# the NEURON

WEST VIRGINIA JOURNAL OF SCIENCE AND RESEARCH

Summer 2013

## Sowing seeds of growth

Dr. Barbara Liedl
West Virginia State University

West Virginia Higher Education Policy Commission

NSF

WVEPSCOR

# DR. BARBARA LIEDL

## West Virginia State University

## Growing a local food industry

### Dr. Barbara Liedl likes to grow things.

The associate research professor at West Virginia State University is well known around the Gus R. Douglass Institute for the varieties of tomatoes she and her students cultivate. Bell peppers and chili peppers are another frequent harvest, and this year artichokes are among the crops growing in the garden.

She and her students cross certain plants with others and study the DNA, working to find specific genetic traits to develop strains that will resist disease, resist insects or grow better in certain conditions, such as in a greenhouse or high tunnel instead of an outdoor garden.

And while her labors produce some bright red, green and yellow (and delicious) scientific results, the vegetables she grows at WVSU's Agricultural and Environmental Research Station are not necessarily her most important crop.

Throughout southern West Virginia, Dr. Liedl is sowing seeds of growth. She's working with growers, economic developers, government agriculture departments and community organizations to grow a network of small farms that can supply the region with fresh, locally grown produce while benefiting the local economy.

"West Virginians spend more than $7 billion annually on food," she points out. "Less than one percent of that is spent on food grown in the state. All of us in agriculture are committed to changing that. We want to see more food produced for consumption in state."

While West Virginia's mountains and valleys are not conducive to the large, commercial farms like those found in the Midwest, West Virginia farmers can take advantage of the interest in local foods, grow varieties not produced on a large scale and use alternative approaches to create a niche that allows them to compete with the large-scale farms.


**The Barbara Liedl file:**

Bachelor of science: Purdue University, Horticultural Production

Master of science: University of Minnesota, Plant Breeding/Plant Physiology

Doctorate: University of Minnesota, Horticulture/Genetics

"There is an amazingly entrepreneurial spirit in this state. They can take a piece of land that in the Midwest would not be considered for anything, and they can grow something."

Barbara Liedl

***Top Photo:*** *Research Technician Robin Turner and undergraduate student Brian Wooten review tomato crossbreeding data in the greenhouse of West Virginia State University.* ***Series Above:*** *Wooten, Liedl and Graduate Student Doug Bright take pollen from a wild predecessor of today's tomato to study the DNA. They hope to find genes that can be transferred into modern tomatoes to produce varieties that are tasty, nutritious and sustainable as well as resistant to insects, drought and wilt.*

Photography by John Sibold and Barbara Liedl

content

Dr. Liedl notes that there are twice as many farms in West Virginia now as there were just a few years ago, and more than half of West Virginia's farmers are women.

The growth in Mountain State farming is partially attributed to:

- A coordinated support network of the Extension Services of WVSU and West Virginia University
- Small farm programs at the federal and state departments of agriculture
- Many community-based organizations that are working together to develop the production distribution and marketing systems necessary to enable locally grown foods to become more accessible at local markets.

"I see my job as helping all those groups get the information they need," Dr. Liedl says. "How the food is grown, picked and processed; how it is shipped and marketed. You have to have that business piece to go along with the production piece."

Back to the scientific research, Dr. Liedl says one way to make small farms more productive is by developing varieties of tomato particularly suited for growth on West Virginia farms.

"This is a state that is bananas for its tomatoes," she says, noting that several well-known varieties, such as the Mortgage Lifter and West Virginia 63, were developed in the Mountain State.

She notes that people are passionate and resourceful about their land as well. "There is an amazingly entrepreneurial spirit in this state. They can take a piece of land that in the Midwest would not be considered for anything, and they can grow something."

Dr. Liedl says there is still plenty to do by many people - civic leaders, soil scientists, nutritionists and others - to grow West Virginia's budding crop of new farmers. Yet she is confident that the will, the passion and the knowledge of diverse people working together can make it happen. Besides, perhaps the best resource is the farmers themselves. "Some of my best ideas have come from farmers."

## 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**.

This material is based upon work supported by the National Science Foundation under Grant No. EPS 1003907.
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.

## WVU Tech hosts ninth annual Camp STEM

West Virginia University Institute of Technology hosted its ninth annual Camp STEM (Science, Technology, Engineering and Math), sponsored by AT&T, on June 16-21. The one-week summer program teaches high school students about the STEM disciplines through hands-on, interactive learning.

Fifty-two campers from as far away as Texas traveled to Montgomery to learn about the STEM disciplines and potential careers. "Camp STEM is designed to inspire high school students to study engineering and science by giving them a chance to take hands-on classes in fields such as computer science, chemistry and engineering," said Dr. Kimberlyn Gray, WVU Tech's First Year Programs Coordinator for the Leonard C. Nelson College of Engineering and Sciences.

WVU Tech faculty teach the courses with assistance from upper-class students. In addition to the classes held on campus, campers had an opportunity to tour the New River Gorge.

"This camp is not just about WVU Tech," said Dr. Zeljko Torbica, Dean of the Engineering and Sciences College. "The main purpose of the camp is to raise the awareness of and expose the participants to a wonderful world of STEM fields."

WVU Tech's Dr. Hasan El-Rifai demonstrates combustion chemistry during the Renewable Energies Technologies class at Camp STEM.

# Students encouraged to submit science videos for upcoming **STaR** Symposium

A science video competition will be one of the features of the 5th biennial Science, Technology and Research Symposium October 22-23, 2013 at Waterfront Place Hotel in Morgantown.

Undergraduate and graduate students are encouraged to produce and enter three-minute videos that explain their research in a way that would be clear to middle school students. Cash prizes will be awarded for the top videos in the graduate and undergraduate categories. Videos are due by September 8.

The STaR Symposium also will feature a series of speakers talking about The Evolution of Energy: From Scarcity to Abundance. The keynote speaker will be David Pogue, *New York Times* columnist, author, *CBS News* correspondent and host of *PBS NOVA scienceNow*.

The STaR symposium is open to students, faculty, researchers, and industry and business people wanting to learn about energy use, energy conservation and energy research in the Mountain State. Learn what experts say about the realistic potential of energy development and use in West Virginia.

Complete information about the Symposium and the science video competition is available online at **www.wvresearch.org/STaR**.

West Virginia researchers and faculty are encouraged to help promote the STaR Symposium. A printable flyer and suggested e-mail and social media tools are available on the website.

# **Dig this!** WVU **Lunabotics Team finishes second** in annual competition

For the third straight year, the team from West Virginia University finished near the top in NASA's annual Lunabotics Mining Competition at the Kennedy Space Center in Florida. The Mountaineers took second place in the competition for the coveted Joe Kosmo Award for Excellence, which honors the team earning the most points overall in the competition.

"With this year's finish I think it's safe to say that WVU is now recognized as having one of the top robotics programs in the country," said Powsiri Klinkhachorn, professor in the Lane Department of Computer Science and Electrical Engineering and advisor for the team.

More than 700 students representing 50 universities and eight countries came to Kennedy Space Center May 20-24, to compete as teams created remote-controlled or autonomous excavators called lunabots. During the competition, the lunabot had 10 minutes to collect as much simulated lunar soil, also known as regolith, as possible.

"Despite a stuck limit switch," said Klinkhachorn, "we were still able to collect more than 15 kilograms of regolith, which was enough to qualify us for day two of the competition."

After several modifications, the WVU team tore through the competition on day two, collecting a record-high 150 kilograms in its second run. The team finished fourth overall in the mining competition and second for the team spirit award.

WVU enjoyed the support of alumnus and retired NASA astronaut Captain Jon McBride, who stopped by before the competition started to wish the team luck.

The WVU Lunabotics Team was sponsored by the NASA WV Space Grant Consortium, the Statler College, the Lane Department of Computer Science and Electrical Engineering and U.S. Air Force ROTC. In-kind support was provided by the WVU departments of mechanical and aerospace engineering and chemical engineering.

> "With this year's finish I think it's safe to say that WVU is now recognized as having one of the top robotics programs in the country."
>
> Dr. Powsiri Klinkhachorn, professor in the Lane Department of Computer Science and Electrical Engineering

# MU researcher lands NIH grant to **study mechanisms** of **human reproduction**

Dr. Guo-Zhang Zhu, an associate professor of biology at Marshall University, has received a two-year, $148,800 grant from the National Institutes of Health for his work to study the processes of human reproduction. Research in Zhu's lab focuses on understanding the molecular basis of fertilization and early embryonic development.

In addition to helping scientists understand the mechanisms of cell differentiation and development, the study funded through NIH's National Institute of Child Health and Human Development may offer insights into the causes of infertility in men and lead to new strategies for assisted reproduction and male contraception.

The National Institute of Child Health and Human Development sponsors research on human development; maternal, child, and family health; reproductive biology and population issues; and medical rehabilitation. Zhu previously was awarded a three-year NIH grant worth $212,792.

# **Civil engineering student wins** National Science Foundation Fellowship

Emily Lipscomb, a senior majoring in civil and environmental engineering at West Virginia University, is the recipient of a 2013 National Science Foundation Graduate Research Fellowship Program (GRFP) that will support her work to identify water pollution sources.

"I first became interested in the NSF Fellowship when Dr. (Jennifer) Weidhaas encouraged me to apply," said Lipscomb, a native of Swanton, Md. "The NSF GRFP offers an incredible opportunity for students in science and engineering to further their graduate education while alleviating the financial burden. I was also interested in the fellowship because of the freedom it offers for me to pursue my research interests."

The current focus of Lipscomb's work is the development of a microbial source-tracking method that can be used to identify water pollution resulting from poultry litter. Lipscomb started working on the project under Weidhaas' guidance as part of the Department of Civil and Environmental Engineering's Summer Undergraduate Research Fellowship program.

"Emily did such great work," said Weidhaas, assistant professor, who noted she expects two papers to be published as a result of Lipscomb's work. "She continued working part-time in my lab over the school year to finish out her project."

NSF Graduate Research Fellowships are extremely competitive and are used to support the most promising graduate students in the fields of science, technology, engineering and mathematics. Lipscomb will receive $30,000 per year for three years to support her research as well as additional provisions to cover her graduate school tuition.

"Dr. Weidhaas has played a huge role in encouraging my development as a researcher," Lipscomb said.

# Researchers awarded $750,000 **NASA grant** to study **muscle** and **bone loss** associated with **space travel**

Dr. Miaozong Wu of the Marshall University School of Pharmacy has been awarded a $750,000 grant from NASA to lead a team of researchers investigating muscle and bone loss associated with space travel.

Wu's three-year project was one of only 14 funded nationally through NASA's Experimental Program to Stimulate Competitive Research.

Wu's team of collaborators for the project includes Dr. Eric Blough and Dr. Nicole Winston, also of the School of Pharmacy; Dr. Henry Driscoll and Dr. Omolola Olajide of the university's Joan C. Edwards School of Medicine; and colleagues at West Virginia State University, University of Louisville, University of Delaware, Universities Space Research Association and NASA's Johnson Space Center. The project also will involve both undergraduate and graduate student researchers.

The group will have three primary objectives—to study the effects of space travel on the body's muscles and bones, to identify possible causes and to develop potential treatments.

The findings are expected to have direct applicability not only to NASA personnel traveling in space, but also to anyone who is experiencing musculoskeletal loss, including aging patients and those suffering from cancer, AIDS and diabetes.

Learn more at **www.nasa.wvu.edu**.

Dr. Miaozong Wu of the Marshall University School of Pharmacy is leading a team of researchers studying muscle and bone loss associated with space travel. The project is funded by a recent $750,000 grant from NASA's Experimental Program to Stimulate Competitive Research.

Photo by Rick Haye, Marshall University

# Marshall cancer researcher presents **technology developed** to help **personalize chemotherapy**

Marshall University biomedical sciences researcher Dr. Pier Paolo Claudio traveled to a national medical meeting in Chicago this summer to present a technology he and his colleagues think will help physicians personalize chemotherapy for cancer treatment.

Claudio's presentation at the annual meeting of the American Society of Clinical Oncology focused on ChemoID, a system he has developed with Marshall biology professor Dr. Jagan Valluri to measure the sensitivity of patients' tumors to chemotherapy drugs. "Oncologists every day face many challenges in determining the best course of therapy for an individual cancer patient," says Claudio. "The basic problem is that patients with similar diagnoses don't always respond to the same chemotherapy. This technology we have developed could help physicians select the appropriate chemotherapy for an individual patient—giving them an edge in their fight against cancer."

He says ChemoID is the first chemosensitivity test for both cancer stem-like cells and bulk tumor cells.

Claudio says cancer stem-like cells are a small, resilient subset of cells found in tumors. Current anticancer therapies are imperfect because they target the tumor without treating the root of the cancer—the small subpopulation of these tumor-initiating cancer stem cells thought to be responsible for recurrences. The result is that the tumor often shrinks but soon grows back. In addition, the stem-like cells appear to be preferentially resistant to both standard chemotherapy and radiation treatments.

He says more evaluation of the technology is needed, but a clinical trial on a small number of patients found ChemoID 100 percent accurate in predicting which drug is more effective in treating patients affected by brain cancer if the cancer stem-like cells are evaluated.

The upshot for a cancer patient, he says, is that ChemoID may make possible personalized treatment by predicting the most effective drug combination to successfully target that specific patient's cancer—increasing the chance the drugs will work and perhaps reducing side effects by helping the patient avoid unnecessary drugs.

Claudio acknowledged the contributions of Dr. Anthony Alberico, chairman of the Department of Neuroscience at the university's Joan C. Edwards School of Medicine, for providing the clinical samples, as well as his co-investigators at the school of medicine, McKown Translational Genomics Research Institute and Edwards Comprehensive Cancer Center.

# WVU Tech students **share passion** for **robotics**

Engineering students from West Virginia University Institute of Technology shared their passion for robotics with live demonstrations of their robot this spring in the following schools: Clay County High, Hurricane High, Chapmanville Middle, H.E. White Elementary, J.E. Robins Elementary and Sherman High.

The WVU Tech robotics team included mechanical engineering students Jason Browning, Darrell Gartin, Samuel Johnson, Wyatt McClead, and Joseph Menello. Electrical engineering students Derek McBrayer and Nathan Settle also were members of the team.

The students originally designed and built the robot for their capstone project. The team traveled with their robot to the American Society of Mechanical Engineers (ASME) design competition in Toronto, Canada. After the competition, the students decided to take their robot on the road — presenting their project to local schools, and encouraging students to consider a career in one of the STEM disciplines.


WVU Tech students Cory Igo, Samuel Johnson and Nathan Settle demonstrate their robot's climbing capabilities outside of Old Main.

# Concord faculty receives grant for **mathematics research**

Concord University Assistant Professor of Mathematics Dr. Christopher McClain is recipient of a $15,000 mini-grant from the Center for Undergraduate Research in Mathematics located at Brigham Young University.

Concord is one of only 12 institutions selected from 65 applicants to receive a grant.

The funding will support a year-long research project for McClain and three Concord students during the 2013-2014 academic year. Students selected to participate are Joshua Beverly of Beckley, Mariah Farley of Lerona and Felicia Stover of Sandstone.

McClain said their research topic is "Graph Structure Theory." Students will decide the specific focus of the project from two choices: "Graph Coloring Problems" and "Vertex Domination of a Graph."

McClain said he hopes that this and future research projects will encourage more students to further their education at graduate school.

CURM
Center for Undergraduate Research in Mathematics

# Learn about upcoming **STEM activities for kids** at **www.wvresearch.org/STEM**

Have you checked the STEM activities website? The Division of Science and Research has established a web page to promote Science, Technology, Engineering & Mathematics activities for kids in West Virginia.

The site, **www.wvresearch.org/STEM**, is designed for parents and teachers to check regularly to see what upcoming 'STEMulating' activities will be in their area.

Organizations and institutions in West Virginia planning STEM activities for kids are encouraged to let the division know about those activities so they can be posted on the site. Send information via the e-mail address listed on the web page, or mail it to the address on the back cover of this magazine.

# WVU and the EdVenture Group join forces to **encourage STEM education** in **local schools**

As part of an effort to boost interest among talented students in science, technology, engineering and math programs, West Virginia University's Statler College of Engineering and Mineral Resources is partnering with The EdVenture Group to promote STEM learning environments in several Preston County schools this fall through the study of transportation. Participating schools include Preston High School, Bruceton School, Central Preston Middle School and West Preston Middle School.

"We think the field of transportation is a great technical platform for students to learn about STEM," said Dr. David Martinelli, professor of civil and environmental engineering at WVU. "Everyone can relate to every-day transportation issues, such as highway congestion and traffic accidents."

Faculty and students in the Statler College will provide the technical expertise while representatives from the Morgantown-based EdVenture Group will provide components related to development and delivery.

"The EdVenture Group will be managing the projects and working with the teachers, students and college mentors to build lessons and activities that can be used in sixth through 12th grade classrooms," said EdVenture Group founder and former high school math teacher Lydotta Taylor. The EdVenture Group, Martinelli said, will ensure the modules are applicable to state and federal learning outcomes.

Three civil engineering undergraduate and graduate students–Carlee Hamrick, Allison Arnold and Rachel James–will be teaching the modules. All three students are from West Virginia and as peer mentors, can demonstrate the many possibilities available in STEM career fields.

Dr. Avinash Unnikrishnan, co-principal investigator for the project, believes that having role models only a few years older than the high school students will motivate the teenagers and further promote confidence in the program.

"There are two aspects to this program," said Unnikrishnan. "One is having access to knowledge and the belief and confidence that individuals can do STEM, and the other is having access to successful young role models like the college students."

The project will consist of three main topics within the sphere of transportation-traffic control devices, roadway design, and transportation planning and logistics.

"Students enjoy real-world examples and applications of math and science," Taylor said. "Engineering provides the perfect concepts and problems to make this happen."

"We think the field of transportation is a great technical platform for students to learn about STEM. Everyone can relate to every day transportation issues, such as highway congestion and traffic accidents."

David Martinelli
professor of civil and environmental engineering

# Marshall University announces **hydroelectric demonstration project**

Marshall University's Center for Environmental, Geotechnical and Applied Sciences and the West Virginia Brownfields Assistance Center have announced the installation of a hydro generator to be used as a demonstration and education project in a watershed near Montgomery.

Installed in conjunction with the Morris Creek Watershed Association, the hydro generator is using acid mine drainage discharge as its water source. It is the latest in a series of projects the university is conducting in partnership with the West Virginia Division of Energy's Office of Coalfield Community Development to demonstrate renewable energy applications on former surface-mined properties.

The Morris Creek Watershed is located in an extensively mined area of Kanawha and Fayette counties. George Carico, director of the West Virginia Brownfields Assistance Center, said mining has not occurred in the watershed since the late 1980s but acid mine drainage discharges are present.

Water from a discharge has been diverted to provide the water source for the generator. After the water passes through the generator, it is directed back into the mainstream for treatment before entering Morris Creek.

Power generated from the 1.3-kilowatt system is being used to charge the Morris Creek Watershed Association's stream monitoring equipment and meeting facility. The association is monitoring the generator's performance and will be offering informational tours of the system as part of its ongoing educational program.

Carico worked with the Division of Energy to find a suitable site to demonstrate this type of renewable energy. He says that while the project provides renewable energy to the watershed association, it also has a great deal of educational value.

"We're seeing an increasing interest in various types of renewable energy all around the state," he adds. "Electricity generated from hydropower is definitely not new, but using mine water discharge as a power source is.

"This system, though quite small in terms of electrical generation capacity, will help people better understand this particular type of renewable energy. With the Morris Creek Watershed Association providing educational outreach programs, members of the local community and students and teachers, as well as other watershed groups, will get to see close up how hydropower in the right setting can provide a reliable power supply."

Funding was provided from the Appalachian Regional Commission and cash and in-kind funding from the Morris Creek Watershed Association. The association's match included engineering expertise and support from West Virginia University Institute of Technology and Bridgemont Community and Technical College.

For more information about the project, contact Carico at 304-696-5456 or carico@marshall.edu.

Mike King, left, and other members of the Morris Creek Watershed Association check out the pipes carrying mine drainage discharge to power a hydro generator recently installed in the watershed. (Photo courtesy of Morris Creek Watershed Association.)

# WVU's **Luo, Fabozzi** earn **UTSR Fellowships**

Kevin Luo

Eric Fabozzi

Two students in the Benjamin M. Statler College of Engineering and Mineral Resources at West Virginia University have earned fellowships through the National Energy Technology Laboratory's University Turbine Systems Research Program. Kevin Luo of Morgantown, W.Va., and Eric Fabozzi of Buffalo, N.Y., began their fellowships in May.

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. These fellowships are considered an investment in educating tomorrow's developers of clean, efficient and affordable power production.

Luo has worked for General Electric Transportation the past two summers as an intern and will work for General Electric Power and Water as a fellow. "I'm excited to start my third summer at GE," he said. "Since thermal barrier coatings for gas turbine engines are my area of interest, getting a firsthand look at an industrial setting is a great opportunity."

Luo's fellowship will take place in Schenectady, N.Y.

Fabozzi, a mechanical and aerospace engineering dual major, will be working with Siemens Power Generation, in Orlando, Fla. "I anticipate that I will come out of this with a great deal of knowledge regarding the gas turbine field as well as pertinent experience that will transfer over in years to come," he said.

This is the third straight year that WVU has successfully placed students in positions in the gas turbine industry through the UTSR fellowship program.


# Marshall University **Research Highlights**

The Marshall University Research Corporation has released a publication featuring the past year's highlights from the university's research enterprise. The 2012-13 edition of "Research Highlights" is available online at **http://tinyurl.com/ResearchHighlights2012-13**.

# Marshall University selected to help **implement energy** and **power curriculum for high school students**

The Southern Regional Education Board has selected Marshall University to help implement an energy and power program of study for high school students in West Virginia and other states.

As part of SREB's Advanced Career program, faculty members from Marshall's College of Information Technology and Engineering are working with the West Virginia Department of Education to launch a sequence of four courses intended to increase the number of students who leave high school prepared for further study, advanced training, and careers in energy and power.

Engineering professor Dr. Richard Begley, who is directing the project at Marshall, said energy and power were selected because of their importance to West Virginia's economy. The project is one of several similar initiatives SREB is developing in partnership with its member states.

"The Advanced Career program focuses on high-wage, skilled fields important to the participating states economy," Begley added. "The goal is to deliver courses that start students down the path toward a recognized industry certificate, a community/technical college certificate, or an associate or bachelor's degree in that field."

The new courses were designed by teams from universities and high schools in partnership with industry experts. The curriculum incorporates a hands-on approach with experiments that use energy and power measurement instruments, data software and computer simulations. Participating students will learn to apply mathematical and scientific concepts, and will use technology and engineering to solve real-world problems found in the energy and power industry.

"This is what modern career-tech education looks like," said SREB Senior Vice President Gene Bottoms. "Because the aim is to graduate more students with more options, the program is available to any and all mainstream students. It flips the switch for those students who aren't sparked by traditional teaching styles and gives them a new way to learn. It's a path we must take to not only graduate more students, but to prepare them for what comes after high school."

Begley said Marshall's primary role will be training high school teachers to deliver the curriculum. The trained teachers will pilot the new courses during the upcoming school year, and next summer will help train teachers from other states.

For more information about the Advanced Career program at Marshall, contact Begley at 304-696-3438 or begley@marshall.edu.

# Commentary

## STEM Engagement in West Virginia: **A Call to Action**

By Brian O. Hemphill, Ph.D.
President
West Virginia State University

The United States continues to lag behind industrial countries around the world in science, technology, engineering and mathematics (STEM) education. When the numbers are examined, it is a narrowing pipeline from kindergarten to baccalaureate education.

In West Virginia, we must address the significant decline in students pursuing STEM fields. Between 2009 and 2012, there was a 63 percent decrease in students retained in STEM programs at four-year universities statewide.

More alarming is the fact the majority of this decrease occurred most recently between the 2011 and 2012 academic years. With the projected growth in STEM career opportunities in the state, there is a substantial need for West Virginia to address STEM challenges across all levels of education.

At West Virginia State University, we have been developing and will continue to develop STEM initiatives ranging from K-12 outreach to baccalaureate apprenticeship programs. These efforts, both inside and outside the classroom, place emphasis on improving youths' skill sets and understanding career opportunities connected to STEM. The University is also promoting innovative classroom teaching, after-school special interest topic sessions and summer immersion experiences, such as camps, workshops and other experiential learning opportunities.

Additionally, the university is making critical investments in undergraduate STEM research programs that promote increased student and faculty interaction. The university's newly developed Research Rookies program is a concerted effort to ensure that from a student's first semester on campus they receive quality laboratory research experience. The program will launch in the fall of 2013 with five freshman and sophomore students being paired with engaged researchers and professors, and presenting their research at the end of their academic/Research Rookies year to partners, faculty and their peers.

It is not enough to capture science career track students as they matriculate through college. Engagement and investment in STEM education must begin with the state's next generation of STEM scholars. To address this need, the university's Center for Advancement of STEM (CASTEM) is working to provide quality STEM outreach programs to K-12 youth throughout West Virginia in areas such as robotics, aerospace engineering, agricultural science and other disciplines. Additionally, WVSU CASTEM is working with professors in various colleges and departments at the university to ensure that pre-service and in-service teachers are receiving professional development opportunities to improve their capacity for educating West Virginia's youth.

These programs, in addition to strong support from the governor and the legislature through initiatives such as the Eminent Scholars Program and the Research Trust Fund, represent a positive model to help move forward needed investment in West Virginia's STEM infrastructure.

WVSU, as a land-grant institution, is poised to make a substantial contribution to the STEM workforce of tomorrow and can do so only through the strong support of state leaders, engagement of faculty, and involvement from business and industry. We hope that you, as a citizen, educator or industry leader, will join us in this investment for the educational and economic future of West Virginia.

Division of Science and Research
West Virginia Higher Education Policy Commission
1018 Kanawha Blvd E Suite 1101
Charleston WV 25301-2800
304-558-4128
www.wvresearch.org

PRST Standard
U.S. Postage
PAID
Charleston, WV
Permit No. 271



# FROM THE DIRECTOR: It's all about growth

Notice that a common theme in this edition of *the Neuron* is growth. West Virginia State University's Barbara Liedl is growing hardy, delicious and disease-resistant tomatoes, as well as the more important crop of local small farmers and a related regional farming industry.

WVU Tech and the other higher education institutions are growing future students in Science, Technology, Engineering and Mathematics fields by offering exciting Summer STEM camps to spur interest among K-12 students to enter science and related fields after high school.

Marshall University and West Virginia University, as well as the other schools, are growing knowledge about cancer treatment, acid mine drainage, robotics and other subjects with new research and new teaching programs.

The growth must continue. Workforce Development forecasts predict that West Virginia needs more college graduates every year, especially more graduates in STEM fields to keep up with job market needs. To grow our state's job opportunities, we must get more of today's youth interested in STEM fields.

The Division of Science and Research is working to grow STEM by holding a science video competition in association with the October 22-23 STaR Symposium. Undergrad and graduate students can win cash for the best three-minute science video. Lindsay Emery of WVU's LIINC program and the Division of Science and Research staff are working on a plan to get those videos in front of K-12 students, so the younger students will see research done by people just a few years older than they are. It's an exciting opportunity to grow the STEM network. Learn more about the STaR Symposium and the video contest at **www.wvresearch.org/STaR.**

Meanwhile, keep growing.

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