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Dr. Sher Hendrickson-Lambert
Shepherd University

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A walk on the wild side of science

Sher Hendrickson-Lambert has studied condors, taught about conservation in South Africa and helped round up wild horses in Ecuador. It sounds like a pretty diverse life, but the common denominator for the assistant professor of biology at Shepherd University is a passion for genetic research and evolutionary biology.

During graduate school at the University of Wisconsin, Hendrickson-Lambert researched why condors in the northern Andes were becoming extinct unlike the ones in the south. Unexpectedly, she found that condors throughout the Andes had low genetic diversity in genes from the mitochondria which turn calories into energy. One conclusion was that, at the higher altitude, the condors were experiencing natural selection from the low-oxygen conditions and the harsh cold. Food sources for a large-bodied scavenger can be sparse as well. This research sparked an interest and gave her the experience she needed when she went back to Ecuador to study wild horses living at a very high altitude (4,000 meters) in 2006.

The horses in Ecuador arrived in the region with Spaniards over 400 years ago - similar to the history of the wild mustangs in America. For the past decade, a local hacienda owner has been rounding up the horses to trim their elf-like hooves because the northern Andes soil isn't rocky enough for the horses' hooves to wear down naturally. Without this intervention, the animals could easily become crippled. Hendrickson-Lambert went on the round-up missions for two years and collected hair and blood samples during the process.

She explained, "Essentially my question is: if you drop a formerly domesticated animal off in a new environment, such as in the harsh conditions of high altitude, what happens when natural selection for survival occurs?"

At Shepherd, she's using the samples collected to conduct an extensive comparison between the genotypes of these horses with the DNA from their ancestors (that lived in Spain) with a goal of discovering exactly how these modern-day horses have adapted to a life vastly different than their homeland. She hopes to learn how the genomes of animals change when they are put in new circumstances. This type of research and subsequent findings could be the key to saving endangered animals in the future.

Along the same lines, Hendrickson-Lambert is excited about something called a frozen zoo. Although it is a novel idea for West Virginia, it's not a brand new concept. The Frozen Zoo® at the San Diego Zoo Institute for Conservation Research, for example, has been freezing biological materials from animals and plants for decades. Scientists there have a collection of samples from over 800 species and subspecies. The Frozen Zoo® website boasts that, to date, the organization has





Endangered Appalachian species

about the division of 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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Hendrickson-Lambert and undergraduate student George Lambert observe a salamander, which is native to W.Va., in her lab.

reintroduced 33 species back into the wild - including five species of reptiles, 17 birds and 10 mammals. In many cases, these efforts have meant the difference between extinction and survival. While the San Diego Zoo has acted as a predecessor to similar projects, there are still less than a dozen such organizations worldwide.

Hendrickson-Lambert aims to build up something akin to this at Shepherd. She calls her version the "Laboratory of Genomic Diversity-Shepherd University", and she received $40,000 from West Virginia's Research Challenge Fund this year to develop it.

Hendrickson-Lambert said cell samples for the Laboratory of Genomic Diversity will likely be collected from museum samples, animal rehab centers and personal collections. Once collected, stored genetic material from each species is kept indefinitely because DNA can be duplicated when new questions arise.

Her ultimate goal is to focus efforts on collecting Appalachian-specific samples. She plans to ask questions about genetic diversity, resilience to disease and/or adaptability to learn how to save animals that are threatened by habitat loss and global warming in the region.

"My hope is that we will be able to learn more about regional species and how to save the endangered ones before they completely go away," she said.

Hendrickson-Lambert's interests are not limited to the lab, though. She would ultimately like to work with a non-governmental organization on policy-making for endangered animals. However, that would have to be concurrent with teaching at Shepherd because she genuinely enjoys helping students learn about the field of genomics.

At the end of the day, Hendrickson-Lambert said she is happy to be at Shepherd and is especially thrilled about founding the Laboratory of Genomic Diversity.

She commented, "It's exciting because there's a program to be developed here, and I'm on the ground floor. The bonus is that my fellow faculty members are amazing, and it's a really collaborative environment."

Hendrickson-Lambert's multifaceted life doesn't stop at this. To learn more about the HIV research she undertook while working at the National Institutes of Health and the course she taught in South Africa last year, visit **wvresearch.org**.

Graduate assistant Joanna Martinez pulls a sample out of the freezer in Hendrickson-Lambert's lab.

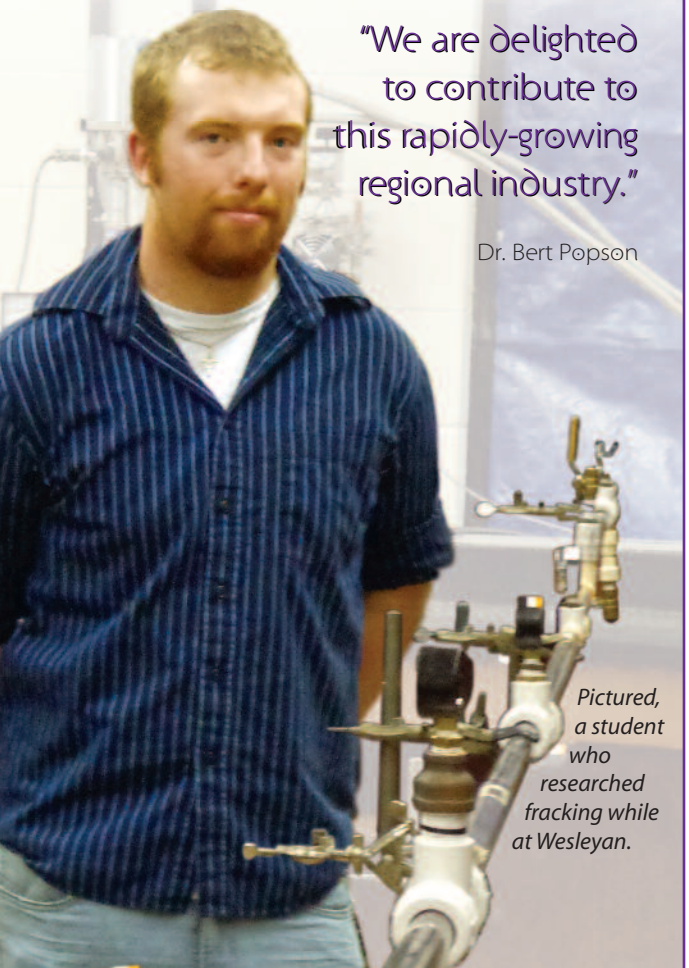
Wesleyan introduces new science degree to support regional industry

West Virginia Wesleyan College (WVWC) has announced that, beginning in August, the school will offer a Bachelor of Science degree in petroleum and natural gas geophysics.

In recent years, innovations in geophysics have fundamentally changed how natural resources are discovered and produced. One of the most noteworthy innovations is the three-dimensional seismic survey which has resulted in tremendous advances in successfully finding oil and natural gas. In addition, new technology, such as horizontal drilling, has enabled cost-effective extraction of natural gas from the Marcellus and Utica shale rock layers.

"We are delighted to contribute to this rapidly-growing regional industry," said Dr. Bert Popson, chair of the Department of Physics and Engineering.

The new WVWC program has a hands-on emphasis, with foundation courses in physics and mathematics and advanced courses in geophysics. The major will prepare graduates for employment in the natural gas industry or admission to graduate study in geophysics and related fields.



"We are delighted to contribute to this rapidly-growing regional industry."

Dr. Bert Popson

Pictured, a student who researched fracking while at Wesleyan.

A $2.5 million initiative aims to increase diversity in STEM fields

Marshall University, West Virginia University and West Virginia State University have joined in a nine-university initiative to increase the number of underrepresented minority students studying in the fields of science, technology, engineering and mathematics (STEM). A five-year, $2.5 million National Science Foundation (NSF) grant will fund the Kentucky-West Virginia Louis Stokes Alliance for Minority Participation.

This partnership of higher education institutions is being led by the University of Kentucky. Other alliance members include the University of Louisville, Western Kentucky University, Centre College, Kentucky State University and Bluegrass Community and Technical College. The grant marks the second phase of the diversity effort, which began in 2006.

With an undergraduate focus, the new funding will sponsor programs and initiatives at the alliance members' institutions to attract greater numbers of diverse students to the STEM fields, increase retention and graduate up to 500 students over the next five years. In addition, the alliance will seek out cross-institutional opportunities for students in undergraduate research and internships. The alliance has the potential to significantly impact the lives of up to 5,000 underrepresented undergraduate students in the two Appalachian states.

The overall aim of the NSF Louis Stokes Alliance for Minority Participation Program is to cultivate a greater number of diverse students to successfully compete in the nation's STEM baccalaureate degree programs and to increase the number of students interested in, and academically prepared to enter, graduate study programs. The program defines underrepresented groups as African Americans, Hispanic Americans and Native Americans.

WVU research team developing test strips to diagnose traumatic brain injury

For years, diabetics have been using a tiny drop of blood from a finger prick to accurately detect blood sugar glucose levels. A team of researchers at West Virginia University (WVU) is now working to develop a similar device to diagnose another type of problem: traumatic brain injury (TBI). Dr. Nianqiang Wu, professor of mechanical and aerospace engineering, and Dr. Yuxin Liu, an assistant professor in the Lane Department of Computer Science and Electrical Engineering, have teamed up to create the test strip. Both have extensive experience in the development of nano-scale devices with applications in health care.

A SERIOUS PUBLIC HEALTH PROBLEM

In 2010 in the United States alone, the Centers for Disease Controls estimates that more than 2.5 million traumatic brain injuries occurred either as an isolated injury or along with other injuries. In even the mildest of cases, prompt attention and accurate diagnosis are key to ensuring brain health. Brain imaging using computerized tomography scans and magnetic resonance imaging are commonly used to diagnose the most severe cases. Traumatic brain injury cases are also diagnosed using a blood sample, which is drawn in a laboratory environment by a healthcare professional and then sent for processing. The total time for results can take up to half a day. To date, no *in vitro* diagnostic tool is commercially available to rapidly identify and differentiate between mild and severe cases of traumatic brain injury.

"There is a critical need to develop a point of care device to rapidly determine if a brain injury has happened and its severity," Wu said.

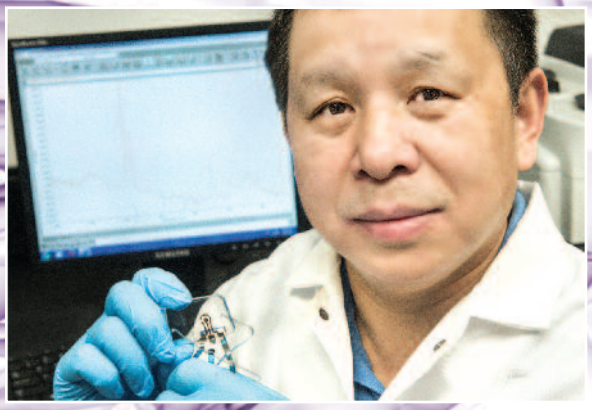
With funding from the National Institute of Neurological Disorders and Stroke, part of the National Institutes of Health, the team from WVU is working to create such a device that can be easily deployed in a number of settings.

"We are working to create a type of test strip that will be able to test for TBI biomarkers or proteins in the blood," Wu said. "Using just a drop of blood from a finger prick, the strip could be administered by virtually anyone at the time of injury and dramatically reduce the amount of time needed to begin treatment."

Wu noted that the strip could have applications in areas ranging from athletics to the military, and could be especially useful in the treatment of young children.

"Children are not little adults," Wu said. "They may lack the ability to verbalize their symptoms. The use of test strips could avoid such an unchecked risk."

The WVU team expects it to take about three years before they will have testable prototypes and if all goes well, they hope to have the test strips to market in the near future.



Pictured, at top, Dr. Nianqiang Wu.
Pictured, at bottom, Dr. Yuxin Liu.

"There is a critical need to develop a point of care device to rapidly determine if a brain injury has happened and its severity."

Dr. Nianqiang Wu

BSC engineering student compiles assessment of city's stormwater system

A year ago Bluefield State College (BSC) student Jackson Mohler began what he thought would just be a summer internship - a project of gathering information about the condition of the city of Bluefield's Stormwater sewer system. The project quickly grew into a "Systemwide Infrastructure Condition Assessment" of the city's drainage system and Mohler's work expanded into a year-long initiative that has included more than 1,500 inspections and over 3,500 photographs.

Because of the implementation of more stringent stormwater control mandates, Bluefield was facing a challenging task. Stephen Duffy, the Bluefield Sanitary Board's Engineering Manager/Stormwater Director, explained that the sanitary board had been given responsibility for meeting the West Virginia Department of Environmental Protection's compliance requirements of the city's Municipal Separate Storm Sewer System (MS4) permit, and the city formed the Bluefield Stormwater Board (BSB) to oversee the management and execution of these responsibilities.

Duffy explained the permit, "The MS4 permitting program is a federally-mandated, state-regulated, locally-enforced/implemented pollution prevention program intended to reduce polluted stormwater runoff from reaching streams and other natural water bodies."

Knowing he would need some help, Duffy contacted faculty at the BSC School of Engineering Technology & Computer Science for an intern candidate. Faculty member Erik Baldwin recommended Jackson Mohler, a senior majoring in Civil Engineering Technology.

"We were being asked to manage a system that was more than 100 years old and had pressing maintenance needs, and we didn't have good data regarding the condition and scope of the system," Duffy said. "Until Jackson arrived and compiled the condition assessment, our work was more reactive than proactive. When a basin broke, we tried to repair it. Now, we can look at a map and determine areas where work needs to be done, and then concentrate our efforts on repair work in those areas."

"The entire experience here has influenced my career direction," Mohler said. "The research I was able to conduct for the Bluefield Stormwater Board was a huge opportunity, permitting me to collect and assess data. I realize now that there are two types of assessment—public safety and structural."

The information Mohler collected has been entered into the BSB database and will be tied to its Geographic Information System. "It's amazing to consider the savings that have been realized through the work Jackson has done," Duffy said. "He is a great example of the benefit a business or municipal organization can derive from hiring a student as an intern."

Mohler, who graduated in May, has been accepted into the Master of Science Civil Engineering program at the University of Tennessee.

> "The entire experience here has influenced my career direction."
>
> Jackson Mohler

Marshall professor receives large national grant to study progression of cancer

Dr. Vincent E. Sollars, an associate professor of biochemistry and microbiology at the Marshall University Joan C. Edwards School of Medicine, received a $432,000 grant from the National Cancer Institute to research a cutting edge concept to fight cancer.

The Academic Research Enhancement Award (AREA) will fund a three-year project for Sollars in "epigenetics," a relatively new concept in cancer therapies that has shown great promise.

"The basic question we are trying to answer is 'What are the processes that enable a normal cell to start misbehaving and become cancer cells?" Sollars said.

As he explains it, the process that cells undergo to become cancer cells ultimately produces a cell that stops listening and cooperating with neighboring cells. That communication, however, is necessary for the complex mixture of cells our bodies contain.

He said, "This grant will investigate a process known as 'canalization.' Much like a canal for water directs the flow of water, canalization directs a cell as it matures into the specific type of cell needed by the body. Disrupting the canalization process can cause a cell to change and lose its direction, potentially pushing it down paths that lead to cancer."

Sollars said his team will be testing the role of canalization in the process of maturing cells and cancer development. They will be targeting leukemia specifically with this grant but the results of their study can apply to all types of cancers.

"We think our work can have a great impact on science's understanding of how cancer progresses and will even help develop new treatments for most cancers," he added.

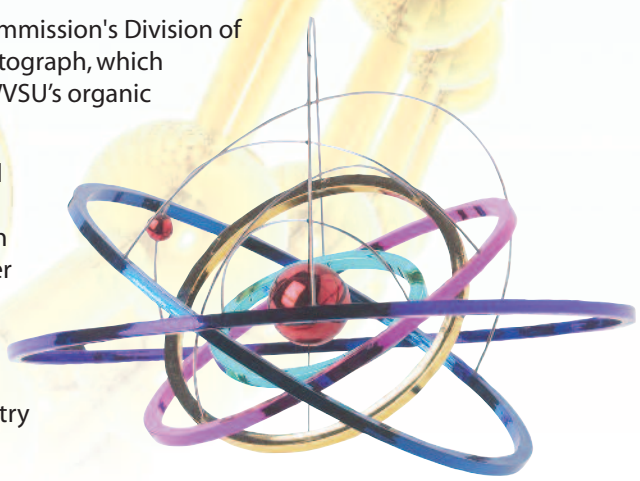
This particular grant is specifically designed to give students practical opportunities to participate in cutting-edge academic research. Over the course of the project, Sollars anticipates involving eight students from Marshall's undergraduate and graduate programs as well as students from the Joan C. Edwards School of Medicine. The grant also will fund a full-time technician.

New instruments at WVSU fuel curriculum modifications, expand research capabilities

Students, faculty and staff at West Virginia State University's (WVSU) Department of Chemistry are benefitting from new investments in instruments and curriculum modifications that are leading to broader research capabilities at the Institute campus. More than $600,000 in new instrumentation and equipment, funded through state and federal grants, has been acquired in the past 18 months, expanding research capabilities for scientists and students.

With the help of the West Virginia Research Trust Fund, WVSU acquired a new 400 MHz Nuclear Magnetic Resonance Spectrometer. Such instruments are commonly funded through a single source; however, WVSU successfully raised funds from private sources to match $100,000 from the West Virginia Research Trust Fund. WVSU also secured a smaller $30,000 award from the West Virginia IDeA Network for Biomedical Research Excellence and resourcefully allocated university equipment funds to complete the purchase.

In addition, grant assistance from the West Virginia Higher Education Policy Commission's Division of Science and Research led to the acquisition of a new Agilent 7890 Gas Chromatograph, which replaces an older instrument. The new equipment immediately found use in WVSU's organic teaching labs during the spring 2014 semester.



A liquid chromatograph mass spectrometer will also be installed before the fall semester. The equipment was purchased with a successful grant application to the United States Department of Defense. It expands the school's capabilities in both chemistry and biotechnology. The Time-of-Flight (TOF) mass spectrometer is capable of examining small molecules, reaction components, biological processes and proteins with high sensitivity and accuracy.

These new instruments, paired with future acquisitions, will provide WVSU's students and researchers with modern tools for research and training on industry standard equipment.

WVU Robotics Team on a hot streak

First-time competitor West Virginia University (WVU) received $5,000 from NASA in June for being the only team to successfully complete level one during this year's Sample Return Robot Challenge. The challenge is part of NASA's Centennial Challenges and earned the Statler College of Engineering and Mineral Resources team the right to return in 2015 for a chance at the $1.5 million level two prize.

It's been a big year for the team. This was actually WVU's third-straight win in a NASA-sponsored robotic competition in less than two months. In May, the Mountaineers took first-place honors in the mining and outreach competitions in NASA's 2014 Robotic Mining Competition. Two weeks later, they ruled the Rock Yard at Johnson Space Center in Houston, Texas, scoring a record-high 99 points in winning NASA's Revolutionary Aerospace Systems Concepts-Academic Linkage or Robo-Ops Competition.

"It's exciting to see such innovative approaches to solving tough technical questions," said NASA Chief Technologist David Miller. "These challenges are intentionally difficult so that we can make leaps, not steps, in progressing the technology. We are proud that the Mountaineers have risen to the occasion."

Miller presented the team with a check for $5,000, which they plan to use as seed funds in the development of a scholarship that promotes robotics education and research at WVU.

The goal of the Sample Return Robot Challenge event, which took place at Worcester Polytechnic Institute in Massachusetts, was to design and develop robots capable of exploring landscapes in space wit control. In level one, robots have 30 minutes to locate and re that was previously identified in the robot's onboard compu robots have two hours to retrieve objects across various leve Seventeen teams traveled to the competition and 14 were cl

"Our team did an outstanding job building and designing th perform the tasks required to be successful," said Clarksburg Jared Strader. "I was surprised to see that there were not mor teams to complete level one at this year's competition. The majority of teams struggled with simple problems, which was interesting to see."

Strader served as the team's lead programmer and was responsible for computer vision and software integration and testing.

NASA Centennial Challenges were initiated in 2005 to engage the public in the process of advanced technology development. The program offers incentive prizes to generat revolutionary solutions to problems of interest to NASA and the nation. Competitors are not supported by government funding and awards are only made to successful teams when the challenges are met.

Shepherd faculty awarded grant for girls' STEM conference

Dr. Sytil Murphy, assistant professor of physics at Shepherd University, and Dr. Jordan Mader, assistant professor of chemistry at the school, have been awarded a grant totaling over $4,000 from the NASA West Virginia Space Grant Consortium to help fund a one-day science, technology, engineering and mathematics (STEM) conference at Shepherd for girls in grades five through eight this fall.

The purpose of the conference, called "Seeding Your Future," is to increase the interests and abilities of middle-school girls in STEM-related fields and professions through hands-on activities facilitated by Shepherd faculty and students who believe in engaging girls in STEM at a young age.

"Our hope is that, through positive interactions with scientists and aspiring scientists, the girls will realize that they are more than capable of doing science and that it is fun."

Dr. Sytil Murphy, assistant professor of physics

"We hope that, ultimately, this increases the number of girls who continue to enjoy science in school and that some of these girls will choose STEM careers or to be science teachers."

Dr. Colleen Nolan, dean of the School of Natural Sciences and Mathematics (SNS&M), said, "I'm excited that two of our women science faculty members have received funding to engage middle school girls in science and that a large number of SNS&M faculty members are willing to develop and teach activities in this workshop," Nolan said. "The ability to reach out to young girls is critical if our state and nation are to continue to be global leaders in science and mathematics."

Murphy said she and Mader have participated in similar events at other institutions.

"We know how rewarding these conferences are for all involved. We are overjoyed that we are able to bring this event to Shepherd. With luck it will become an annual event," she said. Conference details will be available later in the summer and posted on **wvresearch.org**.

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NASA Chief Technologist David Miller

WVSOM physiologist tackles issue of ventricular fibrillation

Ventricular fibrillation (VF) is a rhythm disturbance of the heart which causes sudden cardiac death. In ventricular fibrillation, the heart's electrical activity becomes disordered and chaotic, and the ventricles flutter or quiver rather than beat normally. When this happens, the heart pumps little or no blood.

In the pre-hospital setting, 65-85 percent of patients in cardiac arrest have VF identified as the initial rhythm by emergency services personnel. VF ends in death within minutes unless prompt Advanced Cardiac Life Support (ACLS) measures are instituted.

Hugh Clements-Jewery, Associate Professor of Physiology at the West Virginia School of Osteopathic Medicine (WVSOM), is conducting research to better understand what triggers ventricular fibrillation during a heart attack. His research is being funded by a grant from the American Heart Association.

"Achieving a better understanding of the cellular processes involved in producing this lethal heart rhythm could aid in the development of new drugs that influence these processes and thereby prevent sudden cardiac death," he explained.

Clements-Jewery first got interested in this topic as an undergraduate studying physiological science at Oxford University. "I found it fascinating that no one had figured out how to prevent arrhythmias safely using drugs," he said.

He found a mentor in his Ph.D. advisor, Dr. Michael Curtis of the Rayne Institute at King's College London, who was committed to research which could help prevent early death from sudden cardiac arrest.

"It became more than a purely academic pursuit of understanding how things work," said Clements-Jewery. "We never lose sight of a 'druggable target,' finding a condition that is amenable to pharmacological treatment."

Specifically, he is testing the importance of the concentration of ATP (adenosine triphosphate), which is the source of energy used by heart cells, to development of ventricular fibrillation.

His research hypothesis is that ventricular fibrillation that occurs during a heart attack can be traced back to a lack of ATP. If so, delaying the loss of ATP during a heart attack should delay and reduce the occurrence of ventricular fibrillation. To test this, Clements-Jewery is designing experiments that target processes that consume or manufacture ATP. "By reducing ATP consumption or increasing ATP manufacture, we hope to maintain ATP concentration during a heart attack," he continued.

He described a sink with the faucet turned on. Water is coming into the sink at the same time it is draining from the sink. If the sink holds a certain volume of water and the rate of new water from the faucet equals the rate water is being drained, then the water level in the sink stays constant. During a heart attack, the tap turns off and the water level drops. But – to return to the biological realm – if ATP can be made by an alternative source or the consumption rate can be reduced, then more ATP is available to maintain normal electrical function.

To date, his research findings support this hypothesis. The longer he's able to delay ATP consumption, the longer it takes for VF to occur within the heart.

Clements-Jewery has three WVSOM medical students assisting him in the lab this summer. He said that future modifications of the research could include testing new models and using *in vivo* experiments.

Two students from WVSOM'S class of 2017 who are assisting Clements-Jewery.

Sharing the wind

Ridge tops and high places are ideal locations for wind turbines to capture breezes that help power society. Unfortunately, the same locations are also ideal places for golden eagles to soar. Researchers from West Virginia University (WVU) and Penn State University are currently trying to figure out the best ways to make sure the eagles can fly freely and energy can be generated as well.

"Economic development creates complex problems when juxtaposed against wildlife conservation," said Tricia Miller, who recently earned her Ph.D. in ecology from Penn State and is a wildlife biologist in WVU's Division of Forestry and Natural Resources.

"Migrating eagles are looking for resources that will support their migration, while people choosing locations for wind turbines are looking for resources that support energy production," Miller explained. "In this case, both are looking for wind resources."

Topography has a strong influence on how wind moves across the landscape. Updrafts are generated from wind hitting topographic features such as hillsides, which disrupt horizontal movement of wind.

"In the ridge and valley region of the central Appalachians, the ridges are long and narrow," Miller said. "Because of the narrowness of the ridges, you see a large degree of overlap in selection by both eagles and wind energy. In other regions, like the Allegheny Mountains, the topography is much more variable. There are larger expanses of flat areas where wind moves more evenly across the landscape. Wind like that is good for turbines but not for eagles. There are also edges where updrafts occur, which is better for eagles, but not so great for wind energy."

To help determine where the eagle-friendly topography is, Miller and her colleagues attached GPS tracking devices to golden eagles that were captured on wintering grounds in Pennsylvania, West Virginia and Virginia. The devices collected one data point every 30 seconds.

"In addition to location, the GPS units provided altitude, speed and heading so we could determine if the bird was in flight and how high it was flying," Miller said.

Using the research, Miller and her colleagues can predict risk to the wildlife which allows turbine sites to be located in a place with good energy generation potential - but one that presents a lower risk to eagles. For turbines that are already built in high-risk areas, the research allows for the opportunity to schedule a shut-down period during peak migration times, which can reduce the risk to golden eagles with minimal loss of energy generation potential.

This research was funded by the United States Department of Energy, the Pennsylvania Game Commission, the Virginia Department of Game and Inland Fisheries and the Charles A. and Anne Morrow Lindbergh Foundation.

WVSU Research Rookie Megan Guetzloff discusses her work with keynote speaker Dr. David R. Williams during a poster session at the 19th Annual Research Symposium.

"It was really exciting being a Research Rookie this year," said freshman Emily Peal, a biology major. "You really don't know how to do scientific methods until you're hands-on with them, so it was fun and educational to be able to do that through this project."

WVSU Research Rookies featured at symposium

West Virginia State University (WVSU) hosted its 19th annual Research Symposium on campus at the end of April to share information and celebrate the scientific research being conducted by students.

"The symposium provides a public forum for our students to share their scientific research with a wider audience," said Dr. Katherine Harper, dean of the College of Natural Sciences and Mathematics and a professor of biology. "When students become part of a research group, it not only reinforces their scientific skills but makes them feel like part of a family, so this is also a celebration of their hard work and accomplishments."

Led by a keynote address on organic chemistry from Dr. David R. Williams, professor of chemistry at Indiana University, Bloomington, the daylong event featured a poster session by the American Electric Power Research Rookies participants. The Research Rookies program began last year through AEP funding which launched the WVSU AEP Foundation Full STEAM (Science, Technology, Engineering, Agriculture and Mathematics) Ahead Program. Eight Research Rookies presented posters and shared their experiences.

"It was really exciting being a Research Rookie this year," said freshman Emily Peal, a biology major. "You really don't know how to do scientific methods until you're hands-on with them, so it was fun and educational to be able to do that through this project."

Marshall senior receives scholarship from meteorology society

Marshall University senior Shawn Michael Cheeks was selected by the American Meteorological Society to receive the Mark J. Schroeder Endowed Scholarship in Meteorology. Cheeks is double-majoring in computer science and applied mathematics and minoring in meteorology.

"I was truly surprised when I was notified that I had received this scholarship," Cheeks said. "I would like to thank Dr. Paulus Wahjudi of the Computer Science Department and Dr. Kevin Law of the Geography Department, as I have worked closely with them on various projects during my time here at Marshall, and I believe their recommendations played a key role in my receiving this award."

"This recognition reflects Shawn's drive, initiative and accomplishments," Bieniek said. "It is a wonderful affirmation of his achievements and promise."

Cheeks also won second place in the Division of Science and Research's STaR Symposium video competition last fall for his video about an Android-based application that he developed which allows users to submit reports of severe weather directly to the National Weather Service.

Outreach program connects students to engineering

The Statler College of Engineering at West Virginia University (WVU) has been providing quality educational programs for its students for more than 125 years but now the college, through Outreach Coordinator Cate Schlobohm, is extending its educational programs to younger students to expose them to engineering before they even enter college.

In addition to many annual events that are designed to get kids onto campus, Schlobohm also works with elementary, middle and high schools in the state setting up visits from WVU's engineering students. Once set up, the Statler Ambassadors outreach team goes into those schools and leads hands-on activities which teach students what engineering is all about. They also showcase opportunities available in the field.

"Our goal is to meet the teachers' needs," said Schlobohm. "Every school is different. Some schools have something in the curriculum that they want us to relate to engineering. Others just want us to solidify what engineers do because, to young students, this is an ambiguous occupation."

The Statler Ambassadors design and build "projects in a box"- simple, reusable and transportable activities--and help the young students work through them.

Colin Frosch, a junior civil engineering major from Clarksburg, put his transportation planning knowledge to use by designing and building a transportation game. He used plywood and dowels to create a course for the students to navigate through.

"I remember being on the other side of outreach programs as a kid and remembering how much more fun I had when I was able to do hands-on activities," Frosch said. "I always loved being able to build things and experiment. Outreach programs gave me those opportunities."

Recently, the Statler College bridged a partnership with the Children's Discovery Museum of West Virginia in Morgantown to provide fun, educational exhibits for preschool children.

"Working with the Statler College will give us the opportunity to improve our engineering exhibit area and expand our special event offerings," said Julie Bryan, director of the museum.

When asked to sum up the outreach efforts, Schlobohm said, "Overall, we just want young students to learn that there are opportunities in engineering. In a lot of the places we go, college isn't seen as a given. We want to show the kids how they can coordinate something they are passionate about into their future."

A group of students play the Transportation Game which uses plywood and dowels to create a course for them to navigate through.

Mark Schuchardt teaches a camper how to make a slow sand filter.

Brian Woerner, left, chair of the Lane Department of Computer Science and Electrical Engineering, works with a group of Boy Scouts at Merit Badge University.

Middle and high school students get real-life look at forensic science

Television shows depicting forensic science – like the CBS hit "CSI" –pull in big ratings and generate buzz around the process of catching bad guys. But how realistic are these portrayals?

Youth in West Virginia had the chance to find out firsthand through a series of free Saturday workshops provided by the West Virginia University (WVU) Next Generation Forensic Science Initiative. Through hands-on, laboratory-based activities, middle and high school students learned the fundamental aspects of fingerprints, footwear impression evidence, firearm identification, bloodstain pattern analysis and biometrics.

Gerald Lang, of WVU Research, says the idea for the workshops evolved from the university's participation in the 2013 National Scout Jamboree. At the nine-day summer event in Mount Hope, W.Va., the university showcased its forensic sciences program with 11 different activities representing seven different forensic disciplines. Scouts who completed four or more exercises received a patch from WVU. Lang said they gave out 6,000 patches in four days.

"The concept is rooted in STEM education," Lang said. "Our goal is to expose youth to the sciences."

Chris Bily, instructional coordinator for forensic and investigative science, said the workshops gave students a more realistic view of how investigators treat crime scenes and test evidence.

"A lot of what is seen on TV is not reality," Bily said. "Television forensic science is frequently misrepresented and glamorized for television ratings purposes. These workshops provided our participants with a hands-on experience of forensic science, and we hope it opened their eyes to the possibility of pursing forensic science as a career."

BSC solar panel installation initiative featured at STEAM conference

Bluefield State College (BSC) was recently featured at the Thurgood Marshall College Fund's STEAM (Science, Technology, Engineering, Agriculture and Math) Conference in Atlanta.

BSC Associate Professor of Biology Dr. Tesfaye Belay spoke at the event about enhancing STEAM education using Solar Panel Installation as a module. Through a Thurgood Marshall College Fund grant, 15 BSC students and three faculty members received training from Virginia Tech in solar panel installation. Belay relayed to the audience how BSC students' mastery of the subject matter was strengthened because of the "hands-on" learning that resulted from the collaborative agreement between BSC and Virginia Tech.

"The audience was very impressed with the way we utilized our undergraduate students at BSC to install solar panels. The panels provide electricity for lighting the largest parking lot on the Bluefield State campus," Belay explained.

A new focus for West Virginia

L. Jeremy Richardson, Ph.D.
Senior Energy Analyst
Union of Concerned Scientists

Like many native West Virginians, coal is part of my heritage. My grandfather, a first-generation American, proudly worked the mines. He died of black lung at age 77. My father is a retired longwall maintenance foreman, and today my brother is a union miner in the same mine.

As for me, my eyes were always turned toward the sky. I studied physics at West Virginia University, finished a Ph.D. at the University of Colorado, and researched planets orbiting other stars at NASA's Goddard Space Flight Center. I turned away from what might have been a promising career as an academic researcher because I wanted to focus my professional efforts on another passion—addressing the risks of climate change. I often joke that I'm the "black sheep" in a family that owes so much to the coal mining industry. Knowing that burning fossil fuels is one of the primary causes of climate change, and recognizing the urgent need to shift our energy system to cleaner resources, I always wondered what would happen to a place like my home. My arrival at the Union of Concerned Scientists starting in 2012 was a sort of homecoming for me—an opportunity not only to study how West Virginia might diversify its economy, but also to bring people together to talk about overcoming the challenges the state faces.

The world is changing and it isn't just the growing recognition that we are seeing the consequences of climate change today, everywhere around us, from rising seas to more dangerous heat waves. Economic forces—namely cheap natural gas—are changing the calculus for electricity generation. Renewable energy costs have fallen dramatically, and these technologies come without the severe environmental consequences of extracting coal and natural gas. The average installed cost of solar photovoltaics (PV), for example, fell by about 40 percent from 2008 to 2012—and by another 15 percent in 2013 alone. Solar power has become cheaper than coal in many parts of the country, including Utah, a state with no policies that support renewable energy. Even in our region, long-term contracts for wind power are starting to squeeze out coal-fired generation.

When I look at what West Virginia has to offer, though, I am optimistic. We have the National Energy Technology Laboratory, home to some of the world's best experts on carbon capture and sequestration. Drilling in the Marcellus Shale has changed the economics of natural gas, stimulating new investments in the manufacturing and chemical sectors in our state. More importantly, we have impressive wind, solar, and even geothermal resources we can tap into. Opportunities abound for creating the new energy economy right alongside the current one, including using abandoned mine lands for utility-scale solar facilities. Such efforts, particularly in southern West Virginia, would create new jobs where people are hurting from mining layoffs.

And West Virginia has more to offer than its energy resources. Tourism, locally grown food, biotechnology, innovation, and advanced manufacturing are only some of the sectors where our state has great and still untapped potential. Researchers and community groups across the state are leading the way.

West Virginia can embrace this new reality. The truth is, we can't turn back the clock on our energy economy. Instead, we have to take a longer view—looking beyond our rich coal heritage and our current but finite natural gas resources. Focusing on technology and research can lead the way to a sustained and bright future for our state.

Division of Science and Research
West Virginia Higher Education Policy Commission
1018 Kanawha Blvd E Suite 1101
Charleston WV 25301-2800
304.558.4128 X 7
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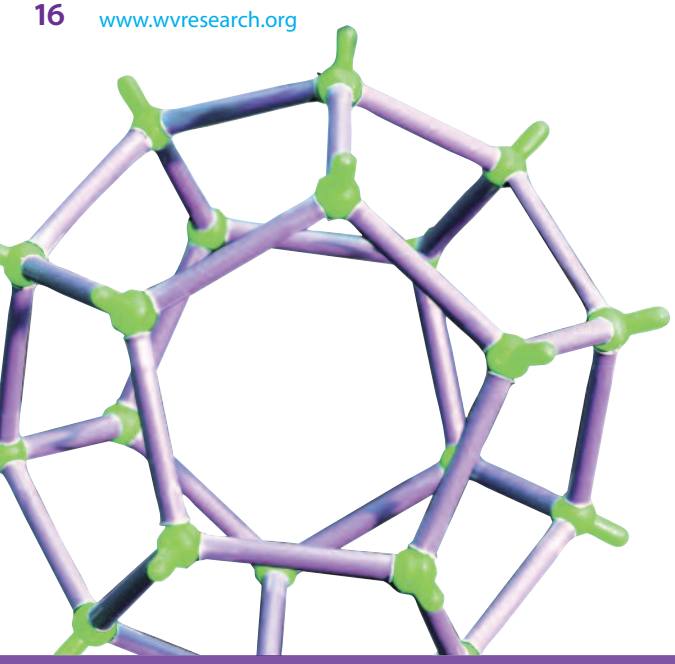

FROM THE DIRECTOR:
Approaching the finish line

In August of 2010, West Virginia's Experimental Program to Stimulate Competitive Research (EPSCoR) received a five-year, $20 million Research Infrastructure Improvement (RII) grant from the National Science Foundation. It's hard to believe, but we have just commenced our fifth and final year of the award!

Titled "Bionanotechnology for Public Security and Environmental Safety", the grant was designed to create strategic framework for West Virginia to achieve measurable growth in the field of bionanotechnology. One of our specific goals has been to enhance public security and environmental safety through research in this field. The interdisciplinary effort to achieve this goal has been led by West Virginia University, Marshall University and West Virginia State University. Researchers at these institutions have tirelessly worked together over the last four years in the bionanotechnology and molecular sciences to create "lab on a chip" technology which can more easily and remotely identify potential environmental threats and even diseases. We are excited about this research because innovations in this area have real potential to create brand new marketable technologies and devices — and the jobs to manufacture them right here at home.

This particular issue of *The Neuron* contains an article about some specific research that Dr. Nianqiang Wu, professor of mechanical and aerospace engineering at WVU, and Dr. Yuxin Liu, an assistant professor in the Lane Department of Computer Science and Electrical Engineering at WVU, are working on right now in this field. If you haven't yet, I encourage you to read it. You may be surprised at what medical issue they're hoping to lessen the effects of with a test strip. The possibilities in bionanotechnology are seemingly endless.

The Division of Science and Research will give you the opportunity to learn even more over the next year through a series of short monthly videos highlighting some of our scientists who will share details of their research in their own words. Be sure to keep a look out for these videos on our website and via social media posts - and do us a favor by sharing them with your friends and colleagues. We want everyone to see and appreciate the innovative research happening right here in West Virginia!

Jan R. Taylor, Ph.D.
Director of Science and Research
West Virginia Higher Education Policy Commission

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