Marshall classmates Ramin Garmany, also a former student of the Department of Biological Sciences who is now starting his second year as a M.D.-Ph.D. student at the Mayo Clinic in Rochester, Minnesota; Dr. Diane Dawley, a graduate of the Marshall University Joan C. Edwards School of Medicine who is currently working as a resident at Eastern Carolina University; and Daniel Crow, who is working on his M.D. at Marshall's Joan C. Edwards School of Medicine.

Above: Amina Kunovac (right) works with her mentor John Hollander, Ph.D., in his lab as they research engineered nanomaterial, such as particles found in cosmetics, food and medical materials.

From refugee to researcher: WVU graduate student focuses on harmful particle exposure

By **Wendy Holdren**

Nearly two decades ago, Amina Kunovac sat in a room in Croatia with an interviewer and a translator.

The interviewer asked her, "What do you want to be when you grow up?" The scared 7-year-old replied, in Bosnian, that she wanted to be a dentist.

It was 2001, seven years after the end of the ethnically-rooted Bosnian War.

Kunovac's father worked as a bus driver, and without options for child care, her mother struggled to find a job. Kunovac remembers school as a refuge, a place where she could go to take her mind off the dismal, post-war surroundings.

Her parents decided to apply to relocate to the United States through a refugee organization. They wanted a shot at better opportunities. Their family interview was the third and final step in the process.

As the team was making their decision, Kunovac, along with her mother, father and older brother, took a trip to a nearby zoo to pass the time. When they returned, they learned their lives were about to change — they were being relocated to the United States.

Over the next few months, the family packed their bags, said their farewells to loved ones and tried to prepare for the transition as best they could. Kunovac remembers frantically trying to learn English from one of her brother's books, which covered basics, like greetings and colors.

"My parents couldn't help me, and my brother didn't know much English either," she explained. "I went into second grade, and he went into fifth (when we moved to America)."

Learning English was tough, Kunovac said, but within three months, she and her brother were already excelling in their classes in public school in New Jersey. Although she remembers the transition as scary and somewhat challenging, she says being in the United States, and at West Virginia University, has provided her educational and career opportunities she knows she never would have had otherwise.

Ever since she can remember, Kunovac wanted to go into the medical field. At first, she thought dentist. Later, she thought physician.

But during her undergraduate studies in biology and forensic science at the University of New Haven in Connecticut, she found her true passion in research — a way to explore the "why" behind so many bio-medical questions. Kunovac's interest in research is what ultimately led her to the WVU Biomedical Sciences Graduate Program.

"The research our lab does has the potential to make a huge impact," she said. "The idea that something I do in the lab could affect the lives of millions of people, that really drives me."

Now in her third year as a doctoral student in exercise physiology, Kunovac is a graduate research assistant in the lab of John Hollander, Ph.D.. She's found a particularly interesting area of research — exposure to engineered nanomaterial (particles found in cosmetics, food and medical materials) — which led her to apply for and receive an American Heart Association Predoctoral Fellowship.

Specifically, Kunovac's research aims to assess the cardiovascular health of the offspring when exposure to these particles occurs during pregnancy.

"While the use of nanomaterials can be beneficial, understanding their interactions within the body is important," she explained. "I focus on titanium dioxide, which is one of the most prevalent nanomaterials used in consumer products. It's found in makeup and lotions, like sunscreen. It's used for its photocatalytic properties, to give color, or in sunscreen, to protect against UV rays."

Kunovac said when someone inhales these particles, it can cause serious effects on the cardiovascular system. Further, her research has found exposure during pregnancy can cause harmful effects to the fetus. Exposure also alters genetic material in the fetus, and cardiac dysfunction remains through young adulthood.

Next, Kunovac will explore whether antioxidants can help prevent the exposure damage. The AHA Predoctoral Fellowship directly funds her research, along with conference support, which will help her develop collaborations.

"This research is important for development of safe exposure levels which will allow the Occupational Safety and Health Administration to develop proper guidelines for use to ensure the safety of workers and consumers," she said.

Photo courtesy of West Virginia University

First2 Network announces summer immersion program

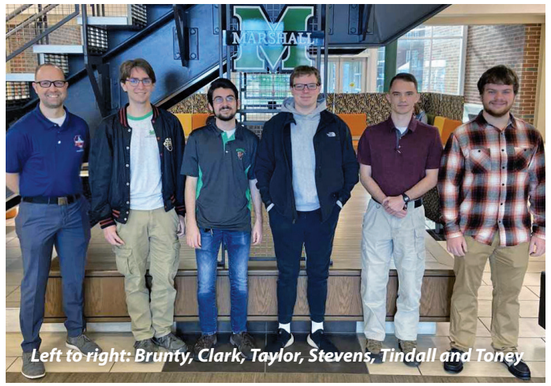
By **Michael Fultz and Angela Sundstrom**

First2 Network (First2) announced a new set of research immersion experiences available for undergraduate students and rising freshmen.

First2, a grassroots effort aiming to improve the college enrollment rate and success of undergraduate science, technology, engineering and mathematics (STEM) students during their first two years of college, with an emphasis on rural first-generation students, will support a Summer Immersion Program for students to gain hands-on research experience. Based on the demand for 2019, the program will expand to 101 students at nine sites. The purpose of these two week programs is to help students gain knowledge in research, academic services, STEM careers and college persistence.

Nine program sites were selected including Fairmont State University, Green Bank Observatory, High Rocks Educational Corporation, Marshall University, University of Charleston, West Virginia School of Osteopathic Medicine, West Virginia State University, West Virginia University and West Virginia University Institute of Technology. Each site will employ multiple experienced undergraduate students to act as mentors.

Applications are now available. For more information, visit first2network.org.



Left to right: Brunty, Clark, Taylor, Stevens, Tindall and Toney.

Marshall's Collegiate Cyber Defense team places in top 10 of National Cyber League Team competition

Team members included A.J. Clark, Philip Taylor, Peyton Stevens, Neale Tindall and Colton Toney. The team is led by Josh Brunty, associate professor of digital forensics and information assurance in Marshall's College of Science.


Thompson

WVU engineering professor named Fellow of the National Academy of Inventors

Greg Thompson, Ph.D., associate professor of mechanical and aerospace engineering at West Virginia University, has been named a fellow of the National Academy of Inventors, which is the highest professional distinction accorded solely to academic inventors.


Cooper

Marshall University Ph.D. student earns prestigious research fellowship

Skylar Cooper, a biomedical research graduate student at Marshall University, was awarded the Pharmaceutical Research and Manufacturers Association (PhRMA) Foundation fellowship. This award supports Cooper's thesis research, focused on the effects of electronic cigarette flavors on nicotine addiction.


Risher

Marshall University scientist earns national support for NAS research

The work of Marshall University neuroscience researcher, W. Christopher Risher, Ph.D., on neonatal abstinence syndrome (NAS) was selected for the Research Partner Program through the Brain & Behavior Research Foundation.

Photos courtesy of Marshall University and West Virginia University

COMMENTARY: Anne Barth

The importance of capturing federal research dollars for small businesses in West Virginia

TechConnect West Virginia considers the Small Business Innovation Research and Small Business Technology Transfer (SBIR-STTR) program one of the most important tools for growing and diversifying West Virginia's economy.

The multi-billion dollar SBIR-STTR program is a highly competitive program that encourages domestic small businesses to engage in Federal Research and Development that has the potential for commercialization. SBIR-STTR awards let small businesses explore their tech potential and provide the incentive to profit from its commercialization.

"Researchers at West Virginia's colleges and universities who are working on projects that have the potential for commercialization should consider the benefits of the SBIR-STTR program, which is a non-dilutive funding source."

In short, the Federal government secures the R&D it needs as small businesses get help offsetting the cost of the R&D while still controlling their intellectual property. Researchers can leverage federal dollars to test new products and services with the goal of establishing new businesses and creating jobs.

Researchers at West Virginia's colleges and universities who are working on projects that have the potential for commercialization should consider the benefits of the SBIR-STTR program, which is a non-dilutive funding source. TechConnect is working in partnership with the West Virginia Small Business Development Center to provide technical assistance for those who are interested in securing early stage seed funding to bring new products, services and technologies to market.

Companies winning an SBIR Phase-I award receive up to $150,000 to test their concept. Companies winning an SBIR Phase II award can receive up to $2 million to further test and commercialize their research. The program is often called "America's Largest Seed Fund" for good reason.

West Virginia, traditionally, has had a low number of applicants for these programs. When West Virginia firms do apply, they are just as successful at winning SBIR-STTR awards as businesses from any other state. To impact the economy, however, we need more firms to apply.

TechConnect West Virginia, in partnership with the West Virginia Small Business Development Center, is leading a new program called Bridging the Ecosystem in Science & Technology in West Virginia to increase awareness of the benefits of applying for the federal SBIR-STTR programs while also providing financial and technical assistance to help companies and researchers do so.

The "Best in West Virginia" program is made possible by funding from the Federal and State Technology Partnership Program of the U.S. Small Business Administration. It features SBIR-STTR bootcamps across the state through August of 2020 to provide counseling and guidance for applicants, identify resources to assist in application and registration to apply and more.

In addition to educational activities offered through Best in West Virginia, the State of West Virginia launched an SBIR-STTR matching fund in January 2020 which provides even more incentive for small businesses to explore the program.

Increasing the number of SBIR-STTR applications from West Virginia will lead to more awards, which in turn will lead to the establishment of new ventures and new jobs. Most importantly, it will help diversify and grow West Virginia's economy.

Anne Barth is the Executive Director of TechConnect West Virginia, a statewide economic development organization focused on driving innovation, cultivating entrepreneurship and creating greater economic diversity.

Photo courtesy of Anne Barth

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