ARKANSAS asset initiative

ASSETS of Arkansas

February 2015

ARKANSAS SCIENCE & TECHNOLOGY AUTHORITY

Advancing the talent and innovation necessary for Arkansas to prosper.

An NSF EPSCoR Project

Empowering Women in STEM

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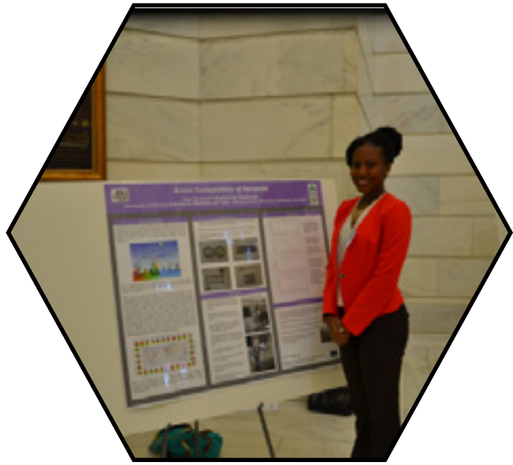

What is ASSET Initiative?

The Arkansas ASSET Initiative is a multi-institutional, interdisciplinary, state-wide program. Our current project, ASSET II, is designed to strengthen Arkansas research areas with potential for national significance and with major economic development potential. Our three specialty areas include: plant-based production, solar cell technology, and new power electronics.

The Arkansas ASSET Initiative is part of the National Science Foundation's EPSCoR Program. An integral component of the program is entrepreneurial training, support for commercialization of new technologies, and an educational outreach program that targets the STEM pipeline needed to support the advanced technologies workforce.

P3 ARKANSAS CENTER FOR PLANT POWERED PRODUCTION

GREEN

VICTER Vertically-Integrated Center for Transformative Energy Research

ASSETs of Arkansas

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Director's Welcome

Welcome to "Empowering Women in STEM". As we prepare for Women's History Month in March, our story begins with Dr. Mary L. Good, a nationally distinguished scientist who currently leads the George W. Donaghey Emerging Analytics Center (EAC) at the University of Arkansas at Little Rock. Her knowledge and hard work have positively impacted the academic, industrial, and government sectors both inside and outside of Arkansas and inspired many of the researchers who have followed in her footsteps. We also recognize, Dr. Fiona Goggin, Plant Powered Production (P3) faculty researcher at University of Arkansas, Fayetteville, shares her passion for research (pg. 10) along with her research collaborator, Dr. Argelia Lorence, (also with P3) at Arkansas State University, who's research interests and accomplishments (pg. 12). These outstanding faculty members were awarded Co-PIs via the NSF EPSCoR Track 2 program launching the Plant Imaging Center (PIC) a 2-state collaboration between Arkansas and Missouri. For more information on this new, exciting research edit visit http://plantimg.uark.edu.

The ASSET Initiative Go GREEN Girls Summer Academy hosted at University of Arkansas at Fort Smith in June 2014 exposed sixth through ninth-graders to STEM career skill sets and opportunities with a healthy dose of fun (see pg 8).

On pages 14 thru 18, ASSETS of Arkansas honors native Arkansans who have had extraordinary careers in science, technology, engineering and mathematics field (STEM). Women such as Raye Jean Jordan Montague and Dr. Edith Jones worked hard to overcome issues of sexism and racism within their respective fields and went on to have very successful careers. Montague became a registered professional engineer with the U.S. Navy. Dr. Jones established a hospital in Houston, Texas and clinics named in her honor. We honor also the contributions of Dr. Virginia Williams, Dr. Chandler, and Dr. Pittman and their efforts to improve of food security and healthcare worldwide.

In the 21st century, advances in technology and science continue to enhance our lives on a global scale. Researchers from VICTER, P3, and GREEN research centers continue to take on leadership roles in professional organizations, entrepreneurship, and research initiatives both inside and outside of Arkansas. Drs. Min Zou (VICTER) Maureen Dolan (P3), Elizabeth Hood (P3) have leveraged their scientific expertise and and commitment to student workforce development to promote entrepreneurial businesses initiatives (see pages 22, and 24-25). Next up, Drs. Nastassia Jones, Guiliana Medrano and Melissa Kelly share a bit about their research interests.

"Empowering Women in STEM" highlights female undergraduate students who have shown high interest in research including Nadia Smith and Kristin Kovach (VICTER Center) working with Drs. Roy McCann and Gregory Salamo. Alyssa Caparas (ASU), Kiara Newhouse (UAM), and Rebecca Ring (ASU) and Tiffany R. Howell (UAPB) also received the 2014 ASSET REU Summer Internships providing funding for them to explore opportunities in research while gaining practical, hands on experience. We hope you'll enjoy reading our story and appreciate all of the hard work in advancing STEM that the women of Arkansas have and continue to render to the community at large.

Sincerely,

Dr. Gail McClure
Vice President Sponsored Projects

Dr. Mary L. Good, Chemist

Dr. Mary L. Good is well known for her distinguished career contributions in Science and Technology in academics, industry, and government. Mary L. Good was born in Grapevine, Texas but she grew up in Arkansas. Her father came to the state to be a superintendent for schools and her mother a schoolteacher. Following the years, she succeeded in her college and graduate studies. While serving as a professor at the chemistry department at Louisiana State University (LSU), she was recognized for her research results by nationally. Her expertise became so well known that research centers and corporations sought out her knowledge to contribute to their businesses. After some time in industry she had a chance to get involved with government positions where she led sevearal national science initiatives.

Dr. Good has published over 100 articles in refereed journals, authored one book, "Integrated Laboratory Sequences", and received numerous prestigious awards. Apart from all her career accomplishments, Dr. Good considers her family to be her best legacy. She has two sons and several grandchildren.

Dr. Mary Lowe Good attended the University of Central Arkansas (UCA), to study home economics, but after taking a chemistry course she changed to a physics and chemistry major. Good graduated with a B.S in Chemistry from UCA in Conway, in 1950. The University of Arkansas, Fayetteville awarded her a graduate fellowship in inorganic and radiochemistry funded by the Atomic Energy Commission, where she studied inorganic chemistry and radiochemistry with Dr. Raymond Edwards. She graduated with a M.S. and Ph.D. both in Chemistry in 1953 and 1955, respectively.

Following her graduation, Dr. Good obtained a faculty position at Louisiana State University (LSU) at Baton Rouge in 1955. After a couple of years lecturing, Mary and William J. Good, her husband, were transferred to the new LSU campus in New Orleans, Louisiana in 1958. At the new location, the Goods spent the next 20 years lecturing and doing research. Within that time period 1967, Dr. M. Good began to

Dr. Mary L. Good
Photo from: http://www.heinzawards.net/recipients/mary-good

use Mössbauer spectroscopy to study the molecular structure of complicated compounds containing metal ions especially compounds containing ruthenium. In 1974, Dr. Good was appointed the Boyd Professor of Chemistry, LSU's chemistry department's highest honor. For the next four years, she continued to work at the New Orleans, LSU campus and from 1978 to 1980 she was a Boyd Professor of Materials Science, Division of Engineering Research at LSU in Baton Rouge.

After 25 years as an educator at Louisiana State University, Dr. Good took a challenge to serve as Vice President and Director of Research for United Oil Products, a Corporate Research Center. For 13 years, she remained with company. While the company was going through several restructurings, Good continued her field work and received several promotions through the years. When Dr. Good left in 1993, she was senior vice president of technology at Allied Signal Research and Technology Laboratory.

In the 70's and 80's, Dr. Good also held part-time government jobs responsibilities. She was the first woman to lead the National Science Board serving on the board under both President Carter and President Reagan. In 1991, Dr. Good was appointed to the Council of Advisors on Science and Technology by President George H.W. Bush. From 1993 thru 1997, Dr. Good served as Under Secretary for Technology Authority in the U.S. Department of Commerce under President Clinton.

After leaving the Under Secretary position, Dr. Good came to the University of Arkansas at Little Rock (UALR). At UALR she served as a professor and she is the Founding Dean of the College of Engineering and Information Technology (E.I.T). Currently, she leads the George W. Donaghey Emerging Analytics Center (EAC).

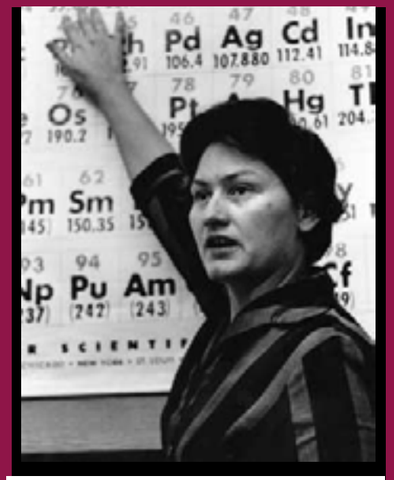
Honors and Awards

- Vannevar Bush Awards, NSF highest Honors (2004)
- Alpha Chi Sigma Hall of Fame (2002)
- The 6th Annual Heinz Award in Technology, the Economy and Employment (2000)
- Philip Abelson Award, American Association for the Advancement of Science (1999)
- Othmer Gold Medal Award, the founding members and affiliates of the Chemical Heritage Foundation (1998)
- Priestley Medal, American Chemical Society (1997) (Dr. Good was the first woman to receive this medal.)
- Federation of Materials Societies National Materials Advancement Award (1996)
- Glenn T. Seaborg Medal, by the University of California, Los Angeles (1996)
- Honorary Fellowship, The Royal Society of Chemistry (1995)
- Ralph Coats Roe Medal, American Society of Mechanical Engineers (1993)
- Distinguished Public Service Award, National Science Foundation (1992)
- IRI Medal from Industrial Research Institute (1991)
- The Delmer S. Fahrney Medal (1988)
- American Institute of Chemists Gold Medal (1983)
- Scientist of the Year, Industrial Research and Development Magazine (1982)
- Garvan-Olin Medal, American Chemical Society (1973)
- Agnes Faye Morgan Research Award (1969)
- * Plus many others not listed

PRESS Play to Watch Video of **Dr. Mary L. Good**, video by the **Chemical Heritage Foundation** (CHF).

Mary L. Good, Interview by James G. Trayham at Little Rock, Arkansas, 2 June 1998 (Philadelphia: Chemical Heritage Foundation, Oral History Transcript # 0171)

Dr. Mary Good working in her laboratory in Louisiana State University.
Photo from the Chemical Heritage Foundation



Dr. Mary Good taugh in New Orleans and Baton Rouge both part of Louisiana State Univeristy.
Photo from the Chemical Heritage Foundation

CAMP CONNECTS GIRLS, SCIENCE

GREEN Academy

The GREEN Summer Academy at the University of Arkansas at Fort Smith was held June 23-27, 2014, but it started nine months ago with two UAFS professors' devotion to encourage more young females to pursue careers in STEM fields. Dr. Jennifer Jamison of Van Buren, Assistant professor of Chemistry , and Sabrina Gomez, an Electronics Technology instructor created the camp after noticing a scarcity of females enrolled in science and math courses at UAFS. The camp was held for sixth through ninth-grade girls.

"When I was in school going for my bachelor's in electrical engineering, I was the only female in many of my classes," Gomez said. "Girls need to know that they have just as much ability as boys and that going into science and engineering can be exiciting. We are focusingon showing the students positive female role models in these careers so they know that they can do it, too."

Students participated in games and labs covering topics including solar cell power, circuits and gear motors. One activity involved campers harnessing sun and lamplight and converting it into mechanical movement. Another had students build a circuit and draw ethanol across it, allowing electricity to flow through it and power a motor.

Campers also visited three local businesses that have implemented green energy concepts into their operations- Baldor Electric Co., which ulitilizes energy efficient motors; the Fort Smith Department of Sanitation, which works with local utilizes to produce natural gas from waste in the landfill; and the Fort Smith Utility Department, which ensures that the city's water supply meets government standards and plays positive role in protecting the environment. Jamison said the camp helped simplify a subject that can seem intimidating to many students.

"Many people, especially young women, have negative persceptions about the physical sciences for many reasons. A main reason is that the physical sciences are seemingly difficult to understand," she said. "One of my passions is unlocking the mystery associated with the field in hopes of convincing yound women that science is a viable career to pursue."

The camp attacted 18 female students to enroll and participate in the camp, exceeding the expected enrollment.

"Initially we had planned for 12 campers, but we decided to allow more students due to the amount of response we had," Gomez said, adding that 6 local teachers participated in the camp and plan to take concepts from camp back to their classrooms to help encourage more students.

Adeline Newhart, a 13-year-old camper from Lavaca Middle School , said the camp taught her "that girls can do anything including what you think a boy would do."

"I have been having so much fun" she said. "I enjoy getting to meet new friends from other places and I like doing science hands-on because I can understand it better."

Jamison said she hopes the camp was eye-opening for students.

"We hope we showed these young women that STEM is not something that is this huge, unsolvable mystery," she said. "It is something that anyone can do, and no matter who they are – whether they are girly girls, tomboys, shy or outgoing—there is a place in STEM for them.

UA FORT SMITH™

The Interactive World of Plants and Insects

Dr. Fiona Goggin

Plants and insects are living organisms that affect the food supply for humans. At the University of Arkansas, Dr. Goggin investigates the interaction between both organisms. Since plants provide the architecture of the natural world; they shape our habitats, and historically, the plants around us have shaped our diet, our homes, and our cultures. Insects serve as both as pollinators and as herbivores on plants. Goggin's laboratory goals are to help development crop varieties that are more resistant to insects and round worms. This will help reduce pesticide usage, and also increase food production, because significant farm productivity is lost to insect pests.

Entomologist

Goggin's research program is focused on plant defenses against herbivory, with an emphasis on mechanisms of resistance against various types of predatory flies (i.e. aphids) and worms (i.e. root-knot nematodes). Vascular feeders can cause massive physiological changes in their host plant such as abnormal outgrowth of plant tissue. Many of these herbivores are also important vectors of plant pathogens. While these interactions are important from both an ecological and a practical agricultural perspective, relatively little is known about the physiological or molecular basis of plant responses to vascular herbivory. Goggin uses tomato (Solanum lycopersicum) and Arabidopsis thaliana as model systems to investigate this question, and to explore the relationship of plant defensive pathways induced by aphids and nematodes to plant defenses against other biotic and abiotic stresses. Her laboratory studies both broad-spectrum, induced defenses against herbivores and isolate-specific, resistance-gene-mediated innate resistance, and utilizes molecular and genomic approaches to identify potential sources of resistance against insects.

In the science field, the unpredictability of scientific funding and the lack of long-term funding presents challenges for scientists in Arkansas and elsewhere to build cohesive research programs that can address big-picture questions--questions about "how" and "why" that go beyond superficial description. Scientists in Arkansas are also spread out across multiple institutions and can be rather isolated. NSF EPSCoR has done a great job of building connections across the state and reducing isolation through the efforts of Arkansas ASSET Initiative.

The networking opportunities that Arkansas EPSCoR provides help build the face-to-face relationships that translate into effective scientific partnerships. EPSCoR funding helped establish new and productive collaborations within Arkansas. It provided the seed funding that Goggin needed to start research projects that ultimately landed other much larger federal grants.

In her field, entomologists have an advantage in reaching out to the public, because everyone has first-hand experience with insects, and most people have questions about them. Also, entomologists have many outreach opportunities at the K-12 level because insects lend themselves well to classroom projects, and are a great way to get kids excited and engaged with science.

Goggin's goals are to foster a love of science and advance students' analytical skills when she has a change to teach. Hence students will be successful in whichever science field they prefer to follow.

Goggin influences students life beyond the knowledge they receive in her class, she mentors undergraduate and graduate students in her laboratory. In her professional career, she has supervised 2 summer interns from the George Washington Carver project and advised or co-advised 3 undergraduates from the INBRE program. In addition, she also mentored 6 undergraduate and 6 graduate research projects at the University of Arkansas. The quality of the training in Goggin's laboratory is reflected in the student's productivity, since in the graduate division several of her mentees have received scholarships, fellowships, award recognitions, thesis award, and national grants due to the research results at her laboratory. In the undergraduate division, her students have received NSF funding and after graduation they have entered professional programs for medicine, optometry, pharmacy, and Ph.D. programs in Entomology.

In 2005 and 2011, she received the Outstanding Mentor award from the University of Arkansas for her involvement in undergraduate research. According to couple of graduates, Goggin is a faculty member with the most positive influence in their college careers. Her "teaching strategy used in the course was excellent. The course content was very concise, relevant, and up-to-date… Good combination of insect molecular biology and physiology. The course was thought-provoking" a student commented in a 2006 class evaluation.

As a research scientist, Goggin has published 26 peer-reviewed articles. She has receive more than $1.9 million in competitive funding since 2003 from state and national programs or organizations such as the NSF, NSF-ESPCoR, USDA-NRI, Arkansas Soybean Promotion Board, Arkansas Experiment Station, Arkansas Biotechnology Institute as well as

the California Tomato Commission. Her expertise has become well known within the NSF and USDA-NIFA; she has served in the panelist for graduate and postdoctoral fellowships programs; she has also served as external grant reviewer for numerous proposals submitted to the USDA-NRI and NSF. In addition she has also review proposals to the Israel Science Foundation and the Academy of Sciences of the Czech Republic.

Goggin has made great progress in her career. She has given more than 30 research talks including 11 at international meetings since 2000. Goggin has also given more than 50 other oral presentations and posters in regional and national meetings of the Entomological Society of America, Gordon Research Conference in Plant-Herbivore Interactions, the Biennial International Plant Resistance to Insects Workshop (IPRI), American Society of Plant Biology (ASPB) National Meeting, Society of Experimental Biology (SEB) International Meeting to name a few.

"Stay motivated and focus despite the challenges you will find along the way...."
-Argelia Lorence, Ph.D.

The world population keeps increasing, while the amount of agricultural land is not. In order to accomplish agricultural sustainability, Dr. Argelia Lorence's research group is developing novel strategies to make crops more productive. For example, one of the potential benefits of increasing our understanding of Vitamin C could lead to a new strategy for producing crops that can adapt to the changing environmental conditions we now face world wide.

The Lorence group focuses on understanding how plants transform myo-inositol, an abundant sugar, into Vitamin C, a vital antioxidant that is essential for both human and plant health. The group applies the knowledge they are gaining to increase Vitamin C content in crops and "engineer" plants that grow better, faster, and are more nutritious while at the same time tolerate a wide number of common environmental stresses.

Biochemistry has been a lifelong passion for Lorence. Since she was a kid, she was interested in understanding how organisms make all of the amazing molecules found in nature. After receiving her Ph.D, she started doing research in plant metabolic engineering in Cuernavaca, Morelos (Mexico). That interest drew her into Prof. Craig Nessler's Laboratory and while working in his group they discovered a new pathway leading to vitamin C formation.

Lorence's advice to a student following a scientific a career is to find a subject you are truly passionate about because becoming good in science is going to take a lot of work and you need to stay motivated and focused despite the challenges you will find along the way. The greatest lesson she learned was from Dr. Rodolfo Quintero, her mentor while in graduate school: "Always, always, no matter what, you need to do your very best because you are competing for opportunities with the best in the world."

Dr. Argelia Lorence, Bioengineer

Lorence received her education in Mexico: B.S. in Biochemical Engineering from Universidad Autonoma Metropolitana Iztapalapa (UAM-I), in 1991, M.S. in Biotechnology from Universidad Nacional Autonoma de Mexico (UNAM) in 1995 and Ph.D. in Biotechnology also from Universidad Nacional Autonoma de Mexico (UNAM) in 1997. She obtained her first faculty position right after graduating with a Ph.D at Centro de Investigacion en Biotecnologia (CEIB) of Universidad Autonoma del Estado de Morelos. (UAEM). There she started a research group on plant metabolic engineering.

After a couple of years working as an Assistant Professor in Mexico, she came to the U.S. to visit Prof. Nessler's laboratory for one year. From January to August 2000, she had the opportunity to do research at Texas A&M and then she helped moved the Nessler Lab to Virginia Tech. Year 2000 was a great year, full of learning experiences in all senses. At the end of 2000,she had to decide whether to continue the faculty position in Mexico or to come to the U.S. and work at Virginia Tech. She chose the latter. After three years of post-doctoral work Lorence applied to multiple faculty positions. Four Universities offered her on campus interviews, and the best offer came from Arkansas State University. This is the journey that caused her to join the ASU faculty in the summer of 2005.

Women of Arkansas with Science, Technology, Engineering, & Mathematics

The Encyclopedia of Arkansas in an excellent resource that highlights the contributions of Arkansans to science, technology, engineering and mathematics. The following profiles identify a few key women who have distinguished themselves across this disciplines.

http://www.encyclopediaofarkansas.net/

Raye Jean Jordan Montague

Raye Jean Jordan Montague was born in Little Rock, Arkansas on January 21, 1935. She was the daughter of Rayford Jordan and Flossie Graves Jordan. While still in the segregation era 1950s, Jordan was not able to enroll in an Arkansas' university where engineering programs were offered. Instead Jordan did her undergraduate studies in business at the Arkansas Agricultural, Mechanical, and Normal College (AM&N), (now the University of Arkansas at Pine Bluff).

Montague began her professional career with the navy at the David Taylor Model Basin (now the David Taylor Naval Ships Research and Development Center) in Carderock, Maryland, as a digital computer systems operator. As she gained experience and knowledge, she was promoted to computer system analyst at the Naval Ship Engineering Center. She also became program director for the Naval Sea Systems Command (NAVSEA) Integrated Design, Manufacturing, and Maintenance Program, and division head for the Computer-Aided Design and Computer Aided Manufacturing (CAD/CAM) Program.

Pulaski County, Arkansas
Photo from: http://tinyurl.com/qywybr8

Montague served as an internationally registered professional engineer with the U.S. Navy. Montague is also credited with the first computer-generated rough draft of a U.S. naval ship, and the first female program manager of ships (PMS-309), Information Systems Improvement Program. After several decades of hard work and great success, Montague retired in 1990. Sixteen years later she returned to west Little Rock, Arkansas where she remains active with LifeQuest, the Links Inc., Alpha Kappa Alpha Sorority, Inc., and the American Contract Bridge League. She also dedicates time to mentor students at UALR and students at eStem Elementary Public Charter School in Little Rock.

Edith Irby Jones, MD

Dr. Edith Irby Jones was born on December 23, 1927, near Conway, Arkansas. Jones dedicated her life to her profession to make a difference in the lives of others. Jones' success and kindness has been recognized nationally as well as internationally. She has worked to teach, improve and provide affordable health care. Jones collaborated with civil and medical organizations to establish and support hospitals in the United States as well as in Haiti, Mexico, Russia, China, and many developing countries. She is one of the founders of the Mercy Hospital in Houston. Two health care centers in Veracruz, Mexico and Vaudreuil, Haiti were named in honor of Dr. Jones.

Among all the good hearted actions to provide and support healthcare, she has been an active member of numerous national organizations. In1985, she was elected the first female president of the National Medical Association (NMA). Jones is the only female founding member of the Association of Black Cardiologists (ABC). She is a member of the American Medical Women Association, the NAACP, and Universal Healthplan of Texas, Inc.

Jones was the daughter of Robert Irby and Mattie Buice Irby. She lost her father when she was eight. Within a few years after her father's death, she also lost a twelve year-old sister due to typhoid fever. While she was young she also suffered from a strong fever that prevented her to attend school for a year. All the family crisis of been unable to afford medical attention due to poverty, was one of the factors that impacted Jones to study medicine to help others who could not afford visits to the doctor.

Dr. Jones was the first African American to attend and to graduate from the University of Arkansas for Medical Sciences (UAMS) during the segregation times in mid-1900s. Prior to her graduate studies, she studied chemistry, biology, and physics in Knoxville College in Knoxville, TN. She graduated from Langston Secondary School in Hot Springs in 1944.

Dr. Edith Irby Jones, photo by Arkansas Democrat-Gazette.
(Photo from http://tinyurl.com/la9fju2)

Faulkner, Arkansas.
(Photo from: http://tinyurl.com/o23un7h

Dr. Virginia Anne Rice Williams, Biochemist

Dr.Virginia Anne Rice Williams was a pioneer in the field of enzymes and the study of rice. In the mid 1900's, while conducting her graduate studies at Louisiana State University (LSU), she focused her research on the effect of milling on rice and enzymes (substances that promote chemical changes within the plants and animals that produce them) for two decades at the Louisiana Agricultural Experiment Station.

After she earned her Ph.D degree in 1947, she joined the LSU faculty as professor and researcher. Through her research results in enzymology, she became well known in the international science community. In 1954, she was elected as the first LSU faculty member to the American Society of Biological Chemists due to her outstanding work on vitamin B, nutrition and metabolism. The following year, she presented a paper on bacterium cadaveris at the Third International Congress of Biochemistry in Brussels, Belgium. This presentation was the first to report the relationship between cadaveris enzyme and human metabolism. For several years she continued her study on bacterium cadaveris to learn how it used proteins and carbohydrates to survive. Even though, she was unable to solve the problems, her findings and methods helped scientist to control the bacteria in different ways. She also received federal grants to continue her research between histidase health problems.

Virginia and her Husband
Photo from: http://tinyurl.com/okufya6

Williams publish over 60 scientific papers in which it contributed to scientist's understanding of rice's fundamental chemical composition. Also, Williams and her husband co-author Basic Physical Chemistry for the Life Sciences, which was rated the best in its field by the Journal of Chemical Education.

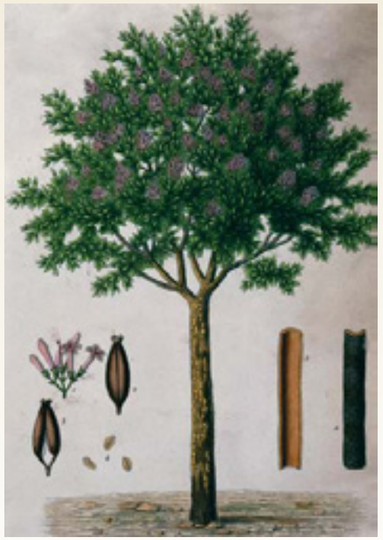
Williams was born in North Little Rock, Arkansas, to Roderic J. Rice and Mattie Thurman in 1919. After she graduated from Hendrix College in 1940, she pursued her doctoral studies in biochemistry at Louisiana State University (LSU). While working on her Ph.D., she married Dr. Hulen B. Williams in 1942. After a successful scientific career, she died during a surgery for cancer in 1970.

Pulaski County, Arkansas
Photo from: http://tinyurl.com/qywybr8

Photo from: http://tinyurl.com/lemy952

Dr. Florence Clyde Chandler, Botanist

Dr. Florence Clyde Chandler
Photo from: http://tinyurl.com/lqzoy3d



Cinchona tree's bark contains the alkaloid quinine along with other alkaloids effective against malaria.
Photo from: http://tinyurl.com/o5gr9px

Chandler graduated from the University of Arkansas at Fayetteville with a double major in music and science in 1923. Following her graduation year, she taught in Pine Bluff Public Schools for 3 years. She later moved to New York where she worked at the New York Botanical Gardens and attended Columbia University where she earned a masters in 1927 and a Ph.D. in 1940 in botany.

After she received her doctorate, Chandler continued to work for the Botanical Gardens. In 1943 she moved to Guatemala to conduct research for Merck. While working for Merck experimental farm, she breed cinchona trees to develop a new source of quinine to cure soldiers suffering from malaria. She was able to breed trees whose bark produce alkaloids from which quinacrine, a quinine substitute, could be synthesized.

After returning to the United States in 1947, she worked on the production of new flower varieties with W. Atlee Burpee Seed Company at the Ford Farm at Doylestown, Pennsylvania. In 1948, she experimented with various trees and flowers at the Boyle Thompson Institute for Plant Research in Yonkers, New York for next eighteen years. There she was able to hybridized a tree that could grow thirty feet in ten years.

Florence Clyde was born in September 28, 1901 in Scott County, Arkansas. She was the daughter of William Festus Chandler and Nannie Charlotte Shannon. After she retired in 1966, she moved to Tucson, Arizona, where she died in 1984.

Scott County, Arkansas
Photo from: http://tinyurl.com/pabj8o9

Dr. Margaret Pittman, Bacteriologist

Dr. Margaret Pittman
Photo from: http://tinyurl.com/q68zf7q

Dr. Margaret Pittman's devoted her professional career to working for the National Institutes of Health. Pittman's research was focus in the production, testing, and stadardization of vaccines to prevent typhoid, cholera, pertussis (whooping cough) and other infectious diseases. She used the concept that the effectiveness of a vaccine is related to its potency. She became well known for developing methods for testing the potency of vaccines. Her method became the basis for an international potency requirement. This method provided a better vaccination process for the prevention and reduction of the risk of disease.

During World War II Pittman worked with Thomas Probey to develop procedures that assure the safe delivery of blood plasma to wounded soldiers.

Pittman was born near Prairie Grove, Arkansas, on January 20, 1901.She died in Cheverly, Maryland, on August 19, 1995. Her parents were James Pittman, a country doctor, and Virginia Alice McCormick. Her body rests in Prairie Grove Cementery in Prairie Grove, AR.

MARGARET PITTMAN

Work Experience:

- National Institute of Health (NIH) in 1936: Chief of the Laboratory of Bacterial Products, Division of Bilogics Standards from 1957-1971
- Consultant to the World Health Organization (WHO) in 1959 and 1983
- Quest Scientist in Spain, Scotland, Egypt, and Iran
- Research Scientist at th Rockefeller Institute of Medical Research in New York in 1928
- Teacher at Galloway College in Searcy, Arknasas

Education:

- Hendrix College: BA in Mathematics and Biology (magna cum laude) in 1923
- University of Chicago: MA in Bacteriology in 1926
- University of Chicago: Ph.D in Bacteriology in 1929

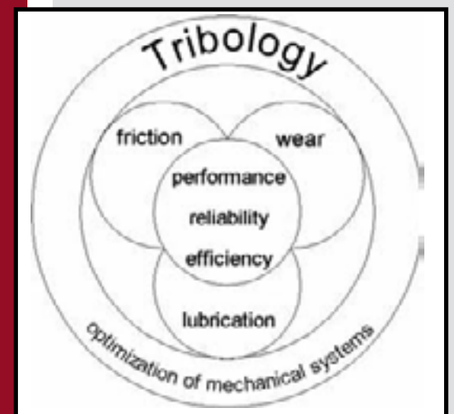
Honors and Awards:

- Federal Women's Award in 1970: for the ability to identify problems, stimulate research and evaluate results
- Honorary Fellowship in the American Academy of Pediatrics: for efforts in improving the health and welfare of children
- Margaret Pittman Lectureship at the NIH (Establish in 1994 in her Honor)

Washington County, Arkansas
Photo from:http://tinyurl.com/pworveh

"Engineering" Entrepreneurship

Dr. Min Zou joined the University of Arkansas at Fayetteville (UAF) in 2003. Zou currently serves a professor at UAF. As a researcher, her expertise in tribology has been recognized by other collegues as a result she has become a Fellow of Society of Tribologist and Lubrication Engineers, a society whose mission is "to advance the science of tribology and the practice of lubrication engineering in order to foster innovation, improve the performance of equipment and products, conserve resources and protect the environment." She has also been elected to serve as an associate editor of the Journal of Tribology.



tri·bol·o·gy
/trīˈbäləjē/
noun: tribology

the study of friction, wear, lubrication, and the design of bearings; the science of interacting surfaces in relative motion.

Photo from: http://www.tribocoating.de/index.php?id=79&L=2

In 2013, Zou and her graduate student Samuel Beckford found a way to make polytetrafluorothylene (PTFE) less adhesive. PTFE is a common dry lubricant used on machine components for example in engine cylinders, space machinery, and biomedical applications. One of the complications researchers had with improving this lubricant is that while applying nanoparticle fillers. The results yield reduce wear on the material but it would increased the material's ability to create friction.

Influence by her father, a materials engineer in aerospace engineering, Zou discovered her passion for engineering at an early age. Zou's current research focuses on nano-surface-engineering, nanomechanics and nanotribology. She is working on developing novel techniques for fabricating nano-engineered-surfaces (NESs) and understanding the tribological, mechanical and wetting behavior of the NESs.

Dr. Zou earned her B.S and M.S in Aerospace Engineering from the Northwestern Polytechnical University in China, recognized for aircraft engineering. She also attended Georgia Institute of Technology where she obtained a M.S and Ph.D in mechanical engineering. Prior to her faculty position at the University of Arkansas, she worked for Seagate Technology, a hard drive company, for several years.

Dr. Corey Thompson, an ASSET Initiative graduate, worked with Dr. Zou on the development of high transmittance nanoparticle thin film for application in solar devices by dip coating methods and the evaluation of their optical, structural, and wetting properties. With Dr. Zou mentorship and their research team, Thompson has published 5 papers and launched WattGlass, a new Arkansas startup, becoming an entrepenueur in developing antireflective and self-cleaning nanoparticle coatings for commercial applications.

VICTER

Nadia Smith
Be Diligent to be Successful

Nadia Smith, anelectrical engineering doctoral candidate at the University of Arkansas at Fayetteville (UAF), works with Dr. Roy McCann, VICTER faculty. In her early teen years, Smith discovered she had a passion for figuring out how electronics work. However, the medical field also drew her attention. At first she considered a career in the biomedical engineering but eventually her intial passion for medicine lost out to her love of electronics.

All the positive reviews, impressive research in electrical engineering and the Caribbean tuition advantage influenced Smith's decision to transfer from the Bahamas to UAF to pursue an electrical engineering degree. Smith chose this path because this area would be applicable to develop the Bahama's electrical infrastructure.

In her research with Dr. McCann, Smith is investigating power electronic topologies for grid connection. This includes topologies such as a multiple input cuk converter, a boost inverter and a multiple input interleaved boost converter. The multiple input converter topologies are beneficial for accommodating an aggregate amount of renewable energy sources with different electrical characteristics such as a Gallium Arsenide Photovoltaic device, a vanadium redox flow battery and a thermoelectric photovoltaic device. The devices used in her research are used to interface to the topologies to analyze its performance at low power and ultimately would be scale to high power applications. This is done through prototyping a system which involves design, simulations and testing. The boost inverter topology provides dc to ac power for grid connection. Also they investigate energy shaping passivity based controls for the previous mentioned topologies and this concept can be extended to power systems. This control technique ensures robust stabilization of systems, which includes minimizing voltage fluctuations in uninterruptible power systems such as wind turbine systems.

Some companies use a microinverter topologies which requires a high frequency transformer for the conversion of dc to ac power for grid connection. Using the boost inverter topology minimizes cost due to the absence of a high frequency transformer and also increases system efficiency. Also using a multiple input converter allows for independent control of various renewable energy sources such as photovoltaic devices and fuel cells in a system which provides for increased energy conversion for grid connect

According to Nadia, her research has potential for a new industry since the grid is always changing thus cutting edge technologies for commercial use are always needed. She plans to develop her own business and obtain a patent to commercialize her research. After she graduates, she plans to leave the state to gain work experience with the electrical engineering degree. Outside the academic field, Smith enjoys playing chess, weight training and socializing with friends.

Kristin Kovach

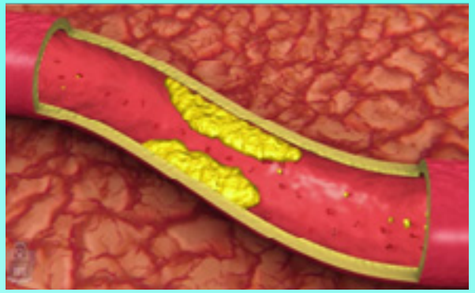
Imagine microbubbles that could break up blood clots, deliver drugs to cancer tumors and help the body absorb medicine. ASSET graduate Kristin Kovach worked with physics professor Gregory Salamo and University of Arkansas Medical School biophysicist Dr. Michael Borrelli to make this promising new technology possible. The microbubbles are made from serum albumin and dextrose and are so small that millions of them look like milky fog in a syringe. Once the bubbles are injected into the bloodstream, ultrasound is applied to help them do their work. That's where Kristin came in.

"My job was to determine how a microbubble reacts to pressure – how much force it can take until it pops, and how it deforms when pressed," she said. Kristin used an atomic force microscope to explore the mechanical properties of the bubbles. It's exacting work that requires a steady hand on the tweezers and a great deal of patience.

"I had to learn to do my own thing – that was hard at first," Kristin said. "It's the biggest challenge I've had at the university."

Her mentor, Gregory Salamo, emphasized the value of independent research. "In the classroom, you apply what you learn; in research, you're a detective pursuing an answer to the mystery," he said. "When Kristin goes on to interview for grad school and other things, that attitude she has about doing things on her own, and using logic, that's very powerful. They will know, this student can do that."

Kristin received an EPSCoR Undergraduate Research award in support of her research, and participated in a National Science Foundation Research Experience for Undergraduates at the University of Illinois in Urbana-Champaign. Her Bodenhamer Fellowship supported a summer of study in Greece and Turkey.



Kristin applied to and was accepted to graduate school after winning a prestigious National Science Foundation Graduate Research Fellowship, one of approximately 2,000 selected in the nation that year. After she earns her doctoral degree, she'd like to help shape public policy related to the sciences.

"I'm interested in making science education in America better, because it's really important, and I feel we're falling behind," she said.

To see video click here: **http://tinyurl.com/okgoz93**

Aquaculture Research

Research scientist, Maureen Dolan is taking advantage of emerging technology to advanced and develop systems for seafood species identification. Dolan and her collaborators are working to make the current methods more accurate and faster methods. Throughout her professional career, she has had positive results in her research. As a result of her research, she has co-founded three businesses, Applied Food Technologies in Gainesville, Florida, Nature West in Jonesboro, Arkansas and Nature Diagnostics in Blacksburg, Virginia.

Dr. Dolan and Alyssa Caparas at Research Day @ the Capitol 2014.

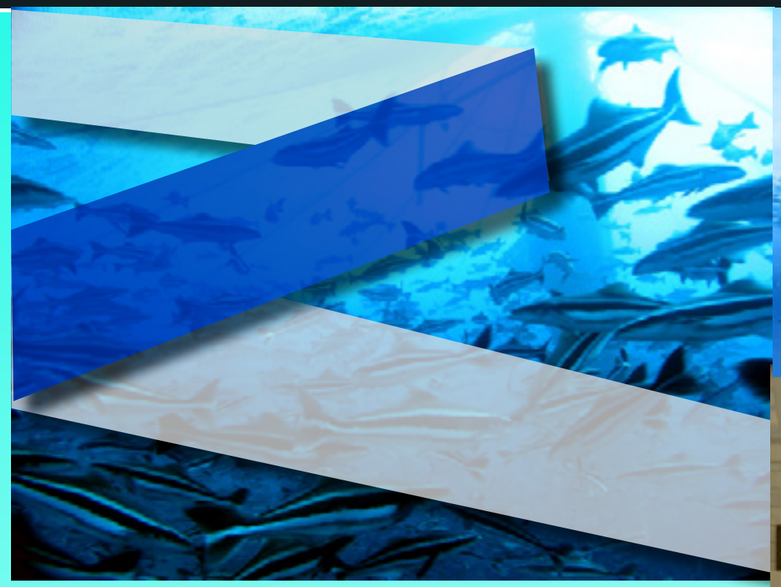
Dolan has mentor several graduate and undergraduate students in their thesis/dissertations and research projects. She has also served in several dissertation and thesis committees at Arkansas State University. Her efforts to increase the number of scientist also reaches the K-12 generations. She is an active contributor/faculty instructor in many ASU Educational Outreach events. Also, she continues to serves as lead instructor at some teacher professional development workshops.

Dolan is an active researcher at the Plant Powered Production (P3) research center. Also, she is an associate professor of Molecular and Cell Biology. She joined the Arkansas State University and the Arkansas Biosciences Institute in 2005. She received her Bachelor of Science in Biology and Chemistry from Quincy University, Quincy, Illoinois in 1987 and a M.S in Biochemistry: Muscle Biology from Iowa State University1990. From the University of Florida, she obtained her doctorate degree in Biochemistry and Molecular in 1996 and postdoc in Plant Molecular Biology, Horticultural Sciences in 1999.

Applied Food Technologies (AFT) is a molecular diagnostics company engaged in the research, development and commercialization of products and services for the food industry.

AFT specializes in seafood species identification and verification. Our seafood species DNA identification method is unique in the commercial marketplace in that its foundation is based solely on taxonomically validated reference material. To our knowledge, it is the only such system in the U.S. We have been working with the seafood industry and regulators for close to a decade to ensure the diagnostics we develop and utilize in our testing services are comprised of the 'best available science' for seafood species identification.

Mislabeling of seafood is a hot topic in the national news not only because of customer dissatisfaction, but also because it constitutes economic fraud. The penalties for mislabeling, including unintentional mislabeling, may be quite severe, and may include fines and prison sentencing. In response to claims of mislabeling, the FDA is currently testing seafood for mislabeling under Import Alert 16-04 (seafood) and Import Alert 16-128 (catfish). The FDA announced that they will expand their program and begin DNA testing of seafood at retail outlets. This new FDA testing program will involve random sampling of all seafood, including imported, domestic, fresh, frozen and processed seafood, both brand names and private label.

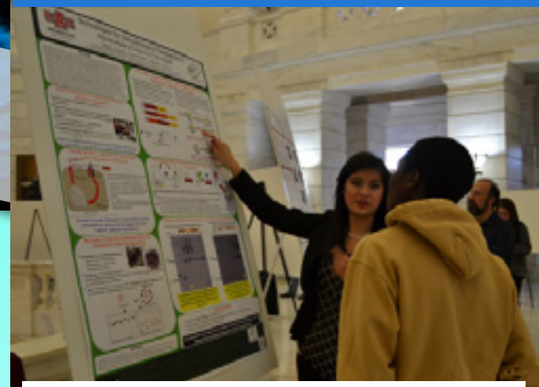


Alyssa Caparas

Arkansas State University undergraduate student Alyssa Caparas has expose her interest in research. Caparas begin to perform research at the end of her sophomore year as an ASSET REU intern in summer 2013 under Dr. Maureen Dolan's mentorship. During her internship Caparas learn laboratory techniques such as western blot analysis, protein purification, incubation of bacteria, and infiltration of transient plants. Caparas demonstrated to have a high research interest during her interenship, as a result she was offer a P3 internship in Fall 2013.

During her 2014 ASSET summer research internship, Caparas worked to develop a innovative strategy to boost the immune system of fish in aquaculture by using plant biotechnology to produce a recombinant therapeutic proteinthat can be stable in the aggressive aquatic environment.

After her summer internship ended, she continued to work in Dr. Dolan's lab on her biology honor's thesis and was recently awarded a 2015 ASSET Research Internship. After obtaining her B.S in Biology, she plans to enroll at the University of Arkansas for Medical Sciences to obtain a M.D./Ph.D. which will allow her to combine medical research and clinical training. Caparas has received the 2013 and 2014 ASSET REU Summer internships, the P3 Undergraduate Fall 2013 internship. She has also been on the Dean's list and the Honor's Director's List during her undergraduate career.



Alyssa Caparas sharing her research results at the Research Day @ the Capitol on March 2014.

Elizabeth Hood, Ph.D.

Dr. Elizabeth Hood's research interests are renewable resources --particularly biomass to ethanol. She also works with foreign gene expression in transgenic plants. She studies plant cell wall structure and function, plant biology, and protein targeting. Hood has over thirty years experience in biosciences. In the lifespan of her career, she has mentored postdocs, Ph.D. , M.S. , as well as undergraduate students from ASU and Utah State University, Logan UT. As she has progressed through her career, she has file 14 patents, published three books, and authored twenty book chapters. As a result of her research work and expertise reputations she has been invited as keynote speaker and presenter at national as well as to international conferences. She has over 35 refereed publication in molecular farming, 10 in agrobacterium, 10 in plant cell walls, and 7 in other categories.

She served as Program Director, Molecular and Cellular Biosciences, Signal Transduction/Cellular Regulation program in 2003-2004. Other accomplishments consist of working at ProdiGene- College State in Texas from 1997 to 2004. At ProdiGene, she served as consultant, principal inverstigator of SBIR grants, vice president for Industrial Proteins business unit, VP Technology, director of cell biology.

Dr. Hood received her B.A in Sociology at University of Oklahoma, Norman, OK. She continue her eduation at Oklahoma State University to obtain a Master's degree in Botany. Hood received her Ph.D in Plant Biology from Washington University in St. Louis, MO. Hood came to ASU as associate vice chancellor for research in 2004 when ASU was looking to establish a research tradition. After 4 years in that position, she returned to faculty and continued doing active research. Hood is a Lipscomb Distinguish Professor of Agriculture at Arkansas State University (ASU). As result of her research, she founded Inifinite Enzymes (a biotech company) in 2006 and Infinite Eversole Specialty Crop Services, LLC in 2009.

Research Interests

Dr. Hood's interest in plant biology began when she took a botany course during her senior year as sociology major student. She had no interest in animal biology. But when she discovered botany, she was hooked. After earning a master's degree in botany, she found that doing the research work was so exciting that she continue school for a Ph.D.

At ASU Arkansas Biosciences Institute, her research team uses corn plants, specifically the seed, to produce proteins that are important components of industrial processes. They work on the technology that allows the proteins to accumulate to higher levels, better promoters, better genetic lines, and better genes of interest.

These enzymes can, for example, be used in the paper industry, which uses enzymes (which are catalytic proteins) to modify the fibers dissolved from paper so that new products can be made from the recycled pulp. Because paper must be very inexpensive, the processes to modify it must also be very inexpensive. The plant seed manufacturing system can make enzymes very inexpensively. The enzymes come from fungal or bacterial genes that are transferred into the plant genome. Thus the plants we use are genetically engineered. We must grow them under permit so that they are not mixed with food corn. These enzymes can also be used to break down plant material into its component sugars so they can be used to make biofuels.

The technology Hood's research team has developed over the years for inexpensive enzymes for industrial applications can lower the costs of some products such as biofuels and recycled paper. These enzymes can also be used to clean up waste streams from industries such as textiles and chemical manufacturing facilities.

Infinite Enzymes is a biotech company with a novel genetic technology for producing low-cost, plant-based enzymes for converting cellulosic biomass into biofuels and other biobased products.

Cellulose is the most abundant molecule on earth and has the potential to become a major feedstock source for manufacturing biofuels. The establishment of a viable and sustainable cellulosic biofuel industry will depend in large part on the ability to efficiently and economically process cellulosic biomass feedstocks, such as switchgrass and miscanthus, as well as the biomass of trees, and residual agricultural and forestry matter.

Infinite Enzymes' plant genetic technology enables the production of cellulase enzymes in the embryo (germ) of the corn kernel. Using transgenic corn as a "plant factory" for producing cellulase enzymes, Infinite Enzymes can deliver high-quality, cost-competitive cellulase enzymes on a commercial

scale without the capital intensive requirements and environmental costs associated with existing enzyme production through microbial/fungal fermentation processes. In fact, the application of Infinite Enzymes' technology could save cellulosic biofuels manufacturers millions of dollars in operating costs and upfront capital costs, thus increasing the economic viability of companies in this industry.

INFINITE ENZYMES

Hood's research team is trying to understand the genetic mechanisms of high protein accumulation in corn. They are also trying to lower the cost of achieving non-regulated status for the genetically engineered plants so they can be grown without containment. Hood's lab in collaboration with several colleagues received two seed funding grants from the EPSCoR project. One grant was to begin doing RNA sequencing to understand the genetic mechanisms of high protein accumulation. The other was to look at standardization of data collection for achieving non-regulated status. These two grants have allowed them to publish and make some efforts to achieve funding although they still have not received a research grant as yet.

Dr. Elizabeth Hood and other colleagues founded Infinite Enzymes in summer 2006. The company is commercializing the enzymes from the plants, growing them, breeding the plants, extracting and formulating them into products. Infinite Enzymes is working with a couple of potential customers to market them.

Dr. Nastassia Jones

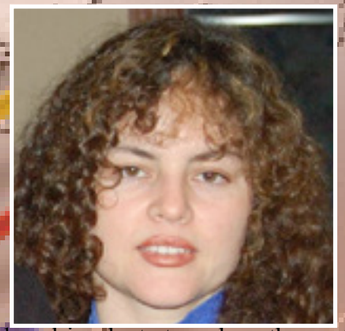
Dr. Nastassia Jones, Assistant Professor of Biology at Philander Smith College, is part of the GREEN team. A trained Microbiologist, she specializes in undergraduate biology teaching and learning; she also has a passion and experience for evaluating and teaching biological science concepts to K-12 science teachers. Jones mentors undegraduate biology majors and research in environmental microbiology and microbiology education.

While working on her doctorate degree, Jones served as a graduate research assistant. Her research was on understading nitrate-dependent humic substance oxidation and the importance of microbiology to biological scientific literacy, analysis of the community dynamics and phylogenetic diversity of nitrate-dependent humic substance-oxidizing populations and identification of novel genes involved in nitrate-dependent humic substance oxidation. As a NSF HEART Graduate Teaching in K-12 Education Fellow, Jones perform a Web-a-lution Learning to determine the impact of web-based instruction and traditional lectures in the high school science classroom

Jones received a M.S and Ph.D. degrees in Molecular Biology, Microbiology, and Biochemistry from Southern Illinois University. She obtained her B.S in Biology from Albany State University, Georgia.

Working in sciences gives you some freedom and automony when planning and performing experiments.

Giuliana Medrano, DVM, Ph.D



Dr. Medrano's passion for vaccine research began with her B.S. thesis in Veterinary Medicine consisting in development and evaluation of a vaccine against Corynebacterium pseudotuberculosis in albino lab mice. During her doctoral stage in the Biochemistry and Molecular Biology program, she was fascinated with the research topic on detection and vaccine development of Sarcocystis, a parasite that affects almost 100% of alpacas in Peru. Her work experience at International Potato Center and during post doctoral research assignment was focused in plant biotechnology and transgenics. The interdisciplinary education and expertise she achieved helps her to explore the interplay between plant and animal field and foresee potential animal and clinical trials within a critical vaccine development area.

Following a competitive national search, Medrano was recruited to the U.S. based primarily on the strength of her medical, molecular biology expertise, and research experience in plant biotechnology. Medrano was initially hired in 2006 as a Post-Doctoral Research Associate. In 2009, she was promoted to the position of Research Assistant Professor at the Arkansas Biosciences Institute, located at Arkansas State University, Jonesboro.

Medrano's work has focused on improving vaccines by producing biological proteins that help stimulate and guide immune responses. We have demonstrated that plants can produce a fully functional mouse protein that can be used to stimulate an antitumor immune response. The proteins will be produced in plants to reduce the cost while increasing the amount produced.

To use exogenous cytokines is considered a novel therapeutics or vaccine adjuvants in diseases and cancer prevention. However the use of this cytokines is cost prohibit for use in the general population. Medrano's lab members use cytokines made in plants as a cost-effective, safe, and rapid production system to prevent viral diseases and tumors which has significant implications in veterinary and human applications. For example lab members have recently demonstrate antitumor activity of our murine Interferon-gamma produced in plants against mammary cancer cells and against lymphoma cells.

Medrano's advice for students following a science career is "If you were not born a genius….work as hard as you can, and keep working harder." In addition working in sciences gives you some freedom and autonomy when planning and performing experiments. At the end, the results are usually rewarding.

Dr. Melissa D. Kelly

Dr. Kelly's research is focused on Vitamin A (retinol). Retinoids have gained much attention as chemotherapeutic agents but are limited in their use due to toxicity. Synthetic retinoids have been tested on a variety of cancer cell lines and have shown to have biological activity and lower toxicity when compared to naturally occurring retinoids. One of the projects of Kelly's laboratory is to investigate the metabolism of these synthetic retinoids. Using lipid extraction techniques and high performance liquid chromatography (HPLC), metabolites are extracted, separated, and isolated. The objective of these studies is to identify new synthetic retinoid metabolites that may be more biologically active and less toxic than previously developed retinoids.

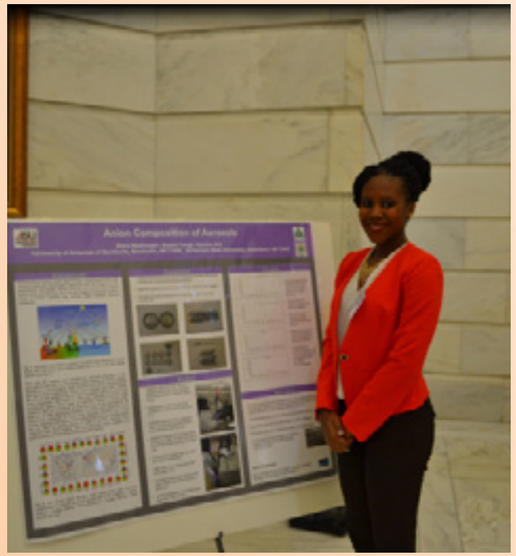
Her laboratory also examines retinoid metabolism and its relationship with diabetes . Recent studies have suggested a decrease in plasma vitamin A concentrations in individuals who are diabetic. The objective of this project is to determine if retinoid metabolism is altered during diabetes and if altered retinoid metabolism influences retinoid availability and retinoid dependent cellular processes.

Kelly has published article in the Journal of Biochemistry, FASEB, FEBS, and the Journal of Labelled Compounds and Radiopharmaceuticals. She had mentor several students who have participated in national research meetings such as the American Chemical Society National Meeting and the National Conference of Undergraduate Research.

Dr. Melissa D. Kelley, an Assistant Professor from the University of Central Arkansas, has taught several upper level chemistry and biochemistry courses at UCA since fall 2003. Kelly graduated with a B.S in Biochemistry from Kansas Stare University. She received a Ph.D. of Biochemistry and Molecular Biology from Oklahoma State University.

ASSET REU Intern

Kiara Newhouse, a biology major from the University of Arkansas at Monticello, has been part of the ASSET REU Summer Internship program for summers 2013 and 2014 at Arkansas State University under Dr. Hashim Ali's mentorship. In summer 2013, Kiara led studies on seed germination and climate change and also assisted studies on ion chromatography, anion composition of aerosols, deliquescence relative humidity of mixed binary salts of atmospheric relevance Jonesboro, aerosols, and formation of HCl (g). During 2013 spring semester, Kiara was part of the Herbarium staff at UAM. Her duties included photographing and filing plant specimens in preparation for a database. Research experience has given Kiara an opportunity to learn how to operate scientific instruments for testing or collecting data such as the ion chromatography, Sioutas 9L Impacator, Thermo Orion pH Detector, Nicolet 8700 FT-IR, and Omnic.



In summer 2014, Kiara and Dr. Ali are working on the composition of anion aerosols. Kiara's goal is to analyze aerosols pollutants in the local area, such as cholorine, nitrate and sulfate contents that are harming the ozone layer and could cause health problems. The study could be a way to balance beneficial vs. harmful aerosols in the environment. The research group will collect aerosols from different traffic locations around the Jonesboro area. A Sioutas Particle Cascade Impactor (PCIS) is used to collect four aerosol samples. The samples are place in the PCIS for 150 minutes at 9L/min flow rate at first and may be increased to improve chromatogram resolutions. The vials are shaken vigoursouly for a minute after which filters are removed from the vial. After filtering the samples with 1mL methanol and 2mL deoinized water. Then the samples are analyzed using a Dionex Ion Chromatograph under the following conditions: AS9-HC column, 2.7 mM NaC03/0.3mM NaHCO3 eluent at 2mL/min with ARS-300 4 mm regenerate, 75 microliters sample size and DS-4 conductivity meter.

Besides her high interest in research, Newhouse also has a passion for mathematics, music, and medicine. Newhouse is an ARK-LSAMP scholar, a certified nurse assistant (CNA) and a Girls State Delegate/ Counselor. She has presented her research at MICA Research Conference Spring 2013, the Southeast Undergraduate Research Conference in Knoxville, TN in Spring 2014, ARK-LSAMP Spring Research Conference 2012, and at the UAM Research Forum Fall 2013. Newhouse was also elected at UAM 2013 Homecoming coming Queen. She is a member of the biology club, med science club, symphonic band, Kappa Kappa Psi (Band Fraternity), and UAM concert choir.

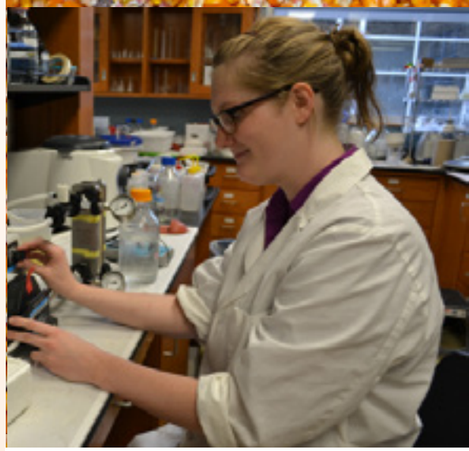
Isolating and Utilizing a Maize Cupin Family Promoter for Recombinant DNA Technology

Rebecca Ring, biology major from ASU, was funded through the ASSET REU Summer internship during summers of 2013 and 2014 to do research at Dr. Elizabeth Hood's lab.

During summer 2014, Ring will be working on isolating and amplifying the cupin promoter with polymerase chain reaction (PCR). The cupin family promoter has shown to express genes at higher levels than the currently used globulin-1 and globulin-2 promoters. A promoter is a region in the DNA (about 2000 base pairs) that lies upstream of a gene. It signals to polymerases where to begin transcription of the genetic code into RNA—the template of protein synthesis. The stronger the promoter, the more highly the gene following it is expressed. The production of glucose from cellulose is the basis of biomasss conversion and is a promising technique for the future of renewable biofuels. If the amount of cellulase produced is maximize with a strong promoter, less biomass can be used to produce the enzyme and the cost of the process is dramatically reduced.

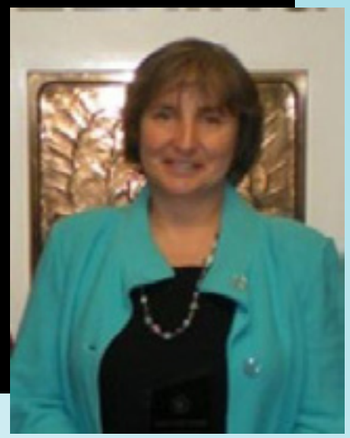
Other objectives of her research include creating a plasmid vector with the promoter and a reporter gene that will allow for quantitative analysis of the promoters's activity; move the reporter gene and promoter to an A. tumefaciens plasmid that will use to perform transient transformation of maize tissue and finally to make a stable maize transformants to confirm transient results.

Ring's plans to pursue a Ph.D. in biology with a Cellular and Genetics mechanisms that cause cancer as her interest of study. Ring's research awards consist of $4,000 from the Arkansas Science & Technology Authority and a $2,500 from the College of Science and Mathematics at ASU both awards for research on maize enzymes for biomass conversion. Ring has been on ASU's Honors Director's List and Chancellors List.



Rebecca Ring working on her experiments in Hood's lab, summer 2013.

Dr. Julie D. Carrier



Dr. Carrier's research program is focused on the extraction of carbohydrates and phytochemicals from biomass. Carrier is particularly interested in components that are embedded in biorefinery-destined feedstock, such as forest residue and herbaceous energy crops, and that can be extracted by pressurized hot water or dilute acid so that their extraction can be coupled to the existing biochemical biorefinery processing technology.

Her extensive professional career includes 61 publications, 17 invited oral presentations, and one patent. Since 1997, Carrier has been awarded over 25 research grants from organizations such as the NSF-EPSCoR, USDA, Arkansas Science Institute, the Department of Energy SERBEP, and many others. Her expertise has allowed her to be selected as a external reviewer of grant proposals for the USDA SBIR programs Phase I and Phase II, the National Research Initiatives, American Chemical Society, and US Civilian Research & Development Foundation (CRDF). Through several years she has serve as a panel member for several USDA programs, NSF programs, and the Natural Science and Engineering Research Council of Canada (NSERC) Interdisciplinary Grants GSC in 2002-2005.

Carrier was awarded the Outstanding Teaching Award in 2004 and 2009 from the University of Arkansas, College of Engineering, Biological, and Agricultural Engineering. From the same department she was also awarded the Outstanding Researcher Award in April 2006 and the Oustanding Service to Student Award in April 2003.

Carrier obtained a B.SC in Agricultural Engineering and a Masters of Engineering and Ph.D in Chemical Engineering from McGill University. She also did her post-doctoral research at the Department of Pharmacognoscy in the University of Leiden, The Netherlands and also in British Columbia Research Inc, in Vancouver, British Columbia.

Cyber Security

Ms. Tiffany R. Howell, Computer science major from the University of Arkansas at Pine Bluff, is very focused on a bio informatics track. At UAPB, Howell has participated in various research projects that have allowed her to garner a basic level experience in the areas of bioinformatics ranging from Data Mining to Social Informatics. Since fall 2013, research assistant Howell supervise and implemented technology deployment in cyber security research lab including, security system, wireless internet enable cameras, iMac machines, and Mac Servers. She also assisted in building a super computer cluster using Linux operating system. Tiffany helped deploy a Linux server for the Computer Science Unit at UAPB. These experiences have impacted her future career goals to pursue a career developing the exceptional biological inspired computer systems.

At the UAPB Computer Science Cybersecurity Research Lab (CRL), Tiffany Howell works with Dr. Jessie Walker on a project that examines intrusion threats in large-scale cyberinfrastructure systems including cloud enviroments. During summer 2014, Howell's main activities is the enhancement of clould computing forencsics focused techniques in detection, prevention mechanisms for multi-stage attacks (MAS) in cloud computing environments particularly focused on the domain of infrastructure-oriented clould systems , which are defined as infrastructure as a service (IaaS) environments.

The research experience will enhance Howell's research skills. She is very familiar with programming languages such as C++, C, and Java as well as with operating systems: Windows, Linux, and Unix. Howell is expecting to graduate on December 2014. She plans to further her education to obtain a Ph.D. in the field of Computer Science.

Society of Women Engineers

The Society of Women Engineers (SWE) is a not-for-profit educational and service organization that empowers women to succeed and advance in the field of engineering, and to be recognized for their life-changing contributions as engineers and leaders. Founded in 1950, SWE is the driving force that establishes engineering as a highly desirable career for women through an exciting array of training and development programs, networking opportunities, scholarships, outreach and advocacy activities, and much more. SWE welcomes both female and male members. Our section is an active student organization that strives to create opportunities to excel for the students in the Donaghey College of Engineering and Information Technology.

For more information on SWE visit the national SWE website
http://societyofwomenengineers.swe.org/

Society of Women Engineers

UALR

Association for Women in Science

AWIS MISSION
AWIS champions the interests of women in science, technology engineering, and mathematics across all disciplines and employment sectors. Working for positive system transformation, AWIS strives to ensure that all women in these fields can achieve their full potential

WHAT WE BELIEVE
Tapping into America's full talent pool is essential to continued U.S. leadership in research and innovation.
We believe women in STEM should be:

- Compensated fairly and without discrimination
- Advanced equitably and without bias
- Respected and recognized for their scientific achievements
- Exposed to successful role models in leadership positions
- Able to achieve optimum work-life integration

For more information visit: www.awis.org