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Scutelleria ocmulgee
Friends and Colleagues:

Welcome most heartily to the inaugural issue of The Fort Valley State University Research Report! It truly is my pleasure to introduce you to what may be one of the best-kept secrets in academia: the dynamic research capabilities and product of Georgia’s historic Fort Valley State University.

I am writing this message almost five years, to the day, after I embraced the honor of becoming FVSU’s eighth president. Although I proudly stood as a graduate in its Class of 1973 and continued to be involved closely in university affairs as an alumnus, I was still surprised in 2006 at the range and depth of scholarly activity at our beloved institution.

It, of course, was well-known to me that we stood out as Georgia’s only 1890 Land-Grant institution, but as I toured the laboratories and experiment sites operated in association with our land grant responsibilities, I truly had my eyes opened. Top-flight scientists labored creatively and successfully to grapple with problems that faced the nation and the world, including possible treatments for some cancers among other medical uses of plants, applications of DNA technologies, and solutions to global energy and environmental concerns.

But, do not think for one minute that FVSU’s top-quality research and productivity has been limited to those fields. Historians, sociologists, artists, mathematicians, psychologists, and computer scientists, among others, also bring their extensive talents to the fore.

These are the stories The Fort Valley State University Research Report tells in this inaugural issue and these achievements are ones that will be expanded upon in subsequent annual editions. Delve into the scholarly world here in “The Valley” and accept our invitation to see firsthand the service and contributions of outstanding individuals who are extending for the good and the bounds of human knowledge. We proudly proclaim that Fort Valley State University is “a light for your path.” We invite you to explore how it also casts a bright light for our state of Georgia, the nation, and the world.

Sincerely,

Larry E. Rivers, D.A., Ph.D.
Research is at the heart of what 1890 Land-Grant institutions do. The research described in this issue of the Research Report from the College of Agriculture, Family Sciences and Technology at Fort Valley State University is further evidence of the seriousness with which our faculty and staff take their responsibilities to inform teaching practice and equip our students with the best possible education and the practical experiences to enhance that education.

Increasingly, communities in this nation, and nations around the world, are called upon to develop means by which to sustain themselves in the face of dwindling natural resources, from the food that they consume to the fuels that are needed to power their lifestyles and business endeavors. Research conducted on our campus is helping these communities to accomplish their goals of sustainability. Biotechnology, both plant and animal, holds tremendous promise as a way to combine age-old scientific principles and practices with cutting-edge technology in an effort to find new ways to make better use of the scarce resources available to our society and to future generations.

This issue of the Research Report is but a snapshot of the research that is being conducted at Fort Valley State University. We hope you enjoy the report and encourage you to come to our campus to see research in action.

Sincerely,

Julus E. Scipio, Ed.D.
The ongoing research on *Scutellaria* at the Fort Valley State University Agricultural Research Station is being conducted with the intention of developing efficient mass production protocols for *Scutellaria ocmulgee* and other medicinal skullcaps. The goals of the research are to conserve the plants, develop a low temperature germplasm conservation facility at FVSU, study anticancer properties and develop an understanding of the plant’s mechanism of action. Through the ongoing research, using various cancer cell lines and rats as an animal model, Dr. Nirmal Joshee, assistant professor at FVSU, and his team, have established that *Scutellaria* extracts have appreciable bioactivity on rat and human glioma (brain tumor) cells (Parajuli et al., 2009, 2010).

*Scutellaria* (commonly known as skullcap or scullcap) species have been extensively used in the traditional medical systems of China, Korea, India, Japan, European countries in Europe, and North American countries. Skullcap is well known among the Cherokee and other Native American tribes as a sedative and female medicinal herb. Cherokee women use skullcap herbs to maintain healthy menstrual cycles. Also, a decoction of the root is consumed after child birth to stimulate the reproductive system. *Scutellaria* is a powerful medicinal herb and it is used in alternative medicines as an anti-inflammatory, antispasmodic, and sedative.

*Scutellaria* inhibits tumor growth and enhances survival of glioma-bearing rats. F344 rats were subcutaneously transplanted with F98 glioma cells on the right flank. After five days, one group was administered with SocL (*Scutellaria ocmulgee* leaf) extract (100 mg/kg), five days a week for two weeks. Rats were euthanized when they showed excessive tumor burden. Rats were euthanized on day 29 and the subcutaneous tumor was excised and measured (Parajuli et al, 2010).

This project specifically aims at the conservation of Ocmulgee skullcap that has been reported as a plant growing in Macon and adjoining cities. It is endemic to Georgia. Conservation is the critical need of the hour. This project involves research collaboration and cooperation with scientists in the areas of plant biotechnology/cancer biology, phytochemistry and other related disciplines. There is now a Master of Science program that focuses on biotechnology. The program has been helpful in training graduate students working on their theses. Graduate students are conducting their theses work in *Scutellaria* cryopreservation, reproductive biology and biotechnology.

Bianca L. Richardson is learning tricks of the trade in the area of *Scutellaria* cryopreservation at the National Center for Genetic Resources Preservation in Ft. Collins, Colo. Another graduate student, Karthikeya Venkatesan, visited the U.S. Department of Agriculture’s Natural Product Research Lab in Oxford, Miss., to analyze *Scutellaria* samples for potential anticancer compounds. In addition, two week long intensive training for graduate students was partly supported by the project ‘Advancing Graduate Education in the STEM Disciplines for the Underserved African American and Low-Income American Population’ (PD Prof. Anand K. Yadav).

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Fort Valley State research bears fruit

Guava (*Psidium guajava* L.) is a widely distributed exotic fruit crop in nearly every tropical/subtropical country. Guava fruits contain high amounts of vitamins C and A, dietary fiber, phosphorous, calcium, lycopene and β-carotene. Thus, guava fruits are used to treat gastroenteritis and reduce LDL cholesterol, triglycerides and hypertension. In recent years, the fast-growing niche market for desirable nutraceutical value of some exotic fruits, such as guava in the American produce industry, has created a genuine demand for their increased supply. Guava can be a potential alternative high-value cash crop, especially for the limited-resource farmers in the Southeast and the USA. Therefore, there is an increasing demand for the development of new guava cultivars.

“We have been engaged in guava research at the Fort Valley State University (FVSU) since 1988, developing efficient biotechnology protocols for in vitro plant regeneration, studying interspecific relationships and evaluating guava germplasm using microsatellite markers. We’ve also been characterizing bioactive components from various flesh colored nutraceutical fruits,” said Dr. Anand K. Yadav, professor of horticulture, who has been a pioneer in developing guava research at FVSU. We have mature trees of 13 different guava cultivars and genotypes growing under protection in the Specialty Plants House at the FVSU Research Station.

Dr. Viji R. Sitther, research professional in specialty plants biotechnology at the FVSU Agricultural Research Station, has been working on this specialty crop plant since July 2007. “We have tested and refined the in vitro plant culture protocols for regeneration of guava explants and have developed necessary plant regeneration protocols. Currently, we are investigating different culture media for inducing somatic embryogenesis,” she said.

Another important area of guava research at the FVSU Research Station is genetic fingerprinting. “Similar to the procedure used in forensic DNA fingerprinting to differentiate individuals, microsatellites are being used to identify assorted guava genotypes,” Sitther said. In addition to the germplasm available at FVSU, additional guava germplasm required for this research has been obtained from the National Clonal Plant Germplasm Repository, Hilo, Hawaii, through Dr. Francis Zee, one of FVSU’s U.S. Department of Agriculture – Agricultural Research Service collaborators. In the past, assessment of genetic variation among crop cultivars was measured using morphological or phenotypic characteristics. This, however, is not an accurate estimation of variation and could easily lead to misidentification or duplication with undesirable far-reaching consequences.

Accurate characterization of genetic variation at the molecular level is possible using microsatellite markers. “What makes this technique exceptional is that potential parents for developing desirable improved cultivars could be identified and selected for guava breeding and improvement programs, including the development of cold hardy guava cultivars suitable for unprotected outdoors,” Sitther said. This molecular marker technique has numerous applications including identification of cultivars, quantification of genetic variation and characterization of accessions in guava germplasm collections that researchers are currently investigating.

“The FVSU facility has acquired necessary equipment like the CEQ-8000 Genetic Analysis System, which has the capability of detecting genetic variation,” Yadav said. “The funds from a Capacity Building Grant and matching grant monies provided by Beckman Coulter have helped us purchase this equipment that costs over $100,000.”

Donna Harris, former research technician at the FVSU Agricultural Research Station, helped the team with this research in guava biotechnology.

Another area of research in nutraceutical guava is on health-benefitting bioactive compounds. “We lack knowledge of anthocyanin and polyphenolic composition of nutraceutical guava fruits and very little is known about their phytoneutrient content and antioxidant capacity,” Yadav said.

The research objective is to isolate antioxidants and genetically manipulate antioxidant contents in the red, white, cream and pink-fleshed guava fruits that would escort to the new niche markets.
Phytochemical analysis and antioxidant capacity determination in guava fruits are underway at USDA-ARS, Winter Haven, Fla., facility in collaboration with Dr. Elizabeth Baldwin. Yadav says this research will lead to developing value-added guava varieties that will benefit human health and well being.

Dr. Sadanand A. Dhekney has recently joined the research. Dhekney has conducted research on the development of regeneration systems and genetic engineering in tropical and sub-tropical fruits. He has been involved in studying stress-related gene sequences and genetic elements from the grape and papaya genomes. He has also been actively developing protocols for the induction and maintenance of embryogenic cultures and for the production of transgenic plants. Dhekney will contribute to the development of new cell culture systems and genetic engineering of guava for improving tolerance to stresses caused by cold, disease and pests.

“Our ongoing research efforts in guava will improve the attributes of the existing germplasm and enhance productivity by developing cold-tolerant varieties.”

-Dr. Anand K. Yadav, Fort Valley State University professor of horticulture

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On most farms, a portion of land is usually not suited for growing food crops because of steep slopes, high erosion or poor soil types. Drs. Bharat Singh and Hari Singh, along with collaborators, have shown that farmers can use these soils for growing a number of perennial grasses suited for biofuel to supplement income. Their results have established that napiergrass, also known as elephant grass, produces higher dry matter yield than any other biofuel crop under Georgia climate. Sugarcane, known by the name “energycane” and developed for high dry matter, comes in second. It has the advantage of providing biomass and substantial amounts of sugar. Cellulosic feedstock research at Fort Valley State University is timely as the Energy Independence and Security Act of 2007 mandates the production of 36 billion gallons of biofuel by 2022, and 21 billion gallons of the biofuel must be obtained from cellulosic ethanol and other advanced fuels.

Singh and his colleagues are researching four grass species - napiergrass, energycane, switch grass and giant reed. They are also examining two annual crop species, sorghum and pearl millet. Sorghum’s intended use is for sugar and biomass while pearl millet is targeted for grain research. The remaining crops are being studied for biomass production. All the crop species under
research use a C-4 method of photosynthesis that results in high accumulation of vegetative matter during summer months. The perennials also provide excellent wildlife habitat.

Since their initial research, which began with grain to ethanol production, FVSU biofuel researchers have concentrated on crops not used in the production of food crops. Recognizing the research expertise of these scientists, the U.S. Department of Agriculture’s National Institute of Food and Agriculture (NIFA) agency, under the Agriculture and Food Research Initiative (AFRI) Competitive Grants Program, recently awarded approximately $1 million. Researchers will use the funding to develop sustainable production systems on marginal soils for two perennials - napiergrass, energycane - and the annual, sorghum, which is suited for the Southeastern United States. Under this grant the production systems being developed by the researchers will qualify these crops for the advanced biofuel classification (50 percent or less carbon dioxide emission than gasoline) by reducing tillage, relying mostly on legume cover crops for nitrogen, eliminating irrigation, and using harvesting and post-harvesting to lower pre-conversion costs.

Fossil fuel and biomass fuel are similar except that nature took millions of years to convert biomass into fossil fuel, while mankind has been able to do the same in a matter of hours. In addition, while the carbon dioxide released to the atmosphere by the fossil fuels adds to the greenhouse gas, plants recycle emission from biofuel through photosynthesis. Only these two energy sources come in liquid form used in most transport vehicles today and also only these two sources provide the raw materials for innumerable number of compounds for daily use. To provide comprehensive information on the industrial uses of different crops, methods of their production and recent ongoing research on industrially suited crops, Bharat Singh edited a book entitled, “Industrial Crops and Uses,” published in October 2010 by CABI, Wallingford, UK.

The book discusses the use of plants in a variety of different industries and products including bioenergy, industrial oil and starch, fiber and dye, rubber and related compounds, insecticides and land rehabilitation. Chapters discuss identification of plant species with desired traits, cultivation to obtain the desired raw materials, methods utilized in producing different finished products, current and future research in crop production and processing and present state and future prospects for the industry. This book provides the first systematic review of industrial crops and their uses and thus will be an important resource for students, policymakers and researchers in the fields of crop science, bio-engineering, bio-processing and agro-science.

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Tours of aquaculture greenhouses whet students’ appetites

Each year students of all ages get up close and personal with the inhabitants of the aquaculture greenhouses at the Georgia Center for Aquaculture Development (GCAD) on Fort Valley State University’s campus. In the lush green landscape of lemongrass, basil and water hyacinths, numerous aquaria and tanks hold bright red fish of all sizes known as tilapia. In addition to tilapia there are the dazzlingly colored Japanese koi, largemouth bass, bream, channel catfish and pacu. For those with a taste for lobster and shrimp, there are giant freshwater prawn and the Australian red claw from “Downunder.”

Besides the animals, different types of recirculating aquaculture systems (RAS) are strategically placed throughout the greenhouses to demonstrate this sustainable technology. For those students interested in engineering or in how things work, the different types of RAS whet their appetites for learning about water treatment and recycling. With aquaponics, fish wastes can be turned into valuable products such as basil, lettuce, tomatoes or strawberries, instead of impacting the environment with the release of these wastes.

Aquaponics is the combination of rearing aquatic animals in RAS with the cultivation of plants, herbs or vegetables in a hydroponic or soilless system. Instead of needing chemical nutrient solutions for the plant growth, the wastes from the fish supply all the nutrients needed for plant production. This demonstrates to students the beneficial sustainability and profit potential of aquaponics.

For many students getting a chance to experience RAS with the different aquatic species and plants provides an opportunity for them to explore career options they never considered before. This is especially the case when students from major cities observe FVSU students working with faculty and staff. The experience provides them exposure to new areas of education they may want to explore further. For others, the visit to the greenhouses opens up new areas of career and employment opportunities to consider. At the very least, exposure to the aquaculture greenhouses affords them the opportunity to observe species of animals, which previously they have possibly only seen cooked and served on a dinner plate.

Recirculating aquaculture systems have been integrated into many K-12 education programs as valuable methods of getting students excited about math and science. As students take care of the water quality and fish, they learn valuable lessons in math, biology and physical science. They also learn about teamwork since they interact with other students. At the college level students are developing important animal husbandry skills and improving their knowledge of water quality, biology and aquatic biology.

They learn important skills related to responsibility and problem solving that will serve them well later in their careers. Since the program started at FVSU, more than 20 students have learned important animal husbandry skills. This past summer Dr. Pat Duncan, director of the aquaculture center, taught the first course on RAS to 23 Georgia teachers, who returned to their classrooms throughout the state and incorporated aquaculture into their curricula.

Since opening its doors in 2003, the on-campus aquaculture greenhouses have been visited by scores of students ranging from kindergarten age to the high school level. In 2010 more than 1,500 students either toured the greenhouses or received on-site aquaculture visits from the Center. This does not include the hundreds of students who visited the aquaculture tanks and displays at the Sunbelt Agricultural Expo in Moultrie, Ga., this past October.

Throughout the year students from local schools, along with those from a number of clubs, special education classes and church groups, visit the aquaculture greenhouses. In the summer there are tours from a number of camps, clubs, schools and church groups. When the students can’t come to us we sometimes go to them. Various career days, agriculture meetings and field days are attended throughout the state to provide students with information and demonstrations about aquaculture.

For more than 20 years aquaculture has been the fastest growing system of food production worldwide. Throughout the year at the Center, tours and workshops are conducted with the RAS and aquaponic systems. These events promote education pertaining to the development of aquaculture in Georgia. The variety of RAS and aquaponic systems at GCAD demonstrate to visitors, of all ages, the potential of this technology in raising large amounts of fish and vegetables in a small area with less water than conventional forms of aquaculture. Students who visit the Center learn about the promise of this technology for not only rural, but suburban and urban areas to meet the seafood and produce demands of today and the future.

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Northside High School student Indyja Mitchell looks at the tilapia in the aquaculture area at Fort Valley State University.
FVSU scientist sought to improve meat production methods in ETHIOPIA

Under the Virginia State University Farmer-To-Farmer Program and the Ethiopian Sheep and Goat Productivity Improvement Program (both projects funded by the U.S. Agency for International Development), Dr. Govind Kannan, professor of animal science at Fort Valley State University, was invited to Ethiopia for 10 days to conduct a nationwide training program on sheep and goat meat production and product quality assessment. He also participated in a research project to find a solution for shorter shelf life of carcasses from highland sheep and goats compared to those from lowland animals.

Small ruminant carcasses are exported from Ethiopia to markets in the Middle East. Based on anecdotal evidence, exporting facilities have reported that shelf life is shorter for animal carcasses from highland areas than for those from lowland areas. The problem of early darkening is claimed to exist for both sheep and goats. However, there has not been research documenting these conditions and their possible causes.

Three researchers (Dr. Girma Abebe, Ethiopian Sheep and Goat Productivity Improvement Program, Addis Ababa, Ethiopia; Dr. Arthur Goetsch, American Institute of Goat Research, Langston University, Langston, Okla.; and Dr. Govind Kannan, Agricultural Research Station, Fort Valley State University, Fort Valley, Ga.) collaborated on experiments to determine if the early darkening problem, in fact, exists in carcasses from highland animals, and if so, the possible prevention method. Yearling sheep and goats from highland and lowland areas of Ethiopia were used to determine effects of species (sheep, goat), origin (highland, lowland), length of rest after transport to the abattoir and feeding on carcass surface lightness. Two experiments were conducted, one with rest for zero, one, and three days before slaughter and the second with feeding zero (two days rest), two, and four weeks.

Livestock preslaughter management procedures invariably result in increased production of stress hormones in the animal. Stress causes metabolic changes than can in turn adversely affect meat quality in small ruminants. In regard to meat quality, the important metabolic changes due to preslaughter stress are depletion of glycogen and the consequent inability of muscles to develop adequate acidity levels post-mortem. Dark muscle color is a common condition encountered when animals are exposed to situations that deplete muscle glycogen levels prior to slaughter and is characterized by an elevated postmortem pH.
In the rest experiment, the instrumental color measure L* value (indicating lightness) for the leg surface, three-day postmortem, was lower for the highland animals than for the lowland animals. Leg surface L* value on day three was increased by one and two days of rest compared with zero days for goats regardless of origin, but was not affected for sheep. In the feeding experiment, leg surface L* value on day three was lower for the highland animals than for the lowland animals. Feeding for four weeks increased leg surface L* value on day three regardless of species and origin. In summary, goat and sheep carcasses from highland areas of Ethiopia may darken more quickly compared to those from lowland areas. Also, one or two days of rest before slaughter can increase lightness of the surface of goat carcasses. The results of these experiments were published recently in the African Journal of Agricultural Research (vol. 5(9), pp. 834-847, 4 May 2010).

According to Kannan, the training program he conducted during his visit to Ethiopia in March 2008 was very successful and the event was covered by Ethiopian National Television News. “It was a very productive and gratifying trip. The training program was well received and the experiment yielded some useful results. In addition, I learned a lot about sheep and goat production, and the meat processing systems in Ethiopia,” Kannan said. About 30 participants representing educational and research institutions and the sheep and goat industry attended the formal training program conducted at the Ethiopian Meat and Dairy Technology Institute in Debre Zeit, Ethiopia. Dr. Freddie Richards, director of the Ethiopian Sheep and Goat Productivity Improvement Program and dean of Prairie View A&M University’s College of Agriculture and Human Sciences, gave the opening remarks. Dr. Ameha Sebsibe, director general of the Ethiopian Meat and Dairy Technology Institute at that time, welcomed participants.

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“It was a very productive and gratifying trip. The training program was well received and the experiment yielded some useful results. In addition, I learned a lot about sheep and goat production, and the meat processing systems in Ethiopia.”

-Dr. Govind Kannan, Fort Valley State University professor of animal science
“When you go to the local grocery store, you want to know that the meat you are purchasing and taking home is safe for you and your family.”

- Dr. Ajit K. Mahapatra, Fort Valley State University research professional
E. coli is a type of bacteria that lives in our intestines. Most types of E. coli are harmless. However, some strains of E. coli, including those linked to food poisoning, such as E. coli O157:H7, are very serious and cause bloody diarrhea, severe stomach cramps, dehydration, kidney failure and even death. In food poisoning outbreaks involving E. coli, the deadly E. coli strain O157:H7 is generally always the culprit. E. coli infection can be spread if someone eats meat that is not fully cooked or if they handle raw meat then touch something that ends up coming into contact with their mouth, such as food or utensils. In the U.S., E. coli is the leading cause of foodborne illness, accounting for about 73,000 infections and 61 deaths every year.

E. coli is a major problem for the food industry and a risk to public health. E. coli outbreaks have led to the recall of millions of pounds of hamburger, spinach, lettuce and other produce. “Contaminated beef is a common source of infection and has led to several big meat recalls in recent years,” said Dr. Govind Kannan, professor and interim dean of the Fort Valley State University College of Agriculture, Family Sciences and Technology. His colleague, Dr. Ajit K. Mahapatra, a FVSU research professional, added, “When you go to the local grocery store, you want to know that the meat you are purchasing and taking home is safe for you and your family.”

That’s why Fort Valley State University researchers Kannan and Mahapatra, and former research assistant Donna L. Harris, have spent so much time uncovering new ways to keep food safe. Through a grant from the Cooperative State Research, Education and Extension Services of the U.S. Department of Agriculture (USDA-CSREES), the researcher’s objective was to determine whether low-voltage electric current treatment can be used to inactivate E. coli on beef surfaces. Their work is just one way FVSU’s research makes an impact on a national scale.

The research, published in the peer-reviewed scientific journal “Journal of Electrostatics,” investigated the efficacy of low-voltage electric current on the inactivation of Escherichia coli ATCC
700728 strain on beef surface, using sodium chloride (table salt) solution as an electrolyte. The current levels investigated by the researchers based at the FVSU Agricultural Research Station were 15, 30, and 45 milliamperes per square centimeter. For beef treated with low-voltage current, a 99 percent reduction in \textit{E. coli} was achieved using a 16-minute treatment time. As part of their study, researchers also determined the electrical properties of beef. Their results from this study were published in the peer-reviewed journal “Agricultural Engineering International: the CIGR Journal.”

The authors concluded that low-voltage electric current treatment appears to be an effective process for reducing bacteria on the surface of meat. However, further studies are warranted to determine the effect of low-voltage current on sensory and nutritional quality retention for meat, said the researchers. “Although food safety is our primary objective, we aren’t really helping the meat industry unless we develop a process that can preserve the quality of fresh meat,” Mahapatra said. “A safe product that looks bad or tastes bad is not a viable solution.”

In the laboratory environment, the researchers have proven that it works. They now have to figure out how to make it work in real world conditions. It is an enormous challenge to boost this technology’s ability to inactivate pathogens to near 100 percent at production line speeds and transfer the technology to the commercial arena.

“Consumers should realize that cooking at home is the last point of control for eliminating these microorganisms,” Harris said. Mahapatra added, “If beef is cooked until it’s well done, you won’t have a problem. These microorganisms are basically living cells, and they are fairly inactivated by heat, even \textit{E. coli O157:H7}. If the cells are dead, they are not harmful.”

The researchers’ next plan is to assess the effects of steam on beef, and whether the steam treatment will inactivate the \textit{E. coli}. The results of this research will help determine ways for the beef industry to make its products safer through the use of steam processing.

“There is still a lot we need to know about \textit{E. coli} to completely eliminate it. Therefore, food safety research continues to be one of the FVSU’s highest priorities,” Kannan said.

Coauthors of the published papers are Mahapatra, Kannan, Harris and undergraduate student B. L. Jones.

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Dr. Young W. Park, professor of food science at Fort Valley State University, recently published three books that have drawn worldwide attention to dairy production, processing and technology in different regions of the world. He published his first book in 2006 entitled “Handbook of Milk of Non-bovine Mammals.” Since the book has been released, this timely publication has been globally recognized by numerous dairy scientists, dairy producers, food scientists, small ruminant enthusiasts and consumers around the world.

This book has been translated into Spanish and Chinese, which indicates its global demand. Because secondary dairy species have such a significant impact on economic and nutritional well-being of humanity in many parts of the world, especially in developing countries, this work has been cited as an essential reference book for leading-edge scientific information for dairy scientists, nutritionists, food chemists, allergy specialists, health professionals and allied professionals.

Park’s contribution to the international dairy sheep and dairy goat industries is also noteworthy because he published the most updated reference book, entitled “Goat Milk and Sheep Milk,” as the special issue for the Small Ruminant Research Journal in 2007. This book is especially valuable for dairy scientists, food scientists, health professionals, nutritionists and dairy product researchers. Many of these professionals have an interest in the up-to-date scientific research information on physico-chemical, biochemical, nutritional and rheological characteristics on goat and sheep milk and their products. The application of this knowledge also may impact the efficiency of goat and sheep milk production and enhance the economic sustainability of the goat and sheep milk producing sectors around the world.

Another one of Park’s highly visible contributions to international dairy production is his most recent publication entitled, “Bioactive Components in Milk and Dairy Products.” This book, released in 2009, is an important addition to the world dairy production reference. Since bioactive compounds in milk are increasingly important, fractionation and marketing of bioactive milk ingredients has emerged as a new lucrative sector for dairy industries, specialized bio-industries, and even the pharmaceutical industry. These industrial biotechnological progresses are applicable to other dairy species such as goats because more people drink the milk of goats worldwide than that of any other single species.

Furthermore, Park has published a journal article on goat and sheep milks, which has been the most downloaded article in the world in small ruminant dairy production and veterinary science research fields in 2007. The article is entitled “Physico-chemical characteristics of goat and sheep milk.” This paper has been within the top five most downloaded articles in the Small Ruminant Research Journal for the past four years. Park has received numerous reprint requests for this article from readers across the world.

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The lives of 14 phenomenal, but unsung, heroines are chroni-
cled in a new work written by Fort Valley State University ad-
ministrators and history professors. The “Varieties of
Women’s Experiences: Portraits of Southern Women in the
Post-Civil War Century” is a collection of essays that high-
light the extraordinary lives of Southern women who made
significant social contributions, even at a time when their
rights were restricted legislatively and by American social

It is a collaborative effort produced by authors from the south-
eastern region of the United States. Co-editors FVSU Presi-
dent Larry E. Rivers and FVSU Executive Vice President
Canter Brown Jr. wrote three articles and recruited three
FVSU scholars - Drs. Fred van Hartesveldt, Dawn Herd-Clark
and Terrance Smith - to participate. Professors from the Un-
iversity of Georgia, Florida A&M University, Florida State
University, the University of Central Florida, Florida Southern
College, the Historical Association of Southern Florida, the
University of North Florida and Wofford College also con-
tributed to the project.

“Dr. Brown and I conceived this collection of essays as a way
to illustrate important aspects about the lives of Southern
women,” said Rivers, who wrote an essay about medical mis-
sionary Louise Cecilia Fleming. “We wanted people to know
that women accomplished much more in the public sphere
during the late 1800s and early 1900s than they are credited
with, and also that it’s possible to research their lives.”

In his article, Rivers documents the life of a Black medical pi-
oneer. Fleming, nicknamed “Lulu,” was born in 1862 at the
opening of a tumultuous American civil war. The young
woman bravely rose above slavery, after her freedom, to excel
in life despite daunting challenges. Fleming worked as a
schoolteacher and journalist. She also received medical train-
ing. Sponsored by the American Baptist Home Mission Soci-
ety, she later became the first female Baptist missionary to
serve in the Congo. Sadly, Fleming caught “sleeping sickness”
in Africa and died in 1899 after earning her M.D. degree.

Brown contributed two articles. The first, “Catharine Camp-
bell Hart, 1823-1897: The Uncertainties of Life as a Widow,”
studies the socioeconomic difficulties that American widows,
such as Hart, faced during the post-Civil War era. Hart fell
upon hard times after her Unionist husband, Florida governor
Ossian Hart, died suddenly in Jacksonville. “Catharine Hart
helps us to understand the uncertainties of life for a widow in
the South of the late 19th and early 20th centuries,” Brown
said. “With Social Security and other safety net programs
today, it is difficult for us to comprehend how even the first
lady of a state could find herself near destitution and com-
pletely reliant upon herself to survive.”

Brown’s second article, “Gertrude Dzialynski Corbet, (1874-
1931). ‘Miss Dynamite,’ A Jewish Women in Public Life in
the Progressive-Era South,” studies the life of a Jewish woman activist who helped pave the way for American women’s full social, political and professional participation in the Progressive-Era South.

Van Hartesveldt, chair of the FVSU Department of History, Geography, Political Science and Criminal Justice, follows the life of Florence Johnson Hunt (1866-1953), wife of Fort Valley High and Industrial School’s second president Henry A. Hunt. The school later became Fort Valley State University. “Henry Alexander Hunt routinely gave Florence credit for building the university. Mrs. Hunt taught and raised funds for the school. She was an administrator and did everything Henry A. Hunt did. However, when a public statement was called for, he was the one who made it. He was the face of the institution, and he was the one who got credit. So saying, ‘Florence helped me,’ is not the same as saying she did it. This was taken as pro forma and recognition passed to him. He was famous and she was not,” said van Hartesveldt.

Another article was written by Smith, vice president of student affairs and enrollment management at FVSU, and Sally J. Zepeda, professor and graduate coordinator in the University of Georgia’s Department of Lifelong Education, Administration and Policy in the Program of Educational Administration and Policy. Their subject, Adella Hunt Logan (1863-1915), was an educator, woman’s suffrage leader and confidant of Booker T. Washington.

Herd-Clark contributed an essay about community activist Elizabeth Benton Moore (1878-1932). “The work of Elizabeth B. Moore serves as a testament that one person can make a difference in a community,” said Herd-Clark. “Despite the barriers she faced as an African American woman in the early 20th century, Ms. Moore was able to serve as a catalyst to help transform a community through education.”

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Co-editors Dr. Larry E. Rivers (left), president of Fort Valley State University, and Dr. Canter Brown Jr., FVSU executive vice president, hold up their book that chronicles the lives of 14 Southern heroines.
Millions of people play video games every day, and a vast majority are children. They would rather have fun, be interactive and learn without knowing they are doing so versus being in a classroom listening to a boring, monotone teacher attempting to force them to learn something they may find uninteresting. The research discussed in this article is not an attempt to discount traditional methods of teaching used by educators, instead the information is provided to offer an alternative to the traditional, instructional methods they use. Using video games to educate students will not only benefit them by introducing them to computer science, but it will benefit teachers and professors as well.

Video games may offer an escape from reality and a change from the norm, and that’s what is needed to keep students interested in a subject. If given the option, young people would spend more time playing video games than they would on a school assignment. In "Artificial Intelligence as a Medium for Learning," written by Jared Thorpe (2010), the paper discussed the different forms of artificial intelligence young students use every day and how they could be turned into a learning experience. Other information about video games and how games such as Sims 3 and World of Warcraft could be turned into educational experience was included. For example, in disciplines such as mathematics or computer science, both Sims 3 and World of Warcraft could facilitate K-12 students learning basic math facts or algebra. This would provide a fun, yet stimulating learning tool for increasing achievements related to mathematics.

In Kurt Squire's "Video Games in Education," he writes how educators have long ignored games and downplayed them by only discussing the social consequences. He mentioned how Pokémon has become a cultural phenomenon and said many educators have taken an interest in what effects this game has on players. Squire also discusses what motives can be taken from the game and placed in an educational game to make them more interesting. He argues that video games are a popular and influential medium because of a combination of many factors. For instance, they get such an emotional reaction from players, such as fear, aggression and joy. He argues, it would be impossible to replicate such a video game to educate children.

In Andrew Glassner’s essay “Some Thoughts on Game Design” (1997), he speaks on some very important aspects of video game development and design. To begin, Glassner separates games into four subcategories: arcade, puzzle, strategy and story. According to Glassner, arcade games are labeled as “real-time response and high-focus playing.” These forms of video games, at that time, were rarely played across the Internet because of the difficulty in maintaining high-speed communications between players. Puzzle games and adventure games run hand-in-hand in video game genres. These games are created by designing a series of challenges for the user to solve. These puzzles can range from winning a simple mini-game to advancing in the game to deciphering a cryptogram from earlier in the game. Strategy games often call for some form of tactical planning and execution from the user. In modern gaming society, many first person shooter (FPS) games are considered strategy games. The final gaming category is story. Many movies and cartoon shows use this genre of video games, which attempts to create a narrative thread involving the player.

On September 9, 2009, President Barack Obama launched a campaign called “Educate to Innovate.” It’s geared toward improving the technological, mathematical, scientific and engineering abilities of American students. This program allows young people across America to work with big companies, foundations, non-profit organizations and science and engineering societies to gain technological experience. Obama enacted this program because although we have great schools, excellent teachers and successful students in America, it still seems that students should be doing much better in the aforementioned fields.

Video games are a huge entity in today’s society. As we continue to strive in technology and in education separately, it is beneficial for the two disciplines to cross paths. Finding new and interactive styles of teaching youth causes students to become more involved in their learning instead of passively receiving information. Educational video games, or “edutainment,” can be an extremely effective form of teaching for both students and teachers.

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Mathematics is a tool we use daily to perform tasks, which can be as simple as balancing a checkbook or as complicated as tracking a satellite that orbits the Earth. Its concepts cross boundaries of language and politics to provide the tools to solve problems that confront societies globally. Research in mathematics can lead to new theory as well as numerous important applications toward the welfare of the world.

The research of Dr. Patcharin Tragoonsirisak, assistant professor in the Department of Mathematics and Computer Science at Fort Valley State University, is in the area of nonlinear partial differential equations. In contrast to linear differential equations, an extensive theory for nonlinear differential equations has not been developed. The nonlinear equations exhibit a number of properties, which are absent from the linear ones. These properties are often related to the real world phenomena. Also, the study of nonlinear problems has motivated the introduction of new theoretical and computational methods.

Tragoonsirisak studies phenomena described by nonlinear blow-up models and nonlinear quenching models. Such models have many applications in science and engineering. For example, the models may include combustion, ignition, thermal explosion and damage of materials. Blow-up models have been studied for more than 130 years, while the investigation of quenching models began in 1975. They are closely related.

As an illustration, a combustion described by a blow-up model happens at an infinitely high temperature. If it is described by a quenching model, then it occurs at a finite temperature. In some situations, the model involves a concentrated source, such as in a chemical reaction process due to the effect of a catalyst, or in the ignition of a combustible medium through the use of either a heated wire or a pair of small electrodes to supply a large amount of energy to a very confined area.

As an example to illustrate the research work of Tragoonsirisak, let us look more closely at combustion. Combustion is the burning of a fuel to produce heat. The fuel can be gaseous, liquid or solid. Combustion is the major release mechanism of energy, which is the key to human-kind’s existence. In recent years, the availability of energy sources and the impacts of combustion on the environments have attracted a lot of attention. Also, since fossil fuels have a finite supply, efficient and responsive use of combustion is a primary concern of our society.

Tragoonsirisak investigates the conditions under which combustion occurs, the effects of the spatial dimensions on combustion, the amount of energy and time required for it to happen and the locations of where it happens. Her research also explores whether combustion occurs in finite time, how it behaves at the time when combustion occurs, what happens after combustion, what its final profile looks like and how to prevent the occurrence of combustion.

Tragoonsirisak is not only a mathematician, but also a computational scientist. She has devised computational methods to find numerically the time required for combustion to happen. Since 2008, Tragoonsirisak has published five refereed research papers on these nonlinear models: two in journals, one in a research monograph and two in proceedings. She also has a refereed research journal paper recently accepted for publication.

Tragoonsirisak is very active professionally as shown by her being invited since 2007 to present her research work at a sectional meeting, three national meetings and three international conferences. She also chaired the special session “Applied Analysis and Applications III” at the Fourth International Conference on Neural, Parallel and Scientific Computations held August 11-14, 2010, in Atlanta.

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INNOVATIONS that changed the world

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n the past few decades, technological advances have led to some amazing changes in the daily lives of the average American. The world has witnessed astronauts walking on the moon, benefitted from scientists’ discoveries of antibiotics, which have restricted the scourges of disease, and found innumerable ways to better enjoy their leisure time. Each of these changes began in the mind of an inventor. The four-volume work “Great Lives from History: Inventors and Inventions,” edited by Alvin K. Benson, is being prepared for a fall 2011 publication by Salem Press. It takes an in-depth look at some of our most important inventions and their impacts on society.

Dr. B. Keith Murphy, Fort Valley State University Interim Dean of the College of Arts and Sciences and professor for the FVSU Department of English and Foreign Languages, was invited to contribute essays about five inventors - Robert Moog, Vinton Grey Cerf, Tim Berners - Lee, Marc Andreessen and Burt Rutan - and the technologies forever changed by their work.

Popular music has provided the soundtrack for most Americans’ lives. Since the early days of recording, musicians have been searching for ways to create, control and introduce new sounds into their music. Moog, an electrical engineer (1934 – 2005), created the first electronic synthesizer that allowed musicians to use a small keyboard to elicit a wide range of sounds played across the same expressive spectrum as a saxophone, a cello or even a full orchestra. Moog’s synthesizer forever changed the way popular music sounded and created entire new musical genres such as “techno-pop.”

Other inventions have altered the way people communicate with each another. The Internet first became part of the public consciousness in the early to mid-1990s, but it did not arrive as one single entity. Instead, the Internet, as the country knows it, is the result of a number of inventors coming up with critical innovations at just the right time. Perhaps the most important inventor is Cerf (b. 1943), who is known as “the father of the Internet.” Cerf developed a set of protocols, which eventually became known as Transmission Control Protocol/Internet Protocol or TCP/IP, which allow packets of information to be transmitted over a network, from one computer to another, without loss of data. The earliest versions of Cerf’s Internet protocols date back to 1969. Cerf’s innovation set the groundwork for a worldwide network of shared computing resources.

Berners-Lee (b. 1955) combined this network with a concept known then as “hypertext” to create a network of shared documents he called the “World Wide Web.” Hyperlinks are connections (the now familiar links on web pages) which take a user from one page to another related page of data. At first, the “www” was used to better navigate databases, but by 1989 Berners-Lee had created a global information space that users could “surf.” The only problem was no one seemed to have a surfboard. That is until Andreessen (b. 1971), while still an undergraduate at the University of Illinois, created Mosaic, the first Internet browser in 1993. His second browser was better known: Netscape Navigator. Thanks to Andreessen’s two creations, the “www” was made open and available to anyone, for the first time, so its popularity quickly exploded beyond anyone’s expectations or projections as everyone started “surfing the ‘net.”

From cyberspace to outer space, inventors continually push the boundaries of what the world believes is possible. Rutan (b. 1943) is one of a handful of inventors who is determined to make commercial spaceflight a reality. He was the primary designer of SpaceShipOne, which sent the first civilian into space in 2004. SpaceShipTwo, the next version of Rutan’s dream, is designed to carry up to six paying passengers into orbit. SpaceShipThree, which is already on the drawing board, is expected to be a craft that can stay in orbit around the Earth for extended periods.

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NOT GUILTY
DNA used to overturn convictions
DNA profiling is increasing in its importance, not only in the criminal justice arena, but also in several fields of study. The wrongfully convicted, once considered felons, have been exonerated based on DNA evidence. In their new article entitled “Post-conviction DNA Exonerations,” Drs. Komanduri S. Murty, professor of sociology at Fort Valley State University, and Ashwin G. Vyas, an associate professor of criminal justice at FVSU, explore the causes of wrongful convictions.

According to Murty and Vyas, research studies have consistently concluded that the major factors contributing to wrongful convictions are: eyewitness errors, mishandling of evidence by police and prosecutors, false or coerced confessions, improper interrogations and line-ups and jailhouse informants or “snitches.” Other factors include ineffective assistance of counsel, forensic error and an adversarial justice system. Their paper examines available data provided by the Innocence Project for 233 post-conviction DNA exonerations in the U.S. since 1989.

DNA fingerprinting and profiling are the examination of biological residue found at the scene of a crime. The material, found in the form of saliva, blood, skin tissue, hair and semen at crime scenes, can be crucial in the investigation of sexual assaults and other violent crimes. A person’s genetic code is contained in DNA (Deoxyribonucleic Acid) and the composition is unique for each individual except in the case of identical twins.

After processing, DNA profiles appear like barcodes on x-ray images. This evidence helps prove there was physical contact between an assailant and a victim. For example, during a rape, biological evidence can be left on the victim’s body or at the crime scene. Additionally, hair and fiber from clothing, carpet, bedding or furniture may be transferred from the criminal to the victim’s body during an assault. Genetic comparisons of DNA residue can aid in the identification of criminal suspects.

Properly collected DNA from the victim, crime scene or suspect can be compared with known samples to place the suspect at the scene of the crime. If there is no suspect, however, a DNA profile of the crime scene can be entered into the Federal Bureau of Investigation’s (FBI) combined DNA index system (CODIS), which allows agencies to match DNA profiles with other profiles entered into local, state and national databases to identify a suspect or link serial crimes. A small difference in such codes can exonerate a suspect after expert analysis or provide nearly irrefutable evidence of guilt.

The first DNA exoneration took place in 1989. A total of 233 exonerations took place by 2009, and 168 of them were in the past ten years. Seventeen of the 233 exonerated served time on death row. The total number of years served by exonerees is approximately 2,899, with an average duration of 12 years. Race-wise, the exonerees are comprised of 139 African Americans, 64 Caucasians, 20 Latinos, one Asian American, and the race of the remaining nine is unknown. The average age at the time of their wrongful convictions was 26. The causes of conviction for the exonered cases included one or more of the following: eyewitness misidentification (75 percent), invalidated or improper forensic evidence (25 percent), false confessions, incriminating statements and government misconduct (21 percent), snitching (12 percent) and bad-lawyering (3 percent).

When the professors studied the distribution of exonerated cases for causes of wrongful convictions in each of the 34 states examined, they found that the highest number of exonerated cases were wrongfully convicted African American men. Texas had the most exonerated cases (36), followed by Illinois (29) and New York (24). On the other end, seven states - Idaho, Utah, Minnesota, Kentucky, Tennessee, South Carolina, Connecticut - and Washington, D.C., had one exonerated case each.

Almost in every case, exonerees are angry about serving years or decades in prison for crimes they did not commit. The innocent former inmates say that although there is no true compensation for their loss of human dignity, they should at least receive proper monetary compensation for being falsely accused and convicted. Moreover, they are hopeful that in future the criminal justice system will change the way it handles cases.

The consequences of wrongful convictions reach beyond convicted individuals, according to the researchers. Family members and close friends often experience grief, trauma, embarrassment and financial loss as result of mistakes. In cases where the convicted person is placed on death row, significant others are often faced with the lingering thought of death, which can lead to “anticipatory grief,” anger, frustration and depression. Social isolation is also common. Although, there are resources available for the families of murder victims, such as crisis counseling and emergency financial assistance, there are no government-funded resources and support groups for offenders’ family members. The families of the convicted also feel alienated and experience stigmatization and a loss of identity.

In conclusion, DNA evidence is a crucial tool used in effective police work to solve violent crimes. For the wrongly accused who are sentenced and imprisoned for a crime they did not commit, DNA evidence exonerates the innocent and alerts law enforcement to pursue the true offender. By convicting the guilty and freeing the innocent, DNA evidence truly serves the interest of justice.

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Historically, study abroad programs were primarily available to the socially elite segment of society. In the 1920s the U.S. college system incorporated overseas foreign language study into the higher education curriculum. Over time, study abroad opportunities have broadened considerably. American students are increasingly interested in studying abroad as demonstrated by a 151 percent increase from 1993-1994 to 2003-2004, according to a Wall Street Journal article written by Elizabeth Bernstein in 2006.

Personal enrichment, graduate program acceptance, job opportunities and awareness of global issues are several reasons why students choose to study abroad, according to an article written by Crolyn Langley and Jeffrey Breese in a 2005 issue of The Social Science Journal. In what was identified as the first large-scale survey to explore the long-term impact of study abroad on a student’s personal, professional and academic life, Mary Dwyers and Courtney Peters further demonstrated in a 2004 article, published in Transitions Abroad, that such experiences “positively and unequivocally influence the career path, world view and self confidence of students.”

Fort Valley State University currently offers collaborative study abroad opportunities primarily through programs sponsored by other schools. Although FVSU students have participated in study abroad programs, the 2010 Trinidad and Tobago experience was the first study abroad project coordinated by the Behavioral Science Department. Dr. Sonja Richardson-Shavers headed the coordination efforts. The project was a collaborative effort between FVSU and Savannah State University. The results of an exploratory inquiry of students’ experiences are discussed in an effort to raise awareness of study abroad benefits and opportunities among FVSU students.

Although research for study abroad assessments, particularly for historically black colleges and universities (HBCUs) is limited, Dwyers and Peters surveyed 3,400 study abroad alumni for data that showed studying abroad is a defining moment in the life of a student, and continues to impact the participant’s life for years after the experience. The study further found that students are participating in experiences for a shorter duration and the number of full year and semester stays are declining. Although 72 percent of respondents studied for a full year in the 1950s and 1960s, the number of students participating for less than 10 weeks tripled from the 1950s and 1960s to the 1990s. Regardless of the length of stay, all students reported significant benefits. Gordon and Redmond recommended development of a consortium for institutions that did not have the ability to administer their own programs.

FVSU understands these benefits and thus supported the opportunity for its students through a collaborative effort. The Trinidad and Tobago experience included seven FVSU students, three Savannah...
State University (SSU) students, one SSU and one FVSU professor during the summer 2010 semester. Courses offered for six credits included “International Social Work” and an interactive class entitled “The History of Caribbean Culture.” The courses were designed to educate and mentally prepare students to think from a global perspective. The students experienced several cultural events including visits to Temple in the Sea, Gasperah Cave and a weekend on the island of Tobago where they swam the Nylon Pool, a natural four-foot deep area located in the middle of the ocean. They toured the island of Trinidad and enjoyed the beautiful scenery and ocean at Maracus Bay Beach. Classes were held conveniently on the University of West Indies campus. There was also a 40-hour service learning commitment students had to fulfill to local child welfare organizations in Trinidad.

Although study abroad programs are costly and require significant time commitments from faculty and staff, the benefits outweigh these challenges. This was proven in results from questionnaires and journals completed by participants (Shawntreese Allen, Stephanie Benjamin, Lacey Crews, Brenton Richardson, Tamekia Richardson and Shanah Sharpe). Students’ responses consistently suggested their experiences were life changing, raised levels of self-awareness and expanded their ability to think more globally concerning culture, historical and political issues.

“This trip really expanded my global perspective and helped me to view the world as a complex rather than simple place,” said Tamekia Richardson, a junior social work major. The program provided students with an opportunity to experience and understand the similarities and differences between the Trinidadian and Toboggan culture and American culture. This invaluable experience is something students attending HBCUs should take advantage of, especially since many students have never had the opportunity to travel to another country. “Because of the changing demographics in the United States and the impact global societies have on the United States, it is important that our students understand how interconnected various countries and cultures are,” said Shavers.

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