



**4th Annual  
Undergraduate Research Symposium (URS) of the  
College of Natural Sciences and Mathematics**

---

March 10, 2015  
Student Union Building (SUB)  
University of West Alabama  
Livingston, AL

## Acknowledgements

### **Sponsors**

President Ken Tucker

Provost Tim Edwards

Dean John McCall

The Department of Biological and Environmental Sciences

The Center for the Study of the Black Belt

The Office of Sponsored Programs

Richard and Madoline Thurn

The National Science Foundation Grant no. DUE 1356248

### **Judges**

Charlotte Carter

Jason Cassity

Eric Ford

Heather McDonald

Carey Moore

JJ Wedgworth

Matt Williford

### **Administrative Support**

UWA Information Technology

UWA Printing

UWA Public Relations

For more information, please see our web page at:

<http://secure.uwa.edu/ursnsm/>

Nemeth, James	Dr. Mustafa Morsy	5
Odom, Timothy	Dr. Ketia Shumaker	8
Parrish, Essence	Dr. Brian Burnes	14
Rodriguez, Mary	Dr. Mustafa Morsy	5
Schmidt, Shelby	Dr. Nicole Farris	24
Smoot, Tamara	Dr. Janis Beaird	18
	Dr. Jeffery Merida	
Spears, DeMarco	Dr. Mustafa Morsy	3
Speed, Dalton	Dr. Balakrishna Gokaraju	26
	Dr. Don Yessik	
Stanford, Heath	Dr. Mustafa Morsy	11
Taylor, Anna	Dr. Mustafa Morsy	13
Tubbs, Austin	Dr. Mustafa Morsy	12
Vetzel, Caitlin	Dr. Nicole Farris	23
Ware-Gilmore, Fhallon	Dr. Ketia Shumaker	9
Washington, Desiree	Dr. Mustafa Morsy	13
Williams, KelviNeisha	Dr. Ketia Shumaker	8
Witherington, Layne	Dr. Brian Keener	4
Wright, Bailey	Dr. Nicole Farris	23

## Poster Sessions & Graduate School/Career Expo - Student Union Building

❖	Poster setup	8:00 a.m. – 9:15 a.m.
❖	Welcome	9:30 a.m.
❖	Judging	9:35 a.m. – 11:30 a.m.
❖	Public Viewing Session 1	
❖	Graduate School/Career Exhibition	
❖	URS Group Photo	11:30 a.m.
❖	Lunch	11:45 a.m. – 1:00 p.m.
❖	Graduate School/Career Q & A (Tiger's Den)	1:15– 2:30 p.m.
❖	Public Viewing Session 2	1:15 p.m. – 3:30 p.m.

## Awards Ceremony Banquet - Bell Conference Center 6:00 p.m. – 8:00 p.m.

Welcome  
Introduction of the Symposium's Keynote Speaker  
Keynote Address  
Invocation & Dinner  
Awards Ceremony  
Closing Remarks  
Group Photo

**Author Index**

<b>Student (Last, First)</b>	<b>Advisor</b>	<b>Page</b>
Adams, Kathryn	Dr. Nicole Farris	25
Alhassan, Fatimah	Dr. Janis Beaird	15
Alonazi, Laila	Dr. Jeffery Merida	16
	Dr. Janis Beaird	
Aultman, Krystal	Dr. Jeffery Merida	10
	Dr. Mustafa Morsy	
Barnhill, Quincy	Dr. Mustafa Morsy	5
Carroll, Rebecca	Dr. Ketia Shumaker	7
Castano-Duque, Lina	Dr. Ketia Shumaker	6
	Dr. Dawn Luthe	
Cook, Maisa A.	Dr. Ketia Shumaker	6
	Dr. Dawn Luthe	
Cleckler, Blake	Dr. Mustafa Morsy	1, 2
Farris, Justin	Dr. James Robinson	20, 21
Ferguson, Amanda	Dr. Nicole Farris	22, 25
Ghawazani, Laila	Dr. Janis Beaird	17
	Dr. Jeffery Merida	
Grossman, Manuel	Dr. Jing Chen	19
Henderson, Allison	Dr. James Robinson	20, 21
Holliday, Justin	Dr. Balakrishna Gokaraju	26
	Dr. Don Yessik	
Hubbard, Leigh	Dr. Mustafa Morsy	11
Hynds, Breanna	Dr. James Robinson	20, 21
Johnson, Hannah	Dr. Nicole Farris	24
Jones, Chicko	Dr. Ketia Shumaker	7
King, Riley	Dr. Mustafa Morsy	12
Larkin, Aries	Dr. Mustafa Morsy	1
Napier, Noah	Dr. Mustafa Morsy	10

**Organizing Committee**

Dr. Ketia Shumaker, Chair

Dr. Brian Burnes

Dr. Jing Chen

Mrs. Hoda Hassan

Dr. John McCall

Dr. Mustafa Morsy

## Participating Organizations

**University of West Alabama Graduate School**

<http://www.uwa.edu/graduate/>

**Alabama College of Osteopathic Medicine**

<http://www.acomedu.org/>

**University of Alabama-Birmingham School of Public Health**

<http://www.soph.uab.edu/>

**U.S. Army Corps of Engineers**

<http://www.usace.army.mil/>

**National Ecological Observatory Network (NEON)**

<http://www.neoninc.org/>

**Alabama Power**

<http://www.alabamapower.com/>

Committee, and the Sumter County Soil and Water Conservation District.

### **Sumter County Nature Trust**

The Sumter County Nature Trust was established in 1985 through a gift from Doctors Ralph and Margaret Lyon, both UWA Professors Emeriti. The Lyons, who lived in Sumter County for over thirty years, chose this avenue as a means of expressing their love for the county, for nature, and for people. The Trust is committed to identifying and preserving the natural resources of Sumter County, informing citizens about such matters, sponsoring environmental education activities, and developing sites where citizens can enjoy and appreciate the environmental treasures of the Black Belt Region. Endowment income provides funds for activities initiated by the Trust, as well as matching grants for individuals and organizations interested in fulfilling the goals of the Trust.

### **Fossils of the Black Belt**

A one-day workshop on fossils for high school teachers is held each October, run by the University's paleontologists in partnership with researchers from the Geological Survey of Alabama. Continuing Education credit is offered.

### **Message from the Dean**

The College of Natural Sciences and Mathematics (NSM) places great emphasis on involving our students in actual research. We strongly believe that science is more than a collection of facts; it is a process - a way of doing things. The best way to learn science, is to DO science. When students engage in independent research under the guidance of talented faculty mentors, they gain an insight into the process that can be gained in no other way. The resulting immersion into the techniques of academic research provides undergraduate students with a deeper understanding of their academic fields and prepares them for further success in their academic pursuits and future careers. The NSM faculty pays special attention to a student's individual interests and identity, and takes pride in helping research participants concentrate in his/her field of focus and refine the skills of scientific research.



The College sponsors the Undergraduate Research Symposium (URS@NSM), which is held on Assessment Day each Spring Semester. Undergraduates from a wide range of disciplines present current and recent research projects, showcasing a wide range of topics, approaches, and interests. The URS@NSM also serves as a resource for other undergraduates not yet engaged in research pursuits. Such students can learn how their fellow students developed their intellectual interests, how they initiated and developed their research projects, and how they developed and nurtured connections with their faculty mentors. Finally, URS@NSM is an occasion for students, faculty, staff, prospective students, and alumni to witness how student projects enhance learning, support faculty members' own work, and serve the greater community.

A handwritten signature in dark ink, appearing to read "John McCall". The signature is fluid and cursive, with a long horizontal flourish at the end.

Dean John McCall

## Keynote Speaker

The Keynote Speaker for the 2015 Undergraduate Research Symposium is Dr. Bob Bazell, a professor at Yale University and former NBC Nightly News reporter. Bazell teaches molecular, cellular and developmental biology and holds a bachelor's degree in biochemistry and a doctorate in immunology, both from the University of California, Berkeley. He built his career on two fields of interest, journalism and science.



Bazell made history in the early 1980s when he became one of the first network news correspondents to report on the AIDS epidemic, for which he received the Alfred I. duPont-Columbia Award, given in honor of excellence in broadcast and digital journalism in the public service. He was a reporter and NBC's chief space correspondent during the disaster surrounding the explosion of NASA Space Shuttle Challenger. Bazell spent 38 years at NBC before joining the Yale faculty.

Also among Bazell's professional honors and awards are five Emmys, the Maggie Award from Planned Parenthood, the Hope Funds Award, and the George Foster Peabody Award, presented to him for his reporting on science and medicine, including AIDS, cancer treatment, dangers of cellular phones, and alternative modes of healthcare. He is the author of the book "HER-2: The Making of Herceptin, a Revolutionary Treatment for Breast Cancer," published in 1998.

students demonstrating financial need, enabling them to enter the STEM workforce or STEM graduate school following completion of a baccalaureate degree in biology. The UWA BOSS provides more than monetary support for student participants. As part of the project, students also partake in undergraduate research that better prepare them for the work force or for graduate studies. Students engage in professional development activities and peer mentoring, while also having a faculty mentor who works closely with them as they assume the rigorous curriculum.

### UWA's Project Engage

UWA's Project Engage is a capacity-building program designed to increase the retention rates of students. It is aimed at underrepresented groups majoring in science, technology, engineering, or mathematics (STEM), and focuses on their freshman and sophomore years through intensive academic and personal mentoring. A second purpose of Project Engage is to increase graduation rates of STEM students through their continued participation in project activities during the second year and beyond.

### The Alabama Onsite Wastewater Association Training Center

The Alabama Onsite Wastewater Association Training Center (AOWATC) was established in 1997 because of a growing need for education in the rapidly changing wastewater field. The organization is dedicated to expanding public awareness of water quality issues, with a particular emphasis on wastewater management. The center was established with funding from the United States Environmental Protection Agency through the Alabama Department of Environmental Management, and by donations from the University of West Alabama and other contributors. The center is a member in a partnership that includes many federal, state, and local agencies, including the Alabama Onsite Wastewater Association, the Tombigbee Resource Conservation and Development Council, the Alabama Department of Public Health, the Alabama Onsite Wastewater Board, the Alabama Soil and Water Conservation



## West Alabama Regional Science Fair

The West Alabama Regional Science Fair is an Intel ISEF-affiliated fair serving the counties of Choctaw, Fayette, Greene, Hale, Lamar, Marengo, Marion, Perry, Pickens, Sumter, and Tuscaloosa. These competitions exist in nearly every state in the United States as well as in 40 foreign countries. All Intel ISEF-affiliated science fairs register with Society for Science and the Public and must consist of five participating high schools and/or 50 students in the ninth - twelfth grades. The 2015 West Alabama Regional Science Fair will sponsor a winning student's travel to the 2015 International Science and Engineering Fair to be held in Los Angeles, California from May 11 - 16, 2015. Each year, millions of students worldwide compete in local and school-sponsored science fairs; the winners of these events go on to participate in Intel ISEF-affiliated regional and state fairs from which the best win the opportunity to attend the Intel ISEF. The Intel ISEF unites these top young scientific minds, showcasing their talent on an international stage, enabling them to submit their work to judging by doctoral level scientists—and providing the opportunity to compete for nearly \$4 million in prizes and scholarships.

### STEM Freshman Seminar

UWA 101 (Freshman Seminar) is a required course for all entering freshmen. As biology, math, science, or computer science majors, students have the opportunity to take a special UWA 101 courses designed specifically for them through the UWA Project Engage Program funded by a Minority Science and Engineering Improvement Program grant from The United States Department of Education. In addition to the regular UWA 101 course content, such as campus resources, personal, social, and academic support skills development, and expanded university orientation, the STEM (Science, Technology, Engineering, and Mathematics) UWA 101 course integrates specific STEM-related content and provides students access to enhanced educational technology resources.

### UWA BOSS

UWA Biology Opportunities and Scholarships for Success (BOSS) is a program funded by the National Science Foundation, NSF. The program provides scholarships for academically talented

## Table of Contents

Message from the Dean.....	vii
Keynote Speaker.....	viii
Table of Contents .....	ix
Abstracts.....	1
<b>Biological and Environmental Sciences .....</b>	<b>1</b>
1. Tomato tastes better with fungi added .....	1
2. Bio-Boom: 3-Way Symbiosis aids in Tomato Thermo-Tolerance .....	2
3. Effects of Fungal Endophytes on Crop Production .....	3
4. Comparison of two granite outcrop glade fall floras in the Alabama Piedmont Upland physiographic region.....	4
5. Unraveling and Isolating Fungal Endophytes from Alabama's Plants .....	5
6. Mir1-CP Protein Responses to Herbivore Feeding and Jasmonic-acid Disruption .....	6
7. Gene expression in hardwood trees species exposed to ozone.....	7
8. An Analysis of Genomic Expression Due to Elevated Atmospheric Ozone in Hardwood Trees Native to eastern North America .....	8
9. The First Line of Defense Against Herbivores .....	9
10. A Discovery from Within: The Search for Antibiotics....	10
11. The Dirty Truth: Antibiotics in Soil .....	11
12. Home Grown Bacteria, Can it hold a Solution for Antibiotic Resistant Bacteria? .....	12
13. Dirty Medicine: life saving antibiotics in local soil.....	13
14. Transfer of <i>S. aureus</i> from Gym Equipment to Hands ...	14

15. The Effects of Omega-3 Fatty Acids on the Growth of Murine Tramp-C Prostate Epithelial Cancer Cells .....	15
16. The Effects of Orange Extract on the Growth of Murine Tramp-C Prostate Epithelial Cancer Cells .....	16
17. The Effects of Ganoderma Mushroom Extract on the Growth of Murine Tramp-C Prostate Epithelial Cancer Cells .....	17
18. The Effects of Pomegranate Extract on the Growth of Murine Tramp-C Prostate Epithelial Cancer Cells .....	18
<b>Mathematics .....</b>	<b>19</b>
19. Options Pricing Based on an Actuarial Approach .....	19
<b>Exercise Science .....</b>	<b>20</b>
20. Off-Season Nutrition in Division II Collegiate Baseball Players.....	20
21. The Effects of Concussion(s) on Academic Performance of Division II Collegiate Student-Athletes.....	21
<b>Behavioral Science.....</b>	<b>22</b>
22. Social Media and Happiness: So many, So much, So What?.....	22
23. Happily Ever After? A Content Analysis of Gender in Children’s Media .....	23
24. Gender Representation and Interactions in Superhero Team Movies.....	24
25. Examination of Strong Female Leads in Action Films...25	
<b>Engineering Technology .....</b>	<b>26</b>
26. Integration of Automated Intrusion Detection and Web Service Alarm System using ATmega Microcontroller..	26
<b>Activities and outreach offered by NSM.....</b>	<b>27</b>
Tri-Beta Biological Honor Society .....	27
Alpha Epsilon Delta.....	27

to experience hands-on learning activities in science. *Science Saturdays* activities are two-hour events held three times during each fall and spring semester. Faculty members from UWA host science exploration projects through a variety of activities such as, "What Went By?" to learn how to trace animal footprints, "Crime Scene Investigation series" to learn about fingerprinting and DNA analyses, and "Dr. Frankenstein" to learn about human anatomy. *Science Saturdays* activities are free of charge and are open to all children in the appropriate age groups advertised for each event. There is, however, a limit of 20 children per activity. Since the program started, over 400 K-12 students from 6 surrounding counties have participated in the program. Please visit the *Science Saturdays* website for more information and pictures of activities. <http://www.uwa.edu/ScienceSaturdays>

### Science Coffee Shop

In 2013, the College of Natural Science and Mathematics, in coordination with the Center for the Study of the Black Belt, initiated the Science Coffee Shop series. These informal gatherings, hosted by The Coffee Shop on Monroe, provide an opportunity for UWA faculty and other scholars to meet with community members in a casual atmosphere and discuss a wide range of science topics. Science Coffee Shops have generated community-wide discussions about producing new crops adapted to climate change, the microbiology of beer, the BP oil spill and Alabama marine life, and others. Please visit the Science Coffee Shop website for more information and pictures of activities. <http://mmorsy.wix.com/science-coffee-shop>

### Science Olympiad

Since 2004, the College of Natural Science and Mathematics has hosted the UWA Elementary Science Olympiad. This is an academic interscholastic competition for Grades 3-6 consisting of a series of individual and team events for which students prepare throughout the year. Participating students interact with one another, learn subject matter, and have fun with science. Participation in Science Olympiads has been directly linked to increased interest and achievement in science and math. Events in the ESO relate directly to National Science Education Content Standards and to Alabama Content Standards for Science.

**Tri-Beta Biological Honor Society**

The Beta Phi Chapter of Beta Beta Beta is the sole biological honor society at The University of West Alabama. Beta Beta Beta is a society for students, particularly undergraduates, dedicated to improving the understanding and appreciation of biological studies and extending boundaries of human knowledge through scientific research. As such, Tri-Beta is one of the nation's most respected biological honor societies. The Beta Phi Chapter of Beta Beta Beta National Biological Honor Society was chartered at The University of West Alabama in 1999. Since that time, Beta Phi has installed over 150 regular members of Beta Beta Beta. The members of Tri-Beta at UWA are active in undergraduate research, as well as service to the university community. The organization introduces and orients students to the numerous biological disciplines through guest speakers, shadowing opportunities, volunteer activities, and working on undergraduate research projects.

**Alpha Epsilon Delta**

Alpha Epsilon Delta (AED) is a national health pre-professional honor society dedicated to the encouragement of scholarship and recognition of excellence. Pre-professional areas of interest include medicine, dentistry, veterinary and other similar health fields. The AED chapter at The University of West Alabama was chartered in 2010. Some of the benefits of membership are public recognition of outstanding scholarship, activities which promote interests in professional health, and establishment of contacts with health professionals. Requirements for membership are overall and science GPA's of 3.2 or higher. The science GPA includes biology, chemistry, physics and mathematics.

**Science Saturdays**

The College of Natural Sciences and Mathematics (NSM) at the University of West Alabama initiated the *Science Saturdays* outreach program in 2010. The program aims to acquaint area K-12 students to the exciting field of Science and Mathematics at an early age. The program provides students in elementary, middle, and high schools in and around Sumter County, Alabama, with opportunities

Science Saturdays.....27

Science Coffee Shop .....28

Science Olympiad.....28

West Alabama Regional Science Fair .....29

STEM Freshman Seminar .....29

UWA BOSS .....29

UWA’s Project Engage .....30

The Alabama Onsite Wastewater Association Training Center  
.....30

Sumter County Nature Trust.....31

Fossils of the Black Belt .....31

Participating Organizations.....32

Author Index .....34-34

Acknowledgements.....36

## Biological and Environmental Sciences

### 1. Haven: Tomato tastes better with fungi added

Aries Larkin, Blake Clecker, Namita Sinha, and Mustafa Morsy

California accounts for 15% of national agricultural sales and 7.1% of livestock. California is among several states that lack water supplies. In recent years, California has recorded the driest years in history. About 25% of food in the United State is produced in California. In the last few years, agriculture production has been deeply impacted by drought causing billions of dollars in loss. The effect of drought on agriculture is not limited to California, but it is a global rising problem.

Fungal endophytes reside within plant growing under normal and stressed environments. The hypothesis being tested is that fungal endophyte associated with wild plants growing under harsh environment can provide crop plants with better adaptation and production and can be used as a method of sustainable agriculture. During a summer internship, we collected healthy plants growing under drought conditions. The collected plant's upper root/lower shoot system was surface sterilized, and placed on potato dextrose medium plate to promote fungal growth. A number of pure fungal endophyte cultures were obtained and identified using phenotypic characterization and their 18s r-RNA ITS sequence.

We colonized 6 of the newly discovered endophytes into tomato plants, independently, to compare fruit yield (number and weight) and taste of symbiotic to non-symbiotic control tomato under field conditions. Our preliminary data showed no significant increase of tomato colonized with any of the fungal endophyte compared to non-symbiotic plants. However, the blind tasting surveys of 200 people showed that symbiotic-tomatoes have a better taste than non-symbiotic tomatoes.

### 26. Integration of Automated Intrusion Detection and Web Service Alarm System using ATmega Microcontroller

Don Yessick, Dalton Speed, Justin Holliday, and Balakrishna Gokaraju

The present study describes the implementation of a small-scale prototype intrusion detection design using an ATmega microcontroller. This intrusion detection system will be integrated wirelessly to the home WiFi system and could initiate an email to the respective authority. There have been an innumerous number of commercial home intrusion detection systems, which apparently are very highly expensive including contracts and monthly payments. Most of them are also not efficient in terms of backing up the intrusion event away from the eventful place, and informing the authoritative person and police with confirmation.

The novelty of this application study lies in effectively communicating the intrusion event wirelessly to the home-owners and police with a confirmed image of the scene during the event. The objectives of this study would follow by; (i) prototyping the cost-effective ATmega micro-controller to sense the intrusion based on range detection; (ii) activating the camera for capturing the eventful scene in the form of an image; and (iii) The delayed action of the intrusion is gonna trigger the WebService contained in the Raspberry-Pi Microcontroller board. This WebService will retrieve the image from ATmega Microcontroller through paired radio channel Transmitter and Receiver. Then the intrusion event image is communicated to the authoritative person via an email. In the end, the authority can decide and seek 911 helpline for immediate theft-response. Nonetheless the back-up image of intrusion event is going to play a key role for home-owners, police, and insurance agencies by confirming the event and might even by identifying the intruder.

## 25. Examination of Strong Female Leads in Action Films

Kathryn Adams, Amanda Ferguson, and Nicole Farris

This project intends to analyze the representation of gender roles in action films. We plan to examine Hollywood's portrayal of strong female characters in the light of the reversal of expected gender roles enacted by these women. We will discuss reactions to opposite gender roles by examining *The Hunger Games*, *Charlie's Angels*, and *Divergent*. We hypothesize that the female characters will still be dependent on men in some way, even though they are portraying a strong role. Female leads will still hold onto some of their traditional feminine roles so they do not appear to masculine.

## 2. Bio-Boom: 3-Way Symbiosis aids in Tomato Thermo-Tolerance

Blake Cleckler and Mustafa Morsy

Climate change has caused serious challenges for crop production. Drought and heat waves has put Texas and California's multi-billion dollar agricultural industries at risk. Providing an ecofriendly and effective method to help crop production is imperative for the growing human population. Past research has shown that the use of a fungal endophyte, *Curvularia protuberata*, living symbiotically with a plant can aid in growth production and tolerance to stressful conditions. Further research has shown that a virus, *Curvularia thermo-tolerance virus* (CThTV), aided the fungus in helping the plant. Two different viral genes, ORF1a and ORF2c, were found to help convey elements of stress tolerance to the virus' fungal host. Understanding the effect of these 2 genes within a heat stressed tomato plant was studied. Two week old tomato plants were colonized with 6 different fungal treatments. The following is the list of treatments including *C. protuberata*: With virus (AN), without virus (VF), VF with ORF1a (ORF1a), VF with ORF2c (ORF2c), VF with ORF1a deleted (ORF1aDel), VF with ORF2c deleted (ORF2cDel), and no fungal or virus which serves as a negative control (NS). Six different plants were selected from each treatment and placed in soil simulators. They were tested with heat treatments starting at 35°C and then raised to 45°C. Afterwards, the tomatoes were raised to 55°C. the AN, ORF1a, and ORF2c treatments showed more stress tolerance than the virus free and gene deleted treatments. Unlocking the mechanism behind thermo-tolerance could aid in methods to helping crop production in stressful environments.

### 3. Effects of Fungal Endophytes on Crop Production

DeMarco Spears and Mustafa Morsy

The drought of 2011 cost the State of Texas alone more than \$8 billion. A significant loss occurred in crop production, for example, corn and peanut production fell by 40%. Fungal endophytes reside in almost every plant growing on earth. Many of the fungal endophyte develop a mutualistic association with their host plants. Mutualistic fungal endophyte are those species that obtain a carbon source from plants and in return they provide plants with some nutrients and improve plants' environmental stress tolerance. We hypothesized that endophytes from high stressed plants can aid in crop production under normal agricultural conditions and/or stress conditions. To test this hypothesis, we collected different plant samples located around the University of West Alabama campus as well as different counties throughout the Black Belt Region. Isolating different fungal sub-cultures from various plant species, and identified them *via* PCR of their r-RNA genes followed by sequence identification to determine the endophyte species discovered. Some of the discovered fungal species are being tested in tomato, our model system, under greenhouse conditions. We are comparing the growth rate and yield data of symbiotic tomatoes colonized with 2 different fungal endophytes to non-symbiotic tomatoes. The proposed use of fungal endophyte as a stepping stone for sustaining the agricultural industry is very promising and can help other crops flourish under harsh conditions like the drought.

### 24. Gender Representation and Interactions in Superhero Team Movies

Hannah Johnson, Shelby Schmidt, and Nicole Farris

The purpose of this project is to analyze how gender roles are portrayed in superhero films. A content analysis of the movies *The Avengers*, *Fantastic Four*, *Guardians of the Galaxy*, and *The X-Men* were used to determine what, if any, impact gender had on the portrayals of characters in superhero films. The roles of the female superheroes were compared and contrasted to those of the male superheroes. The points of comparison were what super powers the characters had, how much screen time they got, their costumes, their importance to the plot, and their quality of character development. In all of the films the female protagonists received less screen time and played a less important part in moving the plot forward. In every team, there were numerically more men than women. If a film had more than one woman they did not interact with each other. None of the women in these movies existed independently of a love interest and as such, the hypothesis that the women in films would receive less representation is supported. Additionally, all of the females in these movies were tall, skinny, and very beautiful which furthers the proposition that most women in movies only exist as objects of the male gaze.

## **23. Happily Ever After? A Content Analysis of Gender in Children's Media**

Caitlin Vetzal, Bailey Wright, and Nicole Farris

This project analyzes the depiction of traditional gender roles in children's media sources. Children's storybooks and television shows were examined for this project. A twenty year time period was used to longitudinally determine what, if any, traditional gender roles were represented in these books, and the frequency at which these representations occurred. Additionally, we analyzed popular children's television programming to similarly study depictions of gender. As with the storybook analysis, we viewed a variety of children's television shows produced over a twenty year time span to determine the changes in programming. Our hypotheses were that the frequency at which the gender roles are distributed among the children's media sources will be regulated according to the characters' dress and their speech and that the masculine and feminine roles will divide the gender social structure lines. Findings from literature and television programs varied, but in some way, both sources represent gender stereotypes. Although some behaviors from females depict opposite gender roles, there is a consistency between apparel and accessories to identify themselves as such. Males also portray gender roles; however, "extras" such as accessories, are not placed on males. This might suggest that because males are the dominant gender and masculinity is associated with the majority of males, there is no need to identify this gender group in the way females are identified. There is a trend throughout children's literature and television programming of specific traits associated with females.

## **4. Comparison of two granite outcrop glade fall floras in the Alabama Piedmont Upland physiographic region**

Layne Witherington and Brian Keener

Granite outcrops are harsh environments for plant life because of various abiotic factors. These include shallow soil pockets over bedrock that experience a wide range of temperature and moisture fluctuations but ultimately become very hot and dry in the later growing season. In the Alabama Piedmont Upland, numerous granite outcrop glade habitats exist, all of metamorphic rocks and similar abiotic factors. Different sites are commonly derived from varying types of geologic substrates and resulting soils. Two different granite outcrop glade habitats were identified with differing types of bedrock parent material. Site 1 was in Chambers County and is composed of the Rock Mills Granite Gneiss, while Site 2, 11.4 air mi. to the NW in Randolph County is composed of Almond Trondhjemite. To determine if the differing geologic substrates might yield different flora compositions, the two habitats were surveyed and sampled for the fall flora components. After all collections and determinations, it was found that Site 1 produced 12 taxa not present at Site 2 while Site 2 yielded 32 taxa that were absent from Site 1. The two sites shared 25 taxa. More research is necessary but it is possible that the difference in substrates is largely responsible for the varying floras of the two sites.

## 5. Unraveling and Isolating Fungal Endophytes from Alabama's Plants

Quincy Barnhill, James Nemeth Jr., Mary Rodriguez, and Mustafa Morsy

Fungal endophytes may be credited for the survival of plants growing under drought stress. Many fungal endophytes share a symbiotic relationship with their host plants where fungi positively contribute to the health and fitness of the plants. Fungal endophyte benefits may include reproductive success, physical growth, and stress tolerance.

The aim of the Cell Biology Lab of Fall 2014 was to discover local fungal endophytes that can be used to benefit crop production. We collected wild plants from three different Alabama areas, Athens, Clements, and Livingston. All plants collected were growing under harsh environments such as between the cracks of concrete, where no other plants are surviving. The plants were surface sterilized and pure culture of fungal endophytes were isolated. Isolated fungi were characterized based on their spores and hyphae morphology. In addition, molecular characterization of the fungus r-RNA was identified using Polymerase Chain Reaction (PCR). After amplification, DNA was separated on agarose gel electrophoresis, extracted, quantified and sent for sequencing. Upon receiving DNA sequences, we analyzed the results using the NCBI-Blast search to identify the isolated fungi based on database matches of the r-RNA sequences. One of the fungi found was *Fusarium oxysporum*, a known plant pathogen with some reported beneficial stains. Our future research involves testing if the discovered endophytes have any beneficial role in crop growth and production under greenhouse conditions.

## Behavioral Science

### 22. Social Media and Happiness: So many, So much, So What?

Amanda Ferguson and Russ Davis

There is a long tradition of sociological research examining media and its impact on social life. Generally this literature suggests that increased exposure to mass media, such as television, advertisements, and the internet is associated with a decrease in levels of happiness. Today 'the social' is increasingly framed and shaped through social media. Social media constructs concepts of identity and social relationships, both relevant to sociological inquiry. Only recently has social media and happiness been the subject of empirical analysis. Studies suggest increased social media use is associated with lower levels of subjective well-being. Empirically, how substantial or pervasive this negative relationship is remains unclear. The recency of social media adoption and its unique interactive characteristics also suggest a need to theoretically evaluate the basic causal mechanisms which link social media use to subjective well-being. Addressing this gap in the literature, this study tests the relative impact of three specific measures of social media usage on a subjective well-being happiness scale. Multiple regression analysis was used to analyze data collected from undergraduate students in a southern, rural, mixed race, university setting.



## 21. The Effects of Concussion(s) on Academic Performance of Division II Collegiate Student-Athletes

Justin Farris, Allison Henderson, Breanna Hynds, and James Robinson

Concussions are of a significant concern for collegiate student-athletes. Recent research suggests that concussions cause severe brain trauma and may lead lifelong impairment of reaction time and short-term memory loss. However, very little is known about the effects of concussion on academic performance. Therefore, the purpose of this research was to determine (a) if a relationship exists between pre and post-concussion academic performance and (b) to determine if division II student-athletes return to their previous academic performance post-concussion. Design: Mixed-Method. Setting: The University of West Alabama Applied Physiology Lab. Methods: Questionnaire containing both quantitative and qualitative items. Subjects: 20 division II football players. Measurements: ImPACT test and the Post-Concussion Academic Performance Questionnaire (PCAP-Q). Results: Baseline ImPact scores were significantly different ( $.3140 \pm .14744$ ;  $F= 17.808$ ,  $p<.001$ ) from post-concussion scores ( $.2100 \pm .22867$ ;  $F= 134.088$ ,  $p<.000$ ). GPA pre-concussion was ( $2.89 \pm .64196$ ;  $F=8.935$ ), and post-concussion was ( $2.66 \pm .72449$ ,  $F=2.663$ ). Using the PCAP-Q, 80% of subjects stated they felt their academic performance was hindered post-concussion. Out of 10 concussed individuals, 4 picked attention span as the hardest part of returning to class and another 4 selected memory of new material. 9 out of 10 experienced symptoms the hindered their ability to read and complete homework. Conclusion: While GPAs were not significantly different pre and post-concussion, our research indicates there is a causative relationship between concussion and a decrease in GPA as well as other classroom performance.

## 6. Mir1-CP Protein Responses to Herbivore Feeding and Jasmonic-acid Disruption

Maisa Cook<sup>1</sup>, Lina Castano-Duque<sup>2</sup>, Ketia Shumaker<sup>1</sup>, Gary Felton<sup>2</sup>, and Dawn S. Luthe<sup>2</sup>

<sup>1</sup>The University of West Alabama, Livingston, AL 35470

<sup>2</sup>Pennsylvania State University, University Park, PA 16802

The corn (*Zea mays L.*) genotype Mp708 uniquely resists herbivory by insects. Its resistance stems from the synthesis of the toxic defense protein, Maize Insect Resistant Cystine Protease 1 (Mir1-CP). Mir1-CP accumulation is regulated by the jasmonic-acid (JA) pathway. Fall armyworm (FAW, *Spodoptera frugiperda*) feeding results in Mir1-CP accumulation in leaves. Mir1-CP is abundant in Mp708 roots and, in theory, transported from the production sites (roots) to wounded leaves via vascular tissues. The treatment of Mp708 plants with ibuprofen (IBU) inhibits JA synthesis in leaves and suppresses aboveground accumulation. It is unknown if IBU affects belowground accumulation. This experiment is ongoing research, under a National Science Foundation and United States Department of Agriculture grant, to determine the relationship between abundance and biological factors. Two corn genotypes (Mp708 and Tx601) were treated in the following manner: noninfested, noninfested/IBU, infested, and infested/IBU. Tx601 served as a negative control; it accumulates low levels of Mir1-CP. Samples were collected from roots and leaves following a 24 hour FAW infestation. Corn proteins were quantified; immunoblot analysis determined the abundance. The following results were expected from the experiment: Mir1-CP abundance is positively correlated to FAW herbivory and negatively correlated to IBU treatments. However, due to variables, the results obtained were inconclusive.

## 7. Gene expression in hardwood trees species exposed to ozone

Rebecca A. Carroll<sup>1</sup>, Chicko Jones<sup>1</sup>, Teodora Best<sup>2</sup>, Ketia Shumaker<sup>1</sup>, and John Carlson<sup>2</sup>

<sup>1</sup>The University of West Alabama Livingston, AL 35470

<sup>2</sup>Pennsylvania State University, University Park, PA 16802

In plant species, ozone (O<sub>3</sub>) stress is known to induce physiological and molecular changes that may result in whole plant injury and loss of productivity. In this project, gene expression levels of three different hardwood trees species Black walnut (*Juglans nigra*, L.), Green ash (*Fraxinus pennsylvanica*, Marsh.), and Tulip-poplar (*Liriodendron tulipifera*, L.) were studied in response to three ozone levels (80, 125, 225 parts per billion) known to induce visual injury for 14 days, eight hours per day. Six genes, that are known to respond to oxidative stress, were selected for this study: ascorbate peroxidase (APX), catalase (CAT), glutathione peroxidase (GPX), Cu/Zn superoxide dismutase (CSD), an ethylene forming enzyme (EFE) and rubisco activase (RCA). Real-time quantitative PCR (qRT-PCR) was conducted for four plants per ozone-treatment for each tree species. APX and GPX increased as each level of ozone increased. RCA decreased as the levels of ozone increased. CAT, CSD, and EFE had very little to no change in the different levels of ozone in each species of hardwood trees.

## Exercise Science

### 20. Off-Season Nutrition in Division II Collegiate Baseball Players

Breanna Hynds, Allison Henderson, Justin Farris, and James Robinson

Nutrition is very significant in the overall health of an individual and the outcome of performance. Optimal in and off-season sport nutrition fuels the student-athlete's body to peak performance. However, some student-athletes do not feed properly during the off-season, which is key for maximum force and power training. Therefore, the purpose of this research was to determine if the nutritional intake of off-season Division II baseball players is different from the nutritional intake of sedentary collegiate males. Design: Mixed-Method. Setting: University of West Alabama Applied Physiology Lab. Subjects: Twenty-four males volunteered for the study. Of those, twenty males (10 baseball players, 10 sedentary) completed the study and were used for statistical analysis. Measurements: Seven Day Food Recall and Supplementation Questionnaire. Results: The amount of calories, proteins, carbohydrates, cholesterol, sodium, and calcium consumed by the baseball players were significantly different than the sedentary population. There was no significant difference in the amount of lipids. Of the ten baseball players, nine took supplementation products (Advocare, Protein, Multivitamins, etc.). Conclusion: Research indicates that Division II baseball players consumed significantly more calories in the off-season than the sedentary population. Student-athletes may feel the need for enhanced nutrient intake to develop muscular strength. However, if cardiovascular exercise is not increased during this time period, extra nutrition may be counterintuitive and cause weight gain. Further research is needed to assess specific food choices and supplementation based on metabolic output of in-season and off-season Division II collegiate baseball players.

## Mathematics

### 19. Options Pricing Based on an Actuarial Approach

Manuel Grossmann and Jing Chen

Options pricing has been one of the core subjects in the field of financial mathematics. Black and Scholes derived the well-known Black-Scholes formula on options. However, it was based on multiple assumptions. A new approach to pricing options was introduced by Blatt and Rydberg and it involved no economic assumptions. In order to avoid the limitation that the stock price tends to change in one direction under the lognormal distribution assumption, we make basic assumptions for the financial market and the interest rates. We apply the actuarial approach to price the European option and conduct an analysis of numerical simulation.

### 8. An Analysis of Genomic Expression Due to Elevated Atmospheric Ozone in Hardwood Trees Native to eastern North America

Timothy Odom<sup>1</sup>, KelviNeisha Williams<sup>1</sup>, Teodora Best<sup>2</sup>, Nicole Zembower<sup>1</sup>, Ketia Shumaker<sup>1</sup>, and John Carlson<sup>2</sup>

<sup>1</sup>The University of West Alabama, Livingston, AL 35470

<sup>2</sup>Pennsylvania State University, University Park, PA 16802

The goal of this study was to analyze gene expression due to elevated atmospheric ozone in selected hardwood trees: *Liriodendron tulipifera*, L. (tulip poplar) and *Nyssa sylvatica*, Marsh. (black gum). The two species were treated at four levels of ozone (10, 80, 125, 225 parts per billion) that best represented a conceivable spectrum of exposure. From physical observation, it was clear that elevated ozone levels caused much foliar damage that led to early senescence in tulip poplar, but little to no damage in black gum. Midway through the treatment process, tulip poplar began showing signs of cell death (necrosis) and yellowing of the leaf tissue (chlorosis). Eventually, the tulip poplar lost its leaves. Hence, this study provided physical evidence that ozone contributes to damaging effects in hardwood trees.

## 9. The First Line of Defense Against Herbivores

Fhallon Ware-Gilmore<sup>1</sup>, Michelle Peiffer<sup>2</sup>, Ketia Shumaker<sup>1</sup>, Dawn Luthe<sup>2</sup>, and Gary Felton<sup>2</sup>

<sup>1</sup>The University of West Alabama, Livingston, AL 35470

<sup>2</sup>Pennsylvania State University, University Park, PA 16802

Pest insects have significant economic, environmental and social impacts. The cabbage looper, *Trichoplusia ni*, is a pest native to the United States. They feed on many vegetable plants including all members of the Brassicaceae family, and even tomatoes. When herbivores initiate feeding on a host plant, they present "cues", which the plant perceives and uses to help rapidly mobilize its defenses in response to the herbivore's attack on the plant.

This study was designed to determine if *T. ni* is able to induce the production of leaf hairs or trichomes on newly forming leaves of tomato plants. In some plant species, herbivores or defoliation triggers the production of increased trichomes which act as defenses against herbivores. We will be answering three questions: The first being, "Does cabbage looper saliva induce trichomes?". To investigate this question, we will ablate the spinneret so that the insect is unable to salivate on the plant. Our next question addresses, "Does increased trichome density interfere with growth of cabbage loopers?" A methyl jasmonate treatment, which induces higher trichome densities, will be applied to the tomato plants. The third question is "Does cabbage looper saliva affect the expression of the defense gene, proteinase inhibitor 2?". These experiments will be conducted to better understand the interaction between insects and plants to facilitate the development of new pest control systems.

## 18. The Effects of Pomegranate Extract on the Growth of Murine Tramp-C Prostate Epithelial Cancer Cells

Tamara Smoot, Janis Beaird, and Jeffery Merida

Prostate cancer is highly prevalent in men ages 40-69. Murine Tramp-C prostate cultured cells are used to perform experiments at conditions in which cells can and cannot grow. These cells are generally used for research on prostate cancer. Once at a certain age, men are encouraged to be mindful of their health and aware of their dietary habits. Studies have shown that men who supplement their diet with pomegranate fruit can significantly reduce their levels of prostate-specific antigen (PSA). There are several components that, previous studies have shown, reduce metastasis in prostate cancer cells. The purpose of this research is to determine if pomegranate juice has a direct effect on the growth of these cells. In this research the murine cells were grown under normal conditions of 37°C and 5% CO<sub>2</sub> for 7 days. The cells were grown in RPMI essential nutrients medium. To deter contamination, the cell medium was supplemented with penicillin/streptomycin antibiotics cocktail. To stimulate the growth of the cells, bovine insulin was also added to the medium. These cells were assessed for their growth using inverted light microscopy. We will present data showing the difference in the growth of cells treated and not treated with pomegranate juice or pomegranate juice extract.

## 17. The Effects of Ganoderma Mushroom Extract on the Growth of Murine Tramp-C Prostate Epithelial Cancer Cells

Laila Ghazwani, Janis Beard, and Jeffery Merida

Today, prostate cancer is one of the most common types of cancer that afflicts men. Usually, it is one of the causes of death in men. The longer that men live, the greater the chance that they will eventually get prostate cancer. One of the most popular ways to research and study prostate cancer is using the murine Tramp-C prostate cultured cell line. In our research, we are using various dietary supplements to determine if they have an effect on the growth of these cells. One of the supplements that might play a significant role in the prevention of prostate cancer is ganoderma. Ganoderma is type of mushroom found in China. Men in China are encouraged to eat this mushroom to help prevent prostate cancer. The main purpose of this research is to determine if ganoderma may have a direct effect on the growth of murine Tramp-C cells. These cells were grown under normal condition of 37° C and 5% CO<sub>2</sub> for seven days. In addition, these cells were grown in Roswell Park Memorial Institute medium (RPMI) essential nutrients medium which is commonly used in cell culture and tissue culture. Also, we added to the cell medium a penicillin/streptomycin antibiotics cocktail to limit and prevent contamination. In addition, we stimulated the growth of cell by adding bovine insulin to the medium. The murine Tramp-C prostate cultured cells were assessed for their growth using inverted light microscopy. We will present findings that will show the difference in the growth of cell treated and not treated with a ganoderma extract.

## 10. A Discovery from Within: The Search for Antibiotics

Krystal Aultman, Noah Napier, and Mustafa Morsy

The search for new antibodies has spread to universities around the country through the Small World Initiative (SWI). The discovery of new antibodies within the past few decades have been slim to none and with new antibiotic resistant bacteria surfacing there is a dire need to find novel antibiotics. The University of West Alabama has conducted a series of experiments on soil samples collected around the area to try to find new antibiotic producing bacteria. About 75% of antibiotics were discovered in soil, therefore we are focused on the isolation of bacteria from soil. We applied several pathogens including *Staphylococcus epidermidis* and *Escherichia coli* to plates with bacteria growing from the samples to see if the bacteria was producing antibodies to fight off the pathogen. We have had various results including the different bacteria in each sample and their reactions to the pathogens. This project has allowed us to attempt to make a contribution to the community around us and learn about biological processes that will benefit us in the future.

## 11. The Dirty Truth: Antibiotics in Soil

Heath Stanford, Leigh Hubbard, and Mustafa Morsy

The University of West Alabama partnered with Small World Initiative (SWI) led by Yale University. The SWI is a laboratory research based course focused on finding new antibiotics from soil bacteria. We have collected soil samples from various surrounding areas such as a sewage pond, coal mine, deer field, and other interesting sites where we think a variety of bacteria can be discovered. Throughout our research, we have tested the bacteria from each soil sample by culturing the bacterial samples in different media, such as Brain-Heart and Terrific Broth media. By doing this we are testing the bacterial growth to see how well the colonies grew in certain media. Once we had enough colonies grown, we began testing them for antibiotics by testing their effects of pathogenic bacteria, such as *Staphylococcus cohnii*. If the unknown bacteria produces antibiotic, then we can see inhibition zones of the pathogen growth. This course has provided us with much incite for our future. It gives us an opportunity to do laboratory research that the average individual cannot do on a daily basis, such as removing bacteria from soil. Due to this course we will be more successful in our respected fields in the future.

## 16. The Effects of Orange Extract on the Growth of Murine Tramp-C Prostate Epithelial Cancer Cells

Laila Alonazi, Janis Beard, and Jeffery Merida

Prostate cancer is a cancer that affects men and usually appears after the age of sixty. There are components in fruits and vegetables that play a significant role in reducing prostate cancer. Men are encouraged to intake these fruits and vegetables which may be beneficial in the prevention of prostate cancer. One such fruit is orange. We have used murine Tramp-C prostate cultured cells in this research. The purpose of this research is to determine if orange extract has an effect on the growth of these cells. In this research, the murine cells were grown under normal conditions of 37°C and 5% CO<sub>2</sub> for 7 days. The cells were grown in RPMI essential nutrients medium. To prevent contamination, the cell medium was supplemented with penicillin/streptomycin antibiotics cocktail. To stimulate the growth of the cells, bovine insulin was also added to the medium. These cells were assessed for their growth using inverted light microscopy. We will present data showing the difference in the growth of cell treated and untreated with an orange extract.

## 15. The Effects of Omega-3 Fatty Acids on the Growth of Murine Tramp-C Prostate Epithelial Cancer Cells

Fatimah Alhassan, Janis Beard, and Jeffery Merida

In recent decades, prostate cancer has been one of the most common health issue in United State that threatens the health of older men. Being diagnosed with prostate cancer means that the normal function of the prostate gland, which is responsible producing fluid that makes up semen, has been disturbed. Men are encouraged to intake various dietary supplements which are beneficial in the prevention of prostate cancer. As a part of this research, we have investigated the direct effect of omega-3 fatty acids on murine cancer cells. Murine Tramp-C prostate cultured cells are most commonly used for research on prostate cancer. In this research, the murine cells were grown under normal conditions of 37°C and 5% CO<sub>2</sub> for 7 days. The cells were grown in Roswell Park Memorial Institute (RPMI) essential nutrients medium. Further, we have added bovine insulin to stimulate the growth of these cells. In addition, the deter contamination, the cell medium was supplemented with a penicillin/streptomycin antibiotics cocktail. These cells were assessed for their growth using inverted light microscopy. The purpose of this research is to determine if omega-3 fatty acids have a direct effect on the growth of these cells. We will present data showing the difference in the growth of cells treated and not treated with omega-3 fatty acids.

## 12. Home Grown Bacteria, Can it hold a Solution for Antibiotic Resistant Bacteria?

Riley King, Austin Tubbs, and Mustafa Morsy

Biology Opportunities and Scholarships for Success (BOSS) scholars have partnered with Yale's University's Small Initiative program. The program aims to discover new antibiotics to combat the growing problem of antibiotic-resistant bacteria in the medical field such as *Staphylococcus aureus*. More than 75% of known antibiotics were discovered in soil; therefore, we have collected various soil samples from around West Alabama, particularly areas around Demopolis and Selma. We have cultured the bacteria in our soil samples and collected a diversity of phenotypes of bacteria as well as numbers of bacteria cultures. At this point in the experiment, we are adding bacterial pathogens such as *bacillus subtilis* and *E. coli* to see if any inhibition zones are present. Inhibition zones are areas where the bacteria collected do not allow the bacterial pathogens to grow—signs of an antibiotic production of the yet unknown bacteria. After finding antibiotic producing bacteria, chemical characterization will follow to identify the type of antibiotic produced, with hope that this antibiotic will be novel. As we progress in our research, we gain experience in the field of biology and learn more about the field of biology.

### 13. Dirty Medicine: life saving antibiotics in local soil

Desiree Washington, Anna Taylor, and Morsy Mustafa

The Small World Initiative program at Yale partnered with The University of West Alabama to motivate freshman to dive into the world of research. Through this program, students are introduced to the processes of professional research and development. In class, we hypothesized that by collecting and testing a wide variety of soils; we could identify antibiotic producing bacteria that could eventually lead to life-saving medicines. These antibiotics have either been discovered or they will lead to uncharted territory in the health field. To do this, we chose locations that we thought would yield unique bacteria. After that, we separated one gram of soil from each sample. Then, we separated bacteria from the soil. Next, we placed the bacteria into plate which promoted growth. After , our plates showed that the majority of the soil samples collected throughout the class did in fact have bacteria. The next step consisted of testing the bacteria grown from the soil on plates infected with different types of human's pathogens such as *Staphylococcus* and *E.coli*. The next step in our research is to identify the bacteria that proved to be producing antibiotics. After the bacteria have been identified in the lab, we will have the results to present a scientific conclusion on the bacteria we have or have not discovered.

### 14. Transfer of *S. aureus* from Gym Equipment to Hands

Essence Parrish and Brian Burnes

A concern with *staphylococcus aureus* has emerged because of the possibility that fomites may play a significant role in the transferral of *S. aureus* to humans. Aside from health facilities, studies have found that relatively large numbers of *S. aureus* are also found on shared gym equipment in community fitness centers; however, whether *S. aureus* reaches the body on contact with the fitness center equipment remains unclear. The purpose of this study is to identify *S. aureus* equipment-to-body transfer in a small community fitness center. The users of the equipment were sampled were sampled for *S. aureus* before and after the equipment was used. A previous study at the same gym found that *S. aureus* was present on 84% of surfaces. This study further examines and confirms that fomites do lead to the transmission of potentially infectious Staphylococcal species.