





**3<sup>rd</sup> Annual**  
**Undergraduate Research Symposium (URS) of the**  
**College of Natural Sciences and Mathematics**

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March 11, 2014  
Student Union Building (SUB)  
University of West Alabama  
Livingston, AL

**Schedule of Events**

<b>Poster setup</b>	<b>8:00 – 9:30 a.m.</b>
<b>Public Viewing Session 1</b>	<b>9:30 – 11:30 a.m.</b>
<b>Graduate School Exhibition</b>	<b>9:30 a.m. – 6:00 p.m.</b>
<b>Graduate School Forum</b>	<b>10:30 – 11:30 a.m.</b>
<b>Poster Judging</b>	<b>1:10 – 3:30 p.m.</b>
<b>Public Viewing Session 2</b>	<b>3:30 – 5:00 p.m.</b>
<b>Organizing Committee Remarks</b>	<b>6:00 – 6:15 p.m.</b>
<b>Symposium Keynote Address</b>	<b>6:15 – 7:15 p.m.</b>
<b>Awards Ceremony</b>	<b>7:30 – 8:00 p.m.</b>

## **Organizing Committee**

Dr. John McCall, Chair

Dean Sammy Culpepper

Dr. Jing Chen

Mrs. Hoda Hassan

Dr. Mustafa Morsy

Dr. Ketia Shumaker

## Message from the Dean

Undergraduate research in the College of Natural Sciences and Mathematics (NSM) is an integral part of student learning. Independent research under the direction of faculty mentors represents a unique learning opportunity for many students. 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 his/her field of focus and refine the skills of scientific research.



The College sponsors the Undergraduate Research Symposium (URS@NSM, usually held on Spring Assessment Day), a celebration of the year's efforts in which the students present the results of their research activities to the broader university community. Undergraduates from all STEM (Science, Technology, Engineering and Mathematics) disciplines present their current and recent academic projects, showcasing the diversity of topics, approaches, and interests. The Symposium also serves as a resource for other undergraduates. Those who are not yet engaged in such pursuits can learn how fellow students developed their intellectual interests, approached their current projects, and forged the faculty or community connections needed to achieve their success. 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 black ink that reads "S. Culpepper". The signature is written in a cursive, slightly slanted style.

Dean Sammy Culpepper

## Keynote Speaker

The Keynote Speaker for the 2014 Undergraduate Research Symposium is Dr. Marilyn Roossink from the Department of Plant Pathology at Pennsylvania State University. Dr. Roossink is a professor of plant pathology and of environmental microbiology and biology, specializing in research on the evolution of infectious viral diseases.



Dr. Roossinck received a PhD from the University of Colorado School of Medicine, where she studied Hepatitis B Virus. She then became a postdoctoral scholar at Cornell University, where she began working with plant viruses. She moved to the Samuel Roberts Noble Foundation in 1991 where she studied plant virus evolution, and, later, plant and fungal virus ecology. In 2011 she moved to Penn State University, where she is a professor of Plant Pathology and Environmental Microbiology and Biology. She continues to work on plant and fungal virus ecology and evolution.

Dr. Roossinck's laboratory is interested in understanding how and why viruses evolve to cause disease. The majority of viruses probably do not cause disease, but research in virology has been extremely biased. The only viruses that have been studied are those that cause disease in humans and their domestic plants and animals. Measures to control viral diseases, especially in plants, have been largely unsuccessful. It is unlikely that any effective measures will be designed until it is understood why normally benign, or even beneficial, viruses evolve to cause disease. Dr. Roossinck's lab is using several approaches to tackle this question: they are studying the dynamics of virus populations and the mechanisms of evolution using RNA plant viruses in the family Bromoviridae and they are studying the three-way mutualistic symbiosis among a virus, a fungus and a plant that leads to tolerance of abiotic stress.

## Table of Contents

<b>Organizing Committee .....</b>	<b>ii</b>
<b>Message from the Dean .....</b>	<b>iv</b>
<b>Keynote Speaker .....</b>	<b>v</b>
<b>Table of Contents .....</b>	<b>vi-vii</b>
<b>Abstracts.....</b>	<b>1-19</b>
1) Comparative analysis of ozone effects and responsive genomic expression in two hardwood trees .....	1
2) Corn earworm saliva induces herbivore's defense gene expression in corn .....	2
3) Presence of bacteria in the crucifer flea beetle .....	3
4) Bio-Boom: Enhancing crop production using habitat specific fungal endophytes .....	4
5) Isolation and identification of symbiotic endophytes and their biological impacts on plants .....	5
6) Morphological differentiation in the redspot darter ( <i>Etheostoma artesiae</i> ) .....	6
7) Kin selection in a poeciliid fish .....	7
8) Species of mosquitos found in Livingston, Alabama .....	8
9) Do geese contribute to the amount of <i>E. coli</i> found in treated sewage from the Cahaba Waste Water Treatment Plant? .....	9
10) Exposure to <i>Candida</i> species in a college environment.....	10
11) Bacterial count of discount retail ground beef.....	11
12) Transfer of <i>S. aureus</i> and MRSA from gym equipment to hands .....	12
13) The Small World Initiative: An antibiotic discovery-based freshman course .....	13
14) <i>Palaemonetes</i> sp. size and rates of parasitism in Santa Rosa Island (FL) tidal pools and adjacent seagrass meadows .....	14
15) Ecology of fish assemblages of brackish pools on a northern Gulf of Mexico barrier island .....	15
16) The effects of metaphor training on Autism Spectrum Disorder symptoms .....	16
17) Resting and exercise electrocardiogram sinus rhythm differences in Division II student athletes and sedentary individuals .....	17
18) Athletic trainers' ability to recognize and aid in the treatment of mental health disorders .....	19

<b>Other activities and outreach offered by NSM .....</b>	<b>20</b>
Tri-Beta Biological Honor Society .....	20
Alpha Epsilon Delta .....	20
Science Saturdays .....	21
Science Coffee Shop .....	21
Science Olympiad .....	22
West Alabama Regional Science Fair .....	22
STEM Freshman Seminar .....	23
UWA’s Project Engage .....	23
The Alabama Onsite Wastewater Association Training Center .....	23
Sumter County Nature Trust .....	24
Fossils of the Black Belt .....	24
Participating Organizations .....	25
<b>Author Index .....</b>	<b>26</b>
<b>Acknowledgements .....</b>	<b>27</b>

## I. Plant Physiology and Molecular Biology

### 1) A comparative analysis of ozone effects and responsive genomic expression in two hardwood trees

Timothy Odom, KelviNeisha Williams, Teo Besty, Nicole Zembower, Ketia Shumaker, and John Carlson

The goal of this study was a comparative analysis of ozone effects on two species of hardwood trees: *Liriodendron tulipifera*, L. (Tulip poplar) and *Nyssa sylvatica*, Marsh. (Black gum). The two species were exposed to 4 levels of ozone that best represented a conceivable spectrum of exposure (10, 80, 125, 225 ppb). In terms of foliar injury, Tulip poplar was more sensitive than black gum. From a comparative analysis of the transcriptomes of the two species, results show that the Black Gum tree is more equipped to handle ozone stress than the Tulip poplar.



## 2) Corn earworm saliva induces herbivores defense gene expression in corn.

Brittany Harry, Ketia Shumaker, Dawn Luthe, and Gary Felton

Corn earworm (*Helicoverpa zea*) herbivory on corn is costly in terms of the lack of crop yield and the amount of economic damage. Caterpillar saliva is known to elicit plant defense response in several plants, but surprisingly the effect of *H. zea* saliva on corn defenses has not been reported. A series of experiments were conducted to determine the expression of several defense-related genes in *Z. mays* corn plant hybrid MC 4050 after herbivory by *H. zea*. The saliva of the *H. zea* was tested to determine if this factor is an elicitor of *Z. mays* defense gene expression in corn. Corn plants in the V3 stage were challenged with ablated and non-ablated *H. zea* caterpillars for 24 hours. Control plants were not exposed to *H. zea* caterpillars. The expression of MPI, LOX3, and RIP2 were analyzed by quantitative real-time PCR (qRT-PCR), with Actin as the endogenous control. Significant differences ( $\alpha=0.05$ ) were found among treatments. The greatest gene expression was observed with non-ablated caterpillars. These results suggest that *H. zea* saliva is triggering defenses in corn. Corn is an important food crop worldwide and understanding the components of *H. zea* saliva that triggers corn defenses against this herbivore will help scientists develop novel insect control strategies.

### 3) Presence of bacteria in the crucifer flea beetle.

Morgan Elston, Loren Rivera Vega, Ketia Shumaker, Gary Felton, and Dawn Luthe

Plants and herbivores are great examples of coevolution. Since the beginning of history, plants have to rely on their intricate internal structures to oppose attacks from herbivores. Some herbivores have developed a counterattack to plant defense that allows them to elude such defenses. An example of this was shown in Chung *et. al* studies on how the Colorado potato beetle (*Leptinotarsa decemlineata*) released bacteria to suppress plant defense mechanisms while feeding. Knowledge of the Colorado potato beetle has raised interest in the crucifer flea beetle (*Phyllotreta cruciferae*), and whether it escapes detection in the same manner. In this study, we will be testing if *P. cruciferae* regurgitant contains microbes that help avoid defense from plants. In order to test the hypothesis *P. Cruciferae* was fed fluorescent dyed leaves overnight afterwards the beetles were transferred to fresh cabbage (*Brassica oleraceae*) leaves. The fresh leaves were examined under a confocal microscope to look for remnants of fluorescence from the *P. cruciferae* oral secretions. Afterwards, in order to test for the presence of bacteria, the beetles were fed discs of cabbage leaves (~10 mm in diameter) that had been covered with different concentrations of antibiotics for two days. Beetles were pulverized and plated in LB agar. Bacterial growth was quantified to determine number of CFUs present in beetles. Results indicate that *P. cruciferae* contains bacteria. However, the regurgitation experiments were inconclusive. This research can be essential to develop techniques that could help control the flea beetle in the future.

#### **4) Bio-Boom: Enhancing crop production using habitat specific fungal endophytes**

Blake Clecker, Hayden Armuelles, Caitlyn Bonham, and Mustafa Morsy

Most, if not all, vascular plants are associated with fungal endophytes that inhabit various tissues without causing any apparent symptoms. Many endophytes form mutualistic symbioses with their hosts, enhancing the plants' ability to respond to environmental stresses. Other endophytes can enhance photosynthesis efficiency, osmotic potential, and/or growth and development of plants under normal environmental conditions. Our research is focused on the discovery of beneficial fungal endophytes associated with wild plants growing under naturally stressed environments to use them to enhance crop productivity and increase their environmental stress tolerance such as drought, heat and high salt levels. Eight fungal endophytes were isolated from wild plants thriving in naturally stressed regions of Alabama and inoculated into tomato seedlings. Colonized tomato plants were assessed for their ability to confer salinity and drought stress tolerance in addition to their ability to enhance tomato growth under normal conditions. Two fungal endophytes were proven effective in conferring drought tolerance and enhancing overall plant growth, fruit size, and yield compared to endophytic-free tomatoes growing under similar conditions. The application of these two endophytes into crop plants, under greenhouse conditions, appears to be both an effective and safe method for sustainable improvement of crop yield and stress tolerance. We plan to conduct field trials of tomato colonized with the isolated fungal endophyte and endophyte free tomatoes to confirm their role in growth enhancement under normal agricultural conditions.

## **5) Isolation and identification of symbiotic endophytes and their biological impacts on plants**

Brandon S. Nelson, Nicole Davis, Fannetta Dancy, Tamyia Thompson, Stephanie Shoup, and Mustafa R. Morsy

In the most extreme environments, plants find a way to survive. Some of these plants adapt to the habitat on their own, but others enter a symbiotic relationship with fungi to survive. We conducted an experiment during a discovery based Cell Biology class at the University of West Alabama to identify possible beneficial fungal symbionts from a healthy plant in a harsh environment. Our aim, is to identify fungi that can have useful applications in crop production. We collected healthy plants growing in harsh environments around UWA campus, we sterilized the upper root system and isolated pure cultures of fungal endophytes residue within these plants. We have isolated fifty different fungal isolates. All fungi were identified as Ascomycetes based on their ITS region of rRNA using Polymerase Chain Reaction (PCR) followed by DNA sequencing. We have also tested the soil samples in which these plants were growing in the presence of macronutrients, pH and salt level. All soils were very poor in the major macronutrients, and some soil samples have an extreme pH (9.2). Despite the poor nutrients and extreme pH, these plants looked healthy, suggesting a possible role of the fungal endophyte reside within them in increased their adaptation. Our ongoing research includes testing some of the isolated fungal endophyte in tomato plants (our model system) to check if any of these fungi can provide plants with the benefit of better growth or adaptation to harsh environments such as salt stress, extreme pH, or poor soil nutrients.

## II. Animal Biology and Microbiology

### 6) Morphological differentiation in the redspot darter (*Etheostoma artesiae*)

Taylor Burnett and John McCall

Darters, a small freshwater fish in the Family Percidae, are highly adapted to life in small, shallow streams. They show high levels of site fidelity, and different species are adapted to different ecological conditions. In this study, we examine the degree to which members of a single species of darter living in different stream systems differ as a result of local environmental conditions. I collected 20 individuals of redspot darter, *Etheostoma artesiae*, in June of 2013 from two streams in Sumter County, Alabama. Ten were collected from high flow areas in Mill Creek in the southern part of the county while another ten were collected from a low-gradient area in Sicolocco Creek in the northern Sumter County. On February 2014, the two streams were sampled again and twelve fish collected from each stream. Morphometric measurements were done on all specimens to determine the degree to which morphology differs between the two populations.

## 7) Kin selection in a poeciliid fish

Sidney Collins and John McCall

The primary goal of this study is to examine the relationship between kin selection and cannibalistic behavior. Evolution by the process of natural selection is the driving force in behavioral ecology. Ecological pressures affect species and the way they interact with members of their population and community. These pressures can lead to a phenomenon called kin selection. Kin Selection occurs when a member of a population risks their own fitness to ensure higher fitness for their relatives. This gives the relatives of that individual growth and reproductive benefits. Kin selection can also lead to cannibalistic behaviors in some populations. This means that they will prey on the unrelated young of their species to ensure that the young they are related to have a better chance of reaching sexual maturity and passing on the genes of their relatives. I will collect pregnant female *Gambusia* from two separate populations and allow them to have their young in a laboratory setting. Once the females give birth I will allow a member of one population be in the presence of a fry from a different population and also a fry that is their offspring. If kin selection drives cannibalistic behavior, rates of cannibalism should be lower in unrelated individuals.

## 8) Species of mosquitos found in Livingston, Alabama

Graham R. Berry, Brianna M. Davis, and Kevin J. Morse

There are roughly 60 species of mosquitoes that are capable of carrying diseases in the state of Alabama. In this study, mosquito samples were taken from various locations in Livingston, Alabama to determine the distribution and prevalence of species within the area in an effort to determine what diseases the area might be at risk for. Pipettes were used to extract individual larva from standing water, and adults were captured by hand. From April 2013 to February 2014, 12 different species were discovered. *Culex quinquefasciatus* (Southern house mosquito) proved to be the most common species with 71+ captures followed by *Aedes albopictus* (Asian tiger mosquito) with 39. These species are known vectors for a variety of diseases, including the West Nile virus, Yellow Fever, and Eastern Equine Encephalitis. This study will provide the information needed to determine the number of disease carrying species as well as provide a basis for future studies to determine what diseases can be found in this area.

## **9) Do geese contribute to the amount of *E. coli* found in treated sewage from the Cahaba Waste Water Treatment Plant?**

Avery Smith and Brian Burnes

Water quality is vital for the safety of human and animal life. Treated sewage water must be evaluated to ensure that the levels of bacteria returning into the effluent water supply are acceptable. The Cahaba Waste Water Treatment Plant routinely checks the level of *E. coli* that is returning to the Cahaba River. Recent elevated levels of *E. coli* found in effluent water supply suggest possible *E. coli* contamination from geese that lived on the waste water treatment plant grounds. In order to test this, goose fecal, influent, effluent, and river water samples were collected and isolated by being streaked onto EMB agar. The *E. coli* were assayed by antibiotic resistance and classified using discriminate function analysis. We show that the geese did not contribute to the increase of *E. coli* found in the effluent water supply of the Cahaba Waste Water Treatment Plant.



## 10) Exposure to *Candida* species in a college environment

Tamara Smoot and Brian Burnes

Recent studies have shown that opportunistic mycoses are becoming a persistent public health problem, especially on college campuses. In this study we investigated the prevalence of *Candida* on the campus of The University of West Alabama. *Candida* was recovered from various samples throughout the campus and identified to the species level. Our results for *C. albicans*, *C. tropicalis*, and *C. krusei* are consistent with previous studies. In this study we show that *Candida* species found are typical of the college environment.

## **11) Bacterial count of discount retail ground beef**

Abby Carroll and Brian Burnes

Bacterial contamination of meat products has been an ongoing problem in the US. Consumer safety has been brought to the frontlines, with meat spoilage being one of the main causes of food poisoning. It is a common practice in retail grocery stores to sell expired meat for a discount price. In this study, we investigated the bacterial count of discounted ground beef using the Pour Plate Assay (Nutrient agar with 4% glucose). Studies prior to this have shown that bacteria count can multiply 40 folds within hours at grocery store conditions. Our results support proving studies showing count on the discount ground beef can be higher.

## 12) Transfer of *S. aureus* and MRSA from gym equipment to hands.

Essence Parrish and Brian Burnes

A concern with community acquired methicillin-resistant *Staphylococcus aureus* has emerged because of the possibility that fomites may play a significant role in the transfer of *S. aureus* to humans. Aside from health care facilities (i.e., nursing homes, hospitals, etc.), studies have found that relatively large numbers of *S. aureus* were also found on shared equipment in community fitness centers. However, whether *S. aureus* and MRSA reaches the body on contact with the fitness center equipment remains unclear. The purpose of this study is to identify *S. aureus* and MRSA equipment-to-body transfer in a small community fitness center. Exercise equipment and the users of the equipment were sampled for *S. aureus* and MRSA before and after the equipment was used. A previous study at the same gym found that *S. aureus* and MRSA were present on 84% and 42% of surfaces, respectively. This study further examines the possibility that fomites may lead to the transmission of potentially infectious Staphylococcal species.

### **13) The Small World Initiative: An antibiotic discovery-based freshman course**

Lauren Acord, Mara Deluca, Fhallon Ware-Gilmore, Savanna P. Wooley, and Mustafa R. Morsy

The University of West Alabama is one of 24 nationwide partners in the Small World Initiative (SWI) program led by Yale University. The SWI aims to harness the power of active learning to engage students in laboratory research at the freshman year and to lay the groundwork for the discovery of new antibiotic from soil bacteria. We have collected diverse types of soil samples from areas around UWA campus, such as Lake LU, Alfa Environmental Center, a rural deer field, a ditch, a construction site and boat landing at the Black Warrior River in Moundville. We have tested the bacterial diversity (frequency and types) of these different soils. We found that the soil rich in nutrients contained high number of bacteria compared to soil poor in nutrient. We are currently testing the ability of unknown soil bacteria to inhibit the growth of close relative of bacterial pathogen such as *Escherichia coli* and *Staphylococcus epidermidis*. The course has provided us as freshmen students with a very interesting venue to investigate a very important research and has been an inspiration to be a successful biologist.

### III. Ecology and Environmental Sciences

#### 14) *Palaemonetes* sp. size and rates of parasitism in Santa Rosa Island (FL) tidal pools and adjacent seagrass meadows.

Katelyn Knight and John McCall

Grass shrimp (*Palaemonetes* sp.) are among the most abundant invertebrates in estuaries along the Gulf Coast and are very significant in energy transfer in these systems. They are found in a wide range of habitats, ranging from seagrass meadows in hypersaline lagoons to brackish pools highly influenced by freshwater runoff or rainfall. *Palaemonetes* is susceptible to parasitism by a number of parasites, most notably parasitic isopods in the Family Bopyridae. The incidence of parasitism could prove quite significant to the role played by *Palaemonetes* in marine systems, as it affects mortality rates and shows sublethal effects on activity. In this study, we examine rates of parasitism in grass shrimp collected from two distinct habitats in Santa Rosa Sound, a lagoon system located between Santa Rosa Island and the mainland of extreme northwest Florida. The habitats investigated include seagrass meadows in the lagoon itself and nearby brackish tidal pools on the barrier island. We used hand-held seines and dipnets to collect *Palaemonetes* from the two habitats under investigation during the winter and spring of 2013-2014 and compared shrimp density as well as the rate of bopyrid infestation. In conjunction with grass shrimp collection, environmental parameters were measured in an attempt to determine effects on rates of parasitism. Results are tentative at this point, and data collection continues.

## 15) Ecology of fish assemblages of brackish pools on a northern Gulf of Mexico barrier island.

Caitlyn Bonham and John McCall

Barrier islands in the northern Gulf often feature small, brackish pools that demonstrate varying degrees of connection to adjacent marine systems. Such pools are particularly common on Santa Rosa Island, a long, narrow barrier island in the extreme northwestern Florida panhandle. Semi-permanent pools there range from less than 100 square feet to several acres in size. Some show regular tidal connections with Santa Rosa Sound to the north of the island, while others are flooded only on the highest spring tides. These pools support an assemblage of fish adapted to the highly variable environmental conditions that may occur there. We report here the results of a sampling program designed to examine these fish assemblages and the environmental factors affecting them. Sampling began in the winter of 2013-2014 and continues to date. Eight pools on Santa Rosa Island were sampled monthly by hand-held seine. Salinity, dissolved oxygen, and temperature were sampled concurrently. Collections were also taken from nearshore sand flats and seagrass meadows in Santa Rosa Sound for comparison. Fish assemblages were dominated by euryhaline species such as *Cyprinodon variegatus* and *Gambusia affinis*. Even in pools with a high degree of connection to nearshore waters, there was little similarity between fish assemblages in the pools and those in the Sound. We are currently beginning an investigation of the degree of genetic isolation in fish inhabiting these systems.

## **IV. Other Disciplines**

### **16) An investigation of language accent's influence on emotional reactions and perceptions of intelligence/ability**

Amber Hudson, Breanna Black, and Mark Davis

The study tested language accent influences on emotional/cognitive reactions. Participants listened to one of five audio CV's of individuals applying for an academic position. Participants' facial reactions were recorded and participants rated the target on intelligence/ability. Results indicated more negative facial reactions and self-report ratings associated with less familiar accents.

## 17) Resting and exercise electrocardiogram sinus rhythm differences in Division-2 student athletes and sedentary individuals.

Hakima Amerg, Karissa Lopez, Lindsey Moroski, and James Robinson

**Background:** According to the American Heart Association, sudden cardiac death kills 1 in 44,000 collegiate student-athletes each year. Preventative measures should be taken to ensure heart healthy student-athletes. Electrocardiogram (ECG) is a good predictor of heart abnormalities and should be utilized for all student-athlete pre-participation screenings. However, ECG is rarely employed in sport pre-participation screenings.

**Purpose:** The purpose of this study was to analyze ECG sinus rhythms between student-athletes and sedentary populations before and after exercise. If ECG sinus rhythm differences were shown, pre-participation screenings may be necessary for all student-athletes.

**Methods:** 20 apparently healthy, college-aged student-athletes and sedentary subjects were randomly selected and categorized into two groups. Standard anthropometric measures were collected. Resting ECG was measured on all subjects. Subjects exercised for 15-minutes at a moderate intensity utilizing a YMCA cycle ergometer protocol. ECG sinus rhythms were recorded continuously.

**Results:** Significant differences ( $p < .05$ ) in exercise heart rate were shown between student-athletes and sedentary population. No significant differences were shown in resting or exercise ECG sinus rhythms between the groups.

**Discussion:** Research suggests that athletes have lower exercise heart rates than sedentary populations. However, ECG sinus rhythms did not differ at rest or exercise between the populations. Therefore, ECG's may not be required for pre-participation screenings in all student-athletes. However,



if available, ECG's are recommended for all new athletes to a program.

**Conclusion:** Further studies should include a larger sample size in both populations. ECG is a good measure for pre-participation screenings in both athlete and sedentary populations.

## 18) Athletic trainers' ability to recognize and aid in the treatment of mental health disorders.

Mary E. Watkins, Brittany L. Rodden, and James Robinson

**Objective:** Mental health disorders are becoming more common in the student-athletes. Athletic Trainers (AT) should have clinical knowledge for assisting in treatment of mental health disorders. The purpose of this research was to determine (a) AT competency and knowledge of mental health disorders (b) AT competency and knowledge of depression and (c) AT current practices in referring student-athletes to counseling or sport psychology services.

**Design:** Mixed-Method.

**Setting:** Online and handout survey containing both quantitative and qualitative items.

**Subjects:** A total of 39 AT (19 male, 20 female) representing a response rate of 100%.

**Measurements:** Athletic Trainers Depression Recognition Survey (ATDRS) .

**Results:** 53.8% of AT felt incompetent in recognizing mental health disorders in student-athletes. 30.8% of AT surveyed said they have dealt with a student-athlete battling depression. 69.2% of AT stated that they have never heard of the DSM-V. 84.2% said they were able to recognize the five stages of grief. Only 12.8% of AT have referred a student-athlete to counseling. 97.4% said that additional psychological training would help aid in the treatment of mental health disorders. When asked, 7.7% of AT did not consider themselves a good athletic trainer.

**Conclusion:** Research indicates that AT lack the ability to recognize mental health disorders. However, AT would like to expand on their knowledge and skills to assist with the treatment of their athletes' mental health.

### **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 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 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 350 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.

## **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 2014 West Alabama Regional Science Fair will sponsor a winning student's travel to the 2014 International Science and Engineering Fair to be held in Los Angeles, California from May 11 - 16, 2014. 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 a biology, math, science, or computer science major, 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'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 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.

## 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/>

### **University of Alabama-Birmingham School of Engineering**

<http://www.uab.edu/engineering/home/>

### **Virginia Tech**

<http://graduateschool.vt.edu/>

### **Penn State University Graduate School**

<http://www.gradsch.psu.edu/>

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

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



## Author Index

<b>Student (Last, First)</b>	<b>Advisor (Last, First)</b>	<b>Page</b>
Acord, Lauren	Morsy, Mustafa R.	13
Amerg, Hakima	Robinson, James	17
Armuelles, Hayden	Morsy, Mustafa R.	4
Berry, Graham	Morse, Kevin	8
Black, Breanna	Davis, Mark	16
Burnett, Taylor	McCall, John	6
Bonham, Caitlyn	McCall, John	4, 15
Carroll, Abby	Burnes, Brian	11
Clecker, Blake	Morsy, Mustafa R.	4
Collins, Sidney	McCall, John	7
Dancy, Fannetta	Morsy, Mustafa R.	5
Davis, Brianna	Morse, Kevin J.	8
Davis, Nicole	Morsy, Mustafa R.	5
DeLuca, Mara	Morsy, Mustafa R.	13
Elston, Morgan	Shumaker, Ketia	3
Harry, Brittany	Shumaker, Ketia	2
Hudson, Amber	Davis, Mark	16
Knight, Katelyn	McCall, John	14
Lopez, Karissa	Robinson, James	17
Moroski, Lindsey	Robinson, James	17
Nelson, Brandon	Morsy, Mustafa R.	5
Odom, Timothy	Shumaker, Ketia	1
Parrish, Essence	Burnes, Brian	12
Rodden, Brittany L.	Robinson, James	19
Thompson, Tamyra	Morsy, Mustafa R.	5
Shoup, Stephanie	Morsy, Mustafa R.	5
Smith, Avery	Burnes, Brian	9
Smoot, Tamara	Burnes, Brian	10
Ware-Gilmore, Fhallon	Morsy, Mustafa R.	13
Watkins, Mary E.	Robinson, James	19
Williams, KelviNeisha	Shumaker, Ketia	1
Wooley, Savanna	Morsy, Mustafa R.	13

# Acknowledgements

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