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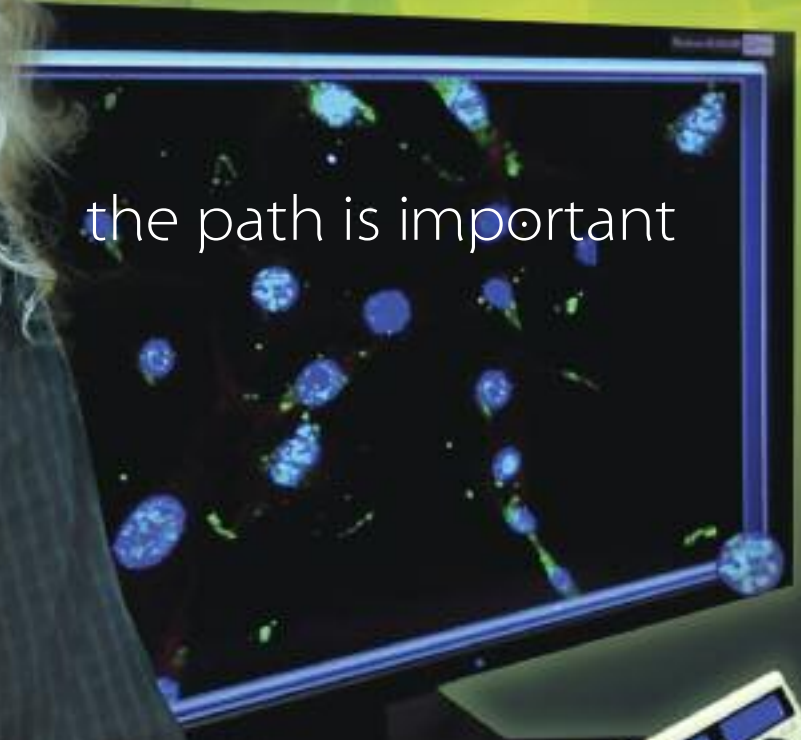
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the path is important



Dr. Michael L. Norton
Marshall University

West Virginia Higher Education Policy Commission



WVPEPSCOR

The Path Forward: **MIKE NORTON**

The Norton file:

Professor, Chemistry, Marshall University
Co-Director, Molecular and Biological Imaging Center
B.S. - Chemistry, Louisiana State University-Shreveport
Ph.D. - Solid State Chemistry, Arizona State University
Postdoc- Electronic Materials, Naval Weapons Center, China Lake, Calif.

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"Growing up in the 1960s, I wanted to be a chemist from the age of five," laughs Norton. "Buying me gifts was always easy for my family. They just got me things related to chemistry. I never thought of doing anything else."

As an undergraduate at Louisiana State University-Shreveport, Norton recalls that he was one of only five students in his physical chemistry class. They met in the instructor's office, and the personal attention he received made an impression.

"That has followed me everywhere," he says. "I've always remembered how great it was—being on a small campus and really feeling I was part of something."

“There is hardly anything better than mentoring undergraduates. The best part of my day today was watching a student see her own sample, which she had prepared, on our multi-photon confocal microscope for the first time. The look on her face was priceless. Mike Norton”

After graduation, his journey took him to Arizona State University for his Ph.D. and then to the Naval Weapons Center in China Lake, Calif., as a post-doc. Norton came to Marshall University in 1991, following a stint teaching chemistry at the University of Georgia. He has been a full professor since 1995.

Again, the path was important.

"What didn't get me tenure at Georgia was precisely what made me attractive to Marshall," says Norton. "I had done a lot of my work with undergraduates, and that wasn't exactly a popular concept for a 'serious scientist' in academia at the time. But Marshall brought me here for an interview and we clicked. I was impressed with the pride in the institution and the vision for the laboratories and research."

Norton's eyes light up when he describes what still inspires him.

"There is hardly anything better than mentoring undergraduates," he says. "The best part of my day today was watching a student see her own sample, which she had prepared, on our multi-photon confocal microscope for the first time. The look on her face was priceless."

For six years, Norton has directed the university's 10-week Summer Undergraduate Research Experience—yet another outgrowth of his journey.

"As a student, I participated in an NSF-funded undergraduate research program, and it was one of the things that primed me with the idea that research for undergraduates is really, really important," he adds. "I see my work with our SURE program as a way to pay back the people who were watching out for me."

The co-founder of two companies, Vandalia Research and Parabon NanoLabs, and co-inventor of the technology upon which a third company, Ecer Technologies, is based, Norton says he never stops learning.

"Every day I have the opportunity to learn how much I don't know. Working with people smarter than you is a great thing," he continues.

"The people I work with have taught me a lot and continue to teach me every day."

He is also gratified by what they have accomplished together, and philosophical about where he has been.

"We wanted to create jobs where we could use our science and make a difference," he smiles. "Now we have 12 people employed in Huntington, living and working where they want to be. That's a good feeling."

"If I've learned anything, it's to avoid negativity, work with people who know how to get things done and always remember that history is the best guide to the future."



Norton with post-doctoral fellows:
Dr. Anshuman Mangalum and Dr. Masudur Rahman

Photos by Rick Hays/Marshall University

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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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Product by West Virginia's own Protea makes the list of **Top 10 Innovations of 2011**



A product manufactured and marketed by a West Virginia company is among the Top 10 innovations for 2011 by *The Scientist* magazine.

"The LAESI (Laser Ablation Electrospray Ionization) DP-1000 revolutionizes sample introduction and data analysis for high-throughput biological mass spectrometry," says the website for Protea Biosciences of Morgantown. "This 'smart source' offers you unprecedented access and visualization of your molecule(s) of interest directly as they exist and where they exist in nature."

Protea is a leader in the emerging field of Bioanalytics. The company develops new technology for the identification, characterization, and quantitation of biologically-important molecules for basic research, pharmaceutical development, and diagnostic applications. Protea employs many science graduates of West Virginia and Marshall universities.

CEO Steve Turner (see commentary, page 15) will be a panelist at the STaR Symposium April 20 (see below).



STaR Symposium to focus on INNOVATION

Innovation: from concept to commercialization is the theme of the Science, Technology and Research Symposium (STaR) April 20-21 at West Virginia State University in Institute. The symposium is a joint event with the W.Va. Academy of Science annual meeting.

Keynote speakers will be **Gentry Lee**, chief engineer for Solar System Exploration at the NASA Jet Propulsion Laboratory; **Dr. Paul Hill**, Chancellor, West Virginia Higher Education Policy Commission; **Jay Rockefeller**, U.S. Senator from West Virginia and chairman of the Committee on Commerce, Science and Transportation; and **Dr. Subra Suresh**, director of the National Science Foundation.

Hear speakers from successful W.Va. biotech start-up companies, experts who help researchers transform discoveries into products, and agencies that support growing new businesses.

The program also features Academy of Science presentations for students and faculty, poster sessions and, awards for best presenters. The Academy will name the state Science Teacher of the Year and present student awards for High-Performance Computational Resources.

STaR SYMPOSIUM 2012

Learn more and register at www.wvresearch.org/starsymposium.



MU-ADVANCE names faculty fellows, awards mini-grants



Dr. Kristi Fondren



Dr. Elizabeth Niese



Dr. Hyoil Han



Dr. Maria Serrat

Marshall University's MU-ADVANCE program has named four faculty fellows and awarded five mini-grants as part of the program to enhance the research and professional development of female faculty members in the fields of science, technology, engineering and mathematics.

MU-ADVANCE is funded through a National Science Foundation (NSF) initiative. Each of the four faculty fellows selected for the competitive awards will receive \$15,000 to be used for research, and \$5,000 for a senior research collaborator to help foster professional development.

This year's faculty fellows are:

- **Dr. Kristi Fondren**, assistant professor in the Department of Sociology, who uses the Appalachian Trail and its hikers to analyze how humans develop relationships with the environment;
- **Dr. Hyoil Han**, associate professor in the Department of Computer Science, who is working to develop a system to help biomedical researchers quickly access evidence-based literature regarding breast cancer;
- **Dr. Elizabeth Niese**, assistant professor in the Department of Mathematics, who will use her award to further her work in algebraic combinatorics and to provide research opportunities for math students at Marshall; and
- **Dr. Maria Serrat**, assistant professor in the Department of Anatomy and Pathology, whose research uses real-time imaging to determine the impact of environmental factors like nutrition, temperature and physical activity on bone elongation.

For Serrat, this newest grant is a continuation of the faculty fellowship award she received last year. She is also one of five MU-ADVANCE mini-grant recipients this year. The mini-grants are awarded in amounts up to \$1,000 and fund professional development.

The mini-grant recipients are assistant professors. In addition to Serrat, they are Dr. April Fugett-Fuller and Dr. Jennifer Tiano of the Department of Psychology, Dr. Anna Mummert of the Department of Mathematics, and Dr. Bin Wang of the Department of Chemistry.

For more information, visit www.marshall.edu/mu-advance.

MU scientist exploring link between obesity and cancer

A Marshall University researcher has been awarded a one-year, \$60,000 grant to further study connections between obesity and cancer.

Dr. Travis Salisbury, assistant professor of Pharmacology, Physiology and Toxicology at the Joan C. Edwards School of Medicine, received the grant from the Pharmaceutical Research and Manufacturers of America Foundation.

Salisbury says epidemiological reports show that obesity increases human risk for several types of cancers but scientists are not sure why. His lab is exploring one possibility.

"Our data shows that adipocytes, or fat cells, secrete factors that stimulate human breast cancer cells to grow rapidly," said Salisbury. "We have discovered that blocking the activity of a specific receptor—the aryl hydrocarbon receptor, or AHR—in the cancer cells reduces their capacity for growth in an adipocyte-rich environment."

"It is quite exciting to think that our findings will provide not only a better understanding of the relationship between obesity and increased cancer risk, but may also suggest future treatments for cancer."



Dr. Travis Salisbury

WVU adds Sample Preparation Lab to growing suite of shared facilities for regional researchers

West Virginia University recently celebrated the opening of a new sample preparation lab on the Evansdale Campus, an important new component of its Shared Research Facilities (WVUSRF).

The new lab is home to a range of technologies that researchers consider vital to the preparation of materials for microscopic evaluation.

"This is an important new addition that should help researchers from all disciplines," Electron Microscopy Technical Lead Dr. Marcela Redigolo said.

The new lab includes an Allied MultiPrep Polishing System – a sophisticated and precise semi-automatic sample preparation tool. In addition to the use of new tools, users of the new lab will be able to work with WVUSRF staff, who provide expertise on the instrumentation and can help users develop effective research protocols and strategies.

The WVUSRF provides access to state-of-the-art equipment for all university and industry researchers; training for students and users for hands-on operation; and experienced staff with technical expertise.

Other resources available through WVUSRF include:

- A Clean Room Facility to fabricate micro to nanoscale structures and devices;
- The Materials Fabrication and Characterization Facility with a variety of instruments to fabricate materials and characterize their structural, chemical, optical, electrical and magnetic properties;
- The Electron Microscopy facility; and
- The Bio-Nano Research facility to facilitate research at the intersection of molecular biology and nanomaterials.

For a general overview of what WVUSRF offers, visit <http://sharedresearchfacilities.wvu.edu>.

Army Funds Research of Power Conversion Units

A West Virginia University professor is working on a three-year, \$150,000 Army Research Laboratory project to miniaturize power conversion units.

"Mobile micro-systems that are palm-sized or smaller require ultra-compact power conversion units to convert multiple voltage levels from a single battery source," said Dr. Xueyan Song, assistant professor in the Department of Mechanical and Aerospace Engineering.

"Collectively, the new knowledge and new technology gained from this research will have a positive impact on a variety of advanced technologies, including improving sustainability of the world's electricity base," Song said.

"This newly funded research will provide excellent training to graduate students at West Virginia University and will foster the development of advanced specialists from the challenging research field of energy materials," she added.

WVU research aimed at improving highway safety

Safer roadways and reduced accidents, injuries and fatalities are the goals of three research projects by West Virginia University civil engineering professors. The \$500,000 research projects by Drs. David Martinelli and Avi Unnikrishnan are funded by the West Virginia and U.S. Departments of Transportation.

The professors are researching fog detection, the state's graduated driver licensing program and school zone traffic control strategies.

Fog is among the most dangerous weather conditions with respect to multi-car crashes. Fog events are known to either be recurring or non-recurring, Martinelli said. If it's recurring, there is an opportunity to detect it with a high degree of reliability and warn drivers accordingly. The fog detection research will examine current technology for predicting and detecting fog events and make recommendations as to the type of systems to deploy, if any, at locations in West Virginia.

The second project involves examining current laws associated with school zones. Emerging trends, such as consolidated schools, fewer students walking to school and fewer students riding the bus, along with more teenagers driving, have led to major congestion and safety issues.

"We will be researching different ways to alleviate the congestion and transportation hazards by looking at traffic devices, access layouts and possible changes to drop-off hours and policies," Martinelli said.

The third project involves the graduated licensing program in West Virginia and its effectiveness in promoting safety among younger drivers. Many states currently have some form of the program, Martinelli said there is no real data to show whether it is working.

The intent of GDL programs is to reduce accidents among young drivers by allowing them to accumulate driving experience under the safest conditions possible. The researchers and their team of graduate students will be looking at the attitudes and level of awareness from teenagers, their parents and local police officers.

"GDLs are difficult for police to enforce, but we believe that their effectiveness might lie more in empowering parents to impose restrictions and manage their child's driving experience," explained Martinelli.

Researchers in the Benjamin M. Statler College of Engineering and Mineral Resources will be working closely with the Perley Isaac Reed School of Journalism to develop survey instruments, as well as public awareness recommendations with respect to the GDL program and school zones.

Public reports from all three projects will be published through the West Virginia Division of Highways Office of Research.

Bluefield State faculty member's traffic congestion research published in journal



The next time you are stuck in traffic, think of Shannon Bowling, assistant professor of Electrical Engineering Technology at Bluefield State College.

"Most people have little idea what causes traffic jams," said Dr. Bowling, who along with Old Dominion University graduate student George Arnaout published a study in the *Journal of Industrial Engineering and Management* on reducing traffic congestion.

"They might think it is probably just a single incident or one driver's error that causes things to stop. Actually, the cause is very complicated and it results from many drivers' actions that get magnified over time. Simply tapping your brakes in a heavily congested zone can cause a traffic jam long after you are gone."

The two researchers considered the impact of Cooperative Adaptive Cruise Control (CACC) on relieving traffic congestion and improving overall traffic flow. "CACC-equipped vehicles have sensors and communication devices that permit them to communicate with other CACC-equipped vehicles and adjust the speed of each vehicle to an optimal value that will maximize the flow of traffic," Bowling explained.

Their research utilized "agent-based modeling," a process that combines microsimulation and macrosimulation. "There are just a handful of researchers in the world studying the effects of CACC who are applying agent-based modeling—it's the latest modeling paradigm," Bowling added.

Because of the practical limitations of injecting CACC vehicles into an actual traffic jam, the researchers created a computer simulation that accurately models the behavior of drivers and also models the behavior of cars equipped with CACC. CACC vehicles react in a traffic jam in a manner that promotes a reduction in congestion and an increase in traffic flow.

"The algorithm is actually trying to simulate the behavior of an older type of transportation vehicle—a train," Bowling continued. "All cars in a train are mechanically linked and, as a result, there is no variance in the speed of each car. It is the speed difference that actually causes a traffic jam. The CACC can create a virtual mechanical link among all the vehicles to reduce variance of speed for each vehicle. This reduces or eliminates traffic congestion."

Read their research at www.jiem.org.

“Most people have little idea what causes traffic jams. They might think it is probably just a single incident or one driver's error that causes things to stop. Simply tapping your brakes in a heavily congested zone can cause a traffic jam long after you are gone.”

Shannon Bowling

Where have all the **Warbler's** gone?

In recent years, the golden-winged warbler (*Vermivora chrysoptera*) has been experiencing population declines throughout the north-eastern United States, especially in West Virginia.

Two West Virginia University researchers hope extensive research and monitoring of West Virginia's population will offer solutions to help preserve the threatened species.

Petra Wood, a research biologist with the U.S. Geological Survey and adjunct professor of wildlife in the WVU Davis College of Agriculture, Natural Resources and Design, and Kyle Aldinger, a native of Hummelstown, Pa. who is pursuing a doctoral degree in forest resources science, received a \$16,000 grant from the U.S. Department of the Interior Fish and Wildlife Service to monitor the population status of the species and associated avian species inhabiting high elevation pasturelands in West Virginia.

According to Wood, there are likely a variety reasons for the decline.

"A factor in the population decline is change in the species' breeding habitat," she said. "Hybridization with blue-winged warblers, a closely related species, as well as nest parasitism by the brown-headed cowbirds also contribute to the problem."

Golden-winged warblers breed in sites known as early successional habitats – areas of growing grasses, forbs, shrubs and trees that provide food and shelter for wildlife, where different types of plants gradually and regularly replace one another – and rely heavily on human disturbances such as mowing, cutting and burning to maintain them. Left unmaintained, the habitats will eventually become forests.

"Even with its recent population decline, West Virginia still represents one of the strongholds of golden-winged warbler populations in the Appalachian region," Aldinger added. "Since they only breed in early successional habitats and generally at higher elevations greater than 700 meters, their habitats are quite rare and unique in West Virginia as it's predominantly a forested state."

In a 2008 study, the researchers identified high-elevation grazing areas like allotments in the Monongahela National Forest as important breeding ground for the species.

To aid conservation efforts in the state, the pair will investigate habitat management strategies for the species with particular interest in how it is affected by livestock grazing, brush-hogging or mechanical mowing, and light tree harvest.

With any luck, research efforts will help preserve and promote the songbird's population for future generations to enjoy.

“A factor in the population decline is change in the species' breeding habitat. Hybridization with blue-winged warblers, a closely related species, as well as nest parasitism by the brown-headed cowbirds also contribute to the problem.”

Petra Wood





U.S. DEPARTMENT OF ENERGY

SOLAR DECATHLON

WVU students selected to participate in international solar home competition

A team of students from West Virginia University has been selected to participate in the 2013 Solar Decathlon. The WVU team is one of only 20 selected for the worldwide competition of university students challenged to design, build and operate the most affordable, attractive and energy-efficient solar-powered house they can. The competition is hosted by the U.S. Department of Energy.



Each team receives a \$100,000 grant from the DOE. The team is led by students from the Benjamin M. Statler College of Engineering and Mineral Resources with help from students in the College of Creative Arts; the Davis College of Agriculture, Natural Resources and Design; and the Perley Isaac Reed School of Journalism.

WVU's entry in the competition, the Preserving Energy with Appalachian Knowledge project, or PEAK, will combine modern smart-home technologies into a rustic-style log home. This is the first time a log-style home has been accepted into the competition.

The Solar Decathlon consists of 10 contests designed to gauge the environmental performance and livability of each team's submission. The contests cover architecture, market appeal and engineering, as well as comfort level, appliances, and home entertainment. Each home must produce as much or more energy than it consumes. The maximum budget for the house is \$250,000.

WVU researcher to study surface coal mining with aim to **reduce impact**

“With this research, we intend to introduce a step-change in how mining industry addresses decision situations that feature multiple criteria for selecting the best alternative.”

Dr. Vlad Kecojevic

In an effort to reduce the environmental impact of one of the state's most economically important industries, a West Virginia University engineering faculty member is studying surface coal mining systems.

Dr. Vlad Kecojevic, associate professor of mining engineering, says future surface coal mining operations will be required to incorporate design features, technologies and practices that substantially reduce environmental impacts.

The new technologies will also improve coal recovery while reducing waste generation, water impacts, ground vibration, emissions and noise and dust generation.

“We will develop and deploy an information-driven system that will help mine operators select the most productive, cost-effective and eco-friendly surface mining systems,” said Kecojevic. “With this research, we intend to introduce a step-change in how the mining industry addresses decision situations that feature multiple criteria for selecting the best alternative,” he added.

Kecojevic expects more than 50 overburden and 120 surface coal mining systems will be analyzed during the duration of the five-year, \$380,000 research program. The WVU team will be working with the Appalachian Research Initiative for Environmental Science, or ARIES.

WVU student wins best paper award for biometrics research

A Ph.D. candidate in West Virginia University's Benjamin M. Statler College of Engineering and Mineral Resources earned the award of Best Student Paper at the 2011 Institute of Electrical and Electronics Engineers International Workshop on Information Forensics and Security in Brazil.

Asem Othman co-authored the paper with Dr. Arun Ross, associate professor at WVU. Titled "Mixing Fingerprints for Generating Virtual Identities," the paper proposes a method to mix two different fingerprints in order to create a new fingerprint and new identity in the case of identity theft through stolen biometrics.

Othman explained that a compromised fingerprint can be used to deceive a fingerprint scanner by someone creating a fake finger of gelatin or modeling clay. The stolen fingerprint image can be directly injected into any communication channel to attack a system and access the user's data.

Othman received a travel grant for winning the award and hopes to present at the 2012 workshop.

Resilient tunnel plug researched at WVU could aid in emergency response

The West Virginia University College of Benjamin M. Statler Engineering and Mineral Resources has conducted a successful performance test of a Resilient Tunnel Plug for isolating sections of transit or rail tunnels in response to events, such as flooding, release of chemical/biological agents or other threats.

The tunnel plug is a 32-foot long, 16-foot diameter inflatable structure capable of blocking the flow of pressurized liquid and gas. Testing was performed in WVU's full-scale tunnel facility which can be configured to emulate a variety of real tunnel geometries and operating conditions.

"The successful test demonstrates the high quality of the innovations and hard work of the team," said Ever Barbero, professor of mechanical and aerospace engineering at WVU. "We are now confident that we will be able to optimize the system and deliver it to the user for field implementation in the near future."

Development of the tunnel plug technology was conducted in partnership with the Pacific Northwest National Laboratory and ILC Dover under the sponsorship of the Department of Homeland Security Science and Technology Directorate.



Four MU students selected for national supercomputing program

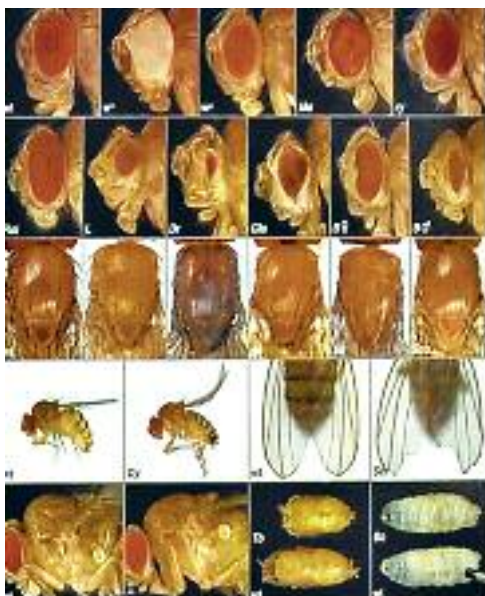
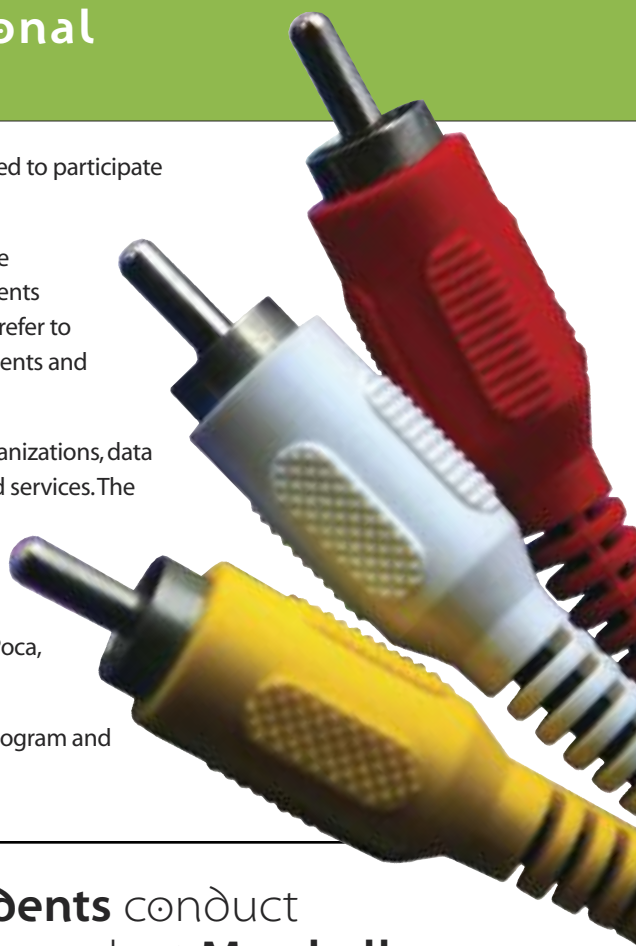
Four Marshall University undergraduates are among 90 students nationwide selected to participate in the 2011-2012 EPSCoR Cyberinfrastructure Student Engagement Program.

Sponsored by the National Science Foundation's Experimental Program to Stimulate Competitive Research (EPSCoR), the year-long program is designed to provide students opportunities to learn more about cyberinfrastructure—a term commonly used to refer to computational systems, data and information management, visualization environments and people, all linked together by collaborative software and advanced networks.

Students will study high-performance and high-throughput computing, virtual organizations, data mining, data management, file systems/storage, visualization, networking and cloud services. The goal is to help them understand the potential of technology and supercomputing to enhance learning and research and to train them to serve as cyberinfrastructure ambassadors on their own campuses.

The four computer science majors are Alex King of Fairmont, Mitchell Browning of Poca, Finley Hammond of Huntington and Brandon Posey of Scott Depot.

"Having four students selected for this program is testimony to the quality of our program and our students," said Dr. Paulus Wahjudi, assistant professor of computer science.



High school students conduct award-winning research at Marshall

Two high school students working in the lab of Dr. Simon Collier at Marshall University are receiving national recognition for their research.

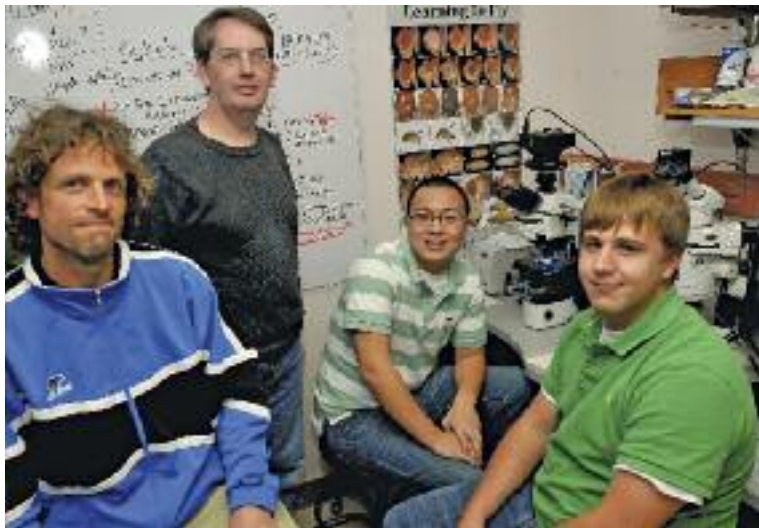
The students, Nathan N. Wang and Jared M. Galloway, are seniors at Fairland High School in Proctorville, Ohio. They have been working in Collier's lab since summer 2010 with Marshall graduate student David Neff to explore the function of a rubber-like protein – resilin – in insect flight.

An associate professor of biology at Marshall, Collier is considered a pioneer in the field.

"This is an important project because not only has it increased our understanding of insect flight, is also has potential implications for the design of biotechnological devices and possibly tissue implants which could employ molecularly engineered protein sheets," said Neff, who is overseeing the research.

Wang and Galloway were recognized nationally for their research last fall when they were named semifinalists in the 2011 Siemens Competition in Math, Science and Technology, the highest science honor awarded to American high school students. The research was supported with funding from the National Science Foundation and the NASA West Virginia Space Grant Consortium.

Fairland High School students Nathan Wang, third from left, and Jared Galloway, far right, were semifinalists in the 2011 Siemens Competition in Math, Science and Technology for their research conducted at Marshall University with Marshall graduate student David Neff, left, and Dr. Simon Collier, associate professor of biology.



MU biology student receives grant to study diabetic retinopathy

A Marshall University biology student has been awarded a grant to conduct research on diabetic retinopathy, a common eye disease during which excessive growth of blood vessels causes damage to the retina.

Clay M. Crabtree, a senior from Kenova, will receive the \$1,800 Grants-in-Aid of Research award from the national science society Sigma Xi. The award will help fund his project to test potential treatments for the disease, which is the leading cause of blindness among working-age Americans.

Crabtree's mentor, Dr. Piyali Dasgupta of Marshall's Department of Pharmacology, Physiology and Toxicology, said the grant will give Crabtree the opportunity to further his education through hands-on experience conducting research that could have a real impact on the health of people across the region.

Sigma Xi promotes the scientific enterprise and honors scientific achievement. The organization's Grants-in-Aid of Research program, with funds designated from the National Academy of Sciences, provides undergraduate and graduate students with up to \$2,500 for vision-related research.



Students showcase their work at State Capitol

More than 100 undergraduate students representing 14 institutions in West Virginia showed off their research to legislators and State Capitol visitors during the 9th annual Undergraduate Research Day.

Also as part of the event, the Higher Education Policy Commission's Division of Science and Research recognized more than \$300,000 in scientific research grants to faculty members from nine institutions: Alderson-Broaddus College, Concord University, Glenville State University, Marshall University, Shepherd University, West Virginia State University, West Virginia University, West Virginia Wesleyan College and WVU Institute of Technology.



WVU senior biology major Julie Diamond explains her research to a Capitol visitor.



Charlie Chen of Alderson Broaddus accepts a ceremonial check for funding provided through the Primarily Undergraduate Institution Research Incubator Grants Program of the NSF's Research Infrastructure Improvement award. Presenting the award are Dr. Jan Taylor, Director of Research Programs, Division of Science and Research, and Higher Education Policy Commission Chancellor Dr. Paul Hill.

WVSU and Marshall scientists collaborate on nanoparticles research

Research scientists from West Virginia State and Marshall universities are growing a collaborative partnership that is providing a unique opportunity for WVSU biotechnology students to gain experience in the emerging field of nanotechnology. Drs. Robert Harris and Gerald Hankins, WVSU biology professors, and Dr. Eric Blough of the Center for Diagnostic Nanosystems at MU, are working together to study the potential effects of cerium oxide (CeO_2) nanoparticles on cellular function.

Because of its extraordinary antioxidant capabilities, cerium oxide has a wide array of industrial and biomedical applications, from a common fuel additive and glass polishing agent to novel treatment for cardiovascular and neurodegenerative diseases. As use for these nanoparticles increases, so does the potential for environmental impact. There are very few studies to understand toxic effects, but recent findings published by MU demonstrate liver toxicity related to cerium oxide inhalation.

Harris and Hankins, along with WVSU biotechnology graduate student Niraj Nepal, are collaborating with Blough to determine the molecular mechanism responsible for cerium oxide-induced liver damage.

The research effort at WVSU is supported by the National Science Foundation under Grant No. EPS-1003907.



WVSU's Dr. Robert Harris, left, with graduate student Niraj Nepal.

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Allied Realty Company gift to support Marshall Institute for Interdisciplinary Research

Donation to be matched by state's trust fund

Marshall University has received a \$100,000 gift from Allied Realty Company to support the Marshall Institute for Interdisciplinary Research. Including this donation, Allied Realty Company has contributed a total of \$350,000 over the past four years to benefit research at the institute.

The company's latest donation is expected to be matched through the state's "Bucks for Brains" West Virginia Research Trust Fund. The previous years' gifts have already been matched, for a cumulative benefit to Marshall of \$700,000.

Allied Realty Company President Rebecca Polan said the institute's role of conducting commercially viable bioscience research at the university and facilitating partnerships with outside companies is vital to the future of Huntington and the entire region.





Aquatic ecotoxicologist joins Marshall University as Eminent Scholar

Dr. Mindy Yeager Armstead has joined the faculty of Marshall University's College of Science through the state's Eminent Scholars Recruitment and Enhancement initiative.

A nationally respected aquatic ecotoxicologist with 15 years experience in the commercial sector, Armstead will lead an interdisciplinary team of scientists focused on research and economic development associated with the region's water and energy resources.

The state funded the \$10 million Eminent Scholars initiative to attract nationally recognized researchers to Marshall and West Virginia universities.

WVU center develops SMART PHONE APP for electric drive and alternative fuel vehicle first responder training



Despite their demonstrated safety and efficiency, some of the new electric drive and alternative fuel vehicles that are becoming more common on American highways will inevitably be involved in highway accidents. When first responders are called to help, "there's an app for that" thanks to experts at a West Virginia University center.

The WVU-based National Alternative Fuels Training Consortium has created a suite of modern technology products, including in-depth training programs, that put knowledge about specific electric drive and alternative fuel vehicles at the fingertips of the nation's first responders.

More than one million electric drive vehicles are expected to be on the road by 2015, in addition to hundreds of thousands of alternative fuel vehicles, according to NAFTC Executive Director Al Ebron. "Because more consumers are choosing electric drive or alternative fuel vehicles, first responders must understand the differences between these and conventional, gasoline-powered vehicles," Ebron said. "Electric drive and alternative fuel vehicles are as safe as conventional vehicles, but they are different."

"The First Responder Safety Training provides first responders with important information to enhance their understanding of those differences."

The app contains information on hybrid, plug-in hybrid, battery and fuel cell electric vehicles as well as vehicles powered by alternative fuels like biodiesel, ethanol, natural gas, propane and hydrogen. Ebron said the free app provides detailed, vehicle-specific information including identification mechanisms, disconnect procedures and other special concerns.

A hard copy version is available as a durable flipbook for emergency personnel to use at the scene of an accident. It details various makes and models of electric drive and alternative fuel vehicles, alerting first responders to such items as high-voltage cables and cut zones.

The app can be used on both the iPhone and the iPad and will be available for Android devices soon. But, the app is only a part of the overall NAFTC effort that is making headlines across the nation as part of its First Responder Safety Training, curricula developed under two NAFTC grants – the Advanced Electric Drive Vehicle Education Program, funded by the U.S. Department of Energy (DOE) as an American Recovery and Reinvestment Act project, and the Clean Cities Learning Program, funded by the U.S. DOE Clean Cities Program.

NAFTC experts are presenting safety training workshops in addition to "train-the-trainer" events that seek to spread education about electric drive and alternative fuel vehicles.

For more information, visit www.naftc.wvu.edu.





State is a true partner in **hi-tech development efforts**

Commentary by Stephen Turner

CEO, Protea Biosciences

West Virginia University's first technology transfer agreement in the biotech industry ten years ago has evolved into a global industry leader in the field of bioanalytics, the identification of proteins and other biomolecules made by all living cells. Today, Morgantown-based Protea Biosciences employs 55 people, serves more than 400 customers around the world, and enjoys great prospects for sustained, long-term growth. (See *Top 10 Inventions of 2011*, page 3.)

I credit our company's development and the growth we expect to the quality – and ingenuity – of our employees and the support we have received from the State of West Virginia and its citizens. The majority of our employees are WVU graduates who, fresh out of college, are building their careers at Protea here in the Mountain State.

The State of West Virginia is a great help. From funding assistance through the Jobs Investment Trust and the West Virginia Economic Development Authority, to the support and encouragement from our governor, congressional delegation and local legislators, this state has been a true partner in our business development. The programs are ably-administered and well-focused to help companies make the investments they need to grow in their critical early stages.

I believe West Virginia has done a great job building the infrastructure to nurture a bioscience industry – upgrading academic research programs; supporting the acquisition of state-of-the-art instrumentation that both undergraduate and graduate students can access; the "Bucks For Brains Program;" and many other initiatives.

I view business development as primarily a "bottom-up" process, similar to planting and harvesting a farm crop. Thus, for West Virginia to further nurture the life science industry, we need to support the recruitment and education of our graduate students in the core sciences (including biology, chemistry, biochemistry, physics, materials sciences etc.).

I recommend that we recruit graduate students just like athletes. Offering even modest increases in living allowances can make the difference between a promising graduate student coming to a West Virginia school or going to another state. Supporting the recruitment of high-potential graduate students and post-docs is a cost-effective and targeted way to help provide the critical "human capital" that will be required to grow our nascent biosciences industry.

I've had the privilege of founding and building biotechnology companies over my 40-year career and I can say without reservation that our team of employees here in Morgantown is the best - intelligent, loyal and hard-working. I believe that some day many of them will start their own companies, taking with them their Protea experience, and creating the kind of "family tree" effect that has given us the Silicon Valley, the Boston corridor, and other dynamic clusters of technology enterprise.

It is a privilege to work with them in building what I believe will be a major, global life science corporation.

Steve Turner

Steve Turner will be part of a panel of speakers on "West Virginia biotech start up success stories" during the STaR Symposium April 20 (see page 3).

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From the Chancellor:

West Virginia has achieved great strides in academic research

West Virginia has made great strides in research, technology and innovation in higher education recently. In the year 2000, who would have thought that over the next 12 years the state would receive

nearly triple the funding for academic research, open several new centers for research and technology, attract dozens of renowned faculty, and significantly increase the number of students entering science, technology, engineering and mathematics (STEM) fields?

Thanks to strong leadership and vision by our state's leaders, West Virginia has exceeded everyone's expectations, and is making great progress toward its higher education vision of research and innovation becoming the primary driver of a new diverse and prosperous economy.

A look at the speakers in the first panel of the upcoming STaR Symposium April 20-21 (see page 3) at West Virginia State University is a good example of the benefits of this type of investment. Our speakers represent Protea Biosciences, Vandalia Research, Progenesis Technologies and TRAX Bio Discovery, all companies that did not exist in 2000.

Yet today they are manufacturing and selling products to markets worldwide, generating revenue, employing scores of West Virginians and showing tremendous potential for future growth, all because they had access to research funding and research infrastructure within the state.

Our achievements are great, but to sustain this level and keep attracting more research investment, we must continue to graduate high quality students in STEM fields. Dr. Jan Taylor, Director of Research Programs, is our point person on a team to develop 21st Century Science Standards to help primary and secondary teachers teach the science standards needed to meet our future higher education needs.

Let's keep the momentum by continuing to invest in research and inspiring our youth with high-quality STEM education.

Carpe Diem,

Paul L. Hill, Ph.D., Chancellor
West Virginia Higher Education Policy Commission