the NEURON

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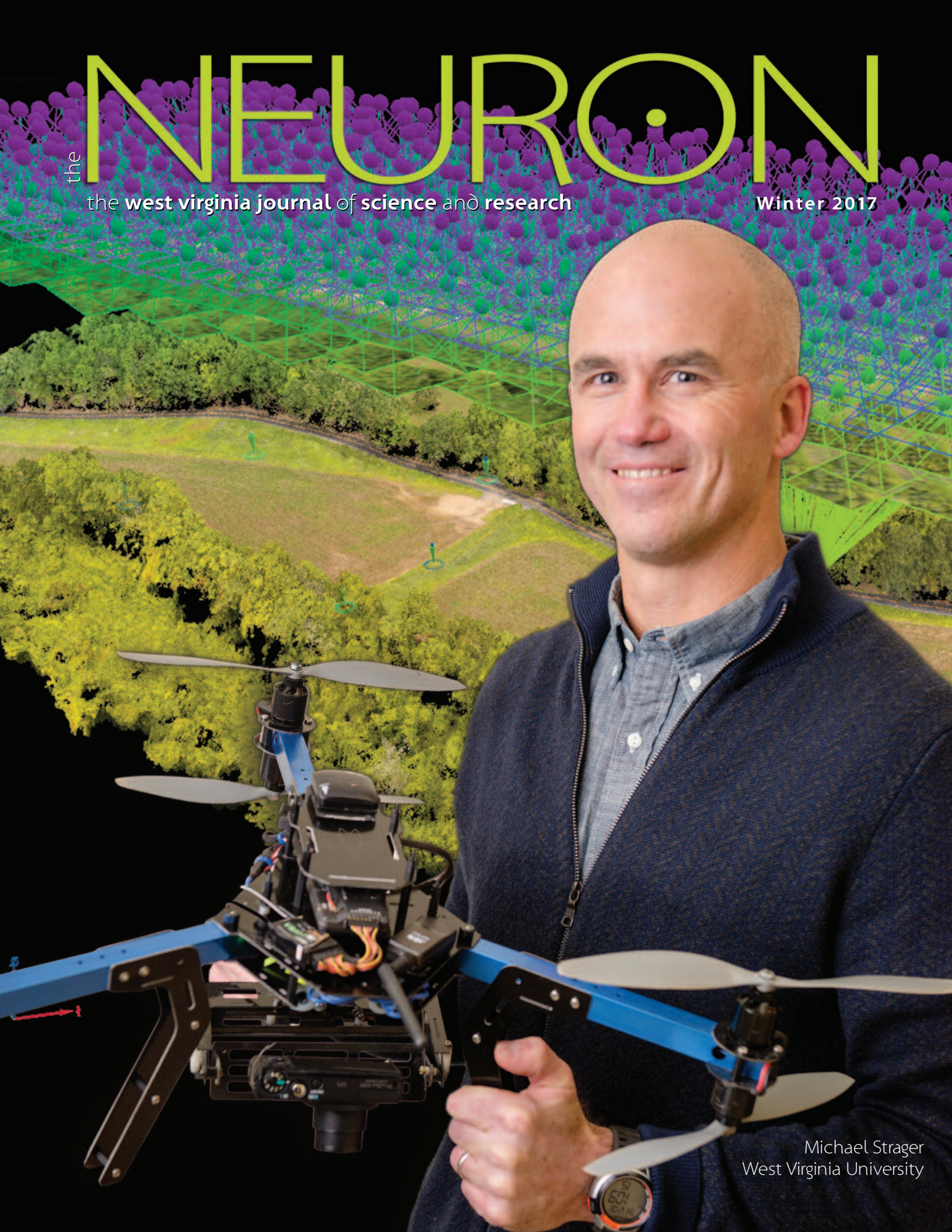

Michael Strager
West Virginia University

A stream of potential

Dr. Michael Strager

West Virginia University

Growing up, Michael Strager was no stranger to water. He lived near the banks of the Monongahela River just outside of Pittsburgh, Pennsylvania. Unfortunately, though, the water was so polluted that he never participated in any water-related recreational activities. Instead he waited all year for summer weekends, when his family traveled to a Northwest Pennsylvania lake where he could fish, water ski and swim to his heart's content. This paradox stuck with him as he grew.

"I always wondered why there was this stark difference in water quality," he said.

Strager, an associate professor in the Davis College, School of Natural Resources at West Virginia University (WVU), used childhood experience and curiosity to steer him into the field of environmental science in order to explore this and other important questions. In his academic career, he integrates environmental economics and spatial data analysis to analyze the tradeoffs in regard to managing natural resources – specifically water.

Strager said, "What I try to do is describe or model different alternative scenarios and present these to decision-makers."

The decision-makers he refers to are in organizations like the West Virginia Department of Environment Protection, the West Virginia Division of Natural Resources, conservation groups and even corporations looking to do business near water sources.

Most of his work has been geared toward the development of computer-based decision support systems that analyze water quality, quantity or aquatic life goals. For example, one such system was implemented in West Virginia after the 2014 chemical spill which severely affected the city of Charleston and nine counties. Zones of concern were delineated upstream of the surface water intakes throughout the state to help protect public water sources from future spills.

The spatial aspect of his analysis requires integrating new and innovative technologies. As part of a West Virginia's current National Science Foundation EPSCoR Research Infrastructure Improvement grant, which is administrated by the West Virginia Higher Education Policy Commission's Division of Science and Research, he is using drones, or Unmanned Aerial Vehicles (UAVs), to gather data about watershed conditions.

Photos by Alex Wilson

about West Virginia science and research

The Neuron is produced by the WV Higher Education Policy Commission's Division of Science and Research. The Division coordinates federal and state scientific research grants, including WVEPSCoR, to academic institutions in West Virginia and conducts outreach activities to broaden the public's understanding of science, technology, engineering and mathematics (STEM). Visit **www.wvresearch.org** for more information.
Editor, Amanda Ramey (amanda.ramey@wvresearch.org).

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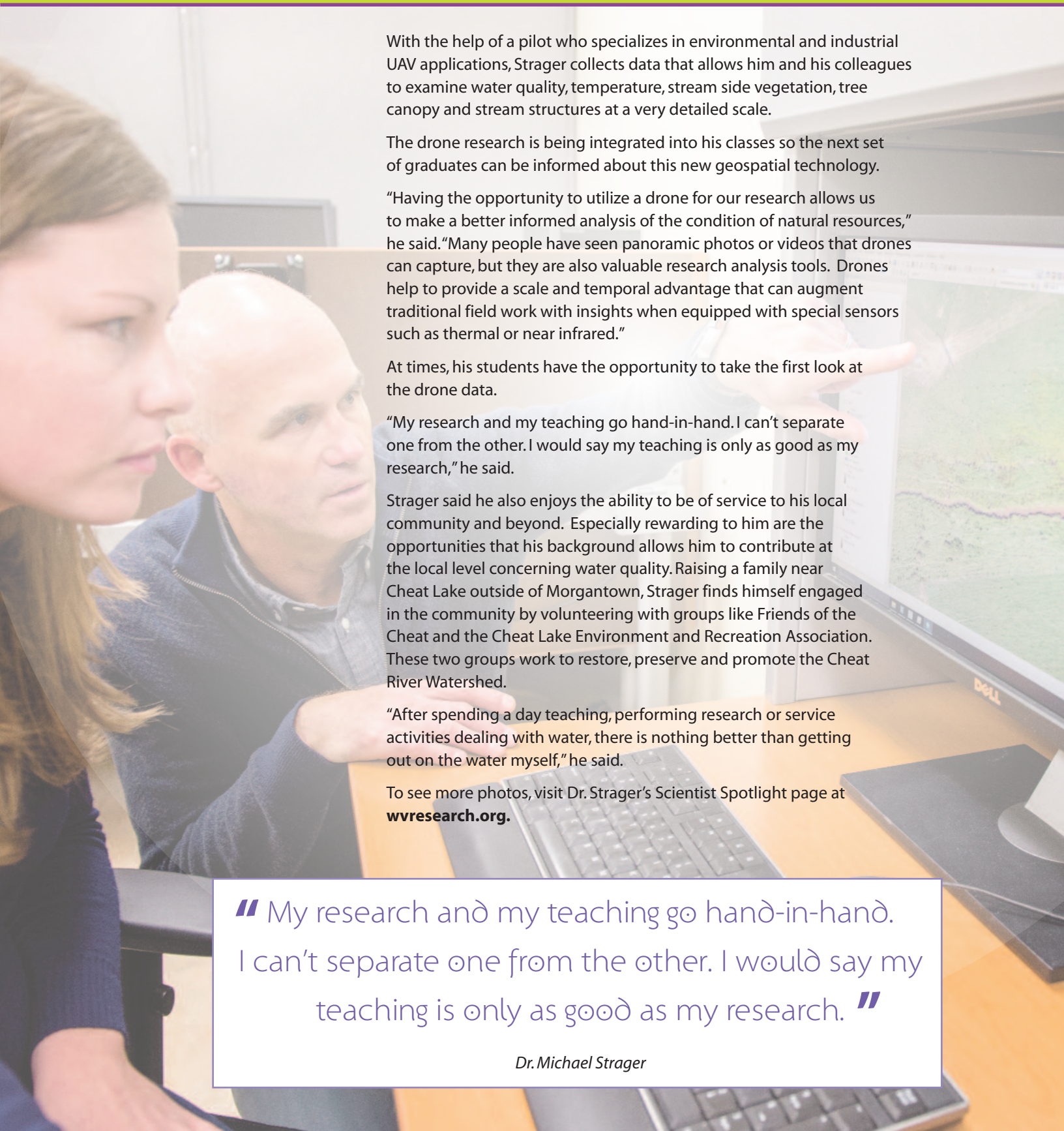

With the help of a pilot who specializes in environmental and industrial UAV applications, Strager collects data that allows him and his colleagues to examine water quality, temperature, stream side vegetation, tree canopy and stream structures at a very detailed scale.

The drone research is being integrated into his classes so the next set of graduates can be informed about this new geospatial technology.

"Having the opportunity to utilize a drone for our research allows us to make a better informed analysis of the condition of natural resources," he said. "Many people have seen panoramic photos or videos that drones can capture, but they are also valuable research analysis tools. Drones help to provide a scale and temporal advantage that can augment traditional field work with insights when equipped with special sensors such as thermal or near infrared."

At times, his students have the opportunity to take the first look at the drone data.

"My research and my teaching go hand-in-hand. I can't separate one from the other. I would say my teaching is only as good as my research," he said.

Strager said he also enjoys the ability to be of service to his local community and beyond. Especially rewarding to him are the opportunities that his background allows him to contribute at the local level concerning water quality. Raising a family near Cheat Lake outside of Morgantown, Strager finds himself engaged in the community by volunteering with groups like Friends of the Cheat and the Cheat Lake Environment and Recreation Association. These two groups work to restore, preserve and promote the Cheat River Watershed.

"After spending a day teaching, performing research or service activities dealing with water, there is nothing better than getting out on the water myself," he said.

To see more photos, visit Dr. Strager's Scientist Spotlight page at **wvresearch.org.**

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> *Dr. Michael Strager*

> "This grant will enable us to do something that has not been done before in our region; that is establishing sustainable funding for people who work at the grassroots level."
>
> *Dr. Richard D. Crespo*

Marshall's School of Medicine receives **$1.3 million grant** for **health care in coal-impacted counties**

Dr. Richard D. Crespo, professor and longtime researcher in the department of family and community health at the Marshall University Joan C. Edwards School of Medicine, recently received a $1.3 million federal grant to continue healthcare work in coal-impacted communities in West Virginia, Kentucky and Ohio.

The Appalachian Regional Commission grant is directed towards high-risk diabetes patients and will fund establishing care coordination teams that include community health workers (CHWs) as part of the team.

The grant will support more than two dozen CHWs who will work with patients in their homes and communities, equipping them with self-management skills to control their condition. Partners in this grant are health insurance companies, with the long-term goal of providing reimbursement that sustains CHW employment.

"This grant will enable us to do something that has not been done before in our region; that is establishing sustainable funding for people who work at the grassroots level," Crespo said.

For two decades, Crespo has directed diabetes translational programs across southern West Virginia and the Appalachian region through the Robert C. Byrd Center for Rural Health and the School of Medicine at Marshall. Working with onsite health care providers in the highly affected regions, Crespo has been successful in creating coalitions to implement evidence-based programs that support long-term changes.

"Dr. Crespo understands the dynamics of healthcare in the under-served areas of our state," said Stephen Petrany, M.D., chair of the department of family medicine. "This grant provides operational money to assist in the expansion of the programs already in place by training new workers to implement the existing successful strategies."

BSC faculty researcher receives **$420K grant** from **National Institutes** of **Health**

Dr. Tesfaye Belay

Dr. Tesfaye Belay, Professor of Biology at Bluefield State College, was recently awarded an Academic Research Enhancement Award (AREA) from the National Institutes of Health (NIH) in the amount of $420,000 over three years. The grant provides support for his research on chlamydia genital infection in a mouse model.

This award represents significant advances in the career of Belay, the research at Bluefield State College and the NIH-funded West Virginia-IDeA Network of Biomedical Research Excellence (WV-INBRE) program, of which Dr. Belay is a 10-year fellow.

One goal of WV-INBRE is to support promising biomedical research at WV-INBRE consortium schools so that pilot data can be collected to support researchers' direct requests to federal funding agencies.

"WV-INBRE gave me the opportunity to develop the grant," Belay explained. "The experience my students and I were able to gain through prior WV-INBRE-funded research has been essential in receiving this major grant. The NIH award is an indication of Bluefield State College's increasing research capability and performance." Belay continued, "The grant provides an opportunity to involve three students in research this year, which will prepare them to enter graduate school or secure positions involving research as a career."

WVU sending **two teams** to **first-ever NASA Mars Ice Challenge**

Two teams from West Virginia University (WVU) have been selected to participate in the first-ever Mars Ice Challenge, a special edition competition under NASA's Revolutionary Aerospace Systems Concepts – Academic Linkage brand of competitions. The Mars Ice Challenge is a technology demonstration competition that seeks revolutionary methods to drill into and extract water from simulated Martian subsurface ice stations.

Dr. Powsiri Klinkhachorn, professor of computer science and electrical engineering leads the WVU MIDAS, or Mountaineer Ice Drilling Automated System, team. Dr. Thomas Evans, research associate professor in mechanical and aerospace engineering, leads WVU's In-Situ Resource Extraction System team.

To participate, interested teams submitted project plan proposals containing innovative designs for drilling and water extraction systems on Earth that could be modified for use on Mars. Only eight universities in total were selected to participate, and WVU is the only university to have two teams chosen.

The teams must demonstrate appropriate progress and successfully pass a mid-project review in April to be invited to NASA Langley Research Center next June. While at NASA, teams will test their drilling systems on simulated Martian subsurface ice stations, solid blocks of ice covered with a mixture of clay and gravel approximately one meter deep. Teams will compete to extract the most water from the ice station.

Recent discoveries of what are thought to be large ice deposits just under the surface on Mars have NASA engineers working on ways to extract water from the ice deposits, which could enable a sustained human presence on Mars.

WVU and Marshall professors work together to create cost-effective bridge construction system

A civil engineering professor from West Virginia University (WVU) and one of his former students, who is now on the faculty at Marshall University, have teamed up to create a cost-effective bridge construction system for short-span steel bridges.

Karl Barth, Samples Professor of Civil and Environmental Engineering at WVU, and his former doctoral student, Greg Michaelson, an assistant professor in the Weisberg Division of Engineering at Marshall, have introduced a new type of tub girder that requires less fabrication and installation time than conventional bridge systems. The two are working in conjunction with the Short Span Steel Bridge Alliance (SSSBA).

According to Barth, the technical working group, which is made up of more than 30 partners from the steel industry, academia, government organizations and bridge owners, took the pressed-brake-formed tub girder (PBTG) system from idea to reality within three years.

"The Federal Highways Administration (FHWA) issued a challenge to us in 2009 to develop a cost-effective accelerated bridge construction system for steel bridges 140 feet or less," Barth said. "This led to the development of an online tool, eSPAN140, which has been successfully employed for a number conventional bridge designs. We also explored a variety of concepts for accelerated bridge construction and settled on the tub girder system because it requires none of the expensive fabrication of traditional systems and uses less material."

The system offers several advantages over traditional short span steel bridge solutions.

"The girder itself, which is available from the steel mill in standard plate thicknesses and widths, is simple to fabricate, requiring very little welding — one girder can be produced in 45 minutes," Barth said. "Because of the system's modular composite design, there is a reduced need for additional details such as stiffeners or cross-frames. The composite unit can also be easily shipped to the bridge site, allowing for accelerated construction and reduced traffic interruptions."

One of the challenges the research team faced before initial testing could be conducted was that they had to develop preliminary girder capacity predictions and evaluate potential efficiencies for a variety of potential configurations. The experimental testing was conducted at WVU. Michaelson collaborates on these efforts, assisting with data analysis, modeling and field-testing efforts.

Michaelson said, "It's exciting to see all the interest in the system from owners, fabricators and engineers. One of the key strengths of the system is its ability to be standardized. We have a lot of work ahead of us, but the system has remarkable advantages in mass applications."

According to the SSSBA, the system offers as much as a 50 percent reduction in fabrication costs, compared to proprietary cold-formed box-girder systems.

A grant from the FHWA's innovative bridge research program funded the first PBTG bridge in Buchanan County, Iowa; it was completed in January. The bridge is providing valuable data to the research team, which is conducting additional testing to measure performance and identify further efficiencies that can be realized for future designs.

Barth noted that three additional bridges are planned for 2017, with two scheduled for West Virginia, in Monongalia and Wayne counties, and one in Ohio in Muskingum County.

"There are others on the horizon as well," Barth said. "We have also had discussions regarding deploying this system in both Canada and Mexico."

West Virginia State University teams with China for **agricultural research**

A research scientist from West Virginia State University (WVSU) recently visited China to facilitate collaborations on research that would strengthen disease resistance in watermelon crops. Dr. Umesh K. Reddy was invited as a distinguished scientist by the Chinese government to advise researchers at the Zhengzhou Fruit Research Institute of the Chinese Academy of Agricultural Sciences and the Beijing Vegetable Improvement Center on how they can incorporate disease resistance and increase fruit quality.

The institutions will soon begin a project seeking to identify genes resistant to Fusarium wilt, a fungal disease devastating to fruit quality. Such work will aid the state's farmers in being able to produce stronger, healthier crops. The group looks to publish results of the project in late 2017.

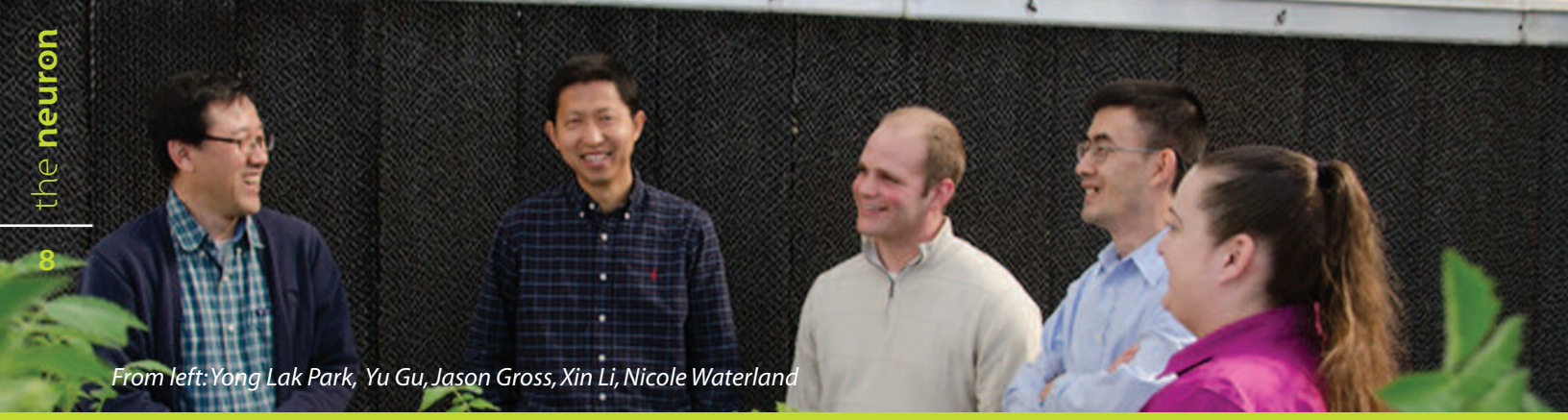
"Our research on grafting and seedless watermelons here at West Virginia State University could greatly impact the Chinese watermelon breeding program," said Reddy. "It was an honor to be able to share our work firsthand and begin to collaborate on a larger scale."

Reddy's team conducts research with vegetable grafting to improve crop yield. Fruit and vegetable grafting involves attaching the top part of one plant with the root system of another, which contributes to growth and disease resistance. Reddy presented his project's findings on the trip and toured Chinese facilities.

China is currently the largest producer of watermelons, claiming 57 percent of the world's production Reddy said. He added that Zhengzhou province has 250,000 acres of watermelon production alone, more than double the production area in the U.S.

Genomics research led by Reddy and Dr. Padma Nimmakayala at WVSU has been published in such prestigious scientific journals as *BMC Genomics; Journal of Heredity; Euphytica; Molecular Breeding; G3: Genes, Genomes, Genetics* and the *Journal of Experimental Botany*.

Dr. Umesh K. Reddy (left) visits with researchers in China to discuss collaborations on disease resistance and increased fruit quality of watermelons.



From left: Yong Lak Park, Yu Gu, Jason Gross, Xin Li, Nicole Waterland

WVU team transitions robot from rover to pollinator

More than 150 food crops in the United States require pollination to produce. Pollinators come in all shapes and sizes and if a research team from West Virginia University (WVU) has its way, they may also one day come in the form of a robot. And it's not just any robot; it's Cataglyphis, the winner of the Sample Return Robot Challenge, which was part of NASA's Centennial Challenge.

Yu Gu, assistant professor of mechanical and aerospace engineering, will lead a team of researchers as they attempt to turn the robot into a precision pollination robot. The three-year study is being funded by a more than $700,000 grant for the first two years from the National Robotics Initiative, a multi-agency effort that includes the National Science Foundation, NASA, the National Institutes of Health, the U.S. Department of Agriculture and the Department of Defense.

The former collection basket on Cataglyphis will be turned into a robotic arm that will be used for precise flower manipulation including pollination. It will be tested in a greenhouse environment on bramble fruit, most notably blackberries and raspberries.

"Approximately $24 billion worth of crops per year in the U.S. rely on pollination by various pollinators," said Park. "However, the recent decline of honey bees has greatly threatened productivity and the shortages of pollinators in the U.S. have significantly increased the cost of farmers' renting them for pollination services."

Through the use of computer vision algorithms, which use image and video data to control the robot's function, the robot will be able to estimate the flower position, size, orientation and physical condition, and to guide the robotic arm to capture and interact with flowers. A set of soft brush tips, mimicking bee's hairs and motion, will then be used to pollinate the flowers.

The design parameters of the delicate robot-flower interface will be driven by a series of insect pollination experiments. The precision rover navigation, mapping and localization of individual flowers within complex greenhouse environments will be provided through a sensor fusion algorithm.

"A database will be automatically generated and updated by the robot, recording the history of flower development and pollination status," Gu said. "This intelligent system will allow more selective, consistent and uniform pollination, which has the potential of leading to better fruit set and production at a large scale."

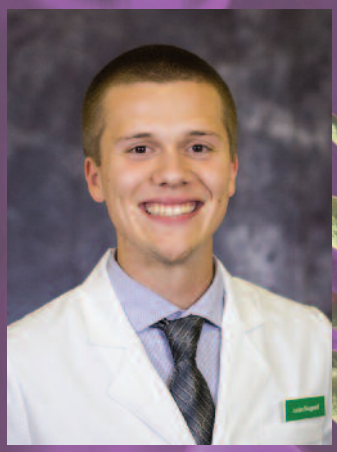
The final evaluation of the prototype pollinator robot's effectiveness will be performed in WVU's Evansdale Greenhouse during the third year of the project.

"Blackberries and raspberries will be grown in the greenhouse under ambient light," Gu said. "Four methods of pollination—bee pollination, manual pollination, autonomous robot pollination and mixed human-robot teaming on pollination—in addition to no pollination, will be performed and the efficiency of each pollination method will be compared."

The effectiveness of pollination will be evaluated by determining the fruit yield per plant, fruit size, fruit weight, harvest time and overall distribution of fruit across a plant.

"Although the proposed experiments will only be focused on pollination, the technology can be further adapted for many other precision agriculture applications," Waterland said. "Toward the end of the project, we will identify and work with 17 commercial partners to transition the developed precision robotics technology into real productivity in the agriculture field."

Timothy E. Long



Jordan G. Sheppard

Pharmacy research team identifies **possible new compound** in **fight against superbugs**

Jordan G. Sheppard, a third-year Marshall University School of Pharmacy student, along with school of pharmacy assistant professor Dr. Timothy E. Long, published research findings in the journal, Bioorganic & Medicinal Chemistry Letters, from an initial study which shows promise for a new tool in the fight against multidrug-resistant superbugs.

Among the most dangerous superbugs are those that the Centers for Disease Control has identified as ESKAPE bacteria that cause infections like methicillin-resistant Staphylococcus aureus, commonly known as MRSA.

"Our research shows that certain manipulation of a widely-available, broad-spectrum antibiotic is effective against MRSA and other Gram-positive organisms," Long said. "This finding is important because it identifies an already FDA-approved antibacterial that can be utilized in a different form to tackle one of the world's most pressing medical issues."

Long says this proof of concept study is foundational to future investigations looking at other existing drugs that could be revised to attack superbugs.

The work was conducted last summer by Long and Sheppard through the Marshall University School of Pharmacy's Faculty Research Support Program.

"Antibiotic resistance is one of the most urgent issues in the medical field, and this research has given us a chance to develop new ideas for combating it," Sheppard said. "Marshall University's School of Pharmacy has many professors who are eager to work with students on their research projects that cover a wide variety of topics, both scientifically and clinically."

According to the Pew Charitable Trusts, the last new major class of antibiotics was invented in 1984. Researchers like Sheppard and Long are hopeful that variations of those older antibiotics will be the answer to the superbug crisis.

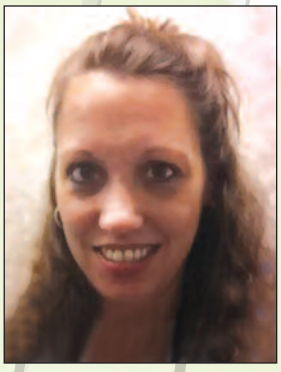
Shepherd's President Hendrix continues **cancer research via live video feed**

Mary J.C. Hendrix

Shepherd University President Dr. Mary J.C. Hendrix is able to continue her cancer research from her office via a live video feed that links her to a research team in Morgantown. Her research lab is now located at West Virginia University's (WVU) Cancer Institute.

Hendrix's computer is equipped with a camera that will provide a live video feed via Skype between her office at Shepherd and the lab in Morgantown. There are also cameras in the WVU lab, including on the microscopes, so Hendrix will be able to see the research as it is going on. Through the open portal, Hendrix will be able to interact with her researchers Dr. Elisabeth A. Seftor, Dr. Richard E.B. Seftor and Naira V. Margaryan. The research team moved to WVU from Northwestern University in Chicago.

Hendrix discussed the ongoing cancer research with Seftor, Seftor, Margaryan and WVU President Gordon Gee during a demonstration of the live video feed. She said classes at Shepherd will have access to the video feed to supplement their curriculum and that moving the lab to West Virginia will benefit both universities.



Kelly Beatty

Forensic Science faculty member to sit on **CAP committees**

Marshall University Forensic Science program assistant professor Kelly Beatty has been named to two College of American Pathologists (CAP) committees: the American Association of Blood Banks (AABB) Relationship Stands Committee and the College of American Pathologists Histocompatibility/Identity Testing Committee.

"I am honored to be participating with organizations committed to enhancing quality in forensic science," Beatty said.

The AABB Relationship Stands Committee edits and writes the AABB relationship standards, which are used for the assessment of labs seeking AABB Accreditation for relationship testing. The members of the College of American Pathologists Histocompatibility/Identity Testing Committee contribute to the development, maintenance testing programs and continuing education in the field of forensic science.

Beatty has been a DNA analyst at the Marshall University Forensic Science Center for 16 years and just recently became an assistant professor in the forensic science program. She has conducted continuing education trainings, locally and nationally, since 2010 and is considered an expert witness with testimony in four states.

Nigel Clark

New WVU study examines **pump-to-wheels methane emissions** from the **natural gas-fueled heavy-duty transportation sector**

A study of methane emissions from heavy-duty natural gas-powered vehicles and refueling stations by West Virginia University (WVU) scientists at the Center for Alternative Fuels, Engines and Emissions, was recently published by Environmental Science & Technology. It greatly expands on very limited data on methane emissions from natural gas-fueled vehicles.

The WVU pump-to-wheels study is the first end-use paper in a collaborative scientific research series designed to measure and better understand the sources and amount of greenhouse-gas methane that is emitted across the natural gas supply chain.

Natural gas-fueled vehicles are expected to play an increasing role in meeting future transportation fuel needs. By relying on a cleaner-burning fossil fuel, natural gas engines can produce fewer greenhouse gas emissions than diesel – but only if methane emissions are kept low. WVU researchers are applying the study's data to develop models to forecast methane emissions from the future heavy-duty transportation sector. The forthcoming report can help the industry target improvements in engine technologies and fueling operations, and identify best practices for minimizing emissions.

By relying on a cleaner-burning fossil fuel, natural gas engines can produce fewer greenhouse gas emissions than diesel – **but only if methane emissions are kept low.**

"Natural gas vehicle and dispensing technology has evolved steadily. We characterized methane emissions from real-world operations to support well-informed projections of future pump-to-wheels contributions from heavy-duty vehicle use," said Nigel Clark, George Berry Chair of Engineering and professor of mechanical and aerospace engineering.

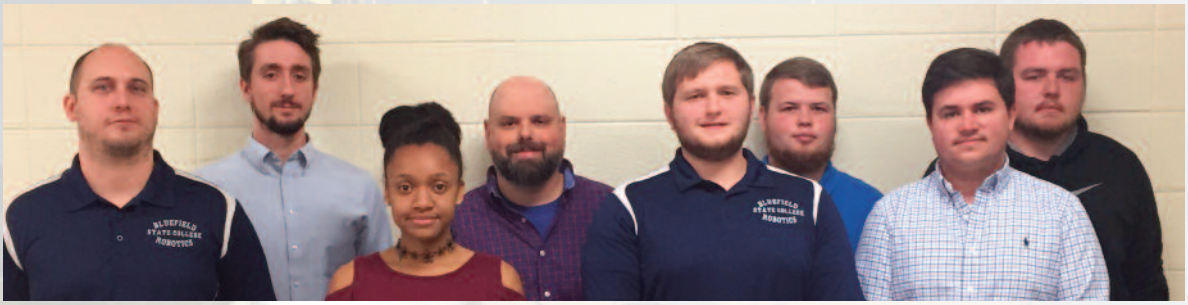
Researchers looked at methane emissions from the pump-to-wheels sector of the natural gas supply chain and characterized emissions factors for each major source associated with currently manufactured heavy duty vehicles and fueling systems. The researchers studied 22 natural gas-fueled transit buses, refuse trucks and over-the-road tractors six liquefied natural gas and eight compressed natural gas refueling stations. Scientists also examined cryogenic boil-off pressure rise and pressure control venting from LNG storage tanks, using both theoretical and empirical modeling. Vehicle tailpipe and crankcase emissions were found to be the highest sources of methane.

Bluefield State students **prepare technology related** to **spacecraft launch** at **NASA facility**

Nearly 70 years ago, a group of young students from southern West Virginia learned about, designed and launched their own rockets inspiring the movie "Rocket Boys." In late 2016, in a laboratory and classroom at Bluefield State College (BSC), a team of young students began participating in a NASA project of their own. The students are preparing the technology that will measure the flight dynamics of a spacecraft from launch to splashdown at NASA's Wallops Island facility.

"Our students will design the equipment and instrumentation required to measure the attitude of a rocket, using an inertial measurement unit that includes an accelerometer, gyroscope, and magnetometer," explained Jeff McFadden, a faculty member in BSC's School of Engineering Technology & Computer Science.

The BSC student team will work with NASA engineers at the Wallops Island facility to load their equipment and instrumentation into a payload onboard the spacecraft. During the summer this year, the students will spend a week at the facility, culminating in the launch and recovery of the rocket and analysis of the data generated by the experiment.



Student team members include: (front row, left-to-right) William Lambert, Shonte Cargill, Samuel Stephens and Logan Spencer; (back row, left-to-right) Samuel Mallamaci, Brian Sanders, Collin Dalton and Darren Snell.

D&E students assist with **West Fork river restoration**

Two Davis & Elkins (D&E) College students did their part to assist with one of West Virginia's most significant river restoration efforts and came away with a new understanding of project details. Seniors Brittany Bolinger and Alyssa Richmond spent much of the fall semester volunteering with the U.S. Fish and Wildlife Service (USFWS), along with other agencies, in the final phases of the West Fork River reconnection.

Bolinger, an environmental science and sustainability studies major, and Richmond, an environmental science major, were selected for the project by Russ McClain, director of the D&E Center for Sustainability Studies, who received a request from 2014 environmental science and sustainability studies graduate Nick Millet, who is now a biologist with the West Virginia field office of the USFWS.

The project involved the removal of three dams that had become obsolete, allowing the West Fork River in Harrison County, West Virginia, to reconnect to streams and tributaries. The dam removals, however, caused the river's water level to drop and, in turn, strand some of the habitat.

Working with AllStar Ecology LLC, the West Virginia Division of Natural Resources and West Virginia Department of Environmental Protection Rehabilitation Environmental Action Plan program, the students' task was to gather and relocate 1,430 native freshwater mussels representing nine species from the exposed river banks.

Brittany Bolinger, left, and Alyssa Richmond, center, assist Sarah Veselka of AllStar Ecology LLC and the U.S. Fish and Wildlife Service with gathering and relocating freshwater mussels on the West Fork River near Clarksburg, W.Va., as part of a larger stream restoration and dam removal project. Students have been assisting on the project since last winter, cleaning up stream bank trash, conducting aquatic surveys and relocating rare mussel species.

Pictured from left are Precast/Prestressed Concrete Institute (PCI) President Robert Risser, PCI 2016 Distinguished Educator Awardee Dr. Wael Zatar and PCI Chairman of the Board Chuck Prussack.

Engineering dean **honored** for **educational contributions** to **concrete industry**

Dr. Wael Zatar, dean of the College of Information Technology and Engineering (CITE) at Marshall University, was named the Precast/Prestressed Concrete Institute (PCI) Distinguished Educator for 2016.

The Distinguished Educator Award was developed by PCI to recognize distinguished engineering, architecture and construction educators who have made significant and sustained educational contributions to the precast and prestressed concrete industry.

Zatar is the first professor from West Virginia to receive this award. He was presented it during the award ceremony of the fall 2016 PCI Committee Days and Membership Conference, which was attended by more than 800 experts in the field. A video displaying Zatar's accomplishments was shown to the event attendees.

"I am truly honored and certainly privileged to be selected as the recipient of the 2016 Precast/ Prestressed Concrete Institute Distinguished Educator," Zatar said. "It was such a special moment to be on the stage in front of more than 800 experts representing every state in the U.S. and from all over the world and accepting this prestigious award from the PCI President Robert Risser and PCI Chairman of the Board Chuck Prussack. The announcement that I was the first professor from West Virginia to ever receive this distinguished award is a moment that I will never forget.

Robert C. Byrd Center for Rural Health

Blanchette Rockefeller Neurosciences Institute

Money from court settlement transferred to **Marshall** and **WVU**

More than six million dollars remaining in a court settlement account has been transferred to Marshall University and West Virginia University (WVU).

The funds were split equally between the Blanchette Rockefeller Neurosciences Institute (BRNI) at WVU and the Robert C. Byrd Center for Rural Health at Marshall under a court order issued by Judge David W. Hummel of Marshall County, West Virginia, in late November. The order ended a decade-long class action court case, William K. Stern, et. al. vs Chemtall, Inc., et al., which, according to court documents, sought and obtained medical monitoring for coal preparation and waste water treatment workers who had been exposed to a chemical neurotoxin.

At Marshall, funding will be used to continue work in rural health, specifically tackling barriers like isolation that many rural providers and rural people encounter.

These efforts are coordinated through the Center for Rural Health in concert with Marshall's department of family and community health and other primary care departments.

"With modern technology and these resources, we can go a long way to ensure better access to health care for our citizens in southern West Virginia and beyond," said Jennifer T. Plymale, M.A., director of the Byrd Center for Rural Health. "Additionally, we can build on innovative educational efforts that have been successful in graduating quality primary care physicians practicing in areas of need throughout West Virginia and the surrounding Appalachian region, as well as continuing our work with community partners on the center's outreach endeavors that are designed to encourage the development of new and innovative health care delivery systems in rural communities that lack essential health care services."

At WVU, the funds will support the research programs in Alzheimer's disease and other neuroscience fields.

BRNI recently announced a recruitment push in quantitative neurosciences that will bring bioscientists, mathematicians, physicists and engineers together to study the complex structure and function of the brain.

"These dollars will directly support our research program, and make WVU even more competitive on a national level," said George Spirou, Ph.D., co-director of BRNI. "We are taking aim at diseases of the brain that have an impact on thousands of families in West Virginia every year, and this will push that work forward."

WVU Shared Research Facilities:
Our instruments are yours to use

Trina Wafle, *Director of WVU Shared Research Facilities and Deputy Director of the WVU National Research Center for Coal and Energy*

My friend's excitement about his first assistant professorship at a northeastern university turned to dismay when he learned that he may not be able to access the expensive, high-end research instruments he needed. Those instruments were controlled by a faculty member in another department who limited use only to those whom he knew personally and trusted. With the tenure clock ticking, my friend decided to travel at personal expense the 767 miles back to his previous employer's lab to conduct publishable research lest he perish while building trust with his new colleague.

This story is all-too-common. High-end research instruments at Carnegie Classification R1 institutions like West Virginia University (WVU) cost hundreds of thousands to a million or more dollars to purchase. Annual operation and maintenance costs range from $50,000 to $100,000 per major instrument. Faculty typically acquire such expensive instruments by submitting proposals to federal agencies. Recipients of highly competitive National Institutes of Health S10 or National Science Foundation Major Research Instrumentation grants can be very protective of their hard-won assets. Yet funding agencies expect the instruments to be used often, by many, and long after the warranties end. It's a formula for distress.

WVU's antidote is its Shared Research Facilities (SRF). Whether from another higher education institution, government or corporate laboratory, any researcher from anywhere can use the same instruments WVU researchers have used to develop materials to detect biomarkers of brain injury, create a microfluidic liver-on-a-chip and produce and analyze electrode materials for longer lasting batteries.

SRF promotes good stewardship of its taxpayer-funded resources by sharing both usage and ongoing O&M costs through reasonable fees designed to distribute expenses across many users and stakeholders. This model has sustained the life of many SRF instruments a decade or more.

SRF managers, most who hold a Ph.D., train graduate students, faculty members or other researchers how to use the instruments, or they run samples for those who may not have the time or expertise to learn.

WVU SRF includes four 'cores'.

* BioNano Research Facilities offer a Q-Exactive Orbitrap Mass Spectrometer with UHPLC and nano-HPLC for mass identification and quantification of proteins, peptides, lipids and other small molecules, with high mass resolution and mass accuracy. Supporting instrumentation includes a CD spectrometer to characterize protein secondary structures.
* Electron Microscopy Facilities include SEM, TEM and a full suite of sample prep tools for surface and structural studies for the materials and life sciences.
* Materials Characterization Facilities offer XRD, XPS, AFM, Raman/FTIR, Ellipsometer and confocal microscopy for identifying materials and investigating their chemical and structural properties.
* Cleanroom Facilities include class 100, class 1,000 and class 10,000 spaces offering photo and E-beam lithography for sample patterning, wet chemical processing, reactive ion etching, thermal processing, metallization and dielectric deposition through E-beam evaporation, sputter deposition, pulsed laser deposition and wire bonding and wafer dicing for sample packaging.

My friend says the best feature of WVU SRF is that access is only keystrokes away—**http://srf.wvu.edu**—where the process, the instrument list and reasonable prices can help fast-track researchers to results.

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FROM THE DIRECTOR: Find the connection

A line can be drawn between science and economic development. Those who work in the STEM fields already know this. In the Division of Science and Research, it's part of our mission to keep connecting the dots for others who don't see it quite so clearly. In fact, not only can a line be drawn to see a connection, but if we want our state to thrive in the future, scientific research needs need to be seen as a driver.

Hence, I'm always pleased when I see people in the public eye recognize this. Former state senator and current West Virginia Public Service Commissioner, Brooks McCabe regularly writes a column in The State Journal to this end. In a recent one dated January 9, 2017, he said, "technology-based economic development offers West Virginia one of its best opportunities to jump-start real growth driven by high-paying research and manufacturing jobs."

In a West Virginia Executive magazine article, Intuit president and CEO Brad Smith (and West Virginia native) said, "I believe the first steps to growing West Virginia's high technology economy are recognizing the need to change and embracing the opportunity that lies ahead."

The opportunity that lies ahead is correlated to re-dedicating ourselves, and better informing others, about the scientific research that is happening every single day in the labs and in the fields across our great state. You will read about just a sprinkling of that research in this issue of the *Neuron*.

Stay tuned with us through future issues, on social media and by watching our video series (which can be found on our website: wvresearch.org), and I trust you will see the dots connecting just as clearly as I do. And, if you already see the connection, please share it with others.

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West Virginia Higher Education Policy Commission