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**8<sup>th</sup> Annual  
Tarleton State University  
Student Research Symposium**

**October 31<sup>st</sup>, 2009**

**Organized by**

**Office of Student Research & Creative Activities  
and  
Tarleton Chapter of Sigma Xi**

**\*A Celebration of Student Research at Tarleton\***

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**Information about the Tarleton Student Research Symposium can be  
obtained at:**

**<http://www.tarleton.edu/~sigmaxi/symposium/>**

**Tarleton State University**  
**8<sup>th</sup> Annual Student Research Symposium, 2009**

*Saturday, October 31<sup>st</sup>*

8:00-8:45 AM – Poster presenters hang posters	1st Floor Science Building
8:45 AM – Undergraduate oral presenters check in with session moderator	Room 110 Science Building
9:00 AM – Welcome Address Russell Pfau, Director, Office of Student Research & Creative Activities Mircea Agapie, President, Tarleton Chapter of Sigma Xi	Room 110, Science Building
9:15-10:30 AM – Undergraduate oral presentations	Room 110 Science Building
10:30 AM-noon – Undergraduate poster presentations	1st Floor Science Building
Noon – Lunch break	On your own
12:45 PM – Graduate oral presenters check in with session moderator	Room 110 Science Building
1:00-1:30 PM – Graduate oral presentations	Room 110 Science Building
1:30-2:30 PM – Graduate poster presentations	1st Floor Science Building
3:00 PM – Presentation of Awards	Room 110 Science Building

**Undergraduate Oral Presentation Schedule**  
(numbers reference abstracts)

9:15 23- Treading Holy Water: Religion in Jane Eyre and Wide Saragasso Sea. Marsha Decker\*, Department of English and Languages (Advisor: Mallory Young)

9:30 24- The Great Recession: The Origins of the Worse Economic Crisis since the Great Depression. Jack Reynolds\*, Department of Accounting, Finance, and Economics (Advisor: Hussain Jafri)

9:45 25- Development of microsatellite markers for studying population genetics of the cotton rat (*Sigmodon hispidus*). Jordan Sparkman\*, Russell Pfau (Advisor), Department of Biological Sciences

10:00 26- Comparative analysis of biological integrity between the Bosque and Paluxy Rivers. Jeremy Munz\*, Chris Higgins (Advisor), Department of Biological Sciences

10:15 27- Level of genetic introgression across a hybrid zone between the shrews *Blarina brevicauda* and *B. hylophaga*. Becca Peters<sup>1</sup>, Cody Thompson<sup>2</sup>, Russell Pfau<sup>1</sup> (Advisor),  
<sup>1</sup>Department of Biological Sciences, Tarleton State University, <sup>2</sup>Department of Biological Sciences, Texas Tech University

### **Graduate Oral Presentation Schedule**

1:00 28- An evaluation of vitamin e and selenium as a treatment for capture myopathy in Rio Grande wild turkeys (*Meleagris gallopavo intermedia*)  
Thomas Schutz\*, Jeff Breeden (Advisor), Jim Mueller, Roger Wittie, Department of Animal Sciences

1:15 29- Attitudes of City Administrators toward Terrorism: North Central Texas 2009 Survey Results and Analysis. Andrew Johnson\*, Department of Social Sciences (Advisor: Dean Minix)

### **UNDERGRADUATE POSTER PRESENTATION ABSTRACTS**

#### **1- Autonomous Self-Balancing Robot**

Rijo Santhosh\*, Department of Physics and Engineering, (Advisor: Mircea Agapie)

The semi-autonomous mobile robot AmigoBot™ needs to be in constant communication with an outside computer to be capable of intelligent behavior. It does have an on-board microcontroller, but that is only used for the lower-level sensory and motor functions. The first phase of our project was to add an on-board mini-PC that the robot literally carries on its back. We call this mini-PC the Brain. The Brain is a full-fledged PC, with memory and a hard-disk; it's only missing the usual peripherals: keyboard, mouse and display. Two main programs run on the Brain: one that communicates with the robot and one that implements the high-level control functions. Our system (AmigoBot and Brain) was an autonomous robot at this point.

The task we chose for this autonomous robot is self-balancing on a seesaw. To be able to sense the tilt, we integrated an inclinometer. A proportional–integral–derivative (PID) controller continuously monitors the angle between the robot's axis and the horizontal, moving the robot to achieve balance. This feedback control system moves the robot in the appropriate direction to compensate for the tilt.

Programming of the PID controller and communication functions was all done in C++, using calls to the ARIATM library (for the AmigoBot) and to the X3 DLL (for the inclinometer).

#### **2- Building and Testing a Linux MPI Computer Cluster**

Jean-Claude Mande\*, Department of Physics and Engineering, (Advisor: Mircea Agapie)

The most widely used measure of computing performance is the number of floating-point operations per second (FLOPS). There is a wide gap between the performance of desktop PCs commercially available today (about ten giga-FLOPS = 10<sup>10</sup> FLOPS) and the performance of today's supercomputers (peta-FLOPS = 10<sup>15</sup> FLOPS). This gap of five orders of magnitude can be bridged with computer clusters, which have multiple advantages over supercomputers, most notably very low cost. We built a networked system of "4+1" PC computers, four compute nodes and a head node. Each PC is equipped with one or two processors and a hard-disk, and the network is 100 Mbps Ethernet, switched. We use a free Linux operating system (Ubuntu) and a

free implementation of the Message Passing Interface (MPI) on all machines. To validate the cluster, we successfully implemented the classical algorithm of block-matrix multiplication. An empirical analysis of performance is included for the above-mentioned algorithm on our cluster.

### **3- The American Recovery and Reinvestment Act**

Paul Wang\*, Janis Petronis (Advisor), Department of Management, Marketing, and Administrative Systems

The American Recovery and Reinvestment Act (ARRA), which became law on February 17, 2009, was designed to provide stimulus funds to jump start the recessing American economy. As with many government programs, the administration and implementation of the Act has become more involved and complicated than getting the Act through Congress. Stephenville is a city of approximately 20,000 people in north central Texas, about 65 miles southwest of the Dallas-Fort Worth Metroplex, and home to Tarleton State University, the second largest institution in The Texas A&M University System. For a city of its size, Stephenville is home to a relatively large number of multinational companies, boasting three manufacturing companies with 100 or more employees: FMC Technologies, Saint-Gobain Abrasives, and Fibergrate Composites. All three have been rated tops within their companies in revenues and output and all three have direct subsidiaries or suppliers in Mexico. All three Stephenville MNCs want to benefit from the ARRA, either through direct funding for projects, or indirectly through customers they serve. The research question for this project is "How can a local company delineate the processes for accessing ARRA funding directly or indirectly within the "Buy American" restrictions of the Act?" The specific restrictions in Section 1605 dictate that ... "manufactured goods" used in projects funded by the stimulus package, for the construction, alteration, maintenance or repair of "a public building or public work", be "produced in the United States." Further, Section 1605 (d) requires that this "Buy American" provision be applied "in a manner consistent with United States obligations under international agreements." The North America Free Trade Agreement (NAFTA) requires the USA to treat goods and services from Mexico (and Canada) as "domestic" (i.e. USA-produced) goods and services. Section 1605 (d) has the effect of exempting Mexico from the "Buy American" requirement for construction projects valued at \$7.4 million or more. It follows that if the country of origin of goods coming from Mexican facilities of the three MNCs is indeed Mexico, those products are not excluded from the stimulus-package-financed projects.

### **4- Element Cycles - An Environmental Chemistry Board Game**

Cody M. Anderson\*, Eric F. Poindexter, S. Whitney Sultemeir, and Linda D. Schultz (Advisor), Department of Chemistry, Geosciences, and Environmental Science

A complete ecosystem consists of the Geosphere (earth), Hydrosphere (water), Atmosphere (air), and Biosphere (life). The essential elements exist in different forms in each sphere and pass between them by chemical and physical processes called biogeochemical cycles. Students are initially introduced to these concepts in Grades 4-6, but do not usually study them intensively until secondary Environmental Science classes.

"Element Cycles" is an activity designed to reinforce correlation of essential elements with their roles in the ecosystem. Each student is initially assigned an essential element and given time to research its cycle using the internet. All students then share results as a class project and use the information to construct game boards with Ecosphere sections, essential elements, and "transition cards" to follow the elements through the ecosystem. Students play the game, either

individually or in teams, to reinforce their understanding of the element cycles. The winner is the first student to successfully pass through the entire ecosystem.

Cost for one set-up is \$6.71. Average time required to complete the game is about 12 minutes. One class period is required for internet research (if done in class), and one period is needed to share results and construct gameboards and cards.

### **5- Morphometric Analysis on Devils River Drainage Basin, TX**

Amanda Couch\*, Department of Chemistry, Geosciences, and Environmental Science, (Advisor: Carol Thompson)

The primary objective of stream morphometry is to provide a holistic understanding of stream/ drainage basin development and to be able to compare multiple drainage basin across different physiographic regions, either for hydrological reasons or economic purposes. An evaluation of morphometric parameters was conducted on the drainage basin of Devils River, TX using two different ordering methods with the purpose of comparing the results to one another. The drainage network data was downloaded from USGS, which was based on a 1:25,000 scale. The data was analyzed using ArcGIS, version 9.2. The parameters analyzed included factors such as the bifurcation ratio and the area of the basin. The results for the bifurcation ratios using the Strahler method were for orders: 1 to 2= 5.16, 2 to 3= 6.27, 3 to 4= 5.00, and 4 to 5= 3.00. These numbers suggest that the drainage basin is slightly affected by the geologic structure of the region.

### **6- Wolbachia Colonization Levels in the Glassy-Winged Sharpshooter**

Ashley Wallace<sup>1\*</sup>, Harold Rathburn<sup>1</sup> (Advisor), Jeff Brady<sup>2</sup>, <sup>1</sup>Department of Biological Science, <sup>2</sup>Texas A&M University AgriLife Research and Extension Center

Wolbachia are inherited intracellular bacteria present in a wide variety of arthropod hosts. They cause a number of phenotypic responses in their hosts, many of which are associated with decreased fitness. The purpose of this study is to determine the Wolbachia colonization levels in the Glassy-Winged Sharpshooter (GWSS), (*Homalodisca vitripennis*) a vector insect that transmits the bacterium causing Pierce's Disease of winegrape. To determine the Wolbachia colonization levels, conventional PCR was used to clone and sequence the wsp gene for the purpose of assay design. After sequencing the gene, the sequence information was used to develop a one hour quantitative real-time PCR (qRT-PCR) assay. These results will be used to determine if geographical or temporal differences exist in GWSS with regard to Wolbachia colonization. We hypothesize that GWSS founders arriving in North Texas each spring will show lower Wolbachia colonization levels than insects overwintering in South Texas.

### **7- Measurement of Oxygen Content in Air Using the "Blue Bottle" - An Undergraduate Lab Exercise**

Eric F. Poindexter\*, Clifford E. Terrel, and Linda D. Schultz (Advisor), Department of Chemistry, Geosciences, and Environmental Science

The classic "Blue Bottle" demonstration utilizes an aqueous solution of methylene blue, glucose, and sodium hydroxide, which reacts with oxygen to produce a deep blue color in a stoppered flask. After a short time the color disappears, then reappears when the bottle is shaken to dissolve more oxygen. The process can be repeated multiple times and makes an entertaining "chemical magic" trick. By using appropriate amounts of glucose, sodium hydroxide, and methylene blue in the flask, varying the concentration of oxygen in contact with the solution, and

carefully regulating the amount of time the flask is shaken, a group of undergraduate students measuring the times required for the blue color to disappear can produce a standard curve that can be used to measure the oxygen concentration in air. The reaction is very sensitive to contamination, so it is essential to clean all glassware carefully and filter air samples through a 0.2  $\mu\text{m}$  nylon syringe filter. Time required for the procedure is about two hours. The exercise was carried out by 15 groups of 2-4 students over a period of one week, and an average oxygen percentage of 18 per cent was obtained for air samples collected in the lab.

### **8- Silencing of Claudin-2 in Keratinocyte Cultures Using siRNA**

Amber Anderson\*, Lynn Lemmons, Tahmina Zaman, Matt Cvitanovich, and Dale Telgenhoff (Advisor), Department of Clinical Laboratory Science

The purpose of this study was to examine the changes in claudin-2 protein in cell monolayers following knockdown with claudin-2 siRNA. Claudins are a family of tight junction proteins and claudin-2 has been shown to form cation selective pores in the kidney and small intestine. The role of claudin-2 in the epidermis has yet to be determined. Previous studies have shown that claudin-2 is increased in wounded epidermis, both in vitro and in vivo. In order to investigate the role of claudin-2 in wound healing we needed to develop a model which was deficient in claudin-2. siRNA, transfection medium, and control siRNA (nonsense siRNA) were purchased from Santa Cruz Biotechnology (Santa Cruz, CA). Human keratinocytes (Cascade Biologics, Oregon) were cultured to confluence in 6 well plates. Multiple replicates were treated with either claudin-2 siRNA, nonsense siRNA, or remained untreated at 37°C. Cultures were rinsed after 6 hours, fresh medium was added, and plates were returned to the incubator. After 48 hours the cells were lysed and the lysate was assayed for protein levels using the BCA assay (Thermo Scientific, Rockland IL). Equal amounts of protein were loaded on an 8% acrylamide gel, electrophoresed, and transferred to nitrocellulose for Western blot analysis. Claudin-2 antibody (abcam, Cambridge MA) was used for detection, bands were quantified using Kodak Imaging system. The bands in the knockdown cells were greatly decreased compared to the two controls. We have developed a successful knockdown procedure for claudin-2 in keratinocytes, which may be used for wound healing studies to examine the role of claudin-2 in keratinocytes.

### **9- Soil Nitrogen Hotspots from Peanut Stover**

Cole Patton\*, Donald G. McGahan (Advisor), David Kattes and James Muir, Department of Agribusiness, Agronomy, Horticulture & Range Management

Nitrogen is necessary for adequate growth and development of vegetation. Soil N is usually the most limiting nutrient. Green manure is one method of adding N to soils. A natural grass legume mix experiment displayed linear traces of more vigorous growth in vegetation that crossed plot treatments. We thought that the linear vigorous vegetation growth seemed to be associated with peanut harvesting residue (peanut stover). A green manure crop is usually a legume that is plowed into the soil as an N source. Peanuts are legumes. Therefore, we speculated that the more vigorous current vegetation growth is linked to peanut stover acting as a green manure addition as the field was removed from peanut cropping and purposed as a research field. We hypothesized that soil nitrogen would be greater where grass was more vigorous. Total soil nitrogen was measured by the Dumas method for soils collected with a push probe to a 19 cm depth below visually determined to be vigorous and less vigorous vegetation. Bulk density was measured and total nitrogen calculated for the soil. Vegetation was sampled and vegetation

nitrogen measured by the Dumas method. A mass balance of nitrogen, total soil and vegetation, was calculated. The vigorous growth vegetation biomass was generally greater (27 to 66.9 g m<sup>2</sup>) than the less vigorous growth (32 to 36 g m<sup>2</sup>) confirming our visual estimation of vigorous growth. Vegetation nitrogen was greater in the vigorous growth (6 to 14 g m<sup>2</sup>) than the less vigorous growth (3.7 to 6 g m<sup>2</sup>). Soil nitrogen was generally not greater in the soil underlying the vigorous growth vegetation. The summation of soil and vegetation nitrogen was not greater in the vigorous growth as we hypothesized. We cannot account for nitrogen lost via leaching below 19cm and nitrogen lost by denitrification. Greater nitrogen in no-growth soil suggests that leaching may have been a pool of nitrogen not measured. We cannot verify peanut stovers contribution as a green manure that contributed to the more vigorous growth coincident with the peanut stover deposition line.

### **10- Partitioning biodiversity of stream-fish assemblages in central Texas**

Emily Blalack\*, Christopher Higgins (Advisor), Department of Biological Sciences

The partitioning of total biodiversity ( $\gamma$ ) into a hierarchy of spatial components (i.e.,  $\alpha$  and  $\beta$ ) is an increasingly important topic in ecology. Nevertheless, little is known regarding temporal changes in the spatial distribution of overall biodiversity, especially in stream ecosystems where temporal variation in water current is an important structuring mechanism. The main objective of this study was to determine whether species richness at different spatial scales (i.e.,  $\alpha$ ,  $\beta$ , and  $\gamma$ ) changed through time. To assess this objective, we used backpack electrofishing to survey the fish assemblage in the South Llano River during all four seasons. For each season, we divided the 100m stretch of river into ten 10m transects with each transect subdivided into four sections (left outside, left inside, right inside, and right outside). Our results suggest most of the biodiversity within a single site along the river arises from turnover among transects ( $\beta$  diversity) and that this pattern is consistent across time despite fluctuation in water current.

### **11- Identification and Characterization of Resistance to *Meloidogyne incognita* in Wild Cucurbit Species**

David Fisher\*, Jennifer Miller, Travis Faske (Advisor), Department of Agribusiness, Agronomy, Horticulture & Range Management

Cucurbit refers to the plant family Cucurbitaceae, which includes melon, pumpkin, cucumber, and squash. *Meloidogyne incognita*, southern root-knot nematode, is one of the most economically important biotic soil borne pathogens on cucurbits. Lack of resistance is related to the lack of available sources of resistance. *Cucumis metuliferus* has resistance to *M. incognita*; however, incorporation of this resistance into other cucurbits has failed due to incomplete chromosome compliments. A few closely related cucurbit species have yet to be evaluated as sources of resistance. These species include *Cucumis melo* var *dudanium*, *C. melo* var *texanus*, *C. dipsaceus*, *Cucurbita factidissima*. Thus, the objectives for this study were to evaluate these four cucurbit species for resistance to *M. incognita* and characterize the mechanism of resistances. The resistant control was *C. metuliferus* and the susceptible control was *C. sativus* cv. Straight eight. Cucurbits were inoculated with, 1000 second-stage juveniles per 500 cm<sup>3</sup> soil at the first leaf stage then sampled at 7 and 49 days after inoculating to determine root penetration and reproduction, respectively. Final population of *M. incognita* on *C. melo* var. *dudanium* and *C. melo* var. *texanus* was lower ( $P = 0.05$ ) than the susceptible control. Root penetration by *M. incognita* was suppressed ( $P = 0.05$ ) in *C. melo* var. *dudanium* and *C. melo* var. *texanus* compared to the susceptible control. *Cucumis melo* var. *dudanium* and *C. melo* var.

*texanus* may be useful sources of resistance to *M. incognita*.

### **12- Damage to acorns by the acorn weevil**

Austin Hubbard\*, David Kattes (Advisor), Department of Agribusiness, Agronomy, Horticulture & Range Management

Acorn weevils (*Curculio nucum* Melsheimer F.V.) damage a portion of the acorn crop produced every year. Tracking damage to the acorns will be vital in understanding the acorn weevil habits. We are tracking the damage to acorns on three oak species (*Quercus virginiana* Mill., *Q. stellata* Wangenh., *Q. marilandica* Münchh.). On each of the species we are trapping live weevils from both the ground and from the trunk of the tree. Also, we are tracking when the infestation of the tree occurs, collecting acorns and testing them for weevil and inspecting the growth of the weevils within the acorn. Results indicated there is a significant amount of annual damage to acorns by the acorn weevils. This means the damage was clearly evident and may be detrimental to the nutritional value of the acorn. Though more research will be necessary, to determine the protein or nutritional value loss, these results do provide a base for future research.

### **13- Neural Networks for automated classification of eclipsing binary stars**

Katherine Leaveck\*, Shaukat Goderya (Advisor), Bert Little, Department of Physics and Engineering

Advances in observational astronomy have given astronomers the opportunity to conduct sky surveys capable of collecting terabytes of data nightly. Photometric observation of stars has drastically increased the number of known variable stars to a point where traditional object-by-object analysis is not feasible. Using artificial neural networks for data mining, data reduction and analysis is of great interest to astronomers who now have more data readily available than any person or team could analyze in a lifetime. This poster presents initial efforts to build a scheme to automatically classify light curves of eclipsing binary stars using Fourier descriptors and artificial neural networks. The raw data was obtained from available public domain databases and a FORTRAN code was written to compute the Fourier descriptors. Large variation in the shape of the light curve can be seen in the Fourier descriptors, with the majority of information being contained within the first 3-4 descriptors calculated. The Fourier descriptors are presented as inputs to the supervised neural network for training and classifying the light curves. The initial results from this work confirm a feasible model to classify binary stars using data mining on databases of tens of thousands of stars to isolate previously unknown contact binaries for further observation.

## **GRADUATE POSTER PRESENTATION ABSTRACTS**

### **14- An Evaluation of Mercury Levels in River Otters of Northeastern Texas**

David Probasco\*, James Mueller (Advisor), Department of Animal Sciences

Mercury is a toxic metal that is known to cause birth defects and neurological effects to humans and wildlife alike. Mercury accumulates in water sources such as reservoirs, lake, ponds, rivers, and streams from runoff. The river otter (*Lontra canadensis*) is an aquatic mammal and can be characterized as a sentinel species for riparian ecosystems. River otters bioaccumulate toxic metals such as mercury from consuming contaminated fish and aquatic invertebrates. Mercury has not been tested since the early 1990s in the Sabine River watershed.

This study is examining mercury levels in otters along the Sabine River, north of the Toledo Bend Reservoir. River otters (N=50) were trapped in 2008 and 2009 at 11 different locations throughout 4 counties in northeastern Texas by a professional nuisance trapper. Hair samples from the head were analyzed for mercury levels using combustion, trapping, and atomic absorption. Mean mercury levels were found to be 17.9 ppm for females (N=18) and 17.2 ppm for males (N=32). The range of contamination was 2.8 ppm to 37.7 ppm. Mercury data will be compared and contrasted to suggested threshold levels for mercurialism. Previous studies have suggested levels of mercury >20.0 ppm may result in decreased survivorship; however, further statistical analysis and literature review is in progress. These results will provide information on mercury levels and potential effects of this heavy metal on top-level predators in northeastern Texas watersheds.

**15- The mandate mystery: How mandates impact school districts physically and financially**  
Denae Dorris\*, Department of Educational Leadership & Policy Studies (Advisor: Mark Littleton)

Many Texas school districts are renovating or constructing facilities at a rapid pace and at high prices. School construction is big business. However, little is known about the impact curriculum mandates have on school construction. This study investigated the impact of the 2006 College Readiness Initiative (“4x4 curriculum” mandate) on Texas public school district 1) construction trends, 2) trends in type of facilities constructed, and 3) financial discretion. Texas public school superintendents (N=228) voluntarily participated in the e-mail survey. Examination indicated a relationship between school district size and the need to construct facilities. Districts reported spending a median of \$500,000 on facilities to implement the 4x4 mandate. Funding method employed to remodel/construct facilities differed according to school district size. A one way ANOVA indicated significant differences in percent of the budget spent on facilities construction across the three levels of school district size. Reported trends indicated most Texas public school districts constructed/remodeled science laboratories (66.2%, n=92) to fully implement the 4x4 mandate. The data from this study indicated, as a result of the 4x4 mandate, 1) construction trends changed in Texas public school districts, 2) trends were apparent in type of facilities constructed, and 3) school districts experienced a financial impact. The study concluded with policy recommendations regarding unfunded mandates.

**16- Evaluation of Prairie Acacia (*Acacia angustissima* var. *hirta*), Panicked Tick-clover (*Desmodium paniculatum*), and Herbaceous Mimosa (*Mimosa strigillosa*) near Stephenville, Texas**

Ray Noah\*, James Muir, Texas A&M University AgriLife Research and Extension Center, David Kattes (Advisor), Roger Wittie, Department of Agribusiness, Agronomy, Horticulture & Range Management

There is a need to identify native herbaceous legumes for plant diversity and habitat improvement. Addition of legumes can increase forage resources for livestock and wildlife, be used for prairie and rangeland restoration, habitat amelioration, and cropland improvement. This study examined three species of native herbaceous Texas legumes near Stephenville, Texas at the AgriLife Research Center. Species included prairie acacia (*Acacia angustissima* var. *hirta*), panicked tick-clover (*Desmodium paniculatum*), and herbaceous mimosa (*Mimosa strigillosa*). Species were observed for seed and herbage yield, forage nutritive value, effect of forage harvest on seed yield, acid detergent lignin (ADL), acid detergent fiber (ADF), neutral detergent fiber

(NDF), and nitrogen. Panicked tick-clover produced the greatest seed and forage yield as well as nitrogen concentrations (1056.96 kg/ha/yr, 3375.23 kg/ha/yr, and 78.84 kg/ha/yr), while herbaceous mimosa yielded the least in these categories (0.23 kg/ha/yr, 2348.13 kg/ha/yr, and 46.91 kg/ha/yr). Fiber concentrations were greatest in herbaceous mimosa (30.25% NDF, 41.84% ADF, and 34.34% ADL) and least in prairie acacia (17.47% NDF, 16.57% ADF, and 11.30% ADL). Results of this study could support the inclusion of these species into many pasture and range land improvement applications.

### **17- Affect of blood sampling on fledging success in white-eyed vireo (*Vireo griseus*) nestlings**

David Davis\*, Department of Biological Sciences (Advisor: Philip Sudman)

Black-capped vireos (*Vireo atricapilla*), one of the most highly endangered birds in Texas, breed in isolated oak-shinnery habitat in the central region of the state. While many studies have been published addressing the habitat requirements/habitat management associated with this bird, few studies have addressed their breeding biology. Researchers at Ft. Hood are interested in addressing questions related to possible multiple pair mating and nestling sex ratios in Black-capped vireos. However, conducting these studies on an endangered species presents special problems and concerns (i.e. permits to collect blood samples would not be issued unless it could be demonstrated that there is no adverse affect on nestlings as measured by fledging success). We chose to use a closely related species, the White-eyed vireo (*Vireo griseus*) to assess the affect of blood sampling on fledging success of 5 day post-hatch nestlings. After locating and monitoring white-eyed vireo nests, a split sample approach of handling and banding all nestlings and taking blood samples from half of the nestlings was be used. Nests were then monitored until fledging to determine if bled chicks fledged differently than non-bled chicks. Blood collected from the chicks was also used to determine the sex ratio of broods to ensure that the methodology used in this study would work for similar studies of Black-capped vireos. In the lab, DNA was extracted, polymerase chain reactions (PCR) and 1% Agarose gel electrophoresis was performed for sex determination. Analysis showed a sex ratio of 65% males and 35% females. A chi-square statistical analysis will be utilized. This project will provide valuable information to our knowledge of breeding biology of this species and may have important management implications for future research on the endangered Black-capped vireo (*Vireo atricapilla*: BCVI).

### **18- A preliminary flora of Hunewell Ranch, Erath County, Texas**

Lauren P. Cowley, Sara Harsley, Allan D. Nelson, (Advisor), Department of Biological Sciences

Floristic data are critical in establishing species' ranges, management practices, documenting range extensions, and monitoring the spread of introduced and invasive species. Native, endemic, introduced, rare, and county records for Erath County, Texas are reported as part of an ongoing flora of vascular plants at Tarleton State University's Hunewell Ranch. Species are compared to those occurring on the Texas Parks and Wildlife Department's noxious weeds and threatened or endangered lists. Plant specimens were collected from September 2006 to August 2007 and from January 2009 to October 2009. Currently, 63 species represent new records for Erath County and include 61 native species, of which four are endemic and two are introduced. No plants listed on the state noxious weed or rare, threatened or endangered lists have been collected.

### **19- Using the Henneke Body Condition Score method to measure stored fat in young horses**

Karey McPhee\*, Don Henneke (Advisor), Department of Animal Sciences

Current body condition score systems measure stored body fat in mature horses. It is important to test the current systems to determine if they accurately score young, growing horses. Nineteen horses were observed during the first 18 months of life. Measurements were taken weekly for weight, heartgirth circumference, shoulder and hip height. After 6 months of age horses were weighed and measured monthly. Ultrasonic scans that measured fat thickness were taken monthly. Measurements were compared with weight and body condition score. Results are in progress.

### **20- Effect of inclusion of dried distillers' grains in small ruminant diets on ruminal in situ nutrient disappearance from alfalfa and cottonseed hulls**

Rachel Allphin\*, Barry Lambert (Advisor), James Muir, Department of Animal Sciences

The effects of dietary distillers' grains (by-product from ethanol production) on ruminal in situ nutrient disappearance from alfalfa and cottonseed hulls was measured in four ruminally cannulated goats. Alfalfa and cottonseed hull residual samples were collected and analyzed for dry matter, organic matter, acid detergent and neutral detergent fiber. Ruminal in situ nutrient disappearance from alfalfa and cottonseed hulls was not affected ( $P < 0.05$ ) by the inclusion of distillers' dried grains in the goat's diets at levels up to 20% of the total ration. These results indicate that dried distillers' grains can be used as a feedstuff for growing goats without adversely affecting ruminal fermentation of other nutrient sources in the diet.

### **21- The Identification of Success Factors of Texas College Students in History 201 Core Requirement Curriculum Courses**

Sarah Gockley\*, Department of Curriculum and Instruction (Advisor: Laurie Hawke)

This study will identify the contributing factors of success of Texas college students taking history core requirement classes. The participants in this study were all classifications of college students, who have enrolled in the core required History 201-U.S. History Through 1877. The research model and method of this study was correlational as the researcher used three types of instrumentation: a questionnaire, a validated Texas state test, and the final grades in the course. The researcher was able to then make a correlation between the types of social studies classes—Dual-Credit, Advanced Placement, and Regular classes—and the overall preparedness of those graduates into college. The researcher obtained permission from the professors and the participating students, whose identities were kept strictly confidential. The findings will show that the original perceptions of college preparedness and the reality of college success differed substantially.

### **22- Insecticide Susceptibility in House Fly Populations from Four Dairies in Central Texas, USA**

Patrick McClellan\*, Jeffery Tomberlin, David Kattes (Advisor), Department of Agribusiness, Agronomy, Horticulture & Range Management

The house fly, *Musca domestica*, is a major pest in and around dairy cattle operations. Not only a nuisance, house flies may also serve as vectors of pathogens that are harmful to humans and animals. House flies were collected from four Erath and Comanche County dairies from May until October 2007 and tested for insecticide susceptibility. A topical bioassay method was used to replicate insecticide exposure. Tests were conducted to determine susceptibility to three

select insecticides, which include cyfluthrin, spinosad, and imidacloprid, on wood and vinyl. Additionally, 2 h and 24 h mortality rates were recorded. Within this study, cyfluthrin on wood showed to produce the greatest overall house fly mortality on wood (62.2%) and on vinyl (93.5%) during the 2 h observation. Spinosad produced the greatest overall mortality rate on wood (75.7%) and on vinyl (90.3%) during the 24 h observation. Imidacloprid resulted in the lowest overall mortality on both wood and vinyl, ranging from 5.6% to 52.2%. House fly mortality was highly variable across facilities and season.

## UNDERGRADUATE ORAL PRESENTATION ABSTRACTS

### **23- Treading Holy Water: Religion in Jane Eyre and Wide Saragasso Sea**

Marsha Decker\*, Department of English and Languages (Advisor: Mallory Young)

Religion in the novels *Jane Eyre* and *Wide Saragasso Sea* is a spiritual acting out of the patriarchal system in both novels.

In Charlotte Brontë's *Jane Eyre*, Jane is searching for love, acceptance, and happiness in her life. Throughout her journey, religion is used to constantly reinforce a woman's expected position in a male dominated world. Religion is shown to be just an outward display by many of the men, which can be taken off or put on at will. As Jane gains emotional strength, religion becomes less dark; however it is still oppressive as the men seek to impose their will upon her. She is able to reject several forms of religion, and therefore attempts of control by men, as she becomes more aware of her own strengths as a woman. Religion as a tension between men and women is used in Jean Rhys' *Wide Sargasso Sea* as well. *Wide Sargasso Sea* is based upon the characters of Brontë's *Jane Eyre*. Christianity stands in as the male essence and Obeah, a West Indian form of religion, as the female essence in the battle for power in the novel. Both are seeking to control Antoinette. She is caught between the two belief systems just as she is caught between desire for her husband and the struggle for her own identity.

My presentation examines how religion is used in these novels to represent the desire of men to oppress and control women.

### **24- The Great Recession: The Origins of the Worse Economic Crisis since the Great Depression**

Jack Reynolds\*, Department of Accounting, Finance, and Economics (Advisor: Hussain Jafri)

While it is clear that the roots of the current financial crisis can be found in the housing boom and subsequent bust, it is not at all clear that one of the most oft cited scapegoats for the crisis, subprime mortgage holders, are the primary culprit. Lax regulations and enforcement of existing regulation, coupled with the securitization of home mortgages all contributed substantially to what some economists have taken to calling the Great Recession in deference to its nearest historical counterpart. Excavating America and its global partners from this economic downturn will be neither quick nor easy nor without some controversy.

### **25—Development of microsatellite markers for studying population genetics of the cotton rat (*Sigmodon hispidus*)**

Jordan Sparkman\*, Russell Pfau (Advisor), Department of Biological Sciences

*Sigmodon hispidus*, commonly known as the cotton rat, can be found across the southern regions of the United States. This mammal has long been the subject of intense scrutiny, having been the focus of several ecological and genetic studies. Two of these investigations have

revealed that *S. hispidus* consists of two distinct genetic lineages, eastern and western, which hybridize in the central U.S. In order to provide a clearer understanding of the nature of hybridization between these two lineages, we are developing DNA fingerprinting markers (microsatellites) that can be used with this species. The FIASCO technique was used to isolate and characterize microsatellite markers from throughout the genome. Briefly, *S. hispidus* DNA was subjected to enzymatic digestion and the resulting fragments were cloned and sequenced. DNA sequences were examined in order to identify quality microsatellite markers. Primers were designed so that markers could be amplified using the polymerase chain reaction. To date, eleven microsatellite markers have been fully developed and tested. Preliminary comparisons of genetic diversity between eastern and western lineages will be presented.

## **26- Comparative analysis of biological integrity between the Bosque and Paluxy Rivers**

Jeremy Munz\*, Chris Higgins (Advisor), Department of Biological Sciences

An Index of Biotic Integrity (IBI) is a method used by environmental agencies to assess the water quality of a stream based on characteristics of the fish assemblage rather than traditional chemical analysis. Although IBIs have been conducted for many of the streams in Texas, no index has been reported for the Paluxy River. Hence, the objectives of this study were to characterize the IBI on the Paluxy River, and to compare IBI scores between the Paluxy and Bosque Rivers (which has been extensively studied). The methods used to conduct the IBI followed the Texas Commission on Environmental Quality guidelines. Two sites were selected on the Paluxy River each 100 meters long, each of which were sampled in 10 meter transects. A combination of backpack electrofishing (6 minutes per transect) and seine hauls (3 per transect) were used to survey the fish assemblage. One site was selected on the Bosque river to use as comparison using the same sampling methods as mentioned above. One site on the Paluxy was considered exceptional based on its IBI score, but the other site (which was within 2 miles of the exceptional site) was intermediate. The intermediate site on the Paluxy was more consistent with the Bosque River, which was also considered intermediate, than it was with the other site on the Paluxy. These results suggest IBI scores can change considerably between sites on the same river as well as between adjacent rivers.

## **27- Level of genetic introgression across a hybrid zone between two species of short-tailed shrew (*Blarina brevicauda* and *B. hylophaga*) in Iowa and Missouri.**

Becca Peters<sup>1</sup>, Cody Thompson<sup>2</sup>, Russell Pfau<sup>1</sup> (Advisor), <sup>1</sup>Department of Biological Sciences, Tarleton State University, <sup>2</sup>Department of Biological Sciences, Texas Tech University

Two species of short-tailed shrew, *Blarina brevicauda* and *B. hylophaga*, hybridize where their geographic ranges meet in Nebraska, Iowa, and Missouri, creating a very narrow hybrid zone. The extent of introgression of nuclear DNA between species across this hybrid zone appears to be minimal at most, but the extent of introgression of mitochondrial DNA has not been assessed. Mitochondrial introgression can be detected by comparing the type of mitochondrial DNA found within individuals with their species designation as determined by chromosomal and nuclear DNA analyses. We sequenced the mitochondrial cytochrome *b* gene of individuals adjacent to the contact zone to determine if any genetically identified individuals contained mitochondrial DNA of the opposite species--the pattern that would indicate introgression. Preliminary results will be presented.

## GRADUATE ORAL PRESENTATION ABSTRACTS

### **28- An evaluation of vitamin E and selenium as a treatment for capture myopathy in Rio Grande wild turkeys (*Meleagris gallopavo intermedia*)**

Thomas Schutz\*, Jeff Breeden (Advisor), Jim Mueller, Roger Wittie, Department of Animal Sciences

Capture and relocation is commonly used to reintroduce Rio Grande wild turkeys (*Meleagris gallopavo intermedia*) to areas of low numbers. However, isotonic muscle contraction during the capture and restraint process reduces blood flow to muscles and may induce the stress related disease, capture myopathy. The goal of this study was to determine if intramuscular injections of vitamin E and selenium could be an effective treatment for capture myopathy. Rio Grande wild turkey hens (n=54) were captured during spring 2007, 2008, and 2009. Hens were divided into a treatment group (vitamin E and selenium) and a control group (sterile saline). Blood samples were collected from each bird after capture and again prior to release after birds were held for approximately 48 hours. Radio marked birds were located at 14 days post-release. Survival rate of relocated turkeys was found to be 81.3% for both the treatment and control group. Further analysis showed that the survival rate of birds in the treatment group (92.5%) was higher than birds in the control group (86.6%), when birds that died during the transport process (n=3) were excluded. Statistical analysis found no difference in survival rates, enzyme levels, and log ratios between the control and treatment group. The failure to understand how vitamin E and selenium affected capture myopathy could have been caused by small sample size, variation in enzyme levels, and trapping methods used. A continuation of this study is necessary to increase sample size and determine the usefulness of this treatment.

### **29- Attitudes of City Administrators toward Terrorism: North Central Texas 2009 Survey Results and Analysis**

Andrew Johnson\*, Department of Social Sciences (Advisor: Dean Minix)

An analysis of a survey conducted on the attitudes of city administrators, secretaries, and managers concerning terrorism. The survey, conducted in the spring and summer of 2009, included all municipalities in the North Central Texas Region. Respondents were asked to rate the preparedness of their respective cities as well as give indications as to how funding, equipment needs, training and other factors impact their cities ability to respond to potential terrorist activity. The survey also gathered information on the demographics of the population studied.