the NEURON

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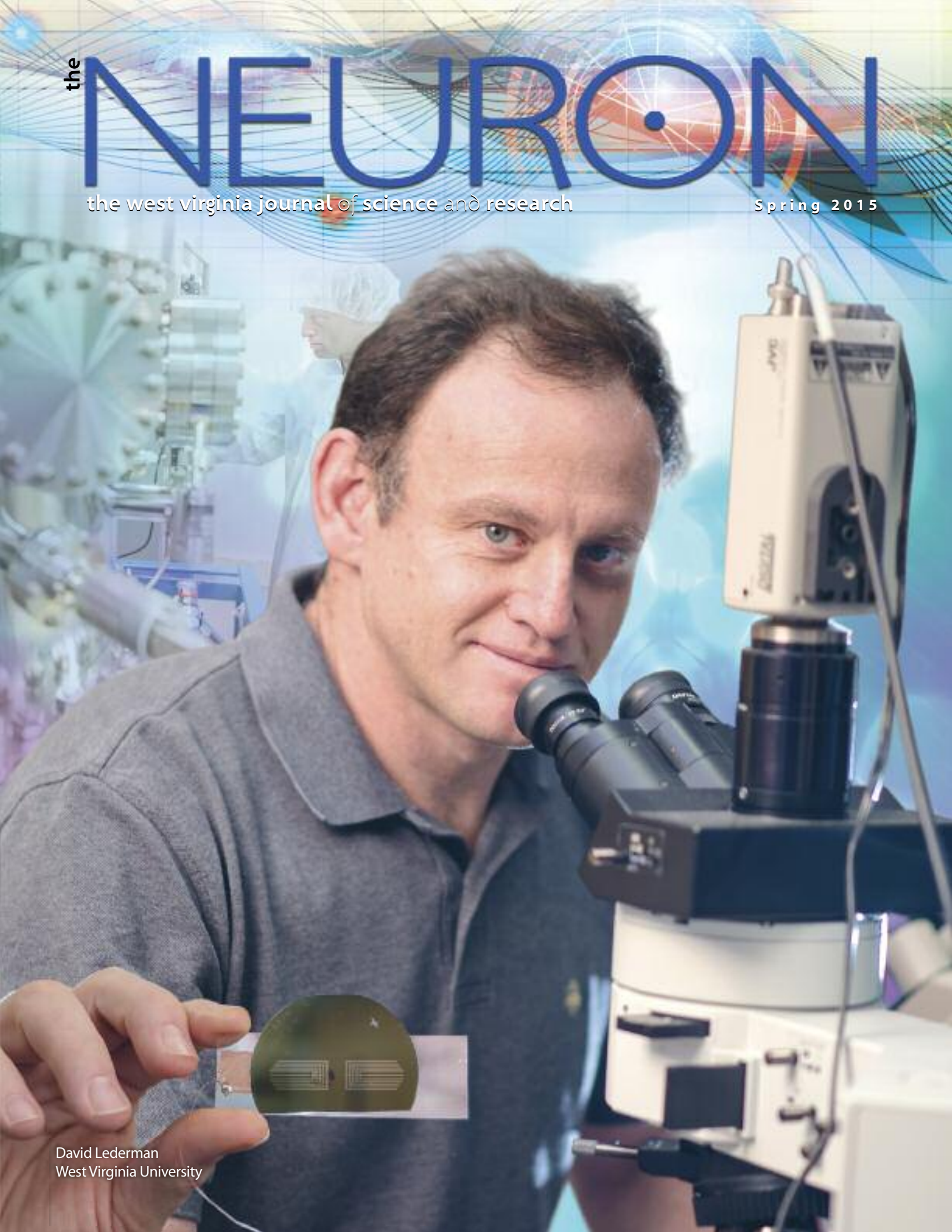


David Lederman
West Virginia University

The leader in Lederman

David Lederman

West Virginia University

Dr. David Lederman was a self-described "science nerd" growing up. As a kid in Latin America, though, he likely had no idea that he'd wind up in West Virginia leading a team of scientists and students through the unknowns of nanotechnology.

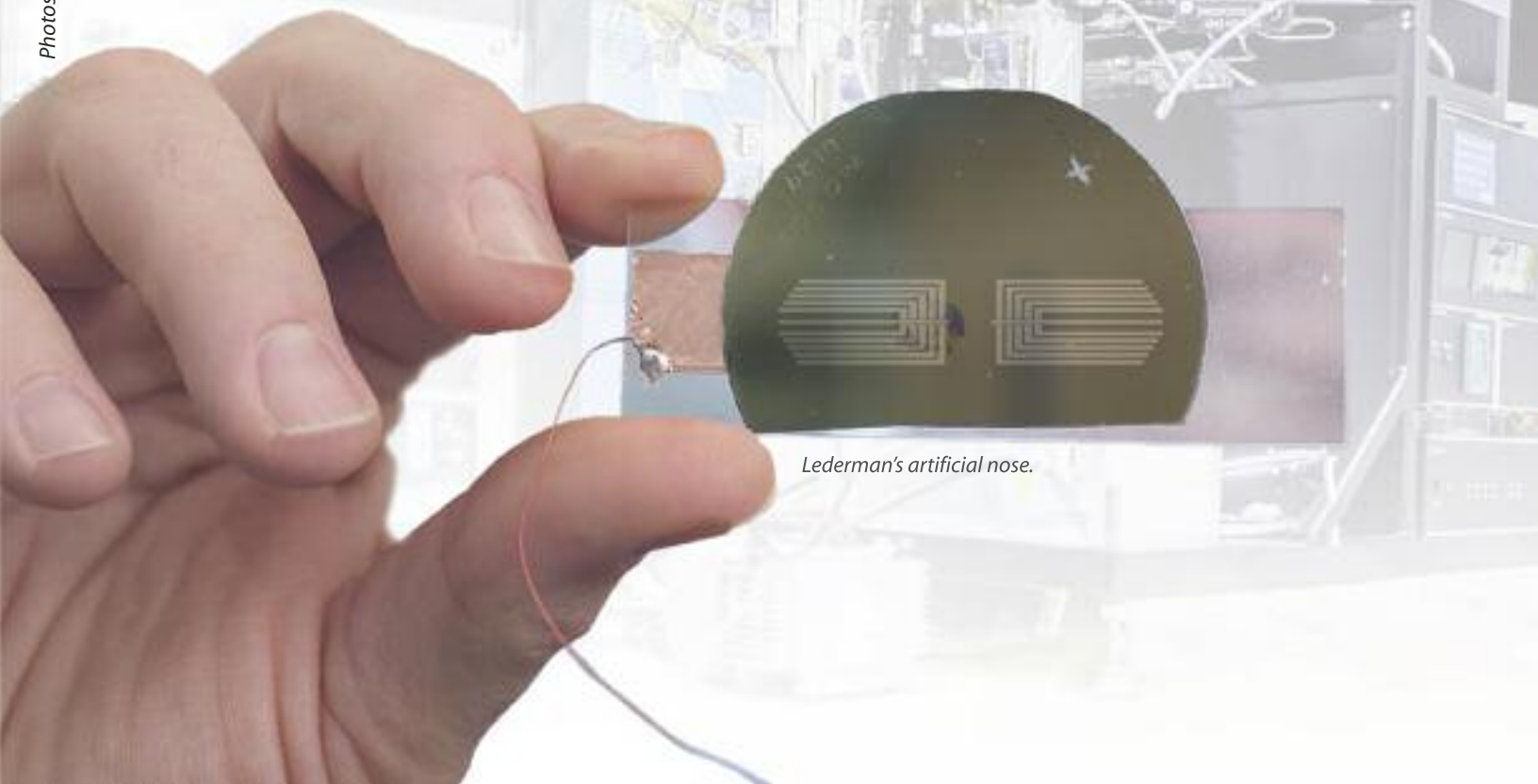
Lederman, whose research team seeks to understand the fundamental properties of materials in reduced dimensions, or nanotechnology, is the Robert L. Carroll Professor of Physics and interim chairperson of the Department of Physics and Astronomy at West Virginia University (WVU) and a co-principal investigator of the state's current five-year National Science Foundation (NSF) Research Infrastructure Improvement (RII) grant.

Of particular interest to him are properties resulting from interfaces between different materials - for example, magnetic and biological materials. The interactions between different types of nanoscale materials are expected to be the basis of future electronic devices.

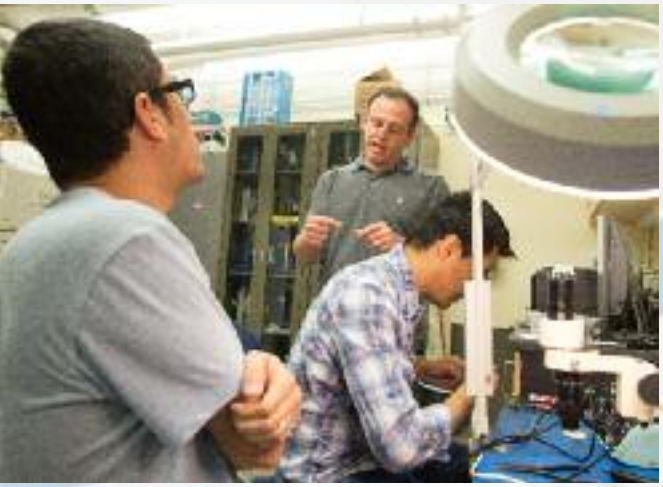
At the top of his to-do list currently is a device that could have far-reaching future possibilities: an artificial nose.

Anyone who's accidentally taken a whiff of spoiled milk understands that the human nose can very easily distinguish between many thousands of aromatic molecules and their various combinations - like the difference between an orange and a strawberry or spoiled vs. non-spoiled milk. The human nose can, in fact, distinguish over 10,000 different smells using 350 receptors. Smell molecules, known as odorants, interact with the receptors to create an overall 'fingerprint' that is recognized by the brain.

Photos by Alex Wilson



Lederman's artificial nose.



Lederman advises graduate students Sercan Babakiray and Amit KC in his lab.

Lederman's "artificial nose" is the same in principal, but a bit different. He hopes that the device he and his team, in collaboration with Professor Kevin Daly's group in the WVU Department of Biology, are working on in the lab could one day simulate the human nose in the realm of detecting and identifying airborne compounds. The artificial nose in its final form would have chemical sensors embedded into it which are designed to detect certain specific chemicals. Each sensor has to be different, though, so when the artificial nose is presented a complex odor that is made up of many chemicals, each sensor has to respond differently. This creates a pattern of sensor responses, which the artificial nose is taught to recognize.

Lederman said this technology could offer the ability to detect odorless airborne chemicals, to uncover bombs in transportation hubs or a field of battle and even to identify hazardous organic compounds in air, water and soil – all without exposing humans to the risks involved in otherwise detecting these things. See the cover of this issue for a photo of Lederman holding the "nose".

This is just one example of research that Lederman is involved in, though. All of his projects are collaborative and interdisciplinary in nature. He participates in NanoSAFE, WVU's nanoscale science, engineering and education program focusing on bionanotechnology as well as the Center for Energy Efficient Electronics (CEEE), an effort to develop new materials and methodologies for future electronic devices.

Collaboration, he said, is key.

"We work hard, help each other and enjoy the pursuit of knowledge. The fun part of science is research: determining what's really true and what's really happening," he said.

While the current RII grant comes to a close this summer, he said the momentum that it has spurred at WVU and around the state, at partner schools Marshall and West Virginia State University, will continue.

"My goal has been to fully integrate a variety of disciplines to create some really useful devices for the future," he said. "I think we've made tremendous progress. We've achieved a lot."

The next step along the collaborative path for Lederman is to make sure industry is tied into the research that's happening at the university level. The vision behind a recently-applied for NSF grant is an industry-supported 'center' that would engage and more fully integrate businesses into real-time research.

He explained, "We would offer research based on what the company is interested in as well as access to our students who do a lot of the work. Those students, in turn, could be future employees of the company. It would be a win-win for everyone."

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.
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Marshall **biomechanics expert** conducted **medical testing** at **NFL Combine**

Dr. Suzanne Konz of the Marshall University College of Health Professions attended the NFL Combine in February and assisted in the medical evaluation of more than 300 professional football hopefuls.

Konz, director of the biomechanics laboratory and an associate professor in the college, said this is her seventh year attending the combine to conduct isokinetic testing on collegiate athletes from across the United States.

"Isokinetic testing is a speed-based test which measures the strength and endurance of a muscle. This type of testing is necessary to determine the stability of the knee and possible longevity of these athletes," Konz said. "To be invited back for the seventh year in a row gives me the opportunity to build upon my knowledge of these testing devices, which benefits our own athletes here at Marshall University."

Konz said isokinetic testing was performed on members of the Marshall football, basketball, soccer and baseball teams this past year. Brandi Anders, assistant athletic trainer for the Marshall women's basketball and tennis teams, said the information provided by the isokinetic testing helps show if the players were at risk for injury or already had an injury which may need to be addressed further.

Anders said, "Dr. K does an excellent job of explaining the benefits of this testing to the athlete and the gains it can help him or her achieve athletically. By providing these numbers, the athletes can focus more on ways to improve their body and decrease risk of injury moving forward."

Dr. Gary McIlvain, chair of the School of Kinesiology at Marshall and associate dean for the college, said many people do not know the benefits of studying biomechanics and that the university has its own expert on the Huntington campus.

"Dr. Konz and her expertise in isokinetic testing is a valuable resource for the School of Kinesiology programs, our students and campus athletes. Her experience in testing Olympic, collegiate and professional athletes is a resource students seek out when learning to administer and interpret isokinetic testing," McIlvain said. "There is nothing that brings the classroom to life more than real-life experience and that is exactly what Suzanne Konz brings to those studying biomechanics here at Marshall University."

WVU researcher receives five-year NIH grant to **study effects of nanomaterials** during **pregnancy**

Nanomaterials are present in everyday household products like toothpaste, shampoo and make-up. Foods such as powdered doughnuts and candy with stamped lettering also contain these tiny particles. Little is known about the effects of nanomaterials on expectant mothers and their babies, but a West Virginia University (WVU) researcher has received a grant to investigate whether they are safe during pregnancy.

Dr. Phoebe Stapleton, post-doctoral fellow in the WVU School of Medicine Department of Physiology and Pharmacology, will use the nearly $1 million, five-year grant from the National Institutes of Health (NIH) to study gestational exposure to nanomaterials. Dr. Stapleton is the first at WVU to earn a Pathway to Independence Award from the NIH.

She will test the effects of two specific nanomaterials: titanium dioxide and multi-walled carbon nanotubes. In addition to their ability to make products stronger and lighter, nanomaterials can be used to design pharmaceuticals that target specific organs or cells in the body, such as cancer cells, and enhance the effectiveness of therapy. Nanomaterials are also useful for medical diagnosis, imaging and drug delivery.

"Nanotechnology readily has tremendous potential to improve human health," Stapleton said. "We don't want to assume a product is safe or unsafe for a population just because they are expecting, especially if there could be a remarkable benefit."

Stapleton will then investigate how maternal exposure early in gestation differs from later and if there is a critical window during development.

Stapleton said the end result of the project could affect how much one should use or consume products with nanomaterials. Her findings could also lead to guidelines for the amount of nanomaterials manufacturers can put in products.

The Pathway to Independence Award comes in two parts. The first is post-doctoral training and career development, which will prepare Stapleton to have her own lab. The second phase is a professional grant to fund lab space, equipment and salaries. During the five-year period of the grant, Stapleton will be mentored by a team that includes Dr. Tim Nurkiewicz, Dr. Jim Simpkins, Dr. David Siderovski and Dr. Vince Castranova.

Stapleton has spent the past four years under the mentorship of Nurkiewicz, associate professor in the Department of Physiology and Pharmacology. Thanks to a previous NIH grant, Stapleton studied the effects of nanomaterial inhalation and found that exposure leads to microvascular dysfunction outside of the lung.

"For example, when you take the stairs, the vessels in your heart and legs are going to expand to increase blood flow for all that activity – to allow the heart to react," Stapleton said. "When there's dysfunction, smaller vessels are not responding in the way we would expect them to. This can cause pain in the legs or the chest.

"We've extrapolated that out to a pregnancy model. We will be asking and answering, what happens if a pregnant woman is exposed to nanomaterials?" she continued. "Then, what happens to the fetus, specifically associated with cardiovascular development? Lastly, what happens to the fetus as it develops into adulthood?"

WVSU Partners with **India** on **Pomegranate Research**

West Virginia State University (WVSU) researchers are working with scientists from India to study the health benefits of the pomegranate.

Pomegranate is one of the most important commercial fruit crops across the world and is considered to be valuable because of its health-promoting traits. For example, pomegranate can be used for a wide range of human diseases including cancers, diabetics, obesity, Alzheimer's disease and hypertension.

Scientists from India, Drs. NV Singh, Rama Jayam and Ravinder Kumar, recently visited the lab of Drs. Umesh K. Reddy and Padma Nimmakayala at WVSU with DNA samples from 100 different pomegranate cultivars that were originally from all over the world.

Using Reddy and Nimmakayala's phylogenetic and association genetics pipeline, the group was able to identify a DNA marker allele that can make pomegranate trees resistant to bacterial blight, a devastating disease that affects leaves, twigs and fruits of the pomegranate tree. The disease has been difficult to manage in both India and the United States.

"We identified a closely linked DNA marker from 'Daru' type of pomegranates that can be transferred to the cultivated forms by simple breeding to build up resistance for bacterial blight," said Reddy. A full article about the project was published in the March issue of the journal Molecular Genetics and Genomics.

Photo: Blight-affected pomegranate fruits.

Students and faculty open **young minds** to the **joys** of **engineering**

Despite intense winter weather throughout late February, WVU Tech students and faculty celebrated National Engineers Week (February 22-28) by sharing engineering with K-12 students throughout the Kanawha Valley.

During the week, WVU Tech hosted a group of fifth graders from Chesapeake Elementary School to spend the day learning about careers. The group toured WVU Tech's laboratories, watched mechanical and civil engineering demonstrations, participated in hands-on engineering activities and ate lunch with WVU Tech student ambassadors who answered questions about college.

WVU Tech also sponsored and participated in BridgeValley Community and Technical College's annual Introduce a Girl to Engineering Day, which brings more than 100 eighth grade girls from schools throughout southern West Virginia to the NiSource/Columbia Gas building in Charleston.

During that event, students met with educators and professionals from engineering fields to learn about engineering careers and built roller coasters as they experimented with potential and kinetic energy.

WVU partners with NASA to launch **state's first satellite** into **orbit**

High above Earth in the darkness of space, more than 100 miniature cube satellites, or CubeSats, orbit the planet in a silent ballet. West Virginia is about to join the dance for the first time with the help of a new collaboration between West Virginia University (WVU), NASA's Independent Verification and Validation (IV&V) program, the NASA West Virginia Space Grant Consortium and TMC Technologies in Fairmont.

As part of the White House Maker Initiative, NASA aims to launch 50 small satellites from all 50 states in the next five years. West Virginia is the first of 21 "rookie states" that have not previously participated in NASA's CubeSat program to be chosen. This will also be the first time a mission from West Virginia will orbit Earth. It is slated to launch as an auxiliary payload on a NASA rocket in mid-2016 through NASA's CubeSat Launch Initiative program.

"This is a major step for our institution and our state," said Majid Jaridi, director of the consortium and professor of industrial and management systems engineering in the Statler College of Engineering and Mineral Resources. "An activity of this scale helps build WVU's reputation in the fields of astronautics, physics and space and helps expand interest and opportunities in science and technology throughout the state."

WVU's close partnership with NASA's IV&V program was fundamental to the development and planning process. Additionally, experiments and subsystems will be manufactured in labs and clean rooms on campus, while NASA's IV&V will integrate all the parts and build the bus, which interconnects all of the modules.

"WVU is advancing rapidly in space-related research and this mission is an important milestone along the path to a vibrant space research program," said Earl Scime, associate vice president for research. "Space research involves scientists from a wide array of disciplines and with our regional partners it is exciting to see that West Virginia now has the necessary skills and knowledge to put together a complete space mission."

CubeSats are small but have high impact. They are built using off-the-shelf components, which make them low-cost methods to build and conduct research in a space environment.

The WVU and NASA IV&V mission, called Simulation-to-Flight 1 or STF-1, will demonstrate advanced emulation technologies, produce high-value science data and promote STEM education throughout West Virginia. Jaridi said that undergraduate and graduate students working on the project will enhance their skills with real-world engineering challenges.

"This is a unique opportunity for students," Jaridi said. "They are going to learn firsthand what it takes to meet the demands and expectations of a NASA mission."

The CubeSat will be roughly the size of a loaf of bread. Its primary goal will be to demonstrate the capabilities of the software-only simulation environments developed at NASA's IV&V program to better support current and future NASA missions. It will also contain experiments from faculty in the WVU computer science and electrical engineering, physics and astronomy and mechanical and aerospace engineering departments.

Severe Alzheimer's patient in West Virginia responds to **Bryostatin treatment**

Researchers at the Blanchette Rockefeller Neurosciences Institute (BRNI) and the Marshall University (MU) Joan C. Edwards School of Medicine recently announced findings from a new study regarding an Alzheimer's patient with very severe disease who was genetically confirmed to have a known variant. The patient showed promising benefits during treatment with the drug Bryostatin, a natural product produced by a marine invertebrate organism. Genetically confirmed Alzheimer's patients as severely advanced as this patient had never previously shown the same level of clinical improvement with other treatments.

"We are very encouraged by the clinical improvements observed. Nevertheless, controlled clinical trials are necessary to demonstrate safety and efficacy. Researchers at BRNI believe, however, that this patient's response is supportive evidence that activation of Protein Kinase C (PKC) by potent activators such as Bryostatin, with both pre-clinical synaptogenic and anti-amyloid efficacies, could be a viable therapeutic approach for the treatment of severe Alzheimer disease", said Dr. Daniel Alkon, Scientific Director of BRNI and Chief Scientific Officer of Neurotrope BioScience, Inc.

Neurotrope Bioscience Inc., which has licensed this novel therapeutic approach from the BRNI, has recently announced positive results of its Phase 2a safety study and is planning a larger proof of concept study in severe Alzheimer patients which is intended to advance Bryostatin for the treatment of this disease.

BRNI was contacted by a West Virginia resident whose family suffered from high incidence of early onset dementia. Dementia in one particular family member, identified in the study as IV-18, began at the age of 27. Symptoms included an inability to speak or swallow as well as immobilizing spasticity, although the patient retained some awareness and attentiveness. On behalf of the family member, BRNI sought and gained allowance from the Food and Drug Administration to proceed with compassionate treatment of the patient with Bryostatin, a drug that BRNI has been researching for over a decade, for treatment of cognitive disorders. The National Cancer Institute provided Bryostatin for this patient's treatment.

Within two weeks of the initiation of treatment, the patient showed clinical improvements including word vocalization, directed focus, restoration of swallowing, increased responses to verbal commands and some improvement of range of limb motion. These improvements persisted for approximately eight weeks, despite an episode of severe pneumonia that required intubation and hospitalization for four weeks.

Investigators at Marshall University's School of Medicine, working in close collaboration with BRNI, constructed the pedigree of the West Virginia family in which members from five generations exhibited very early onset Alzheimer's dementia. By performing genomic analysis on blood samples from two of the West Virginia family members and comparing it with blood analysis from two family members in Michigan, the Marshall University Genomics Core researchers determined that this family has a unique expression of a very rare variant in the PSEN1 gene. This study provides the first description of the clinical presentation of patients with the variant.

Students showcase research at **Undergraduate Research Day** at the **Capitol**

> **"I want to show legislators what undergraduate research funding supports."**
>
> Stephen Sullivan, one of 53 WVU students participating in Undergraduate Research Day at the Capitol.

Dozens of undergraduates took to the State Capitol on March 4 to show state lawmakers concrete evidence of why research is important and worthy of their support.

"I want to show legislators what undergraduate research funding supports," says Stephen Sullivan, one of 53 WVU students participating in Undergraduate Research Day at the Capitol.

Undergraduate Research Day is a day of research, networking and discoveries and annually gives college students from across the state the opportunity to present their research in poster format and present their findings to state legislators.

One of the goals of the event is to demonstrate that research the students conduct can have a positive effect on policy. When legislators see how useful academic research is in practice, they may be more likely to support future research efforts.

Dr. John Maher, Marshall vice president for research, said, "The work these students are doing is on par with what's done at the best universities in the country. This event provides a unique opportunity for members of the legislature to see an aspect of higher education normally hidden from public view, but that is one of the most important tools for developing students for entry into the workplace or postgraduate education."

West Liberty University's **Project crawdad mentors fifth graders in field science**

Project Crawdad, under the direction of West Liberty University (WLU) Professors Dr. Zachary Loughman and Dr. Karen Kettler, recently took some local fifth graders into streams and creeks collecting crawdads for research.

"Our partnership with WLU gave our students an opportunity to do so many things they might not have a chance to do. Fieldwork offered them a way to learn more about science than they could in the classroom alone. As these students progress into middle school it offers them valuable hands-on experiences that will increase their interest in science and math," West Liberty Elementary School Principal Zac Shutler said.

The WLU professors received a $10,000 grant from the Sprout Fund of Pittsburgh to strengthen science skills in elementary-school-age children. Each group of elementary students received a scientist backpack complete with tools and worked with iPads, as well as collected crayfish that were then kept in the classrooms.

"Using crayfish was an added plus, since children of all ages enjoy capturing them while investigating streams," said Loughman, who is assistant professor of biology (zoology/ecology) and is nationally known for his scientific work with crayfish. "The crayfish are the conduit that lead to a better understanding of the scientific process."

Photo: Loughman (left) and Kettler (right) stand with elementary school students who presented research posters at the close of Project Crawdad.

Shepherd's **Best** named an **ACE Fellow**

Dr. Jason Best, professor of astronomy and astrophysics at Shepherd University, has been named an American Council on Education (ACE) Fellow for academic year 2015-16.

The ACE Fellows Program is designed to strengthen institutions and leadership in American higher education by identifying and preparing emerging leaders for senior positions in college and university administration. Best is among 47 Fellows who were nominated by the senior administration of their institutions and selected this year following a rigorous application process.

"Jason Best has contributed in myriad ways to shared governance at Shepherd, building bridges between faculty and administrators," said Shepherd University President Suzanne Shipley. "He is not only one of Shepherd's star faculty members, but a symbol of the type of powerful collaboration needed to move higher education forward. Jason's dynamism and scientific curiosity will serve him well during his semester as an ACE Fellow, and he will return to Shepherd with a powerful new set of tools to apply to our promising future."

Best has published research in numerous venues, including the Astrophysical Journal and the Journal of Computing Sciences in Colleges, and has received research grants from the National Science Foundation and the West Virginia Experimental Program to Stimulate Competitive Research (EPSCoR). In 2006, he established the Shepherd University Observatory using an Innovation Grant from West Virginia EPSCoR and is currently the observatory director.

The ACE Fellows Program combines retreats, interactive learning opportunities, campus visits and placement at another higher education institution to condense years of on-the-job experience and skills development into a single semester or year. As an ACE Fellow, Best will focus on undergraduate research, an issue of concern to Shepherd University, while working with a college or university president and other senior officers at a host institution.

Green roof established on Marshall's new engineering building

The Marshall University (MU) College of Science and the MU Sustainability Department worked with dozens of volunteers in early April to install a new green roof on the Marshall University Arthur Weisberg Engineering Complex. More than 60 volunteers helped move and install plants that now cover the complex's materials testing lab roof with plants native to Appalachia.

Charles Somerville, the dean of the college of science, said the plants will prevent large amounts of rainfall runoff from flowing down to the streets and creating floods.

"Everything that we can do as a society to slow water down and trap it before it gets down into the storm water systems helps to alleviate some of the street flooding and also to alleviate some of that river pollution," Somerville said.

The building is expected to earn a rating of silver from the U.S. Green Building Council's Leadership in Energy & Environmental Design (LEED).

Insulation provided by the plants will also increase longevity of the roof. Marshall Environmental Specialist Travis Bailey said the plants will block wind and sun corrosion and increase the roof's lifespan by 20 to 40 years.

WVU faculty receive prestigious **National Science Foundation awards**

Four West Virginia University (WVU) researchers have won Faculty Early Career Development, or CAREER, awards from the National Science Foundation, its most prestigious recognition for junior faculty. This marks the most CAREER awards granted to WVU in a single year and totals more than $2.3 million over a five-year award period. The 2015 awards bring WVU's total number of NSF CAREER awards to 22.

"This recognition is a testament to the high caliber faculty we have at WVU," said Fred King, vice president for research. "We are attracting faculty who are making meaningful contributions to their fields, and we are providing them with a solid foundation to support their research objectives and to establish fruitful careers in West Virginia."

The NSF utilizes the CAREER awards to recognize junior faculty from across the country who exemplify the role of teacher-scholars through outstanding research, excellent education and the integration of education and research within the context of the mission of their institutions.

"This recognition is a testament to the high caliber faculty we have at WVU."

Fred King
Vice president for research

WVU's 2015 CAREER award recipients

Cheng Cen, *harnessing the powers of graphene*
Eberly College of Arts and Sciences

Cen is developing an on-demand technique to better control the properties of graphene, a material that comes from graphite – the same material used in everyday pencils. In thin sheets, graphene has incredible conductive properties with potential applications such as faster computer processors, bendable electronics and huge reductions in energies that those devices require.

Edward Flagg, *building ultrafast and ultrasecure computing*
Eberly College of Arts and Sciences

Flagg is working to identify, model and establish effective strategies to mitigate the factors responsible for spectral diffusion – the phenomenon of photons that are emitted at different times to have different wavelengths – that affects quantum computation and communication. Quantum computation and communication, an approach to computing that could solve certain difficult problems much faster than modern-day supercomputers, offers great potential benefits to processing power and communication security by exploiting the non-intuitive properties of quantum mechanics.

Jessica Hoover, *forming stronger bonds*
Eberly College of Arts and Sciences

Hoover will develop new catalytic reactions for the formation of carbon-carbon bonds from carboxylic acids through oxidative decarboxylative coupling reactions. The formation of C-C bonds are key steps in the construction of complex structures and the successful development of this methodology will enable the design of new, more efficient catalysts for the formation of C-C bonds by the pharmaceutical and fine chemical industries.

Cerasela Zoica Dinu, *increasing energy and reducing impact*
Benjamin M. Statler College of Engineering and Mineral Resources

Dinu, an assistant professor of chemical engineering, is working to identify technologies capable of increasing the world's energy portfolio while reducing environmental impact. With energy demand rising and the maintenance of supply becoming increasingly problematic, there is a need to build and implement the next generation of materials that can both ensure power generation and guarantee energy sustainability. Dinu's project is focused on the development of the next generation of catalytic nanomaterials for energy efficient systems generation. Dinu is supported by the current West Virginia National Science Foundation Research Infrastructure Improvement (RII) grant – (explained in more detail on pages 2 and 3 of this issue) and was hired by WVU using funds from the last RII.

Living symbol of Rockefeller's science policy legacy finds home at WVU

In a state known for its bountiful trees, there is a new addition that carries a special provenance. A humble apple tree has found a new home at West Virginia University (WVU), and although it may not have the stately presence of the sugar maple or brilliant crimson leaves of the dogwood, its ancestry is the stuff of legend.

There was standing room only in the John D. Rockefeller IV Gallery in the Downtown Library in late April as the university community gathered to dedicate planting of the Newton apple tree, a direct descendent of the one that inspired Sir Isaac Newton's theory of gravity.

The tree was awarded to retired West Virginia Senator Jay Rockefeller by the National Institute of Standards and Technology (NIST) earlier in the same month in honor of his science policy leadership and his strong commitment during his 30-year career in the United States Senate.

Rockefeller bestowed the tree upon WVU to inspire future generations to pursue scientific and technological discovery.

"This award means so much to me," Rockefeller said at NIST upon receiving the Newton Award. "It is a living symbol of how important it is to study and understand the world around us."

Dr. Paul Hill, Chancellor of the West Virginia Higher Education Policy Commission (HEPC), said, "As the Newton Tree descendant grows, it will see new generations of students on this campus grow as chemists, astronomers, engineers, forensic scientists and more. Senator Rockefeller and WVU are sending a strong message that the intersection of science and policy is where West Virginia will thrive in the future."

Event guest speakers, Richard Cavanagh from the National Institute of Standards and Technology; Dr. Paul Hill, HEPC chancellor; Hannah Clip, Udall and Goldwater Scholarship winner; Dr. Maja Husar Holmes, director of Master of Public Administration and WVU President Gordon Gee, stand for a photo with apples to commemorate the event..

WVU Photo by Brian Persinger

WVSU's student chapter of the American Chemical Society.

WVSU student group named outstanding chapter by American Chemical Society

The student chapter of the American Chemical Society (ACS) at West Virginia State University (WVSU) received its third consecutive Outstanding Chapter Award for its 2013-2014 activities. The group also received Green Chemistry Chapter recognition for the fifth year in a row. Participants received their honors at a national ACS meeting in March.

Since forming in 2009, the group has won three outstanding ratings, two commendable ratings, five Green Chemistry awards, four community interaction grants and three travel grants to attend the annual ACS national meeting.

The group, consisting of more than 20 students, was praised for its outreach and educational efforts by award judges, with reviewers citing what they called an outstanding job promoting chemistry to area youth. Student participants regularly visit schools in the Kanawha Valley to teach science to K-12 youth.

"The ACS students are successfully continuing their mission to bring science education to young people," said Dr. Micheal Fultz, assistant professor of Chemistry at WVSU. "We are taking science into both public and private schools on a regular basis to enhance science education at all grade levels."

ACS members also participate in career preparation activities in the medical and science industry, including trips to professional and graduate schools, Careers in Science seminars, local and national professional meetings, and networking with regional science professionals.

HEPC Chancellor takes part in panel discussion about **science policy**

Dr. Paul L. Hill, Chancellor of the Higher Education Policy Commission, recently participated in a panel discussion organized by West Virginia University's (WVU) Science Policy Organization, a group of graduate and undergraduate students dedicated to empowering young scientists, engineers, mathematicians and STEM enthusiasts to be effective advocates for STEM in the political process. The conversation focused on students and scientists and how they interact with policymakers in delivering their message and informing good policy.

Hill shared with students, faculty and others in attendance, "Yours are the voices that will continue to make science and research recognized as the keys to West Virginia's future. Making that voice clear – really talking to the people and opinion makers of West Virginia – is absolutely critical."

Other panelists included Dr. Melanie Page, WVU Assistant Vice President for Creative and Scholarly Activities; Dr. Paul Cassak of WVU's Department of Physics and Astronomy and Jim Wood of the U.S.-China Clean Energy Research Center.

West Virginia State University designated a **Tree Campus USA**

West Virginia State University (WVSU) has received its second consecutive designation as a Tree Campus USA from the National Arbor Day Foundation. To date, WVSU remains the only institution of higher education in West Virginia to hold such a designation.

"West Virginia State has taken the initiative to ensure that our campus trees remain healthy and beautiful for years to come by using proper management techniques," WVSU Extension Agent Brad Cochran said. "Tree Campus USA is a designation that we continue to be very proud of."

To qualify, campuses must meet a series of criteria, including development and maintenance of a Campus Tree Board and Campus Tree Care Plan, having dedicated expenditures toward tree maintenance, hosting an annual Arbor Day observance, and holding an annual Service Learning Project on campus.

The Arbor Day Foundation partners with Toyota to sponsor the Tree Campus USA initiative.

Concord's geology program awarded grant for **research in arctic**

The environmental geoscience program at Concord University has been awarded a competitive research grant from the American Chemical Society Petroleum Research Fund. The three-year study will examine how geological faults begin to grow and connect into structures that can support large earthquakes. The work will take place at a field site in western Greenland.

At the site, a geological fault zone that was once active many miles below the surface of the Earth has been gradually uplifted so that it is now exposed at Earth's surface. The funding from the grant will allow Concord students to travel to the site during the summer over the next three years and participate in collection of field data. The site is located on a remote island in the Davis Strait above the Arctic Circle and will be accessed with helicopter and sea support.

During the academic year, the students will examine tiny mineral grains from samples collected from the field site using Concord's electron microprobe laboratory on campus. The mineral data are critical to the success of the study and will allow the researchers to determine how deep the fault was when it formed and how much frictional heat it generated when it was actively moving.

The $70,000 grant, "Influence of Anisotropy on Dynamic Rupture During Incipient Fault Zone Development," was awarded to Dr. Joseph Allen, Professor of Geology at Concord University, who will serve as principal investigator for the study.

Pictured above: Concord's Dr. Joseph Allen who received a grant to examine a geological fault zone in Greenland.

Below Left: Field accommodations on the Ikertoq fjord in western Greenland. Right: Concord geology student Luke Stevens taking field measurements in 2013.

Higher Education Can Impact the **"Turning Point"** for Young West Virginians

Natalie Roper, Executive Director, Generation West Virginia

In order to attract and retain young talent in West Virginia, we need to affect young West Virginians' perception of the state before the "turning point"—that moment when many decide their ambitions and dreams are beyond the Mountain State. For that future entrepreneur, nonprofit director, city mayor, accountant, lawyer, when is that "turning point" when they decide to take their talent elsewhere?

A 2012 study by WVU's Bureau of Business and Economic Research gives us insight into when this "turning point" might be. West Virginia is attracting the college age population (18-24 years old) at a higher rate than the national average. However, West Virginia is losing 25-34 year olds at almost double the rate of the national average. This suggests that the "turning point" for many West Virginians is likely before they are 25. Colleges, universities, and community colleges have the opportunity to shift this trajectory by connecting young West Virginians' ambitions to our state's opportunity before this critical "turning point."

Higher Education needs to serve as a connector. Many leave the state without knowing the opportunities that exist here. At the foundation is a misperception of what West Virginia communities have to offer. Apprenticeships and internships are important tools in changing these perceptions and connecting students with West Virginia businesses and organizations that offer the opportunity to stay home while achieving career aspirations. Internship and apprenticeship opportunities allow students to develop lasting relationships with potential future employers while changing the perception that young people have to leave the state to find a great job.

Lack of economic diversification is a problem in the Mountain State, so what if West Virginia does not have the career opportunity that a student is working toward?

Higher education needs to empower entrepreneurs. Millennials are an entrepreneurial generation, but many leave the state due to a perception that West Virginia is not open to change, innovation, new ideas, and solutions. We are missing an opportunity to empower millennials to stay and create the changes West Virginia needs. Higher education institutions need to be the state's biggest entrepreneurial advocates to change this perception before our students come to a different conclusion. Our higher education institutions should believe in this generation's ideas more than anyone and empower them to turn those ideas for new farming solutions, art businesses, technology startups, etc. into action.

Our higher education institutions need to exemplify everything we want West Virginia to be. In order to change the outcome of that "turning point," young West Virginians have to see our state as a place for them whether they are a future entrepreneur, welder, teacher, or legislator. If we can connect more students with real world examples of the opportunity in the state and empower students to see themselves as part of West Virginia's solution, we will see a different kind of "turning point"—that moment when many young West Virginian's realize they can do everything they've always wanted, right here at home.

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FROM THE DIRECTOR:
A growing season

An ongoing theme in the stories covered in this issue of *The Neuron* seems to be growth – which is nicely fitting for the spring! Many of our state's colleges and universities have initiatives and goals centered on growth of different types, but a few are pretty outstanding this season. For example:

- A descendent of the original Isaac Newton apple tree which will adorn the campus at West Virginia University that was donated by former United States Senator Jay Rockefeller (pg. 12) will forever remind us of the importance of scientific research and policy-making.
- The new green roof at Marshall University brings life to the school's new Engineering Building and will help with the storm water runoff in Huntington (pg. 10).
- The fact that West Virginia State University (WVSU) has again been named a "Tree Campus USA" (pg. 14) exhibits that the school has a real commitment to a beautiful and nature-friendly environment for its students. In addition, the researchers at WVSU are partnering with Indian scientists to help solve the problem of unhealthy pomegranates – a high value crop that's of great economic importance in many parts of the world.

We've seen growth in our own office as well with the proliferation of our Chancellor's STEM Speaker Series. We began in November then continued with speakers in February and early May. We're now looking forward to the two summer speakers who we've added to our repertoire - Rachel Swaby on June 11 and Leonard Mlodinow on July 16. The grant money that we have been using to bring this series of wonderfully-inspiring science topics to West Virginia is coming to a close, though, so please reach out to us if you or your business or organization would like to get involved in some way to help us keep it going. We've seen tremendous interest and audience growth throughout each of the events and would love to be able to continue into 2016! Call our office at 304-558-4128 or email our Communications Manager, Amanda Ramey, at amanda.ramey@wvresearch.org for details.

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