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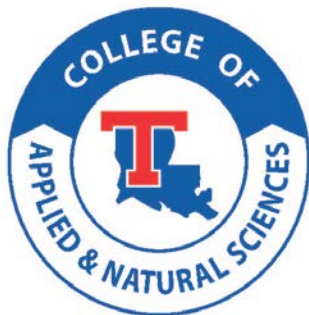
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**College of Applied and Natural Sciences
ANS Day & ANS Research Symposium
Louisiana Tech University Student Center**

April 20, 2017

8:00 – 10:00 AM Oral Presentations - Names of oral presenters are listed below.
(Student center rooms 222 and 224)

- 8:00-8:05 Introduction - Dr. Bill Campbell, Associate Dean for Research
- 8:05-8:17 Heidi Adams; Assistant Professor, School of Agricultural Sciences and Forestry
- 8:17-8:29 Barrett Moore; Undergraduate Student, B.S. in Agricultural Business
- 8:29-8:41 Christopher Stelly; Graduate Student, M.S. in Biology
- 8:41-8:53 Katie Barrow; Assistant Professor, School of Human Ecology
- 8:53-9:05 Anna Whitehead; Graduate Student, M.S. in Molecular Science and Nanotechnology
- 9:05-9:17 Joseph Straub; Graduate Student, PhD in Molecular Science and Nanotechnology
- 9:17-9:29 Dhananjay Naik; Graduate Student, M.S. in Molecular Science and Nanotechnology
- 9:29- 9:41 Cody McLeland; Graduate Student, M.S. in Molecular Science and Nanotechnology
- 9:41-9:53 Jennifer Hill; Assistant Professor , School of Biological Sciences.
- 9:53-10:05 Anusha Elumalai; Graduate student, PhD in Molecular Science and Nanotechnology

8:30 – 11:30 AM Poster Viewing Session – Poster presenters will be in attendance.
(Main Floor of Student Center)

Posters will be presented by students and faculty members from academic units within the College of Applied and Natural Sciences

11:30 – 1:00 PM Lunch Buffet - Free for ANS students, faculty, staff, and invited guests
(Main Floor of Student Center), tickets available in academic unit offices

12:15 - 1:00 PM ANS Student and Faculty Awards
(Main Floor of Student Center)

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ORAL PRESENTATION ABSTRACTS

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Acquisition of a mammalian fur collection to aid in species identification among wildlife students

Heidi L. Adams

School of Agricultural Sciences & Forestry, Louisiana Tech University

Being able to correctly identify a species is a vital skill that every wildlife biologist must possess. For instance, incorrect identification when assessing damage associated with wildlife can lead to ineffective management plans to control the species in question. Furthermore, because wildlife is one of the most enjoyed natural resources by the general public, it is essential for a wildlife biologist to correctly identify species that are of interest or concern by outdoor recreationists to avoid spreading false information about wildlife. With the use of Innovative Instruction funds granted by the College of Applied and Natural Sciences, I acquired a mammalian fur collection consisting of 12 species (raccoon, beaver, bobcat, coyote, gray fox, mink, river otter, opossum, red fox, nutria, striped skunk, muskrat) to assist wildlife students at Louisiana Tech University in learning wildlife species identification. Since obtaining the fur collection, I have used to enhance student learning in the following ways: (1) recognize coloration patterns in the fur and understand the benefit to the animal of such patterns (e.g., camouflage or aposematic [warning] coloration, such as in skunks); (2) learn the biological and ecological benefits of the various cover types and body forms among wildlife (e.g., waterproof fur in beaver and nutria); and (3) compare and contrast size differences between similar species (e.g., the larger red fox compared to the smaller gray fox). The furs were obtained from Perry Furs, the same company from which the Louisiana Department of Wildlife and Fisheries (LDWF) obtain their fur collections.

Morphological Assessment of Longleaf Pine Seedlings to Understand Hybridization Patterns in Seed Crops over the Last Five Years

Barrett A. Moore¹ and D. Paul Jackson²

¹Undergraduate Student, Agricultural Business, School of Agricultural Sciences and Forestry

²Assistant Professor, School of Agricultural Sciences and Forestry, Louisiana Tech University

Longleaf pine (*Pinus palustris*) is commonly planted in the Southern Gulf Coastal Plain because of its strength and tendency to grow tall and straight as well as for ecosystem restoration. In nature, another southern pine species known as loblolly pine (*Pinus taeda*) can cross-pollinate with longleaf pine producing an undesirable hybrid known as Sonderegger pine (*Pinus x sondereggeri*). Sonderegger pine exhibits characteristics of both longleaf pine and loblolly pine. While little is known about the commercial viability of planting Sonderegger pine seedlings, the hybrid species is often known to have a poorly developed crown and contorted branches. Because of this, nursery managers often choose to cull seedlings that develop as hybrids in the nursery to prevent them from reaching forest lands and landscapes. Sonderegger pine seedlings stand out in the nursery with an elongated bud of several inches compared to a true longleaf pine with a bud that rests near the ground line.

Longleaf pine seedlings that were grown in 2015 at a Georgia nursery were brought to Louisiana Tech for evaluation of hybrid-like characteristics. The seedlings were grown from seed collected in 2014 cone crops from two seed orchards in Louisiana and Mississippi. Approximately 80 percent of seedlings evaluated from one seed orchard exhibited bud elongation, however, the hybrid characteristics were different from normal Sonderegger seedling characteristics. To compare, seedlings grown from seed collected from 2013 and 2015 cone crops were evaluated and exhibited only 1-2 percent bud elongation. The objective of this research was to determine why hybridization was so prevalent in the 2014 longleaf pine seed crop and if the cause was the result of a one-time incident or possibly a recurring trend. Morphological characteristics such as root collar diameter, bud elongation, root and shoot biomass, and root weight ratio were recorded from seedlings grown from the 2013, 2014, and 2015 longleaf pine seed crops. Seedlings from these sources were also outplanted in the Kisatchie National Forest near Pollock, LA. The field plots will be monitored for many years in the hope that as the trees grow, evaluations will determine whether they develop more like known Sonderegger pine or if they exhibit more standard longleaf pine form.

Influence of Land Cover on Natal Den Type of Louisiana Black Bear

Christopher D. Stelly¹, Heidi Adams², Sean Murphy³

¹*Graduate Student*, Department of Biological Sciences, Louisiana Tech University

²*Assistant Professor*, Department of Agricultural Sciences and Forestry, Louisiana Tech University

³Louisiana Department of Wildlife and Fisheries

The Louisiana black bear (*Ursus americanus luteolus*) metapopulation has exhibited substantial growth that contributed to its removal from the Federal List of Endangered and Threatened Wildlife in April 2016, however, further range expansion remains a primary goal for the subspecies. Since female black bears exhibit philopatric behavior, range expansion of the species will benefit from sex specific habitat management (i.e., management focused towards female requirements), specifically reproductive habitat. Female black bears are known to select natal dens in large hollow trees, as well as piles of forest debris, in which to birth and rear their altricial cubs. Since the landscapes found throughout the current range of this subspecies are not synonymous in stand type or management, determining the land cover types that influence the type of den selected by females can aid in identifying areas that Louisiana black bears may exploit for reproductive habitat. Thus, my objective is to determine if certain den types (e.g., tree or ground) are more probable in each of the four subpopulations based on the existing land cover types (e.g., forest, natural, agriculture). Den type was identified for 345 natal den locations of Louisiana black bear females from 1993 to 2017. Using spatial coordinates for the dens, surrounding land cover types were identified and also re-classified based upon the 2011 National Land Cover Database. Logistic regression was used to predict the probability of either den type being selected for based on available land cover type. It is anticipated that results will provide further information that will be used to predict areas in, and between, the four subpopulations that can currently serve as natal denning areas, or can be manipulated via silvicultural techniques to influence the selection of natal dens based on land cover availability.

Mixing and Shifting Messages about Gender

Katie M. Barrow¹, Chelsea Paul², Alex Albritton², Meghan Johnston², Trey Courts²

¹*Assistsant Professor, Human Ecology, Louisiana Tech University*

²*Human Ecology, Louisiana Tech University*

This retrospective qualitative study investigated the messages that young women received about gender from their family of origin. Utilizing a narrative approach, emerging adults attending a four-year public university in the Southern United States were asked to type a one-page, single-spaced narrative (approximately 650 words) in which they reflected on the messages they received about gender while growing up in their family of origin. A feminist theoretical framework guided the development of this study and informed the data analysis in which 37 emerging adults shared how gender was reproduced, maintained, and challenged in their families of origin. Data analysis was conducted through an intensive constant comparative process of open, axial, and selective coding techniques. Members of the research team separately reviewed each narrative before coming together to discuss codes and create a unified, yet flexible, coding scheme. Upon multiple iterations of the data, general patterns and themes emerged as reflected by the participants' accounts of their own lives. Data interpretation yielded findings that suggest young women received mixed messages about gender during their childhood and adolescence. Participants noted a stark distinction in messages they received from male and female family members across childhood and adolescence, as well as a shift in the content of the message upon entering adolescence. Moreover, participants spoke to ways in which they currently mix – or plan on shifting – gender roles and expectations in their own lives.

Effect of heat activation on spore germination of *Bacillus anthracis cotH* mutant spores

Anusha Elumalai¹, Dhananjay Naik¹, Henry Johnson¹ and Rebecca Giorno²

¹Graduate student, Department of Applied Natural Sciences, Louisiana Tech University

²Associate Professor, Department of Applied Natural Sciences, Louisiana Tech University

Spores of *Bacillus anthracis* germinate in the presence of nutrients sensed by germinant receptors. Historically, *B. anthracis* spores are exposed to sublethal heat treatments to reduce the time between nutrient exposure and germination (T_{lag}). *B. anthracis cotH* mutant spores germinate faster and more completely than wild type (wt) spores. Therefore we wondered if the heat activation step is necessary for *cotH* phenotype. We measured and compared the germination rates of heated and unheated wt and *cotH* spores using loss of optical density. Heat activation does not reduce the T_{lag} in *cotH* spores. Heat activation does not positively impact germination rates in *cotH* spores. We suspect that heat activation denatures proteins which lower the germination rates in wt spores and these proteins are absent or heat resistant in *cotH* mutant spores. We will investigate other mutant strains that impact germination in *B. anthracis*.

Shared enemies, habitats, and alien invaders: Interactions between exotic Asian tiger shrimp (*P. monodon*), native shrimp, and red drum predators

Jennifer M. Hill^{1,2*}; Brian Klimek²; Olivia Caretti³; Kenneth L. Heck Jr.²

¹ Louisiana Tech University, Ruston, LA; jmhill@latech.edu ² Dauphin Island Sea Lab, Dauphin Island, AL ³. North Carolina State University, Raleigh, NC

Since 2011, Asian tiger shrimp (*Penaeus monodon*) have steadily appeared in commercial shrimp catches from North Carolina to Texas. Their consistent presence is concerning because the tiger shrimp's large body size, crustacean diet, and estuarine distribution suggests that tiger shrimp may consume and/or compete with native shrimp. Furthermore, tiger shrimp size may hinder predation and limit biotic resistance to tiger shrimp invasion. To assess these concerns, we used mesocosm experiments to examine predatory and habitat displacement interactions between tiger shrimp and native shrimp. We also used large mesocosms to differentially compare red drum (*Sciaenops ocellatus*) predation rates on tiger shrimp and native shrimp and their anti-predator responses. In contrast to initial fears, tiger shrimp predation rates on native shrimp were low. However, interactions between native shrimp and tiger shrimp often displaced native shrimp from preferred habitats. Surprisingly, interactions between tiger shrimp and native shrimp did not increase predator-driven mortality in the presence of red drum. Red drum consumed fewer tiger shrimp than native shrimp potentially due to their larger size. Together these results suggest that tiger shrimp may have few negative impacts on native shrimp, even though there appears to be limited biotic (predator) resistance to tiger shrimp invasion.

Presenting Author: Professional

Presentation Preference: Oral

Topics: Biological Invasions, Behavior, Community Ecology

CotH controls Alanine racemase (Alr) assembly to *Bacillus anthracis* Spores

Cody Mcleland¹, Rebecca Giorno²

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²*Faculty, School of Biological Sciences, Louisiana Tech University*

Background: *Bacillus anthracis* undergoes a multi-step developmental process resulting in a dormant spore. This durable spore is the infectious particle, which must break dormancy and germinate to cause disease. We study the two outermost spore layers: the exosporium and the coat (2). Alanine racemase (Alr) is thought to be assembled into both layers and converts the germinant L-alanine into the germination inhibitor D-alanine (1). Compared to wild type (wt), *cotH* and *alr* mutant spores germinate more completely and in suboptimal concentrations of L-alanine. Because spore assembly is controlled by protein–protein interactions, and CotH controls a minimum of four spore proteins, we hypothesize that Alr is one of these CotH assembly-dependent proteins.

Methods: Germination assays were conducted using L-alanine alone or with cogerminants (i.e. L-tryptophan). Wt, *cotH*, and *alr* spore extracts were analyzed through immunoblotting with anti-Alr antibodies.

Results: With 10 mM L-alanine, the *cotH* and *alr* spores germinate comparably and more completely than wt spores (Data Not Shown). Similar trends were observed using 0.5 mM L-alanine and 5mM L-tryptophan (Figure 2). Western blot analysis shows *cotH* spores are negative for Alr (Figure 1).

Conclusion: We have confirmed that CotH controls the assembly of Alr to the *Bacillus anthracis* spore. Germination kinetics with L-alanine as a germinant or cogerminant indicate that *cotH* and *alr* spores germinate more fully due to a lack of Alr.

Identification of Morphogenetic proteins in Alanine racemase (Alr)

assembly in *Bacillus anthracis* spore.

¹Dhananjay Naik, ²Rebecca Giorno

¹ Undergraduate Student, Department of Applied and Natural Sciences, Louisiana Tech University

² Assistant Professor, Department of Applied and Natural Sciences, Louisiana Tech University

Bacillus anthracis spores are the infective particle for anthrax. Spores are extremely resistant to harsh conditions and can stay dormant for years. Dormancy can be overcome by a process known as germination in the presence of nutrients (typically L-alanine and an amino acid or a nucleoside). We study the two outermost spore layers: the exosporium (outermost) and coat (which is underneath). These layers are assembled through series of protein-protein interactions. Some proteins such as SpoVID, CotE, CotH, and CotO are responsible for the assembly of the other 80-100 proteins that reside in these layers and are called morphogenetic proteins. Previous studies indicate that Alanine racemase (Alr) is present in both the exosporium and the coat. Alr inhibits germination by converting L-alanine (germinant) to D-Alanine (germination inhibitor). We used two different methods to determine which of the morphogenetic proteins control the assembly of Alr in the spore. The first was a fluorescence based assay to measure Alr activity of the spores. The second was western blot analysis using an anti-Alr antibody. We are able to measure Alr activity in wild-type spores, and can also inhibit that activity using D-cycloserine, a known inhibitor of Alr. We then measured Alr activity in the deletion strains for the morphogenetic proteins listed above as well as *alr*. Initial results indicate that both *alr* and *cotH* mutant spores lack Alr activity. Furthermore, these results have been confirmed by western blot analysis which indicates *cotH* spores lack Alr. These results show that CotH is responsible for Alr assembly. We are currently exploring if the other morphogenetic proteins decrease Alr activity.

The Role of MED31 in the Regulation of Mesenchymal Stem Cell State

Joseph Straub¹, Erik Beadle¹, Bruce Bunnell², Jamie Newman³

¹*Graduate student, School of Biological Sciences, Louisiana Tech University*

²*Professor, Tulane Center for Stem Cell Research and Regenerative Medicine, Tulane University*

³*Professor, School of Biological Sciences, Louisiana Tech University*

Mediator, a eukaryotic protein complex composed of 26 subunits in humans divided into four modules, is a master regulator of cell-type specific gene expression. Mediator functions as a large molecular adaptor that, with the help of DNA looping, connects gene regulatory element-bound activators to the transcription pre-initiation complex (PIC) located on the promoter. Mediator then recruits RNA polymerase to the PIC. Our research focuses on how Mediator influences the state of differentiating bone marrow-derived mesenchymal stem cells (MSCs). Bone marrow-derived MSCs are harvested from adult donors and, in addition to their ability to self-renew, can differentiate down chondrogenic, osteogenic, and adipogenic lineages. Published research demonstrates that the absence of the middle module subunit MED31 reduces cell proliferation and appropriate differentiation as evidenced by reduced limb development in mouse embryos. We performed knockdowns of MED31 using siRNA, then performed osteogenic and adipogenic differentiation assays for up to 14 days post-transfection to determine the role of Med31 in directing proper differentiation. The MSCs remained viable post-transfection but displayed reduced adipogenic and osteogenic differentiation as demonstrated by images of cell morphology and patterns of gene expression. These results suggest MED31 is important for appropriate Mediator function in regulating MSC differentiation.

Characterization of Stem Cell-Biomaterial Interactions on Tailorable Poly(Ethylene Glycol) Hydrogels Designed for Tissue Engineering Applications

Anna Whitehead¹, Nehal Patel², Mary Caldorera-Moore³, and Jamie Newman⁴

¹ Graduate student, MSNT, School of Biological Sciences, Louisiana Tech University

² Graduate student, MSNT, College of Engineering and Science, Louisiana Tech University

³ Assistant Professor, Biomedical Engineering, Louisiana Tech University

⁴ Assistant Professor, School of Biological Sciences, Louisiana Tech University

New developments in stem cell research and biologically mimicking (biomimetic) materials are rapidly advancing potential methods for the regeneration of diseased or damaged tissues. In order to be clinically applicable, fully functional cells and tissues must be mass produced on a large scale, leading to the development of a novel field recently coined biomanufacturing. Currently, there is a need for new techniques in biomanufacturing that are inexpensive, tailorable, and reproducible. Here, we have developed a poly(ethylene glycol) (PEG)-based hydrogel platform that supports the attachment and viability of both mouse embryonic stem cells (mESCs) and human bone marrow-derived mesenchymal stem cells (hMSCs), which are pluripotent and multipotent stem cells, respectively. We have demonstrated that these stem cells continue expressing pluripotency (*pou5f1* and *nanog*) or multipotency (*tfrsf10d* and *cd44*) markers when cultured on our hydrogel platform. Previous studies have demonstrated that matrix elasticity can influence stem cells fate. The hydrogel platform we developed can be tailored to mimic the elasticities of native tissues, including bone (50–60 kPa), cartilage (25–30 kPa), and muscle (8–10 kPa). Thus, this platform has the potential to be used to direct stem cell differentiation toward specific lineages. mESCs and hMSCs were seeded on hydrogels of various elasticities during differentiation, and the effect of elasticity was analyzed using quantitative reverse transcriptase PCR and immunofluorescence. The studies described here increase our understanding of stem cell-scaffold based tissue engineering, as well as serves as a foundation for future cell-substrate interaction studies.

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“It’s in the Bag”! Rethinking the way we teach colostomy care

Tara Haskins¹, Sherrie Roberson²

¹*Assistant Professor, Division of Nursing, Louisiana Tech University*

²*Assistant Professor, Division of Nursing, Louisiana Tech University*

Nursing faculty across the nation are hearing the call from higher education, nurse educator experts and students to move from standard lecture and memorization to active learning techniques. In an effort to transform content in a medical surgical course, faculty in an associate degree program developed a student learning activity addressing patient care and colostomy appliances. Empathy in nursing students is addressed in nursing literature and was central to the project. Learning objectives included aspects of assessment, skill application and the sensitive, yet lived experience of clients faced with the need for a colostomy. Faculty were deliberate to make this activity extend beyond the classroom in a meaningful and impactful way. This poster presentation will present supportive literature, objectives, preparation and execution of this project for easy replication. In addition, student reflection and faculty pearls will be shared with the audience. These presenters are currently exploring this project from a research perspective. *Objectives:* The learner will understand the relevance of empathy in patient care and the impact on student learning. The learner will be able to evaluate the effectiveness of this activity for future adaptations in their courses.

Care for Angola Prison Men: Meeting Hospice Needs

Casey Henley¹, Daniel Nickeson², Melissa Madden MSN, RN³

¹*Undergraduate Student, Division of Nursing, Louisiana Tech University*

²*Undergraduate Student, Division of Nursing, Louisiana Tech University*

³*Assistant Professor, Division of Nursing, Louisiana Tech University*

The Division of Nursing held a screening of “*The American Nurse*” documentary during the National Nurses week festivities in May, 2016. The “*American Nurse*” documentary featured five nurses caring for their patients and aimed to elevate the voices of nurses through their personal stories. Tonia Faust RN, Angola Prison Hospice nurse, was featured in the film. Tonia Faust was invited as guest speaker to the showing of “*The American Nurse*” documentary where she was presented with five large containers of items. The Student Nurses Association drew up the list of items collected to donate to the hospice patients at Angola prison. Items included body wash toothpaste, deodorant, socks, lotions, dry soups, small packaged crackers and glade plugins. A poster was made and displayed on the SNA board in the classrooms. The information was conveyed through student emails, class group chats, Division of Nursing Facebook and on latechsna.org. This project demonstrated the Student Nurses community involvement through the donation of needed items to the Angola Prison Hospice patients. The viewing of the documentary reached over 170 attendees including nurses, students and alumni and it enhanced the development of two of Louisiana Tech’s Division of Nursing student learning outcomes: Service and Teamwork and Collaboration. The project was awarded the 2016 Louisiana State Student Nurses Association Community Health Award.

Putting Parkinson's on the Ropes: SNA Rocks Steady at Louisiana Tech University

Melani Howard ¹, Jaylin' Hampton ¹, Tara Haskins, DNP, RN

¹ *Undergraduate Student, Division of Nursing, Louisiana Tech University*

² *Assistant Professor, Division of Nursing, Louisiana Tech University*

In 2016, Louisiana Tech University Lambright Intramural Center brought Rock Steady Boxing to our community at the request of a local physician having been recently diagnosed with Parkinson's. Being one of three locations in the State, we are the only Rock Steady Boxing location in North Louisiana. Rock Steady Boxing is a nonprofit organization that began in 2008 in Indianapolis. The program aims to improve the quality of life of the over 60,000 people diagnosed with Parkinson's yearly. This community based fitness program uses non-contact boxing training techniques to build agility, endurance, hand-eye coordination and strength. The difference is that in the gym, Parkinson's disease is the opponent, giving birth to the phrase "Fight Back". There is growing interest and research in the neuro-protective nature of intense "forced" exercise. Participants have shown physical and psychological improvement from baseline evaluations.

The Student Nurses Association (SNA) at Louisiana Tech University adopted Rock Steady Boxing as an official community service opportunity for their members. SNA members volunteer during one of the three weekly 1 ½ hour exercise sessions or promote the program while increasing Parkinson's awareness in the community. Nursing students are able to see symptoms of Parkinson's disease during the physical activity as well as levels of severity experienced by the Rock Steady participants. The students volunteer during workouts by providing stand by assist as needed, demonstrating flexibility exercises, and cheering encouragement during heavy bag, combination, and speed bag drills. The coaches and participants at Rock Steady state that the Nursing students are great examples of a collaborative relationship with healthcare. Louisiana Tech Rock Steady coaches, participants and significant others believe that the students elevate the energy in the gym through excitement, encouragement and enthusiasm. This poster will provide the learner with an overview of the Rock Steady program and showcase volunteer efforts of the Student Nurses Association at Louisiana Tech University.

Effects of Lentil Physical form and Digestive Enzyme Availability on Postprandial Mood Responses

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Background We previously found that consuming a blended lentil meal reduced postprandial blood glucose response by 4.5 ± 1.1 mg/dL compared with a no lentil control but did not differ from a whole lentil meal. Furthermore, when the enzyme supplement α -galactosidase (α -gal), which has the potential to accelerate blood glucose absorption by promoting oligosaccharide digestion in the small intestine, was taken with the meals, there were no significant interaction, or main effects on glucose response compared with a placebo. Since poor glucose control has been associated with negative mood and higher blood glucose has been linked with both positive and negative mood responses, we hypothesized that consumption of both blended and whole lentils or taking placebo will lead to better mood responses compared with a no lentil control or α -gal respectively. Furthermore, the interaction effects of the lentil meals with α -gal will reduce the positive mood responses compared with placebo. **Methods** Mood data were collected as part of a randomized crossover, double-blind, placebo-controlled trial of lentil physical form and α -gal availability on glucose and appetite responses. Over a 3-h period following the consumption of breakfast burritos containing $\geq \frac{1}{2}$ cup of cooked whole (W), blended (B) or no lentils (C), each in combination with 3 α -gal or placebo pills subjects ($n=12$; BMI 23 ± 3 kg/m²; aged 28 ± 10 y (mean \pm SD)) rated the following mood responses: overall mood pleasantness, concentration, happiness, mental energy, physical fatigue, sleepiness, boredom, anxiety and irritability on a 9-point rating scale. **Results** Mixed model ANOVA showed the total AUC for overall mood pleasantness was higher for the α -gal than the placebo (1179 ± 42 vs. 1137 ± 42 , $p=0.042$, 4% difference). There were no main effects or interaction effects on AUC for any of the other mood variables. Consistent with the AUC results, analysis of changes over time in overall mood pleasantness also showed an effect of the enzyme supplement ($p=0.001$) such that α -gal resulted in higher overall mood pleasantness compared with the placebo. The time course analysis for the other mood variables showed significant effects; in general, consumption of both blended and whole lentils lowered positive mood responses (concentration, mental energy and happiness) and increased negative mood responses (physical fatigue, anxiety and irritability) from baseline compared with the control (the magnitude of effects ranged from 5-11% on a 9 point scale). Alpha-gal also generally resulted in increases in positive mood responses and decreases in negative mood responses. Also, mood differences across treatments were not associated with differences in blood glucose response. **Conclusions** Alpha-gal but not consumption of lentils resulted in favorable effects on mood responses in the postprandial state in our study. These effects did not appear to be mediated by changes in blood glucose.

USDBC; NIH RR025761

Title: Portion Control Education Program

Author(s): Angeline Baker, Destiny Cain, Rachel Haines, Abigail Holden

Affiliation: Undergraduate Students at Louisiana Tech University

Abstract text:

This community nutrition project included three components: (1) needs assessment; (2) intervention; and (3) evaluation. The population was 9¹/₂-11¹/₂ grade students in a Health and Nutrition class at Ruston High School. The objective of the initial needs assessment was to determine knowledge of correct portion sizes of various foods commonly consumed by teens. Data were collected using a written survey.

According to Lincoln Health Foundation, 16.6% of children aged 12-19 years of age in Lincoln Parish are either overweight or obese. The 17 participants in this study were 14 to 17 years old. The results from the written survey indicated a knowledge deficit in correct portion sizes of foods. A knowledge deficit was predetermined to be a score that was below 70%. The mean score of the 17 students was 14%: one student scored 40%, three students scored 30%, three students scored 20%, five students scored 10%, and five students scored 0%.

Based on this assessment, an intervention was planned. The intervention included one 45-minute education session with an activity to reinforce the lesson. The education session took place in the classroom at Ruston High School during the 5¹/₂ hour class. Before the lesson was taught, students were asked what they knew about childhood obesity rates in America, Louisiana, and Lincoln Parish; risks associated with childhood obesity; and behaviors contributing to obesity. The lesson focused on behaviors, particularly portion control. The lesson involved a hands-on activity in which volunteers were asked to participate in pouring, into a bowl or cup, what they believed was the correct serving size of various foods: dry cereal, salad dressing, apple juice, and one inch cheese squares. Three students at a time were asked to volunteer as each item was presented separately. Once the students poured what they believed was the correct serving size, the rest of the class guessed which serving was the closest to the correct serving size. Students were then instructed on the correct portion size and a sample was shown to provide a visual of what the correct portion size looked like, based on MyPlate recommendations. During instruction, food models were passed around and students were instructed on correct portion sizes of various foods/food groups. Questions and discussion were encouraged and students eagerly participated in discussion appearing genuinely interested in knowing more about nutrition. Afterwards, students were given a post-test that was exactly like the pre-test, which was administered prior to the lesson to evaluate what they had learned. The class mean score after teaching the lesson was 40%. Though the students enjoyed the class, changes in knowledge were low. It appears that repeated instruction may be necessary for knowledge change.

Based on this study, we recommend extending the lesson to two or three 45-minute sessions to provide more information related to risks and behaviors associated with obesity and appropriate portion sizes as well as suggestions related to food choices and healthy alternatives for snacking and physical activity.

Influences on Food Choices in College Women: A Community Nutrition Project

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This community nutrition project included three components: (1) needs assessment; (2) intervention; and (3) evaluation. The population was college females and the sample included the Panhellenic Council, which was a representation of the Louisiana Tech University Greek community. Objectives of the initial needs assessment were to determine: influence of peers on food choices, reasons and frequency for eating out, and knowledge and understanding of basic food preparation within a budget when cooking at home. Data were collected using a written survey.

The 14 participants in this study were 19 to 22 years old and members of a sorority at Louisiana Tech University. The results from the survey indicated all participants had a basic understanding of healthy food choices. The majority of the population agreed they ate more healthfully when cooking at home than when eating out. Most the participants went out to eat an average of twice per week, while 14% went less and about 1/3 went more than twice per week. Peer pressure occurred often in all participants; the majority indicated pressure to choose food similar to the group's meal choices, be it healthy or unhealthy, while still ordering something they would enjoy. The main barriers to choosing healthy options when eating at home or away from home were lack of time and money.

The intervention included two educational sessions. The first session focused on cooking at home for one on a budget. Participants viewed a PowerPoint Presentation in an informal, discussion-oriented setting. The power point included a video, preparation and shopping tips, and basic meal plan, handouts, and prepared sample recipe. The objectives were for participants to be able to identify/apply one tip mentioned in the lesson regarding saving money and one tip mentioned in the lesson for cooking for a single person. The second session focused on making healthy choices when eating out and included a PowerPoint Presentation and a handout that explained tips on how to eat healthy at restaurants and providing pictures of healthy meals that can be found at restaurants located in the Ruston area. The objectives were for participants to be able to identify/ apply at least one tip on making better choices while eating at restaurants and identify at least one healthy option on one of the sample menus provided.

After each session, participants were evaluated and they evaluated the presenters. For both sessions, participants gave high marks to the presenters, especially in the areas of being enthusiastic and knowledgeable about the topics covered and presenting information in a way which could be used day to day. As presenters, we felt the sessions were most impactful as the information was presented from college females to college females. This relationship level allowed participants to feel more comfortable and relatable resulting in a more successful intervention. The participants realized it was possible with their lifestyle to make these changes. Based on this study, we recommend having more resources available on campus for college women to learn and manage an individualized plan for eating healthy with a busy, college lifestyle.

The Relation between Early Childhood Educators' Supportive Behaviors and Preschoolers' Engagement in Classroom Food Experiences

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Determining the most effective practices for classroom-based intervention implementation is vital to ensure success and sustainability of educator-led programs and achieve positive outcomes for children. It is hypothesized that early childhood educator (ECE) behaviors consistent with best practice will be correlated with the preschoolers' engagement in the food experience. Fidelity observations were completed once per month (for 8 months) in each of the 15 Head Start classrooms taking part in a school-based nutrition curriculum. The goal of this program is to improve the dietary preferences and behaviors for children and families through ECEs' role modeling and leading hands-on experiences with healthy foods. Fidelity observations determine the degree to which program lessons were completed as intended. Bivariate correlations were run to explore relations between *Supportive Behaviors* and *Children's Engagement* by month. Results suggest that the *supportive behaviors* most strongly related to *Children's Engagement* are *Pacing* and *Appropriate Strategies*. *Pacing* was correlated with *Children's Engagement* for 7 of 8 months (Range: $r = .47, p = .09$, marginal, to $r = .83, p < .01$). *Appropriate Strategies* was correlated with *Children's Engagement* for 6 of 8 months (Range: $r = .49, p = .08$, marginal, to $r = .93, p = .002$). Additional analyses of fidelity observations show that ECEs exhibited behaviors consistent with desired practices in many areas including linking to learning outcomes, being prepared for the lesson, pacing the lesson, and responding to children's comments/questions. Teachers also tended to avoid negative practices during lessons such as threats and making negative comments. The areas in which the ECEs did not perform as well were completing lessons in small groups, making positive comments about food, eating food with the children, and using the program mascot in lessons to promote the food to the children.

Parent and Child Outcomes of a Head Start Curriculum Featuring Sensory Exploration and Interactive Cooking with Children

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Our purpose was to determine the at-home impacts of a school-based nutrition curriculum. Eighty-three Parent Interviews were completed at baseline and post-intervention on a sub-sample of parents who had a child attending a Head Start taking part in a school-based nutrition curriculum. The goal of this program is to improve the dietary preferences and behaviors for children and families through ECEs' role modeling and leading hands-on experiences with healthy foods. Baseline interviews were completed during parent orientation and post-intervention interviews were completed via phone. Several significant improvements were reported by parents. Using paired-sample t-tests, we found a marginally significant increase in cooking meals at home ($t = 1.77, p = .08$). Significant increases in parent intake of six of eight target foods were observed: Apples ($t = 2.47, p = .02$), Tomatoes ($t = 2.08, p = .04$), Sweet Potatoes ($t = 2.83, p = .006$), Carrots ($t = 4.11, p < .001$), Bell Peppers ($t = 2.07, p = .04$), Spinach ($t = 2.82, p = .006$), and Green Beans ($t = 2.36, p = .02$) and a marginal increase in intake of Blueberries ($t = 1.75, p = .08$). Parents increased their practices of asking children to select produce at the store ($t = 2.87, p = .005$) and showing their children that they enjoyed eating fruits and vegetables ($t = 1.87, p = .06$). Parents reported high levels of exposure to the program. This is notable as their exposure was largely indirect. For example, 90.5% reported that they had heard of the program at follow-up; 50% reported that they had attended a food experience at the center. Most (84.5%) reported that their children talked to them about fruits and vegetables eaten at school once per week or more; 46.4% discussed this with their parents every day. Over half discussed the program mascot with their parents more than once per week. Similar to findings with parents, paired sample t-tests indicated that child intake children increased for five of eight target foods at home: Sweet Potatoes ($t = 3.30, p = .001$), Carrots ($t = 4.20, p < .001$), Spinach ($t = 2.71, p = .008$), Green Beans ($t = 2.08, p = .04$), and Blueberries ($t = 2.66, p = .009$) and marginally significant increases for intake of two: Apples ($t = 1.81, p = .075$) and Bell Peppers ($t = 1.70, p = .09$). Parents also reported significant decreases in child intake of sugary sweets like cakes, cookies, and candy ($t = 2.16, p = .03$) as well as snack foods like chips and dip ($t = 1.99, p = .049$). A marginally significant decrease was observed for fast food intake ($t = 1.69, p = .096$). The overall program goal is to increase nutrition outcomes in families. These findings suggest that although the program is school-based and parent program exposure is indirect, significant changes occur at home in both parent and child behaviors.

Ethics and Safety of Respiratory Therapist

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Respiratory therapy involves many ethics and safety procedures. Respiratory therapist treat asthma, pneumonia, COPD patients, ventilation needs, and numerous other respiratory diseases, illnesses, and injuries. From newborns to the elderly they are exposed to it all. Therefore, there must be precautions set in place. This exploratory study features the main ethical and safety precautions studied over many articles. For example, the ethical choice to administer off-labeled drugs to a child to reduce pain, the effects of aerosols in the work environment, the hazards of *ipatient* versus face to face contact, and the ethics of end-of-life care. I used a literature methodology to conduct research about this topic and better inform the readers about the dire need for more education and training for these healthcare workers.

Social Media in Healthcare: Helpful or Harmful?

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The use of electronics, technology, and Internet in healthcare has increased tremendously since the idea of electronics healthcare first began. Today these are found in healthcare through the use of Electronic Health Records (EHRs), Electronic Medical Records (EMRs), patient portals, blogs, social networking sites, and telemedicine. More specifically, there has been a rise in social media use among patients and physicians. While social media has been shown to be beneficial when used by patients and physicians, there are also downfalls in the use of social media.

Why Medical Marijuana Is Essential

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Medical marijuana has been used medicinally for thousands of years. There has been ongoing research on the benefits that medical marijuana has. Many people view marijuana as an illegal drug that should not be used but there are actually more good than bad that comes from using the drug. The purpose of this research is to provide knowledge on medical marijuana and how it has proved to be an effective form of treatment for many diseases/conditions. This research includes information on the substances in marijuana and diseases such as epilepsy, Parkinson's, cancer, and Alzheimer's it has helped treat. The argument on whether or not medical marijuana is neuroprotective or neurotoxic is also mentioned. We have also compared medical marijuana to other drugs that are being prescribed by doctors today. The limitations of the research are discussed along with the recommendations for practice. This is an explorative study on medical marijuana and its benefits. The research question is, if marijuana is known as the most common street drug, then why/how is it a treatment for neurodegenerative disorders?

Diagnosis and Sample Handling of HIV in a Clinical Laboratory

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The diagnosis of Human Immunodeficiency Virus (HIV) depends upon the accuracy of the test, along with secondary testing to confirm an initial positive. The problem presented in current HIV testing is that it is a cyclic process which can put a lot of stress on a patient involved. There are many testing procedures that a clinician can choose to follow, however, all of these methodologies has a flaw in its function. The Enzyme Linked Immunosorbent Assay (ELISA) test requires an abundance of sample, and the western blot is outdated as a diagnostic procedure. The Western blot is not used for diagnosis, but is simply utilized for the confirmation of a primary testing method. Rapid tests along with the ELISA require a secondary mode of testing when confirming a positive result. Polymerase Chain Reaction (PCR) is only used in specific cases that involve patients who have undergone specific medical treatments or have already been diagnosed with a particular type of HIV infection. With diagnosing these infections, sample handing methods that are in place must be followed because if the protocols are not adhered to then the diagnostician may be putting themselves as well as other patients at risk for contamination.

Confidentiality and Privacy of Medical Information

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This paper is an exploratory study of research literature concerning perceptions of medical information privacy. A thorough review of the research was conducted. Research was studied pertaining to the Health Information National Trends Survey (HINTS) conducted by the National Cancer Institute. Per HINTS data, respondents were asked if they felt their medical information was safe from unauthorized access, that the information was safely guarded, and if they had ever withheld information from a medical provider out of fear of loss of privacy. The research showed that 58 percent of the people were concerned about their privacy related to medical records and that 14 percent had withheld information from their medical provider out of privacy fears. Additional studies of research into privacy of medical information found the same rates of concern among young adults, adolescents, and workers. Elderly patients as well as minority races were very concerned about their medical privacy. Working in healthcare requires due diligence to maintain the confidentiality and privacy of any medical information received. Education about maintaining privacy of medical records is paramount. There is much work required to improve the rate of patients' confidence in medical information privacy.

Coconut Oil as a Treatment for Thrush in Horses

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It is well known that a horse is only as healthy as its hooves and the old adage, “no hoof, no horse” is still a very valid statement. Thrush is a common cause of lameness in the horse affecting several million horses in the United States alone which is a constant and significant health problem of horses. The Merck Veterinary Manual defines thrush as a degeneration of the frog with secondary anaerobic bacterial infection that begins in the central and collateral sulci. The medium chain fatty acids like lauric acid and capric acid, amongst others, are important constituents of coconut oil, and have been extensively proven to have antimicrobial properties. This study is being conducted to determine if application of coconut oil will decrease the bacterial growth associated with hoof thrush. For this project, 12 horses were selected that exhibit the clinical signs for thrush. Treatment groups consist of 1) Control group: no treatment (n=6) and 2) Treated group: one teaspoon of coconut oil rubbed on the underside of the hoof every three days for 45 days (n=6). On days 0 and 45 of the experiment, all horses will be swabbed for laboratory testing. *Fusobacterium necrophorum* has been proven to be predominant in thrush, therefore samples will be streaked on *Fusobacterium* selective agar (FSA) plates. In addition to numbers and amount of bacteria present, hoof scores are being determined for each horse throughout the treatment period.

Evaluation of white-tailed deer preference and nutritional quality among commercial food plot seed mixes

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Food plots are commonly used to attract wildlife to an area. Several companies providing food plot seed mixes boast on wildlife foraging desirability among wildlife for food plot seed mixes they provide, causing seed mix costs to vary. Our objective was to evaluate the ecological value of high- and low-cost seed mixes based on white-tailed deer foraging preference. We established 2, 0.4-ha food plots in north central Louisiana. We established a 2 (sites) x 3 (seed mixes) randomized block design with the following seed mix treatments: (1) a basic clover seed mix (control); (2) a white clover mix (advertised as having high protein content and digestibility); and (3) a mix with various clover species. Initial seeding occurred in February 2016; an additional seeding was required in March 2016. Sites were monitored with three game cameras/site that photographed deer consumptive events. Pictures were inspected and double captures were omitted. Deer presence, consumptive events, and the experimental unit (seed mix treatment) in which they occurred were recorded. Deer presence/consumptive events data are being analyzed using repeated measures techniques with sites and replications as random effects and seed mix treatment as fixed effects. Results from the initial analyses indicate a significant difference in deer consumptive events among the 3 seed mix treatments within the food plots ($p < 0.001$) with deer showing a stronger preference for the food plot seed mix with a mix of various clover species. Future analyses will include second field season data (seeding occurred March 2017), as well as nutritional quality of the food plot vegetation.

Effects of Three Methods of Weaning in Reducing Stress in Beef Calves

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The beef cattle industry is continuously working to improve the humane care and treatment of animals. Importantly, within this industry and others, weaning is one of the most stressful times in a calf's life. Weaning, or the removal of a calf from its dam, occurs at approximately six to eight months of age. Accordingly, increased or excessive amounts of stress on a calf can lead to sickness and decreased daily gain, an important factor in the beef industry as profits, puberty, and efficiency of the animal are all correlated with weight of the animal. To minimize stress during this time, producers utilize different methods of weaning calves, including: fenceline weaning, abrupt weaning, and the use of nose flaps. Therefore, the aim of this pilot trial was to determine the effects of different weaning methods on average daily gain in beef calves. To achieve this aim, 40 calves from the Beef Unit at Louisiana Tech University were randomly divided into three treatment groups (abrupt, fenceline, and nose flaps), with an equal number of bulls and heifers in each group. Calves subjected to abrupt weaning were removed from their mother on day 1 of the trial and moved to another location. Calves weaned by a common Fenceline Weaning Protocol were left in a pasture adjacent to their mothers. Lastly, calves weaned by a nose flap received flaps which were inserted non-surgically into their nasal openings and then turned back into the pasture with their mothers. Thus, in all treatment groups the calves were unable to nurse their mothers. Weights were recorded on days 1, 14, and 45 of the trial to calculate average daily gain. Calves were processed (vaccinated for respiratory diseases, dewormed, etc.) according to standard protocols for preconditioning programs such as Vac-45, Tri-Merit, and Select Vac. Average daily gain from day 1 to day 14 of the trial did not differ ($p \geq 0.05$) between calves weaned with flaps compared to those weaned abruptly or by the fenceline method. However, calves weaned by the fenceline method had significantly lower ($p \leq 0.05$) rates of average daily gain than the calves that were weaned abruptly. Interestingly, when assessing average daily gain between days 14 and 45 of the trial, no differences were seen based on treatment. Lastly, similar to the first 14 days of the trial, calves weaned by the fenceline method had significantly lower ($p \leq 0.05$) rates of average daily gain than the calves that were weaned abruptly. No significant differences ($p \geq 0.05$) were seen between calves weaned with flaps compared to those weaned abruptly or by the fenceline method. In conclusion, the use of nose flaps to wean beef cattle should not significantly increase stress experienced by the calves during this period. It is interesting, however, that fenceline weaning decreased average daily gain compared to abrupt weaning, as this conflicts with

previous data from other labs. Therefore, further research is warranted to fully define if one method of weaning is indeed less stressful than others.

Robert Hane

Herbicide Application over Hardwood Afforestation site release Morning Glory

Herbicide application is an important step in successful hardwood afforestation. The purpose of our genetic herbicide trial was to determine which timing of herbicide application (Oust XP) was the most efficient at controlling weeds and releasing untested hybrid sweetgum trees planted in 2015. Height and ground line diameter were measured for each tree prior to the growing season, and again at the end of the growing season (2016). While taking measurements late in the growing season we noticed some of the trees were partially or completely covered by Smallflower Morning Glory (*Jacquemontia tamnifolia*). Enough trees were affected to warrant a full tally of the site for Morning Glory and determine if any causes were apparent. Rows receiving a treatment of Oust XP for herbaceous weed control were approximately ten times more likely to be bound by Morning Glory than the seedlings that were not treated with herbicide. Seedlings that were bound by Morning Glory had significantly more diameter growth than unbound seedlings, but there was no statistical difference in the height of the seedlings. Due to the fact that Morning Glory germinates in the summer it was able to take full advantage of the competition-free study plot and overtop the seedlings. It is thought that increased diameter growth exhibited was a response to Morning Glory overtopping the seedlings.

Stimulating Poultry Production in Livestock Management Courses

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In each animal science course offered at Louisiana Tech University we strive to provide numerous opportunities for applied, hands-on learning. The Animal Science curriculum features several courses which discuss or are centered on the poultry industry. Our objective is to enrich student learning and job preparedness by incorporating applicable poultry production techniques and processes to animal science courses. Last spring, students in the Introduction to Poultry Science course built a chicken coop, allowing poultry to be raised on Tech Farm. If applicable, broilers produced on the university's farm can be harvested and processed at the Louisiana Tech Meats Lab. Purchase of an egg incubator and hatcher combination allows students to raise chickens and other fowl from an egg to a finished product. Tech Farm currently has a small egg production system. Alumni and other contributors have also donated fertilized eggs in the past and offered to do so in the future. Thus, we will now be able to consistently produce replacement birds, as well as fresh poultry products through our animal science courses. There are several animal science courses capable of integrating incubating, hatching, and raising poultry into their syllabus. Such courses include: Introduction to Animal Science (ANSC 111), Introduction to Animal Science Laboratory (ANSC 113), Introduction to Poultry Science (ANSC 201), Introduction to Livestock Management (ANSC 224), and Meats (ANSC 315). Each year approximately 150-200 students will be enrolled in these courses. At the beginning of the quarter, students will collect eggs from chickens on Tech Farm along with any donated to the classes. They will candle each egg to determine fertilization and then incubate all fertilized eggs. On Day 18 of incubation, eggs will be placed in the hatcher tray, which stimulates a different environment than what has been provided the first 18 days of incubation. From days 18 to 21, students will monitor hatching progress. Following hatching, the chicks will be placed in a brooder on Tech Farm until they are large enough to move into the coop. If the class is producing broilers, they will continue to feed the birds and will then process them at the end of the quarter. If laying hens are being produced, they may remain on Tech Farm for egg production.

The Importance of Louisiana Wood Products Manufacturing in a Changing Economic Environment

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The Wood Products Manufacturing sector contributes millions of dollars and thousands of jobs to Louisiana's economy by utilizing the state's number one crop, timber, as its raw material. It is surprising, though, that little information has been communicated about this sector over time. This is particularly true given the national and global factors that have impacted the forest products industry over the past two decades. Two techniques were employed to investigate the changes in Louisiana's Wood Products Manufacturing industries, location quotients (LQ) and shift-share analysis, using U.S. Census Bureau County Business Patterns employment data from 1998 to 2014 (the most recent year of available data when the study was begun). Five industries were examined using a minimum employment criterion of 300 jobs- Sawmills, Softwood Veneer and Plywood, Engineered Wood Products, Truss Manufacturing, and Reconstituted Wood Products Manufacturing.

Location quotients, relative employment at the state level to that nationally, were developed for each industry for the years 1998 and 2014. These indicators described the degree to which industry concentrations, or specializations, existed in the state each year. All industries possessed LQ_{2014} greater than 1.00, meaning they were more concentrated in Louisiana relative to the U.S. as a benchmark. Temporal changes were then determined as $LQ_{Ratio} = LQ_{2014} / LQ_{1998}$. Industries with LQ_{2014} and LQ_{Ratio} greater than 1.00 were deemed state strengths due to their high concentrations that were also increasing over time; Sawmills, Engineered Wood Products, and Truss Manufacturing qualified as such. Reconstituted Wood Products Manufacturing possessed LQ_{2014} greater than 1.00 but LQ_{Ratio} less than 1.00. While historically important to the state, this activity could be vulnerable to greater economic forces due to its concentration decreasing over time. Softwood Veneer and Plywood remained unchanged over the time series.

Employment changes from 1998 to 2014 were further decomposed using shift-share analysis. Louisiana Wood Products Manufacturing a net job loss of (3,400). Had the sector grown at a rate equal to the U.S. economy over the timer period, it would have gained 999 jobs. The significant contraction of the U.S. forest products industry overall would have cost Louisiana (4,300) Wood Products Manufacturing jobs had the state's sector changed at the same rate as its national counterpart. Reconstituted Wood Products Manufacturing displayed a competitive disadvantage over the time series. The state's Sawmill industry lost (770) net jobs, but its competitive advantage locally resulted in less job losses than those experienced

nationally. Distinct competitive advantages were found in Engineered Wood Products and Truss Manufacturing, where employment increased despite national level declines over the time period.

Lumber's Carbon Product Value in the South

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Lumber production in “America’s wood basket,” the 13 southern U.S. states, significantly contributes to the region’s economy. Using timber, manufacturing, and market price data, I determined lumber output in the South totaled 20.5 billion board feet in 2014 (the most recent data year), with a value of \$10.5 billion. However, there is additional economic value that is not currently being realized- lumber’s value as a carbon storehouse. Information on the environmental benefits forest products like lumber provide may encourage consumers to further consider sustainable materials in their purchasing.

Establishing carbon’s market value has been challenging, and that effort is still ongoing. Nine states along the east coast participate in the Regional Greenhouse Gas Initiative (RGGI), which took effect in 2009 as the first mandatory market-based program begun to reduce emissions of carbon dioxide. In 2012, the California Air Resources Board initiated the California Carbon Allowance (CCA) under its “California Cap and Trade Program.” Each program seeks to provide a mechanism via the marketplace that will drive long-term investment to improve efficiencies and develop cleaner technologies.

The carbon contained in the South’s 2014 lumber product was determined by converting board footage of production to bone dry tons. The lumber was initially assumed to be at 15% moisture content (dry basis) per U.S. Forest Service conversion factors. Fifty percent of the bone dry wood weight was then considered as carbon. By this measure, more than 13.5 million tons of carbon were stored in the South’s 2014 lumber product. To provide an estimated carbon product value, the RGGI clearing price and CCA futures contract were aggregated, averaged geometrically over the 2014 calendar year, and then converted from \$ per ton CO₂ to \$ per ton C, where carbon’s mass is 27.3% of CO₂’s total. This resulted in a mean price of \$29.17 per ton C.

The carbon product value was then determined by multiplication to be \$279 million. This represented 2.7% of the revenues received by southern lumber mills in 2014- dollars currently not being captured in the marketplace. The carbon value of softwood lumber (lumber sawn from gymnosperm tree species) was \$160 million, while the carbon stored in hardwood lumber (lumber sawn from angiosperm tree species) amounted to \$118 million. Louisiana’s sawmills produced 930 million board feet of lumber in 2014, which subsequently stored 616,000 tons of carbon valued at \$11.3 million.

Modifying Green Fluorescent Protein (GFP) Utilizing QuickChange Site-Directed Mutagenesis

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Green Fluorescent Protein (GFP) is an invaluable biological tool for imaging at a cellular level. Derived from the jellyfish species *Aequorea victoria*, GFP has the unique feature of producing a bright green fluorescence. The fluorescence from fluorescent proteins is derived from three amino acids, Serine⁶⁵, Tyrosine⁶⁶, and Glycine⁶⁷ these form an aromatic chromophore. Through alterations of specific amino acids in and around the chromophore, color modifications including YFP (yellow), EBFP (blue), and ECFP (cyan) can be produced. Utilizing QuickChange Site-Directed Mutagenesis, point mutations such as V68L and T203Y are introduced into a GFP containing plasmid to create Yellow Fluorescent Protein. To induce these mutations, primers are specifically designed to amplify the desired gene during polymerase chain reaction (PCR). After amplification, the subsequent plasmids are Dpn-1 digested to remove methylated DNA, and competent TSS cells are then transformed with the plasmid. By means of ampicillin agar plates, colony PCR, and gel electrophoresis, we determine if our desired product (YFP) was produced. Ultimately, QuickChange allows us the ability to modify GFP and create products that not only significantly improve the protein's fluorescence, but that also allow it to react with other molecules such as Reactive Oxygen Species (ROS).

Phylogeography and Species Delimitation of Slimy Salamanders (*Plethodon glutinosus* complex) in the West Gulf Coastal Plain

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Identifying species is challenging when they cannot be differentiated visually. A lack of recognition results in multiple cryptic species being grouped under a single species name, thereby underestimating biodiversity and hampering conservation efforts. In cases where species are undifferentiated morphologically, genetic data are often needed to delimit species. Slimy Salamanders of the *Plethodon glutinosus* complex are known for their extensive cryptic species diversity. The complex consists of 16 described species, and although, as a whole, they are common throughout much of the eastern United States, many species have restricted ranges. Species with highly restricted ranges are at higher risk of extinction and thus, it is imperative to identify range-restricted, cryptic species in order to protect them adequately. Evolutionary relationships within the *P. glutinosus* complex are poorly resolved and additional species likely remain to be discovered, especially in regions that have been poorly studied. The West Gulf Coastal Plain encompasses western Louisiana, eastern Texas, southern Arkansas, and southeastern Oklahoma. Three species of Slimy Salamanders, *P. albagula*, *P. kisatchie*, and *P. sequoyah*, are known from this region, but our knowledge of species diversity and distributions in the region is based on genetic analysis of only five populations. My research aims to determine the true species diversity, species distributions, and evolutionary relationships of Slimy Salamanders within the West Gulf Coastal Plain. Using mitochondrial DNA sequences from salamanders sampled throughout the region, I have found that: 1) the range of *P. kisatchie* is broader than previously recognized, 2) *P. sequoyah* is nested within and not distinct from *P. albagula*, and 3) an undescribed cryptic species may also occur within the region. Future work will incorporate sequence data from multiple independent nuclear loci and employ explicit analyses for delimiting species based on the multispecies coalescent model. Results from my research will inform conservation efforts for these species by clarifying their status as species and determining species distributions.

The Role of Med31 in Mesenchymal Stem Cells

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Med31 is a part of a large protein complex called Mediator. The Mediator complex is a key regulator of cell-type specific transcription. Mediator is composed of 31 distinct subunits divided between four modules: the head, middle, tail, and CDK8 modules. Mediator plays a crucial role in the regulation of gene expression and is present in all eukaryotes. This complex is required for cell-type specific transcription of protein-coding genes, meaning that without Mediator, proper development would not occur. Med31, located in the middle module, is the specific subunit that we are interested in and we are investigating its role by knocking it down and then evaluating expression of both fat and bone differentiation markers using bone marrow derived mesenchymal stem cells (MSCs). MSCs are used both because of their self-renewing properties and their differentiation potential. Knock down tells us if the lack of Med31 from the mediator complex will promote differentiation of MSCs in one direction over another. So far, what we have found is that when Med31 is knocked down, a reduction in cell proliferation occurs. We have seen that early fat markers are reduced and a reduction in adipogenesis is observed. In the future, we plan to evaluate osteogenic differentiation in the absence of Med31.

Termites mediate decomposer community structure and function

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Forest ecosystems cover ca. one third of earth's surface and are the largest terrestrial carbon (C) sink. Within forests, the majority of C is stored within soil and dead biomass like leaf litter and wood. Termites are ecosystem engineers that mediate decomposition and decomposer communities both directly via the consumption of soil, wood, and plant matter, and indirectly via the deposition of nutrient rich feces, movement of soil, and tunneling activity and may be a primary driver of C cycling in wood decomposition across their range. Yet despite this qualitative knowledge, there exists few studies that quantitatively measure the impacts of termites on decomposer community and function. We tested the hypothesis that *Reticulitermes flavipes*, the primary subterranean termite in the SE US, would increase both the quantity of decomposers and decomposition of wood in soil ecosystems. We conducted initial soil mesocosm experiments, where 500 ml soil was placed into 40- 32 oz mesocosms among four treatment levels (n=6 per treatment). Half the mesocosms received wood inoculated with bluestain (ophiostomatoid) fungi, a common fungi in CWD that has been previously linked with increased termite activity, while the other half will received wood without fungi. Half of each of these treatments will receive 1 gram of *R. flavipes*, while the other half will receive none. Mesocosms were harvested at 7 and 14 weeks and wood measured for mass loss and invertebrates extracted, identified, and counted. After 14 weeks, mesocosms with termites present had ca. 1.5 times more invertebrates than those without, while wood inoculated with bluestain had no impact on invertebrate communities. This was largely driven by increases springtails and mites. Wood decomposed ca. 18 times faster when termites were present than absent in mesocosms. This research is an important first step toward understanding biotic regulation of decomposition processes and quantitatively demonstrates the direct and indirect effects termites have on decomposer community structure and function.

Understanding density dependent growth factors in a common generalist butterfly

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Lepidopterans (moths and butterflies) impact ecosystem functions like productivity because they facilitate pollination, directly impact plant biomass through herbivory, and are prey for higher trophic levels. Factors that influence lepidopteran growth rates and mortality can thus have major consequences for ecosystem productivity. Lepidopterans deposit eggs on plants en masse, and the number of individuals developing on a given plant may vary. Density - dependent growth is a natural characteristic of some organisms that encourages them to have higher rates of growth when under stress due to intraspecies competition from population density. Temperature and food availability can impact the amount of competition through altered metabolism and resource limitation respectively. Food availability can increase an organism's stress from competition, possibly triggering density dependent growth mechanisms. As ectotherms, temperature directly regulates lepidopteran physiology and metabolism, and increased temperature may increase growth rates and food demand. *Vanessa cardui* is a common, wide-spread, generalist lepidopteran herbivore. To determine the impacts of herbivore density, food availability, and temperature on growth rates and mortality, we set up two experiments. The first experiment tested the hypothesis that herbivore density and food availability impact herbivore survival and growth rates. We predicted that low food availability and high population density would increase growth rates and survival, while high food availability and low population density would decrease the growth rates and survival. To test this hypothesis, we used 4 treatment levels: 1) low density + low food availability, 2) low density + high food availability, 3) high density + low food availability, and 4) high density + high food availability. Lepidopterans in each of these treatments were deployed into treatments in their second instar, with 30 individuals in High density treatments and 5 in low density. Their survival and growth was monitored every 3 and 7 days respectively. The second experiment tested the hypothesis that herbivore density and temperature impact herbivore survival and growth rates. Specifically, we predicted that higher temperature levels would increase growth rates and survival by speeding up metabolic processes, and that caterpillars raised in lower temperatures would have the opposite effect. *Vanessa cardui* has a diverse range extending across the United States. Michigan and Texas were states selected for their temperature extremes that existed in the range.

The projected mean summer temperatures for those states over the next 40 years are 70°F and 85°F, respectively. To test this hypothesis, we used 4 treatments: 1) low density + low temperature, 2) low density + high temperature, 3) high density + low temperature, and 4) high density + high temperature. Each treatment was raised till the all the lepidopteran's life cycles had been completed. Preliminary results suggest that low densities and high food availability had greater proportions surviving than high density and low food availability treatments. The second experiment is currently in progress. Rising temperatures may impact

ecosystems in a variety of ways. Understanding how temperature and food availability affects herbivore mortality and growth can increase our ability to predict changes in ecosystem function with global change.

The Role of NOTCH3 in Determining Mesenchymal Stem Cell Fate

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The NOTCH signaling pathway has been shown to play a vital role in determining cell fate of human Adipose Stem Cells (hASCs). Misregulation of the pathway is associated with some diseases and cancers, including breast cancer. To date, the four individual NOTCH ligands have not yet been characterized for their role in adult stem cells. The aim of this project is to characterize the role of NOTCH3 in the maintenance and differentiation of hASCs. NOTCH3 appears to have the highest level of expression in hASCs. Preliminary results using siRNA-mediated knockdown of NOTCH3 show that while self-renewal and cell viability is unaffected by the loss of NOTCH3, there is a significant increase in adipogenesis when cells are encouraged to differentiate into adipocytes. Experiments are on-going to determine the role of NOTCH3 in bone differentiation. Since regenerative medicine relies heavily on controlling stem cell fate, the characterization of the NOTCH signaling pathway will act as a gateway for further advances.

Location, Location, Location: Do differing enrichment methodologies affect the above and belowground productivity of *Spartina alterniflora*?

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In coastal Louisiana, roughly 18,500 acres of economically and ecologically vital wetlands are lost each year. Their conservation and restoration requires knowledge of how various processes, including enrichment, sea level rise, and subsidence, affect plant growth patterns and production.

While many studies agree that nutrient enrichment stimulates aboveground *Spartina* production, they disagree on whether enrichment stimulates or reduces production of belowground biomass. The disagreement of these studies may be from local marsh processes or from different enrichment methodologies, where some studies enrich surrounding water and others enrich sediments. To examine if enrichment location affects *Spartina* production patterns, we performed a pilot study (N=7) where small plots (0.25m²) of *Spartina alterniflora* were enriched aboveground, belowground, and a combination of both. We collected metrics of shoot abundance, shoot height, aboveground biomass, new root production, and belowground biomass to measure aboveground and belowground production. Different enrichment methodologies showed no significant effects on shoot abundance or on new root production. Data from shoot biomass and belowground samples may provide further insight into plant production patterns. Further examination of both above and below ground enrichment in response to enrichment location could enhance restoration efforts.

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Presentation preference: Poster

Preferred presentation topic: 16, 25, 11

Which morphogenetic spore protein(s) control the assembly of IunH to *Bacillus anthracis* Spores?

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Abstract: The spore is the infectious particle of anthrax. Germination is a process which converts metabolically inactive spores to active vegetative cells. Inosine-uridine preferring nucleoside hydrolase (IunH) is responsible for inhibiting germination by degrading the germinant inosine. Spore formation relies on morphogenetic proteins that control the assembly of additional proteins to spore surface layers. To determine which proteins control the assembly of IunH to the spore, we measured IunH activity in *cotE*, *cotO*, *iunA* and *spoVID* at room temperature and 37° C. We found that IunH is more active at 37° C and that *cotE*, *cotO*, and *iunA* mutant spores have decreased IunH activity. This suggests IunH assembly is controlled by more than one morphogenetic protein.

The Implications of a Reactive Oxygen Sensitive Green Fluorescent Protein to Measure *Candida albicans* Production of Antifungals.

Claire E. Jones, Patrick L. Hindmarsh
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Candida albicans is an opportunistic fungal pathogen commonly found in the mucosal tissue of the human body. In immune-compromised patients *C. albicans* causes candidiasis, which can be fatal in extreme cases where the yeast causes a systemic fungal infection. Due to the commonality of this yeast the use of antifungal drugs in treating infections has been well documented, although there are many conflicting reports on how these drugs kill *C. albicans*. *C. albicans* produces reactive oxygen species (ROS) as a stress response during exposure to antifungals drugs. Using a reactive oxygen sensitive GFP (royGFP), with mutations in yEGFP at S147 and Q204 where the amino acids are replaced with cysteine, it is possible to measure the production of those ROS by the change in fluorescence emission. Using site directed mutagenesis, we introduced point mutations replacing serine and glutamine with cysteine. Our rosGFP cassette will be transfected in *C. albicans* via homologous recombination tested using a variety of antifungal drugs.

Modification of the human beta-globin gene by the CRISPR/Cas9 system

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The field of genome editing is rapidly advancing largely due to the CRISPR/Cas9 system that can be easily targeted to a genome locale of interest to make a double stranded cut. After the system makes a cut, the cell DNA repair machinery tries to repair it by so called non-homologous end joining, NHEJ, mechanism which often results in unpredictable insertions and deletions that can be quite large. Alternatively, if homologous DNA is available, another cell process that utilizes homologous recombination can repair the cut in DNA restoring the original sequence. The former DNA repair process can be used to inactivate genes while the latter DNA repair process can be used to correct mutations that cause genetic diseases. It is remarkable that homologous recombination is capable of correcting not only point mutations but also relatively long stretches of genomic DNA. In order to facilitate the replacement of such DNA fragments by homologous recombination, Cas9 nuclease has to be channeled to genome sequences that flank the genome fragment of interest by two different guide RNA molecules that target Cas9 molecules to desired locations. In addition to the preferred outcome – DNA fragment replacement – the doubly cut genomic DNA can undergo severe rearrangements in one or both chromosomes leading to cell damage. To understand if genome editing using doubly cut DNA is a viable option, we compared the replacement and genome rearrangement outcomes using singly and doubly cut DNA models. In these experiments we targeted Cas9 nuclease to the human beta-globin gene via either one or two guide RNAs and analyzed the rates of desired replacement and undesired DNA rearrangements. Our results show that singly cut genomic DNA leads to fewer unwanted rearrangements and higher fragment replacement rates compared to the doubly cut DNA. The minimization of the undesired genome rearrangements in the doubly cut DNA will require suppression of the non-homologous end joining DNA repair pathway.

Creating modified YFP (Yellow Fluorescent Protein) Venus and Citrine that respond to ROS in *Candida albicans*

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Venus and Citrine are fluorescent proteins that are considered improved versions of Yellow Fluorescent Protein (YFP). Venus and Citrine are brighter, more stable, and have faster maturation times than YFP. YFP is a modification of GFP (green fluorescent protein). We have used QuikChange® Site-Directed mutagenesis PCR (polymerase chain reaction) to create YFP from GFP by substituting V68L and T203Y amino acid changes. Following the substitutions in YFP, we can further direct desired amino acid substitutions to create Venus and Citrine from YFP. Citrine requires a Q69M mutation from YFP, while Venus requires the mutations F46L, M153T, V163A, and S175G are required. Once the proper mutations have been introduced to create Venus and Citrine, QuikChange® Site-Directed mutagenesis can be used to substitute certain surface exposed residues to cysteines which will form disulfide bonds. These disulfide bonds allow a change in the excitation of the fluorescent proteins by the presence of ROS (reactive oxygen species). Recent studies have shown that ROS play an important role in the fungicidal action of antifungals; however, little is known about the specific action by which cell death is caused. This is of particular interest because of the problematic antifungal resistance that has developed in *Candida albicans*. These modified ROS responsive Venus and Citrine proteins can be used to study what cellular compartments or organelles ROS are found after *Candida albicans* is exposed to antifungals. In addition, these ROS responsive Venus and Citrine fluorescent proteins would be a novel tool for *Candida albicans*.

Impact of Bluestain Fungi (Ascomycota: Ophiostomatoid) on Ant Diversity in Coarse Woody Debris

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Global change is driving biodiversity loss and altering the distribution and intensity of biotic interactions within communities. One example is the southern pine beetle, which is a major disturbance agent in southeastern US coniferous forests that kills thousands of trees annually. These beetle-killed trees ultimately become coarse woody debris (CWD), and are pre-inoculated with ophiostomatoid (bluestain) fungi that is vectored by the southern pine beetle during the attack of the host tree. Bluestain fungi does not degrade the wood, but attracts invertebrate species, such as mites and termites. These species are a food source for many predatory species, such as ants (Hymenoptera: Formicidae). Ants are a successful and abundant group of organisms and are frequently the dominant predator in invertebrate communities. How ant colonization of CWD impacts decomposer and invertebrate community structure remains relatively unexplored. However, evidence suggests that ants have significant impacts on detrital communities. Because bluestain fungi attracts invertebrate species that are common prey of ants, I hypothesize that bluestain fungi will increase ant diversity and alter ant species assembly in CWD and change ant community composition in CWD versus the local ant species pool. To test this, 72 loblolly pine trees were inoculated with one of six bluestain treatments in 2011. Two randomly selected trees from each treatment were then felled at six different times over a four-year period. In 2015, ~1m x 25 cm diameter logs from felled trees were collected and invertebrates extracted from the logs. Ant species and common invertebrates were identified from 3 and 4 year old CWD. To determine the change in ant community composition, I will compare ant species present in CWD to the local species pool, which I will collect summer 2017 through hand sampling, pitfall traps, baiting, and leaf litter sifting. In preliminary results, we have found a total of 14 ant species, in comparison to ~98 ant species present in the nearby Noxubee National Wildlife Refuge. Four species (*Myrmecina americana*, *Nylanderia faisonensis*, *Monomorium minimum*, and *Camponotus pennsylvanicus*) are most common in the CWD, and are present in 45%, 64%, 64% and 27% of logs sampled, respectively. After 3 years, there was an average of 3.2 ant species (n=5) in bluestain treatments versus 0 in controls (n=1). Together, these preliminary results suggest that bluestain fungi increases ant diversity and ant species assembly in CWD in Southeast pine forests.

Exploratory Research on Zika Virus Testing

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Today's medical world has seen tremendous improvements over the years, in all its aspects. Such progress has allowed the identification of microorganisms such as bacteria, fungi, and viruses. The focus was mainly on viruses; the Zika virus especially. Zika infection has become a serious threat in the past three years, spreading to new geographical locations. It has been linked to cause severe brain defects on children whose mother were pregnant on the period of infection. The purpose of the paper was to explore different studies related to Zika infection, and how adequate testing can help identify the virus in patients and possibly limit its geographical advancement. The cases of Zika infection explored were reported in Brazil, Colombia, French Polynesia, Micronesia, and in the United States. Viruses are particular in that they do not grow on agar plates, which are testing plates used to test most microorganisms in laboratories. They required specific testing methods such as the enzyme-linked immunosorbent assay (ELISA), reverse transcriptase polymerase chain reaction (RT-PCR) and the plaque reduction neutralization test (PRNT). Those tests can be performed using a small amount of blood from the possibly infected person. They provide quick results and are simple enough to allow a better identification and isolation of Zika virus.

Lab-on-a-chip thermoelectric ELISA technology for detection of TNF- α

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Microfluidic enzyme-linked immunosorbent assay (ELISA) decreases the required sample volume and the incubation time by increasing the mass transfer rate of the analyte. We report thermoelectric lab-on-a-chip ELISA system for detection of TNF- α in biological samples. Antimony/bismuth thermopile sensor was integrated to the lower surface of a microfluidic device and the detection of the analyte was performed in under continuous flow conditions. The thermopile has 60 bismuth-antimony thermocouple junction pairs, exhibits a Seebeck coefficient of $6.3 \mu\text{V} (\text{mK})^{-1}$ and electrical resistance of 20-25 k Ω . The device has two inlets and single outlet and was fabricated using xurography, a prototyping technique using a cutting instrument to manufacture the channel out of 100 μm thin Kapton® tape coated with adhesive on both sides. The tape was sandwiched between two microscope glass slides to form the device's upper and lower channel wall. Detection of the analyte was achieved using a capture anti-TNF- α monoclonal antibody followed by detection via glucose oxidase-conjugated secondary antibody. The analyte/antibody complex was immobilized using biotin-streptavidin binding chemistry to the lower surface of the device, within the measuring junctions of the thermopile. Two microfluidic syringe pumps supplied independent injections of buffer in the inlets of the device. A fixed concentration of glucose was injected through a sample loop into the fluid flowing within the microfluidic device. The thermopile sensor measured the heat released during the enzymatic reaction between glucose and glucose oxidase. Nanovolt meter instrument connected to the thermoelectric sensor detected and recorded the heat released during the enzymatic reaction. The magnitude of the thermoelectric signal was proportional to the concentration of TNF- α in the biological sample. A standard calibration curve was generated for various concentrations of synthetic TNF- α (0-2000pg mL⁻¹) by plotting the calculated area under the curve of the thermoelectric response versus the analyte's concentration. The TNF- α concentration was measured in the medium of human astrocytes and results will be validated using the thermoelectric ELISA technology. Human astrocytes were treated with lipopolysaccharide (100ng mL⁻¹) and TNF- α concentration was measured using traditional ELISA protocol. The levels of TNF- α were 170pg mL⁻¹ in non-stimulated and 251pg mL⁻¹ in stimulated astrocytes medium.

The Use of Biocompatible Hydrogels to Direct Stem Cell Differentiation

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One of the leading causes of death worldwide is the result of myocardial infarction, which can lead to severe and irreversible heart tissue damage. As the heart lacks regenerative properties, this damage often causes the heart to fail and require surgical repair using donor tissue. Unfortunately, organ donors with healthy transplantable hearts remain extremely scarce, causing a distinct discrepancy between supply and demand of healthy, compatible organ tissue. Engineering tissues using stem-cell seeded biocompatible synthetic scaffolds may be an efficient solution to this ever-growing problem, as the properties of these scaffolds can be manipulated to induce stem cell differentiation into a chosen lineage. One goal of this project is to optimize the differentiation of mouse embryonic stem cells (mESCs) into spontaneously contracting cardiomyocytes when plated on biomimetic hydrogels imitating the elasticity of cardiac muscle tissue. mESCs seeded on hydrogels of varying elasticities will be assessed based on their morphology, gene expression, and protein expression using imaging, qRT-PCR, and immunofluorescence, respectively. Each of these assays will determine the extent of differentiation, with qRT-PCR being used to specifically identify differentiation towards either atrial or ventricular cardiomyocyte lineages. In addition to mESCs, human mesenchymal stem cells (hMSCs) are similarly being used as a more clinically relevant cell type to demonstrate the use of hydrogel-based materials for tissue engineering and biomanufacturing. Viability assays and differentiation staining have been used to demonstrate the successful growth and differentiation of hMSCs into viable adipocytes and osteocytes on hydrogels of varying elasticities. We will begin testing their differentiation potential on hydrogels ranging in elasticities that mimic the environments of various tissue types. The understanding and optimization of the hydrogel scaffold will enhance the success of clinical applications for tissue engineering and will contribute to a better understanding of stem cell-scaffold interactions.

Use of aqueous ozone as a disinfectant of *Bacillus anthracis* spores and mechanisms of action

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Bacteria of the *Bacillus* genera are capable of forming dormant and resilient structures called spores in response to harmful environmental conditions. *Bacillus anthracis* spores are the infectious particle of the disease anthrax. To date known disinfectant methods for anthrax are expensive, harsh, and toxic to humans. To analyze new and effective methods of disinfection, a better understanding of the spore structure is needed. Spores are composed of many layers. The core, which contains the DNA, is in the center of the spore and is surrounded by a layer called the cortex. The cortex layer is then encased in a multilayered shell called the spore coat. Studies on *Bacillus subtilis* have shown that the spore coat plays an important role in the spore's resistance to chemicals, enzymes, and predation. *B. anthracis* spores have additional layers called the interspace and the exosporium. Little is known about the interspace's role in the spore function. The exosporium encases the entire spore and is separated from the spore coat by the interspace. The exosporium and spore coat play roles in protecting the spore and aiding the cells return to a function cell, a process called germination. Several decontamination methods for spores have been explored including the use of strong oxidizers such as ozone. Ozone has well known sterilizing properties and has a higher oxidizing potential than most other oxidizing agents. Ozone is cheap to produce and when dissolved in water does not leave behind a toxic residue. Experiments with *B. subtilis* have shown that aqueous ozone has the potential to be an effective spore decontaminant at 2ppm. Previous data from our lab suggests that the coat is more important than the exosporium in protecting the *B. anthracis* spore from oxidative stress. However, it also implies that the exosporium did have a role in ozone protection. In the planned experiment three strains of *B. anthracis* will be tested for survivability in aqueous ozone. A normal wild type, a *cotE* mutant which has no exosporium, and a *spoVID* mutant which has no spore coat. The goals of our research are to: confirm that both the exosporium and coat play a role in ozone resistance and if the data suggests a role for the exosporium in ozone resistance, test the exosporium for superoxide dismutase (SOD) activity.

Developing a Red-Green Variant of Green Fluorescent Protein using Site-Directed Mutagenesis

Alex Say, Patrick L. Hindmarsh

The green fluorescent protein (GFP) is a protein isolated from the jellyfish *Aequorea victoria* which fluoresces green (509 nm) when exposed to light in the blue-ultraviolet range (395-475 nm). GFP has been expressed in is widely used in cell and molecular biology for a variety of purposes. Because of the usefulness of GFP, significant effort has been dedicated to developing variants which fluoresce at other colors, notably yellow, blue, and cyan fluorescent proteins and their derivatives. A red-green variant has been reported previously. In the red-emitting state, we expect an emission at 585 nm. Here, we used the Quickchange site-directed mutagenesis technique to make several mutations which have been previously identified as important in the expression of the red fluorescence.

Avian Use of a Bottomland Hardwood Afforestation Site in the Red River Alluvial Valley

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Bottomland hardwood forests cover about 2.8 hectares of the original 10 million hectares that once existed in the southeastern United States. These losses have led to an emphasis on afforestation of retired agricultural land. It is important evaluate changes in wildlife communities as these afforested stands mature. For instance, topographic variation within them can lead to certain tree species becoming better established in certain areas compared to others, leading to an afforested stand with forest types of differing species. Previous research at an 809-ha afforested bottomland hardwood stand near Coushatta, Louisiana identified seven forest types. We conducted point count surveys at 28 point locations evenly distributed among the forest types at the afforested stand six times during the avian breeding (i.e., June-August, twice/month), recording detected species and its distance from point. We used DISTANCE 7.0 to estimate a detection function and avian density within each of the forest types. Avian diversity was calculated for each forest types using Shannon's Diversity Index. Preliminary results for woodland bird density in each of the forest types ranged from 1.698 bird/ha in willow oak (*Quercus phellos*) to 26.181 birds/ha in sweet pecan (*Carya illinoensis*). Shannon's Diversity Indices ranged from 2.354 (H max = 2.565) in sweetgum (*Liquidambar styraciflua*) to 2.591 (H max = 2.833) in sweet pecan. The results from this study will aid in developing if forest management recommendations to promote breeding bird use of the afforested bottomland hardwood stand.

Shifting Rivers and Solid Ground: Biogeographic History of Salamanders on an Isolated Bluff in the Mississippi River Floodplain

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Geographic barriers are integral to the processes of dispersal and vicariance, but some barriers, such as rivers, may vary spatiotemporally, potentially affecting biodiversity patterns in significant ways. Fountain Bluff is an isolated upland in the Mississippi River floodplain along the Illinois-Missouri border, USA. The Mississippi River presently runs on the west side of Fountain Bluff, but the river's course ran on the east side prior to the Illinois glacial stage (~150,000 years ago). The Northern Slimy Salamander (*Plethodon glutinosus*) occurs to the east in Illinois whereas the morphologically undifferentiated Western Slimy Salamander (*P. albagula*) occurs to the west in Missouri. We used DNA sequences of the mitochondrial ND2 gene to determine the species identity and biogeographic origin of Slimy Salamanders on Fountain Bluff. The dispersal hypothesis posits that the species is *P. glutinosus* as a result of dispersal from the adjacent Illinois bluffs at some point subsequent to the westward diversion of the Mississippi River during the Illinois glaciation. Alternatively, the vicariance hypothesis posits that the species is *P. albagula* as a result of the separation of Fountain Bluff from the adjacent Missouri bluffs when the Mississippi River was diverted to its present course on the west side of Fountain Bluff. We found that Slimy Salamanders on Fountain Bluff are *P. glutinosus*, which supports the hypothesis that they originated via dispersal from the Illinois bluffs ~6 km to the east at some point subsequent to the westward diversion of the Mississippi River. A lack of genetic divergence between salamanders on Fountain Bluff and *P. glutinosus* from the adjacent Illinois bluffs also supports the prediction that dispersal was recent. The shifting courses of large rivers have likely had important impacts on biodiversity patterns through multiple mechanisms including facilitating passive dispersal across riverine barriers. As our knowledge of the fluvial histories of major rivers throughout the world increases, we will be able to better understand how rivers influence biodiversity.

Wintering Home Ranges of a Threatened Grassland Bird

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Henslow's sparrow (*Ammodramus henslowii*) is a threatened migratory bird species that winters in the Southeastern United States. We measured home range size of Henslow's sparrows in Southern Louisiana during the 2015-2016 wintering season. We also examined the number of birds with overlapping, or shared, home ranges. Knowledge about home range size and habitats is crucial for effective conservation plan development. Home range size is a good indicator of how much space a species needs to survive how much area needs to be under conservation management. If home ranges are shared, then less area may need to be managed, which reduces costs. Avian Nanotag coded radio-tags were glued to trimmed back feathers of birds in the Lake Ramsey Savannah Wildlife Management Area (WMA) in St. Tammany Parish from December 2015 to February 2016. Forty-five birds were then radio-tracked daily until the tag fell off, the tag battery died, or the bird disappeared/died. Data were recorded using Trimble GeoXT units equipped with TerraSync software and interpreted through ArcMap 10.3.

Influence of Genetics on the Prognosis and Treatment of Leukemia

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The use of genetics in modern medicine has been on the rise for years. Genetic markers are sequences of DNA that have known locations on chromosomes. According to the National Human Genome Research Institute, a subset of the National Institute of Health, they aid in the identification of inherited diseases by linking them to genes. Specific genetic markers can be used in this fashion to evaluate the prognosis of leukemia, specifically acute myeloid leukemia (National Human Genome Research Institute 2017). The mutations found can be labeled as beneficial, neutral, and harmful along with uncertain on health. The mutations that are harmful have the possibility of increasing someone's chance of developing cancer. Other genetic markers, however, are utilized to clarify the prognostic process of certain cancers. Leukemia, Acute Myeloid in particular, is one of these. The latest type of therapy scientists have discovered to treat cancer is gene therapy. Gene therapy is, "a form of therapy that involves inserting one or more corrective genes that have been designed in the laboratory, into the genetic material of a patient's cells to cure a genetic disease" (Mandal, 2014, para. 1). This type of therapy is still in its experimental stages, but essentially the inserted modified gene will alter the RNA transcript as well as the DNA that synthesizes proteins, ergo, correcting the mutation or preventing the mutation from arising.

Role of OGG1 in reactive oxygen species induced DNA damage and repair

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The nucleic acid is susceptible to numerous modifications by a wide variety of chemical agents. Several types of reactive oxygen species (ROS), such as singlet oxygen and hydroxyl radicals, that are generated as byproducts of normal oxidative metabolism induce oxidative modification of the DNA bases. ROS induced DNA damage plays an important role in cancer development and progression as well as aging and age-related neurological disorders. Imbalance between the production of ROS and the biological repair of the oxidative damage causes mutations to DNA and has a plays an important role in in the initiation, promotion, and progression stages of carcinogenesis. The most common biomarker of reactive oxygen species (ROS) induced DNA damage is 8-oxo-7, 8-dihydro-2'-deoxyguanosine (8-OHdG), an oxidized derivative of deoxyguanosine. 8-OHdG is highly mutagenic causing DNA mutations by incorporation of adenine instead of cytosine during DNA replication that leads to mutations in the nucleic acid sequence. Elevated levels of 8-OHdG are measured in leukemia, breast cancer, colorectal cancer, lung cancer, Parkinson disease, and Alzheimer's disease. The base excision repair mechanism had evolved to repair the mutations induced by oxygen radicals. The repair response involves the enzyme 8-oxoguanine glycosylase (OGG1) that removes 8OHdG lesion and restore the genetic material back to its original state. Altered expression of OGG1 leads to accumulation of 8-OHdG adducts, DNA damage, and increased rate of DNA mutation. The objective of this study is to assess the oxidative stress induced changes in OGG1 mRNA expression and protein levels and quantify genomic 8-OHdG accumulation. Human astrocyte cells were cultured in medium specifically formulated to promote the growth of human astrocytes. To simulate conditions of oxidative stress, astrocytes cell line was treated for 16 hours with sodium dichromate (10 μ M, 50 μ M, 100 μ M) and the changes in OGG1 mRNA and protein expression levels were analyzed. A fourth petri dish, without sodium dichromate, served as a negative control. OGG1 mRNA expression and protein levels were assessed using RT-qPCR and Western blot analysis. The expression levels of OGG1 gene decreased as the concentration of ROS-inducing agents increased. The accumulation of sodium dichromate induced nuclear 8OHsG accumulation will be assessed using enzyme-linked immunosorbent assay (ELISA).

Divers vs. Dabblers: Who Accumulates More Heavy Metals?

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Mercury, lead, and cadmium are all toxic metals which can negatively affect wildlife and human health. Because of the potential for bioaccumulation at higher trophic levels, aquatic birds are often used as bioindicators of ecosystem health. To study the accumulation of toxic metals in Louisiana waterfowl, liver samples were taken from ducks of 13 different species. Species were grouped as divers and dabblers. Divers feed at a higher trophic level than dabblers, so we expect diving species to have greater accumulation of these metals than dabbling species. Heavy metal concentrations were measured with x-ray fluorescence. Analyses are ongoing, and preliminary results presented here will be further examined according to species, sex, age, and collection site. Results of this study will provide important information about the health of Louisiana's wetlands and the potential for human contamination from duck meat.

