Research Horizons

RESEARCH HIGHLIGHTS

Fiscal Year 2014

Division of Research and Sponsored Programs

September, 2014

Tennessee State University

College of Agriculture, Human, and Natural Sciences

AGRICULTURAL AND ENVIRONMENTAL SCIENCES
FAMILY AND CONSUMER SCIENCES

Nursery growers in the $150 billion U.S. green industry stand to benefit from research by Dr. Jason Oliver of the College of Agriculture, Human, and Natural Sciences and the Otis L. Floyd Nursery Research Center. Data from Oliver's research was used to gain the approval of three generic imadicloprid treatments for use in the U.S. Domestic Japanese Beetle Harmonization Plan (DJHP), which specifies the necessary insecticide treatments in nursery stock. The newly approved treatments will save nursery growers anywhere from $109 to $738 per treated acre over existing DJHP-approved products.

A multistate observational study published in the *Journal of Food Protection* found that U.S. consumers' food preparation practices are putting them at risk. With funding from the U.S. Department of Agriculture, Dr. Sandria Godwin partnered with researchers from RTI International and Kansas State University to find that an alarming number of consumers do not follow U.S.D.A. recommended guidelines for in-home storage and preparation of poultry and poultry products. These unsafe practices include washing raw poultry before cooking, improper thawing, and not washing hands after handling raw products, particularly during the preparation of eggs. These findings are now being used to develop and design educational materials that will appeal to consumers of all ages and help improve food safety practices, eventually reducing illnesses from salmonella and campylobacter.

The United States—the world's largest poultry producer—generates over $45 billion in retail sales. Dr. Samuel Nahashon's research is aimed at making sure the U.S. stays on top as consumers increasingly demand leaner meat. Nahashon, of the Department of Agricultural and Environmental Sciences in the College of Agriculture, Human and Natural Sciences, has detailed the optimum levels of calcium, phosphorus, and lysine required by guinea fowl—a type of poultry that is higher in protein and leaner than the ordinary chicken. Establishing these optimum species-specific nutritional requirements helps maximize growth and minimize the cost of production, paving the way for a healthier poultry industry that maintains its current levels of profit.

Reducing the prevalence of childhood obesity and disparities among ethnically diverse, low-income children participating in the USDA Women, Infant, and Children (WIC) program, using science-based strategies at multiple levels is a long-term goal of the multi-institutional collaboration, *Nashville **CH**ildren **E**ating **W**ell (CHEW) for Health.* This research, led by Principal Investigator Dr. Baqar A. Husaini (Tennessee State University), Co-Principal Investigators Dr. Janice Emerson (Tennessee State University), Dr. Pamela C. Hull (Vanderbilt University), and Dr. Robert E. Levine (Meharry Medical College) addresses childhood obesity prevention through education, extension, and research with a focus on nutrition education through community outreach. Launched in 2014, the *NashvilleCHEW.org* website averaged nearly 8,000 views per month. The website contains healthy snack recipes, nutrition lectures, and a calendar of healthy food samplings at participating vendors.

BIOLOGICAL SCIENCES

Breast cancer remains the second most common cancer in the United States. Dr. Venkataswarup Tiriveedhi, an assistant professor in the Department of Biology, received a research grant award of $184,000 from the National Cancer Institute Meharry/Vanderbilt/Tennessee State University U54 Partnership. In collaboration with Drs. Ann Richmond and Kevin L. Schey, professors at Vanderbilt University, Tiriveedhi investigates the critical role of inducible salt-sensing kinase SGK1 in the inflammatory cytokine induced oncogene signaling and breast cancer development in an effort to assist in determining the key molecules which play a key role in the salt-induced cancer development. These molecules could be used in the future as drug discovery targets to reduce the incidence of breast cancer.

Scientists in the Department of Biological Sciences reveal their 2014 record of scholarly activity in research through the production of 21 research articles being published in peer-reviewed professional journals.

CHEMISTRY

The Department of Chemistry scientists announce their 2014 record of scholarly achievement in research through production of 26 research articles being published in peer-reviewed professional journals and 57 conference papers being presented at local, regional and national conferences.

College of Business

The College of Business (COB) and Tennessee State University envision benefits of increased graduation rates as Principal Investigator Dr. Retta Guy developed and currently implements a retention plan, Partners in Academic Student Success (PASS), designed to improve retention and success progression for COB students on academic probation and suspension. PASS is a Tennessee Board of Regents Access and Diversity Grant in the amount of $40,000.

College of Education

Teachers in the Nashville Metropolitan School System are recipients of advanced educational technology. Tennessee State University Principal Investigator Dr. Judith Presley, professor in the College of Education, leads a research project, Building a Pipeline of Teaching Excellence, which capitalizes on the National Board for Professional Teaching Standards' (NBPTS) unique repository of case studies of accomplished teaching, including videos of Board-certified teachers paired with reflective analyses describing instructional decision-making and teaching strategies. The cases are housed in the online resource Accomplished Teaching, Learning, and Schools (ATLAS). Support for this grant began in December 2012 with the Investing in Innovation (i3) fund from the U.S. Department of Education and its $3 million award to the NBPTS which established partners among six institutions of higher education and nine local education agencies in Hawaii, New York, Tennessee, and Washington.

What happens when we hear something? This is one of the questions being examined by Dr. Lisa de la Mothe's Neuroanatomy Laboratory in the Psychology Department. The focus of the lab is to provide a foundation for understanding the structure and organization of the brain in order to better understand behavior. Specifically she examines the neuroanatomical and neurochemical organization of the brain with an emphasis on the auditory system. What we want to know is how the brain is connected and, when we hear something, what is the route sound takes within the brain itself. Some of this work was published in the journal *Frontiers in Neuroscience.*

College of Engineering

The College of Engineering completed the construction of the TIGER (TSU Interdisciplinary Graduate Engineering Research) Institute, located on the ground floor of the Research and Sponsored Programs Building in June 2014. The TIGER Institute will focus on strategic areas of research such as cyber-security, high-performance computing (e.g., bioinformatics), materials, energy storage systems, and advanced visualization. Equipment is being installed in the laboratories to initiate research in the strategic areas. The Institute is directed by Dr. S. Keith Hargrove, dean of the College.

Boeing Company Research Awards: The College of Engineering was awarded three research contracts valued at $1 million total in the areas of aircraft control systems, cyber-security, and advanced energy systems through the Department of Electrical and Computer Engineering, and the Department of Mechanical and Manufacturing Engineering. Drs. Saleh Zein-Sabatto, Landon Onyebueke, and Sachin Shetty are the project leaders.

Dr. Muhammad Akbar from Mechanical and Manufacturing Engineering Department is working towards a fast hurricane storm surge model. Currently his group is developing a model with "implicit solver" for rapid storm surge simulation in a parallel computing platform. He has received a $209,403 grant from the National Science Foundation under its HBCU-UP Research Initiative Award program for two years (June 2014 – June 2016). He is collaborating with a number of experts, including Dr. Rick Luettich at UNC Chapel Hill.

College of Health Sciences

Faculty in the College of Health Sciences contributed to the creation of new knowledge through generation of seven research publications in the *Journal of the National Society of Allied Health,* the *American Journal of Physical Medicine and Rehabilitation, Gynecologic Oncology, Journal of Community Health*, and the Intellectbase International Consortium; and initiation of Oh Happy Day: A Pilot Study of a Culturally Tailored Depression Intervention for African American Female Cancer Survivors with Dr. Elizabeth Williams as the TSU Principal Investigator that originated from a grant award of $10,000 from the Meharry, Vanderbilt, and Tennessee State University Cancer Partnership.

College of Liberal Arts

The College of Liberal Arts is participating in a grant received by Vanderbilt University for $1.475 million from the Andrew W. Mellon Foundation to establish a new faculty development program with Tennessee State University, Tougaloo College, and Berea College. The Mellon Partners for Humanities Education initiative will support specialized training for Vanderbilt post-doctoral fellows who will teach courses at the three schools, and it will support faculty development activities and undergraduate education at the partner schools.

College of Public Service and Urban Affairs

Students have a brighter future for fair housing careers and are experiencing internships with partnering organizations involved in battling housing discrimination. Principal Investigator Dr. Joan Gibran, Dr. Cara Robinson and Dr. Kimberly Triplett, faculty in the College of Public Service and Urban Affairs, are conducting the research project, Sustainable Fair Housing Education Collaborative Outreach, as part of a $1.7 million federal grant awarded to the State of Tennessee. This funding allows TSU to incorporate fair housing education and research into the Urban Studies curriculum.

Center for Aging: Research and Education Services (CARES) has developed a website (www.tnstate.edu/cares). Additionally, CARES will celebrate 25 years of addressing elder abuse and prevention during the 2014-2015 academic year.

Center of Excellence- Information Systems and Engineering Management (COE-ISEM)

The knowledge of nearby planetary systems continued to grow with the 2014 discoveries of a system with four planets around the nearby star HD 141399 and a Neptune-mass planet orbiting the 57th closest star to the Sun, Gliese 687. The vast differences observed in the

structure of these systems demonstrates the large amount of variations in planet formation outcomes, and provides better context for understanding the circumstances required to establish an Earth-like environment supportive of life. Gregory W. Henry of the COE-ISEM continues collaborations with many groups from around the world in making these and other exoplanet discoveries.

Future aircraft will feature improved safety and efficiency based on research into advanced control algorithms which can actively adapt to changing conditions such as structural and component damage. Research led by Dr. Jiann-Shiun Lew of the COE-ISEM is being applied to NASA's wind-tunnel aircraft simulator to rapidly identify and suppress the impact of damage to avoid growth of the damage and ensure continuing safe flight. Additional future applications of the processes being developed include advanced architectural designs making structures more robust and thus safer from earthquakes.

Our solar system has a relatively simple geometry: a single star orbited by eight planets and assorted smaller objects, with everything moving in approximately the same plane, which indicates a high level of structure during the solar system's formation. To explore whether this is a common outcome in nature, COE-ISEM researchers Dr. Matthew Muterspaugh, Dr. Francis Fekel and Michael Williamson, and international collaborators measured the structure of the bright star system 1 Gem. Unlike the solar system, this is comprised of not one but three stars; two circle each other every 10 days, while the third orbits both in 13 years. In what is becoming a trend, the team found that the two orbits are not coplanar at all, being misaligned by nearly 140 degrees. These results may indicate significant differences in the ways planets form as compared to stars.

Center of Excellence for Learning Sciences

The Tennessee Early Childhood Training Alliance's (TECTA) eight sites collectively held 65 orientation classes over the course of three semesters; Summer 2013, Fall 2013 and Spring 2014. A total of 1,742 individuals were enrolled and at the end of the Spring 2014 semester, 1,117 individuals completed an orientation. During this same year TECTA provided $629,193 in scholarship dollars to eligible students statewide. A total of nine child care program directors successfully completed the Administrator Academy, earning the Tennessee Early Childhood Program Administrator Credential. A total of 1,607 academic seats were supported which resulted in the support of 825 students. Also there were 14,940 certificates of completion granted through the Tennessee Child Care Online Training System (TCCOTS), which represents 39,665 training hours.

Credentials are earned following the Social Services Competency Based Training (SSCBT) program. Twenty-four SSCBT participants received their credentials at the 101st Annual Conference of the Tennessee Conference on Social Welfare. Participants are family service workers that come from various Head Start and Early Head Start agencies around the nation.

Tennessee Comprehensive Area Efforts (Tennessee CAREs) Early Head Start program is operated by the Tennessee State University Center of Excellence for Learning Sciences. The TSU-TN CAREs EHS is a program focusing on prevention and early intervention with low-income families. The program consists of six center-based child

care centers, prenatal services, and home-based services in the west Tennessee region. Funding for FY 2014 totaled $2,531,985 and served 213 children and pregnant women throughout the year.

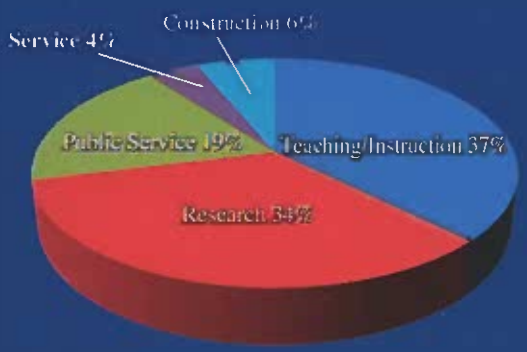
Publication photography courtesy of the Colleges, Centers, and John Cross of Media Relations.

AWARDS BY SOURCE OF FUNDS

Private	$ 1,101,852
State	4,883,212
National Aeronautics and Space Administration	251,523
National Institutes of Health	482,767
National Science Foundation	3,753,606
U.S. Air Force	790,692
U.S. Department of Agriculture	12,938,461
U.S. Department of Defense	10,000
U.S. Department of Education	9,441,013
U.S. Department of Energy	960,828
U.S. Department of Health and Human Services	2,884,701
U.S. Department of Homeland Security	44,101
U.S. Department of Housing and Urban Development	99,939
U.S. Department of the Army	121,400
U.S. National Park Service	10,000
U.S. Small Business Administration	144,822
Total (183)	**$37,918,918**

AWARDS BY PROJECT TYPE

Research	$ 12,786,959
Teaching/Instruction	$ 14,210,576
Public Service	$ 7,016,498
Service	$ 1,543,448
Construction	$ 2,361,437
Total	**$ 37,918,918**



Research Centers and Institutes at Tennessee State University

Center of Excellence in Information Systems and Engineering Management
Center of Excellence for Learning Sciences
Center for Advancing Faculty Excellence
Center of Excellence for Battlefield Sensor Fusion
Cooperative Extension Program
Massie Chair of Excellence
Nanoscience and Biotechnology Core Facility
Center for Prevention Research
Center for Aging: Research and Education Services (CARES)
Entrepreneurship and Economic Development Center
Institute of Agricultural and Environmental Research
Otis L. Floyd Nursery Research Center
TSU Interdisciplinary Graduate Engineering Research (TIGER) Institute
Engineering Research Institute (ERI)

- The Center for Neural Engineering (CNE)
- The Center for Environmental Engineering
- The Center for Excellence in Battlefield Sensor Fusion

Research Areas of Emphasis at Tennessee State University

Advanced Control Systems
Advancement of Human Capital and Leadership
Automated Astronomy
Bio-Security
Biotechnology
Breast Cancer
Climate Change, Weather, and the Environment
Community Engagement, Enhancement, and Economic Revitalization
Cybersecurity, Cyber Physical Systems, BioInformatics and Interoperability
Data Science and Analytics
Digital Storytelling
Early Childhood Education
Energy and Alternative Fuels and Device Storage
Environmental Sciences
Food Safety and Security
Human Health, Nutrition, Obesity, Disease Pathology, and Cultural Disparities
Leadership Development
Mechatronics
Nanotechnology
Neuroscience
Personalized Learning Systems
Plant and Animal Science
Public Policy and Urban Affairs
Speech Pathology and Communication Disorders
STEM Education
STEM Workforce Development
Supply Chain Operations Research

Nannette Carter Martin, *Editor*

Tennessee State University
Quick Facts

Established.....1912

Highest Offering .....Doctoral/Research Intensive

Affiliation or Control.....State

Carnegie Class.....Doctorate

Enrollment.....Undergraduate – 7,237 Graduate – 1,901

Student Origins.....44 states and 38 countries

Student Residency.....77.3% In-state, 40.6% Davidson County

Student Ethnic Diversity.....70% Black, 25% White, 5% Other

Faculty.....351 Full-Time, 132 Adjunct

Tennessee State University
Division of Research and Sponsored Programs

3500 John A. Merritt Blvd.
Nashville, Tennessee 37209-1561

Telephone (615) 963-7631
FAX (615) 963-5068

Email address: www.research@tnstate.edu

Website www.tnstate.edu/research

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