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leading undergraduates to the edge of science

Dr. Joe Allen
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West Virginia Higher Education Policy Commission
NSF
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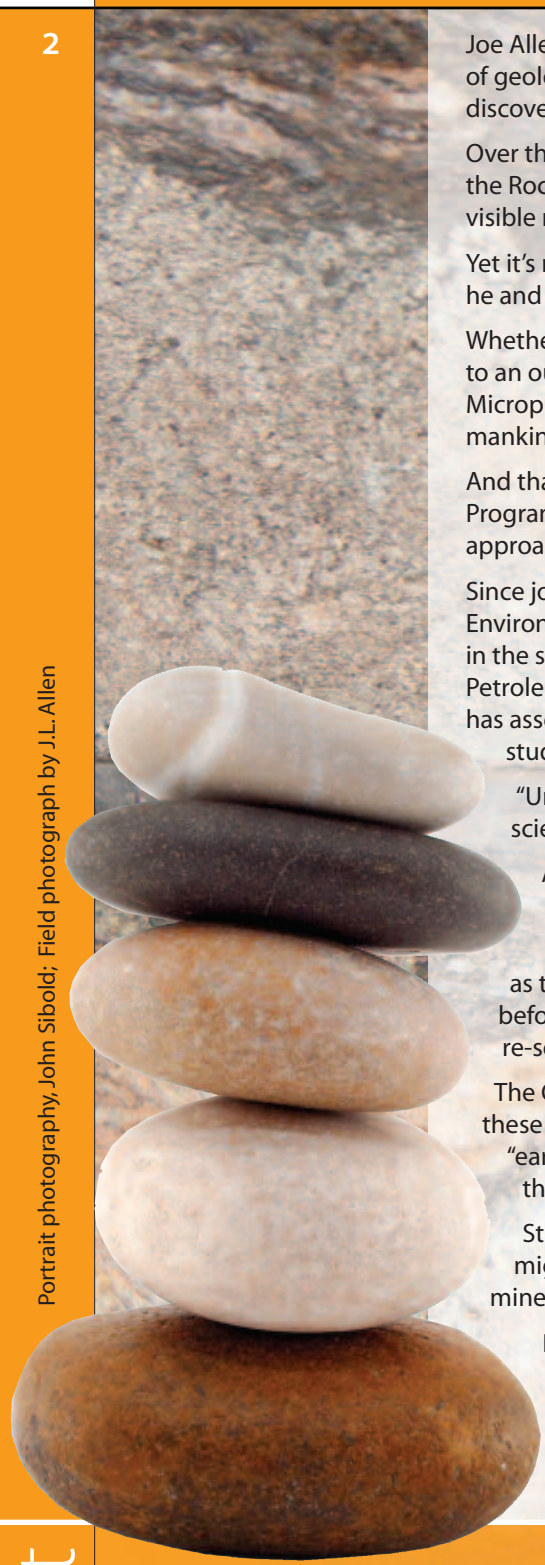
JOE ALLEN:
Leading undergrads to the EDGE OF SCIENCE



Portrait photography, John Sibold; Field photograph by J.L. Allen

Joe Allen knows a lot about earthquakes and the faults where they originate. The 14-year professor of geology and chair of the Division of Natural Sciences at Concord University even serendipitously discovered a previously unknown fault.

Over the years, Dr. Allen has led some 75 students and 75 professional geologists on study trips to the Rocky Mountain region where two ancient earthquake faults are exposed, showing a rare visible record of temblors that occurred 1.4 billion years ago.

Yet it's not what Dr. Allen knows that he believes is important to pass on to his students. It's what he and other geologists don't know that he wants his students to learn.

Whether it's a five-week trip with students to a remote Colorado fault zone, an afternoon class trip to an outcrop near Concord's southern West Virginia campus, or detailed analysis in the Electron Microprobe Laboratory, Joe Allen wants his students to see "the edge of science," that place where mankind's existing knowledge ends and the answers to questions are "we don't know."

And thanks to the efforts of Dr. Allen, his colleagues and West Virginia's EPSCoR (Experimental Program to Stimulate Competitive Research) program, more students have the opportunity to approach that edge.

Since joining Concord as the lone geology faculty in 1998, Dr. Allen has helped institute an Environmental Geosciences undergraduate degree program, one of only three geology programs in the state. With awards from the National Science Foundation, the American Chemical Society's Petroleum Research Fund and the W. Va. Research Trust Fund, Concord's Natural Sciences Division has assembled a respectable collection of analytical equipment to provide opportunities for students to conduct research.

"Undergraduate research tends to open up students' eyes a lot," Dr. Allen says. "They see the scientific process a lot more. That sense of discovery is with them."

Among the student research opportunities is a trip to Colorado to map and study pseudotachylyte systems along the Homestake and Grizzly Creek shear zones.

Pseudotachylyte (pronounced sudo-tacky-lite) is frictionally melted rock that appears as thin veins showing the exact location where an earthquake occurred a billion-plus years before. The rock facings liquefied from heat and friction during the quake, then cooled and re-solidified within minutes, casting in stone a visual recording to be studied years later.

The Colorado faults are significant because through millions of years of uplift and erosion, these recordings are now exposed on the earth's surface and visible for study. Otherwise, "earthquake archaeologists" like Dr. Allen could only infer what occurs during a quake at the shear zone in Earth's middle crust some 10 miles beneath the surface.

Studying this fault behavior is important in Appalachia because faults also impact the migration of economically recoverable reserves of petroleum, natural gas, and other mineral deposits.

But it's not just the geology of a fault or the properties of ancient rock that's important for Dr. Allen's students to see.

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content

"Students get to see science as more than memorization of facts and processes. They are closer to the edge. We can get to 'nobody knows the answer to that,' so students are able to see the limits of science today."

Dr. Joe Allen explains the one-centimeter thick black vein in rock from the Homestake shear zone in the Colorado Rockies is a visual record of an earthquake from 1.4 billion years ago. The rock was nine miles deep at the time of the quake, but came to the surface through uplifting of the Rocky Mountains within the past 70 million years.

about the division of science and research

The West Virginia Higher Education Policy Commission's Division of Science and Research directs the National Science Foundation's Experimental Program to Stimulate Competitive Research (EPSCoR) in West Virginia. The division also coordinates scientific research grants to academic institutions and conducts outreach activities to broaden the public's understanding of science, technology, engineering and mathematics (STEM) disciplines. For more information, visit **www.wvresearch.org**.

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

A SMELLY SABBATICAL:
WV Wesleyan prof to study invasive stink bugs

Whether they came by plane, train or automobile, the brown marmorated stink bug has strayed far from its natural habitat of Asia and established a healthy population in the mid-Atlantic region of the United States. The invasive species causes extensive damage to crops, and scientists throughout the East Coast are looking for ways to control this new pest population.

West Virginia Wesleyan College Associate Professor of Biology Dr. Jeanne Sullivan is joining a team of researchers at the U.S. Department of Agriculture's Appalachian Fruit Laboratory in Kearneysville, W.Va., in a study to limit the growth in numbers and damage wrought by the malodorous insects.

"With the ease of human travel around the globe comes the possibility of accidentally or intentionally releasing an invasive species into the local environment," Sullivan said. "Removed from the environmental constraints that kept it in check in its native population, the numbers can grow astronomically."

Sullivan recently received a grant from the Appalachian College Association to join a team of researchers on this topic. She will describe and quantify basic reproductive behaviors. "I am going to look at what drives mate choice and mating behaviors in this species. It behaves a little bit differently than other stink bug species that have been studied."

Sullivan had been looking for a project like this. "I had wanted to find a pest or invasive species to research," she said. Her research will take her away from campus for more than a year. She will return to Wesleyan in the fall of 2013 to resume teaching.

While Sullivan's and her fellow scientists' work will potentially benefit farmers and consumers in the region, it will also benefit Wesleyan students through future summer research opportunities.

"We want our students to learn to make good observations instead of just looking at something. You do not need to use 10 pieces of highly delicate equipment to do good behavioral science," Sullivan said. "Learning how to do good science is one of those things we really work to instill in our students."

STaR SYMPOSIUM 2012

More than 350 people attended the 4th biennial STaR Symposium and 87th annual W.Va. Academy of Science meeting held April 20 and 21 at West Virginia State University

Left, WV Wesleyan student Colby Stanley receives an award from Jack Carpenter of the W.Va. High-Performance Computational Resources group.
Above, NSF Director Dr. Subra Suresh, U.S. Senator Jay Rockefeller and West Virginia Higher Education Chancellor Dr. Paul Hill were keynote speakers on the second day.

See a list of poster and presentation winners, speaker presentations and photos at **www.wvresearch.org/starsymposium.**

FROM JIGSAWS TO GENETICS:
Piecing together puzzles

As a child, West Virginia University's Dr. Jennifer Hawkins became fascinated with jigsaw puzzles – the kind with lots and lots of pieces.

"I remember the satisfaction of finding two pieces that fit together, and then pride when finishing and getting to see the complete picture," says the assistant professor of biology in the Eberly College of Arts and Sciences. "Science is a lot like that for me. We gather small pieces of information that click together, and over time, a big exciting picture emerges. Unlike the jigsaw puzzle, however, there is no picture on the front of the box to guide you, so that big science picture is even more exciting and more rewarding because it reveals something that no one else knew before – a discovery."

Dr. Hawkins has received a three-year, $755,895 grant from the National Science Foundation to unravel the mysteries of how plants use genetically coded information to build protein molecules that affect the way they look and function. It is work that could someday lead to a more effective way to grow food or even eliminate birth defects.

"Little is known about the genetic controls of gene expression, and therefore, what causes variants to arise in a population," she says. "That's what our project is all about."

She and student researchers will be working with maize to dissect the individual elements that control gene expression through some creative "module swapping" – work that could ultimately lead to improvements in crop yields that could feed more people in a shrinking world.

"This project promises not only intellectual advancement in the fields of molecular and evolutionary genetics, but also the development of a number of possible practical industrial technologies designed to enhance and advance agricultural practices," Hawkins wrote in her proposal to NSF.

For Hawkins, the work, and its potential to provide answers that could improve lives, is a "win-win."

"I was drawn to science because I like the challenge of complex puzzles; if I get to help people in the process, that's even better."

MAJOR GIFT TO PROVIDE TRANSFORMATIVE SPACE AT MU 'S APPLIED ENGINEERING COMPLEX

Huntington-based Arthur's Enterprises has made a large pledge to help build Marshall University's advanced Applied Engineering Complex.

The new facility will have more than 141,000 square feet of classroom, laboratory, office and special applications space that will have a "transformative effect" on the College of Information Technology and Engineering and science-related disciplines. Construction is planned to begin in October.

The Applied Engineering Complex will be located on 3rd Avenue in Huntington between the Arthur Weisberg Family Engineering Laboratories and the Robert C. Byrd Biotechnology Science Center.

The Weisberg family has greatly contributed to the re-establishment of Marshall's engineering degree program, which was re-launched in 2006. Engineering is now one of the fastest-growing majors at Marshall.

The Applied Engineering Complex at Marshall will house the:

- College of Information Technology and Engineering
- Mechanical, Electrical Engineering and Bioengineering Research Laboratories
- Departments of Mathematics and Computational Science
- Computer Modeling and Digital Imaging/Simulation Resource Facility
- Transportation Research Center
- Marshall University Research Corporation

WVU PROJECTILE RESEARCH TEAM GETS INVITE:

Prototypes to be tested at U.S. Army proving ground

West Virginia University scientists have developed a "smart projectile" that they say can be fired from traditional weapons by soldiers on the battlefield and then transform during flight into unmanned aerial vehicles (UAV), providing unprecedented battlefield surveillance through miniature cameras.

Unlike the large, unmanned aerial vehicles controlled remotely by operators half a world away, these smaller UAVs feature wings that deploy in flight after firing and a tiny camera in their noses that designers anticipate will one day provide soldiers with pictures of the battlefield, providing valuable intelligence about the challenges ahead and saving lives and resources in the process.

"Why not have a new class of UAVs that can be fired from the same platforms that soldiers have in their possession?" asks Mridul Gautam, WVU associate vice president for research, the principal investigator of the U.S. Department of Defense-sponsored project. "That would save time, increase availability of surveillance and save soldiers' lives. This is something that is small, easy to move, but still loaded with electronics like cameras and a GPS."

The team was recently invited by the U.S. Army to test fire prototypes at one of America's most prestigious military proving grounds, the Yuma Test Center in Arizona.

WVU's Dr. Jay Wilhelm and Dr. Pat Browning say testing at the Yuma site will reveal a great deal about the capabilities of its smart munitions that they have dubbed the HERO – Hybrid Extended Range Ordnance.

The WVU work is funded through a $2.2 million grant it received from the U.S. Army Armament Research, Development and Engineering Center – known as ARDEC.

BIOLOGY PROFESSOR SECURES GRANT TO SAVE STATE'S PRIMARY NATURAL HISTORY COLLECTION

Thanks to the work of a Marshall University biology professor, the nation's largest museum collection of mammals, amphibians and reptiles from West Virginia will be preserved for future generations.

Dr. Suzanne G. Strait received a $373,256 grant from the National Science Foundation to re-curate and modernize the West Virginia Biological Survey Museum. Her colleague, Dr. Thomas K. Pauley, professor of biology, is co-investigator.

The museum located in the Marshall science building, comprises more than 21,000 specimens amassed over 70 years. Nearly every species in West Virginia, including many listed as federally endangered or at risk, is part of the collection. The grant will allow researchers to buy new cabinets, containers and freezers for storing and preserving the specimens.

"This natural history collection from West Virginia is larger than that of any other museum in the country, and it is truly a unique resource to be developed for training the next generation of biologists who will study Appalachia's animals," said Strait.

Besides re-housing the specimens, the grant allows for scanning field notebooks, maps and slides. "Getting all these records digitized and available online will really put us on the map," Dr. Strait said.

Additional plans include showcasing some exhibits so the museum will be more visible and developing outreach activities for elementary and secondary schools. "A large part of what we want to do during this renovation is get the word out that the museum is here and available for researchers to use," she said.

For more information, contact Strait at straitho@marshall.edu.

WVU ENGINEERING STUDENTS EARN U.S. DOE FELLOWSHIPS

Two West Virginia University engineering students were awarded fellowships through the U.S. Department of Energy's University Turbine Systems Research (UTSR) program.

Tim Repko of Westminster, Md., and Collins Youngblood of Richmond, Va., will travel to two different parts of the country to fulfill their fellowships.

Repko will intern with Solar Turbines Inc. in San Diego. Youngblood will work with General Electric Energy in Greenville, S.C.


Tim Repko

Both Repko and Youngblood have been advised by Andrew C. Nix, a research professor in WVU's Center for Alternative Fuels, Engines and Emissions, who specializes in gas turbine heat transfer, cooling and durability research.


Collins Youngblood

"They are going to work with some of the most renowned gas turbine researchers in the world," Nix said. "This fellowship will provide them with some valuable industrial research and development experience."

The UTSR program addresses key technologies needed to enable the development of advanced turbines and turbine-based systems that will operate cleanly and efficiently when fueled with coal-derived synthesis gas and hydrogen fuels.

WVU ENGINEERING PROFESSOR BANTA CHOSEN FOR FULBRIGHT PROGRAM

Larry Banta, professor of mechanical and aerospace engineering in the West Virginia University Statler College of Engineering and Mineral Resources, has been selected for the Fulbright Scholar Program sponsored by the U.S. State Department. Banta will conduct research on several aspects of fuel cell and gas turbine hybrid electric generation at the University of Genoa in Genoa, Italy.

Fulbright Scholar Program

Administered by the Council for International Exchange of Scholars, a division of the Institute of International Education

STAY-AT-HOME SABBATICAL FOCUSES ON MRI IMAGING


Peter Bandettni

Peter Bandettni, Ph.D., one of the first to apply functional MRI imaging to cognitive neuroscience in the early 1990s, was one of five top experts who conducted a special workshop at West Virginia University on MRI-based technologies for neuroimaging.

The event was a part of WVU's program for core resource support under a neuroscience Centers of Biomedical Research Excellence (CoBRE) grant. It was the first of an annual series of workshops that officials call a "stay-at-home sabbatical" that offers opportunities to learn new techniques and the means to incorporate new skills into research programs.

The workshop consisted of nine sessions that took participants from the very basics of how an MRI scanner works through an actual data collection session on a scanner in the Center for Advanced Imaging. The event was overseen by Center for Neuroscience Director Dr. George Spirou.

WEST VIRGINIA STATE UNIVERSITY UNVEILS NEW HIGH-PERFORMANCE COMPUTER

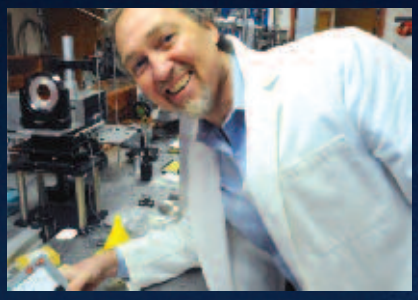
The speed limit on the information superhighway at West Virginia State University got a much needed boost in March 2012, when a new high-performance computing system (HPC) was unveiled at a ribbon-cutting ceremony. The addition of this supercomputer, nicknamed "Stinger," was possible thanks to funding from the National Science Foundation's EPSCoR Research Infrastructure Improvement Track-2 Program and collaborative support from the West Virginia Higher Education Policy Commission's Division of Science and Research.

With a processing speed and capacity equivalent to 120 desktop computers working in tandem, Stinger stands to significantly enhance the research capabilities of WVSU faculty and students. Data that can take days to process using a standard system can now be managed within minutes. Some uses include computational chemistry, gene sequencing, weather modeling and 3-D modeling of micro- and nano-structures. This increased capability will allow students, faculty and researchers to compete more competitively with other institutions in their chosen fields.

Although research will be the primary use of the HPC, administrators hope to also use it as a teaching and outreach tool to attract additional faculty and students into areas of science, technology, engineering and mathematics, and encourage collaborations between faculty and disciplines on campus.

Located in the University's Drain-Jordan Library, Stinger features a visualization tile (viz-wall) display with four 46-inch high resolution monitors, classroom seating and conference space. Also, campus bandwidth was increased from one to 10 gigabits per second to meet demand resulting from the new system.

Directed and administered by Dr. Ulises Toledo, Associate Dean of the Gus R. Douglass Land-Grant Institute, and Dr. Carl Lebsack, Assistant Professor in the Department of Mathematics and Computer Science, this project is a result of collaboration with the University of Arkansas at Pine Bluff and Marshall University, as well as WVSU's Computer Services, Physical Facilities and the Drain-Jordan Library.
For more information regarding Stinger, contact Dr. Ulises Toledo at 304-766-4290.



PHYSICS PROFESSOR LANDS GRANT TO HELP IMPROVE SPACECRAFT PROPULSION SYSTEMS

A Marshall University physics professor has been awarded $200,000 to conduct research that may help improve spacecraft propulsion systems. Dr. Thomas Wilson, an expert in condensed-matter and laser physics, received the grant from the Air Force Office of Scientific Research.

According to Wilson, an ion thruster is a form of electric propulsion used for spacecrafts that creates thrust by accelerating ions. These thrusters, although providing much less thrust than chemical rockets, are able to operate at higher efficiency and for longer periods of time than conventional chemical rocket engines; however, the wall structures of the ion thrusters tend to erode over time.

The goal of Wilson's research is to better understand the erosion process and potentially improve the future design of these propulsion systems.

"We think we can advance our understanding of these erosion processes and perhaps lay the groundwork for selection and design of materials with improved erosion resistance," he said.

"We got this grant for what is referred to as a proof-of-principle experiment," he said. "If we can demonstrate that our diagnostic phonon technique has merit during this project, we think we will be well positioned for major funding in the future."

The Air Force Office of Scientific Research manages the U.S. Air Force's basic research program in aerospace-related science and engineering.

WVU'S GRAHAM EARNS NATIONAL SCIENCE FOUNDATION CAREER AWARD

In an increasingly energy-conscious world, reducing power consumption in any form is extremely important, and to do it without sacrificing performance is critical. A $400,000 Faculty Early Career Development (CAREER) award from the National Science Foundation will allow West Virginia University's Dr. David Graham to create computationally efficient electronics to extend the lifetimes of wireless sensor nodes. Graham is assistant professor of Computer Science and Electrical Engineering.

The CAREER Program offers the NSF's most prestigious awards in support of junior faculty 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 organizations.

HIGH-PERFORMANCE COMPUTING INSTITUTE AIDS COLLABORATION, RESEARCH

West Virginia University reached out to faculty and student researchers across the Mountain State to boost scientific capabilities by hosting a high-performance computing summer institute at the newly renovated White Hall in May.

High-performance computing is the use of parallel processing to run advanced computer programs quickly and efficiently. It is primarily used by scientific researchers, engineers and higher education institutions for complex applications and large calculations.

Goals of the event were to jump-start research efforts throughout West Virginia by providing access to computing resources and expertise, and encourage statewide collaborations through computational methods.

The summer institute was free for faculty and associated student research staff interested in furthering their knowledge of computation-based research. The 25 participants included students and researchers from Shepherd University, Concord University, West Virginia Wesleyan College, West Virginia State University and West Virginia University.

The institute consisted of research talks, computing module presentations and hands-on activities. Research topics ranged from Computational Biology and Chemistry to Computational Fluid Dynamics, while modules included topics such as Introduction to Linux, FIREBALL, Materials Studio, and docking. More information about the content can be found in the agenda online: **http://www.hpc.wvu.edu.**

The institute was sponsored by WV EPSCoR, the National Science Foundation Cooperative Agreement 1003907 and WVU's High-Performance Computing Group.

CELL SIGNALING PATHWAYS
WVU PROFESSOR DEVELOPS NEW APPROACH TO STUDY HOW CELLS MAKE DECISIONS

Understanding how a cell, the fundamental unit of life, processes information is critical for treating disease and promoting health. The biochemical elements within a cell that transmit information along signaling pathways are being revealed at an unprecedented pace. Yet, our understanding of how all of these elements work together remains unclear.

In the April 17 issue of *Science Signaling*, West Virginia University chemical engineering faculty David Klinke and his coworkers describe a new approach to testing our understanding of cell signaling pathways. They use mathematical modeling, called in silico model-based inference, which an editor of Science Signaling said serves as an example of how mathematical modeling can refine our understanding of signaling pathways.

Conventional methods used for scientific hypothesis testing were developed in the early 1900s. These methods were well suited to the questions of the day and were limited to pencil-and-paper calculations, explained Klinke, an assistant professor at the Benjamin M. Statler College of Engineering and Mineral Resources. Today, high-performance computing and high-throughout assays have fundamentally changed the way we study biology and call for a contemporary approach.

To illustrate, Klinke, Ning Cheng, a former master's degree student at WVU, and Emily Chambers, a lab technician, describe two new cell signaling discoveries related to how immune cells respond to cytokines, proteins secreted by the immune system. T helper cells, major components of the immune system, interpret biochemical cues and help coordinate an appropriate immune response.

"While we know many of the biochemical players in this cellular decision-making process, how this process occurs in this particular cell type is unclear," Klinke said. "This challenge in understanding how immune cells orchestrate immunity presents a major hurdle for translating our knowledge of immunity from cell line to mouse to humans."

The researchers developed a combined experimental and computational approach to better understand how cells process and act upon biochemical cues present within the tissue microenvironment. These discoveries have laid a foundation for more studies on how immune cells can be manipulated for better disease therapy. The research was supported by grants from the National Science Foundation, the National Cancer Institute, National Institute of Allergy and Infectious Disease, and the National Institutes of Health.

This challenge in understanding how immune cells orchestrate immunity presents a major hurdle for translating our knowledge of immunity from cell line to mouse to humans.

DON'T LEAVE HOME (FOR MARS) WITHOUT THIS APP

You're planning a long-term trip to the Moon or relocating to Mars—how are you going to survive for months and possibly years without resupply?

This is the challenge you face in the BLiSS Sim, the first science education app developed by the NASA-sponsored Classroom of the Future at the Center for Educational Technologies at Wheeling Jesuit University. With help from NASA's Bioregenerative Life Support System simulator research, you can plan a plant-based, Earth-like solution for oxygen, water and food production.

The BLiSS Sim iPad app is designed to help future space travelers learn how to plan a crop growth system that can support a human crew for long periods of time when frequent resupply is not feasible.

"There are thousands of apps available," said Laurie Ruberg of the Center. "What makes this app unique and highly desirable is that it uses a game format to engage youth and adults in the challenges of supporting humans in space or extreme environments on Earth."

Players learn how four plant types—wheat, potatoes, soybeans and lettuce—can be grown and harvested to supply human oxygen, water and food needs.

To learn more and to download the app, visit **http://bliss-sim.cet.edu.**

MU PROGRAM BECOMES FIRST TO ACHIEVE DIGITAL FORENSICS ACCREDITATION

Marshall University's Forensic Science Graduate Program is the first and only academic program in the nation to achieve accreditation in the area of digital evidence through the Forensic Science Education Programs Accreditation Commission.

Forensic Science Center Director Dr. Terry W. Fenger said accreditation in digital forensics recognizes that Marshall's program has met established standards as a high quality academic program and distinguishes the program nationally.

"Digital forensics is an area of specialization," Fenger said. "Marshall's Forensic Science Graduate Program recognized the need for digital forensic examiners and responded by developing an educational track to address this need."

The Marshall University Forensic Science Graduate Program is a two-year master's degree program. It has four areas of emphasis: DNA analysis, forensic chemistry, crime scene investigation and digital forensics.

U.S. Senator Joe Manchin positions a cell phone in a radio frequency isolation box at the Digital Forensics Investigative Unit. Computer Forensics Specialist Chris Vance explains how digital evidence from cell phones is retrieved.

WV WESLEYAN FIRST IN NATION TO OFFER CHEMICAL HYGIENE OFFICER MAJOR

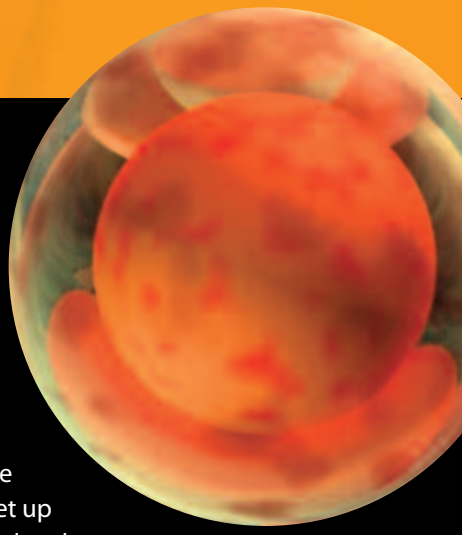
West Virginia Wesleyan College is the first institution of higher learning in the United States to offer a bachelor of science in Chemical Hygiene Officer – a profession that has developed within the last 20 years. Incoming and current Wesleyan students may declare the major or enroll in its classes, which begin in August.

Every lab that works with chemicals is subject to the Occupational Safety and Health Administration Lab Standard, which requires a chemical hygiene officer. Many states have even more stringent requirements than OSHA mandates, and all require a chemical hygiene officer or an appointed employee fulfilling the same professional occupation.

"Our major will emphasize the laboratory experience so that students become effective chemists, and the course work will help them to develop professional skills needed to be a chemical hygiene officer," said Mel Charlton-Smith, chemical hygiene officer and Wesleyan chemistry lab coordinator and lecturer.

The goal of the chemical hygiene officer course work is to ensure students have a firm background in chemistry and a solid grasp of the regulations and responsibilities of the profession. "This will be a groundbreaking program for Wesleyan, the nation and the profession," Charlton-Smith said.

Learn more at **www.wvwc.edu.**



Dr. Jingwei Xie

Dr. Pier Paolo Claudio

SCIENTISTS RECEIVE GRANTS FOR ORTHOPEDIC AND LUNG CANCER RESEARCH

Two Marshall University scientists have been awarded grants of $25,000 each to advance their research, encourage collaborations and spur innovative approaches to healthcare.

Dr. Jingwei Xie and Dr. Pier Paolo Claudio are the recipients of the first grants awarded through the Joint Pilot Research Program set up by Marshall and the University of Kentucky as part of their Clinical and Translational Science Award (CTSA) partnership. Funded by the National Institutes of Health, the CTSA program is aimed at speeding the time for laboratory discoveries to benefit patients.

A senior scientist at the Marshall Institute for Interdisciplinary Research, Xie will use his award to develop a method that may improve surgical repair of rotator cuff injuries.

Claudio, associate professor in the Biomedical Sciences Graduate Program, will use the grant to help develop an assay that will potentially allow the development of personalized treatment for lung cancer.

Xie and Claudio both intend to use their findings from these awards as springboards to apply for larger federal grants for related research.

"These pilot awards are relatively small from a research funding perspective, but they allow recipients to test their ideas and generate concrete results as the basis for proposals to the National Institutes of Health's large grant programs," said Dr. John M. Maher, vice president for research at Marshall.

"It's not unusual for collaborative projects like these to lead to multimillion-dollar awards down the road, after the initial results show significant promise."

SURE TO HAVE A GOOD SUMMER

Eleven undergrads selected for summer research experience

Eleven undergraduate students were at Marshall University for the Summer Undergraduate Research Experience (SURE) Fellowship, which provides each student with a $4,000 stipend and supplies for their research.

The program is funded through the West Virginia Research Challenge Fund, and is administered by the WV Higher Education Policy Commission, Division of Science and Research. SURE participants conduct their research during a 10-week time period.

"We want students to know how strongly Marshall supports undergraduate research," said Dr. Mike Norton, chemistry professor and director of the SURE program. "This is the time when these young minds start utilizing their research skills in preparation for graduate school."

The students and their faculty mentors are:

Samantha Adkins of Huntington with Dr. Massimo Bardi
Caleb Calvary of Columbus, Ohio, with Dr.Michael Castellani
Arrin Carter of Rocky Gap, Va., with Dr. Elmer Price
James Collins of Fort Gay with Dr. Leslie Frost
Courtney Hatten of Wayne with Dr. Laura McCunn
Abigail Hayes of Wheeling with Dr. Brian Antonsen
Catherine Higgins of Montgomery with Dr. Scott Day
Deborah Moore of Huntington with Dr. Wendy Trzyna
Robert Mwangi of Nakuru, Kenya, with Dr. Elizabeth Murray
Anthony Stephenson of Ironton, Ohio, with Dr. Derrick Kolling
Chunji Yin of Yanji, China, with Drs. Simon Collier and David Mallory.

For more information visit **www.marshall.edu/SURE**.

FIVE BUSINESSES SELECTED AS INNOVATE WEST VIRGINIA COMPANIES

Five small manufacturers have been selected as the state's first INNOVATE West Virginia companies. Sponsored by Marshall University, Concord University and Robert C. Byrd Institute for Advanced Flexible Manufacturing (RCBI), INNOVATE WV helps entrepreneurs, small businesses and manufacturers in southern West Virginia develop and commercialize new products. The initiative is funded in part through the U.S. Economic Development Administration.

The five companies selected to receive assistance to support their entrepreneurial efforts and develop novel manufacturing ideas are:

- Blue Gold Inc., White Sulphur Springs
- Carbon Fiber Composites, Ona
- Stinson-Lane LLC, Williamsburg
- Tramco, Williamson
- Vintec Manufacturing LLC, Gauley Bridge

The companies will receive business and technical support from RCBI's experts, as well as state-of-the-art equipment and services, including computer-aided design, reverse engineering, rapid prototyping, and sophisticated fabrication and machining.

"Yankee ingenuity meets southern hospitality with INNOVATE West Virginia," said U.S. Representative Nick J. Rahall. "How we can best introduce entrepreneurs' ideas to the latest tools in technology and get them conversing to produce jobs is the aim of INNOVATE West Virginia".

A second round of INNOVATE WV applications will be taken later in 2012. For more information, visit **www.rcbi.org**, call 800-469-RCBI (7224) or e-mail InnovateWV@rcbi.org.

WVU SCIENTIST DESIGNS NOVEL SYSTEM TO MONITOR AIR AROUND MARCELLUS WELLS

Helping thousands of Marcellus Shale drilling sites along West Virginia's mountainous terrain comply with environmental regulations is a big task. But for Michael McCawley, a research associate professor in the West Virginia University Department of Community Medicine, remote gas wells are as close as his office computer.

With more than 1,400 existing Marcellus Shale natural gas wells across the state and drilling permits issued for another 1,200, monitoring so many drilling sites can be a time-consuming and expensive process. Particularly for those wells in remote and rugged locations, lack of nearby power and phone lines make them impossible to monitor using traditional systems.

McCawley is testing a system of wireless monitoring modules using radio transceivers, 12-volt batteries, solar panels and notebook computers that can measure dust, volatile organic compounds and light and sound coming from a gas drilling site and send the data to a website server that McCawley accesses from his office computer in Morgantown.

"The system is designed to be cheap, portable, off-the-shelf, and easy to use in a wide variety of situations," he said. "Plug and play."

A biologist also trained as an engineer, McCawley has been at the forefront of air pollution and occupational health. From the ash-laden air of Mount St. Helens during its massive 1980 eruption to the Kuwait oil fires during the first Gulf War in 1991, McCawley has been on the scene monitoring air quality. For a man who likes to be where the action is, the Marcellus shale hits home.

"Energy can be developed in an environmentally sound manner and that involves quality control", he said. "Quality control requires monitoring. We need to give industry the right tools to control this thing."

The project is part of a larger effort of the U.S. Department of Energy's National Energy Technology Laboratory, devoted to fossil energy research. The NETL has teamed with five regional universities including WVU to create the NETL-Regional University Alliance through which McCawley's research is being funded. It is one of the major activities of WVU's Advanced Energy Initiative, established to foster research needed to ensure that the development of energy is also environmentally sustainable.

Dr. Shirley Neitch (holding plaque) with Marshall President Stephen J. Kopp, Susan Maier and Ed Maier.

PHYSICIAN NAMED AS FIRST MAIER CLINICAL RESEARCH PROFESSOR AT MARSHALL

Dr. Shirley M. Neitch, professor of internal medicine and chief of geriatrics at the Joan C. Edwards School of Medicine at Marshall University, has been named the inaugural Maier Clinical Research Professor.

The professorship will support interdisciplinary translational research investigating the causes, management and treatment of dementia.

Neitch's first goal is to complete a genetics study of a family whose affected members develop symptoms at a very young age, in their late 20s. The next step, she added, will be to pursue treatment options.

The Professorship is named in honor of Marshall alumnus Ed Maier, following his retirement from General Corporation. General Corporation's gift of $1 million for establishment of the professorship was matched by the "Bucks for Brains" West Virginia Research Trust Fund.

COLLABORATION

is the key to innovation

By Dr. Subra Suresh, Director, National Science Foundation
Excerpted from remarks delivered to STaR Symposium at West Virginia State University

The Experimental Program to Stimulate Competitive Research (EPSCoR) helps the National Science Foundation strengthen research and education in science and engineering throughout the nation and avoid undue geographic concentration.

Supporting EPSCoR is in the nation's best interest because it bolsters science and technology resources through partnerships involving universities, industry, local government, and federal R&D agencies. Partnerships are key to innovation, as today's meeting theme —"Innovation: from Concept to Commercialization" — suggests.

Those of you involved with EPSCoR deserve major kudos for the work you are doing to advance science nationwide. NSF relies on our scientific community to give us insight on what works, how the science and engineering enterprise is evolving, and where emerging opportunities are surfacing.

NSF initiated the concept of EPSCoR more than 30 years ago, and it's fitting that we are meeting here in one of the five charter EPSCoR states. Our goal was to enhance U.S. research capacity across the country in states that historically received limited R&D funding yet were committed to building research and education institutions.

In 1980, there were just five NSF-funded EPSCoR states. Today there are 27 states, one commonwealth, and one territory participating. NSF is pleased that EPSCoR originated here and has been the model for several other research agencies' programs.

Today's interconnected world increasingly involves collaboration, often with partners across both geographic and disciplinary boundaries.

NSF's success is, in no small part, judged by how deeply and broadly engaged our research community is in international collaboration. Global competitiveness requires a science and engineering research workforce that moves easily across borders. Collaboration within our borders is also key to facilitating innovation derived from basic research.

To this end, NSF recently initiated a number of efforts to help sustain the agency's role in U.S. prosperity.

One of those efforts is NSF's Innovation Corps (I-Corps), which is a public-private partnership to accelerate the movement of research results from the lab to the marketplace. I-Corps just celebrated its first anniversary and announced new efforts to elevate this endeavor in the science and engineering community even further.

Another effort is NSF's INSPIRE, which stands for for Integrated NSF Support Promoting Interdisciplinary Research and Education. It's designed to facilitate multidisciplinary and transformative research that might fall between traditional disciplinary boundaries. EPSCoR researchers who come from nontraditional backgrounds will find unique and accommodating niches in this program.

Another recent effort is Science Across Virtual Institutes (SAVI), a pilot framework for international collaboration. This effort continues to expand and strengthen in partnership with other countries and regions.

Finally, NSF's Small Business Innovation Research and Small Business Technology Transfer programs partner with small businesses, non-profits and venture capitalists to accelerate the transfer of science and engineering breakthroughs from the lab to the marketplace.

These are just a few of NSF's recent activities. I am optimistic that even in tight fiscal periods, there are increased opportunities for the science and engineering community. And in this challenge are opportunities for EPSCoR to help us sustain American innovation and advance science. I am your most ardent supporter.

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FROM THE DIRECTOR OF SCIENCE AND RESEARCH:

Good things continue

West Virginia's science and research community expresses a big thank you to U.S. Senator Jay Rockefeller and National Science Foundation Director Dr. Subra Suresh for being a part of the STaR Symposium and W.Va. Academy of Science meeting at West Virginia State University in April. The presence of Dr. Suresh speaks highly of the respect that NSF shows for West Virginia's researchers and the state's EPSCoR program.

Dr. Suresh recognizes what you can see from the articles in this issue -- that many good things are happening across West Virginia related to science, research and education.

Concord's Joe Allen is spending another summer in Colorado, further researching earthquake faults. Even though he is 1,600 miles away, what he and his students learn could offer economic benefit in our own Mountain State.

Wesleyan's Jeanne Sullivan will spend the next year studying stink bugs. It's not the kind of work everyone enjoys, but what she learns may provide economic benefit to farmers. Marshall's Thomas Wilson is working to improve spacecraft propulsion, while research by Jinwei Xie and Pier Paolo Claudio may lead to improved medical treatments.

WVU's Jennifer Hawkins' study on gene expression may help feed an ever-growing global population, while David Klinke's study of how cells process information may lead to better immune system understanding and better treatments for disease.

These are just a few of the activities by students and faculty in West Virginia to improve knowledge, foster economic development and create a better world.

We've made great strides, and we need to continue toward our goal as stated in Vision 2015, the recently updated Science and Technology Strategic Plan, for research and innovation to be the number one driver of West Virginia's new diverse and prosperous economy.

Jan R. Taylor

Dr. Jan Taylor
Director of Science and Research
West Virginia Higher Education Policy Commission