



# SYMP SIUM

EIGHTH ANNUAL UNION UNIVERSITY SCHOLARSHIP SYMPOSIUM

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EIGHTH ANNUAL UNION UNIVERSITY SCHOLARSHIP SYMPOSIUM

TUESDAY, MAY 3, 2011

Reception for Participants, Faculty & Outside Guests  
Grant Events Center 12:00-12:30 p.m.

## Afternoon Concurrent Sessions

Dept.	Room	Student Presenters	Time
Poster Displays	Grant Events Center	Lindsey Bock, Joanna Hull, Abioseh Kamara & Erin Spencer (BIO) Kathryn LaMar (BIO) Danielle Blackstone (BIO) Jordan Float, Katherine Long, Katelyn O'Roark & Devon Sledd (BIO) Emmitt Blankenship, Treston Humphreys & Lauren Parlow (BIO) Benjamin Fulton & Debbie Lai (BUS) Megan Mathis (CHE) Molly Mitchell (CHE) Lauren Quick (CHE) Joshua Cooper (CHE) Savannah Whitted (CHE) Jill Frank (CHE) James Avery, Chris Hayes & Jacob Hodge (EGR) Rob Calvert, Eric Olson & Aaron Porterfield (EGR) Ky Bailey, Jonathan Gwaltney, Wilson Holland, Phillip Johnson & Matt Wilson (EGR) Scott Kahler, Jason Mileham, Brady Sheppard & Ryan Substad (EGR) John Hall & James Avery (EGR) Rachel Brown, Martha Davis, Garnett Miller & Molly Wright (NUR) Debra Buckle & Debra Hendren (NUR) Florence Jones, Terry Sumpter & Carol Sykes (NUR) Lauren Mallard, Blake MacKey, Delena Sanders, Andrew Santoro & Tracey Wilson (NUR) Chris Graham, Melissa Hayden, Ryan Shephard & Joshua Smith (NUR) Carey Ann Bosold, Cevette Hall, Mekonnen Kidane & Tiffany Lofton (NUR) Kimberly Burse, Elizabeth Card, Susan Clifton, Kimberly Keel, Sherrie Turner & Nadia Wilson (NUR) Shari D. Wherry (NUR) Cynthia Powers (NUR) Denise Thornton-Orr (NUR) Rachel Brown (NUR) Tijuana Terrell (NUR) Terry Sumpter (NUR) Kimberly Byrd (NUR) Mollie Headrick (NUR) Patricia Bird (NUR) Kim McIntosh (NUR) Deon Ring (NUR) Lisa Medlin (NUR) Janie Jones (NUR) Cindy Snyder (NUR) Neil Hunter, Jonathan Mitchell, Devipriya Mohan & Nicholas W. VanHise (PHARM) Allorie T. Smith & Brent A. Pierce (PHARM) Rebekah Montgomery (PHY) Alyssa Karr (SOC) Johnna Cosby, Katrina Long, Elise McNutt & Christopher Taylor (SW) Debra Gibbs, Arnzie Johnson, Denise Kelley, Andrea Newman & Temesha Polk-Howard (SW)	12:30-1:00 p.m.
ART/COM	JEN 212	Sarah Palmer Goff (COM) Ellen Reinhard (COM) Katherine Pullen (COM) Kristen Marks (ART) Ben Watson (ART) Colby Stinebaugh (ART)	2:00 p.m. 2:20 p.m. 2:40 p.m. 3:00 p.m. 3:30 p.m. 4:00 p.m.

BIO	WH 101	Marci Davis Ellen Bone Micheala Anderson Laura Finley Kathryn Borucki Russ Duck Chace Franks Faris Adam Bakeer	1:20 p.m. 1:40 p.m. 2:00 p.m. 2:20 p.m. 3:00 p.m. 3:20 p.m. 3:40 p.m. 4:00 p.m.
		<i>Break 2:40 p.m.</i>	
BIO	WH 102	Matthew Beshires Micah Thomas Hannah Staggs Thomas Duncan Aaron Davidson Kayla Hauss Carrie Moore Carson Rider	1:20 p.m. 1:40 p.m. 2:00 p.m. 2:20 p.m. 3:00 p.m. 3:20 p.m. 3:40 p.m. 4:00 p.m.
		<i>Break 2:40 p.m.</i>	
CHE/PHY	A-9	Trey Smith (CHE) Jonathan Boyd (CHE) Emilie Huffman (PHY) Kimberly Lukens (PHY)	2:00 p.m. 2:20 p.m. 2:40 p.m. 3:00 p.m.
CSC	D-53	Chase Steinmann Drew Long Mikias M. Seid Benjamin Fulton Grayson Hardaway	2:00 p.m. 2:30 p.m. 3:00 p.m. 3:30 p.m. 4:00 p.m.
DMS	JEN 225	Ryan Griffin (DMS-COM) Tyler Litton (DMS-COM) Scott Goff (DMS-COM) Rob Simpson (DMS-COM) Colt Dixon (DMS-COM) Erica Davis (DMS-COM) Ryan Oetting (DMS-COM) Nicole McCoy (DMS-COM) Joshua Stephenson (DMS-COM) Jordan Hatchell (DMS-CSC)	12:30 p.m. 1:00 p.m. 1:30 p.m. 2:00 p.m. 2:30 p.m. 3:00 p.m. 3:30 p.m. 4:00 p.m. 4:30 p.m. 5:00 p.m.
ENG	Theatre	Clark Benedetti, Joshua Creswell, Amanda Ellis, Gillian Frank, Treasure Hightower, Hannah Marsh, Abigail Nolen & Holly West	2:00 p.m.
ENG/HIS/PSY	D-54	Caitlin Roach, Taysha Cadenhead, Elaura Highfield, Cameron Puckett & Randall Simpson (ENG) Erika Dean, Chelsea Carrier, Rachel Moore Caroline Sellers & Eric Sparks (ENG) Amanda Bennett, Dwight Davis, Michael O'Malley, Hannah Wakefield & Whitney Williams (ENG) Hunter Bragg (HIS) Tiffany Best, Corey Brawner, Amanda Neibel, Cari Speer & Holly Stevens (PSY)	2:00 p.m. 2:20 p.m. 2:40 p.m. 3:00 p.m. 3:20 p.m.
EGR	PAC A-7	Grayson Hardaway, Karl Magnuson, Jeff Maharrey, Nate Peterson & Rachel Quinn Rachel Carbonell & Caroline McConnell Ian Allen, Chris Hayes, Jacob Hodge & Daniel Kennedy Tayo Adedokun, Ian Allen, Claire Elmlblad & Robert Lynn Kyle Harris, James Jones, Bailey Moore, & Rhett Woody Chris Hayes, Paul Morris & Daniel Sikes	2:00 p.m. 2:20 p.m. 2:40 p.m. 3:00 p.m. 3:20 p.m. 3:40 p.m.

SCHEDULE CONTINUED >

<b>ICS/LAN</b> Session Chair: Cynthia Jayne	<b>BAC-43</b>	Mikias M. Seid (ICS) Melissa Chirino (ICS) Kelly Bogdanovich (ICS) Jennifer Escue (ICS) Emily Alm (LAN)	2:00 p.m. 2:20 p.m. 2:40 p.m. 3:00 p.m. 3:20 p.m.
<b>MUS</b> Session Chair: Joshua Veltman	<b>Hartley Hall</b>	Gillian Frank (Lecture-Recital)	2:00 p.m.
<b>BUS/EDU</b> Session Chair: Terry Weaver	<b>BAC-44</b>	Matthew Parker (BUS) Michael Anderson, Benjamin Fulton & Eboni Murphey (BUS) Mary Ellen Poe & Dennis Regalado (BUS) Jamie Sanders (EDU) Amanda Jeanine Spencer (EDU) Brenda Powell (EDU)	2:00 p.m. 2:20 p.m. 2:40 p.m. 3:00 p.m. 3:20 p.m. 3:40 p.m.
<b>PHARM/SW</b> Session Chair: Todd Stanfield	<b>BAC-87</b>	Erica Rogers (PHARM) Johnna Cosby, Elise McNutt, Katrina Long & Christopher Taylor (SW) Latonia Brooks, Greg Ginn, Veronica Morrow & Elizabeth Wilson (SW) Mary Elizabeth Carnell, Caroline George, Lavanda Ross & Andi Schreiber (SW) Candice Adams, Tynessia Love, Katie Mitchell & Krissie Shells (SW)	2:00 p.m. 2:20 p.m. 2:40 p.m. 3:00 p.m. 3:20 p.m.
<b>THM</b> Session Chair: Taylor Worley	<b>JEN 325</b>	Dwight Davis Zachary Settle John Winfree Skipper Boatwright Dwight Davis Jeremy Seward Robert Andrew Norman	2:00 p.m. 2:20 p.m. 2:40 p.m. 3:00 p.m. 3:20 p.m. 3:40 p.m. 4:00 p.m.



# art

## The Effect of Theosophy as the Message Behind Kandinsky's Artistic Abstraction

**Presenter:** Kristen Marks  
**Faculty Advisor:** Haelim Allen

In his 1911 painting "Sketch I for Composition VII" Vasily Kandinsky relied on pure line, color and shape to communicate spiritual truths as powerfully as music evokes emotion and stirs the soul. This idea of abstraction to communicate spiritual meaning rose in part from Kandinsky's interest in Theosophy. Kandinsky intended for his painting to convey the truths of his belief system, creating a spiritual connection with his audience through mood and feeling rather than interpreting a message from visual symbols. Though the resulting work is strikingly beautiful, it fails to effectively communicate any solid truths because the foundation of Theosophy itself is built on shallow premises. Instead of the artistic abstraction imparting these principles, nothing more is communicated than a vague feeling of spirituality, and the resulting painting is beautiful but ultimately meaningless.

## The Unfinished Image: Examining the Journey of Theophilus Solomon

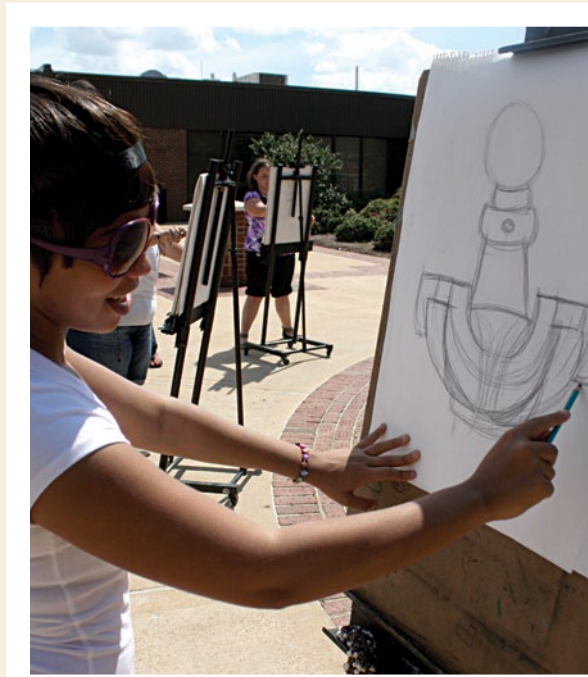
**Presenter:** Ben Watson  
**Faculty Advisor:** Chris Nadaskay

The story of Theophilus Solomon was built from the traditions of Protoscience, mythology and Medieval cosmology. His anachronistic world combines science fiction and fantasy. In revealing the roots of the story I will demonstrate how the traditional source material has been re-contextualized into a personal spiritual autobiography. Theophilus Solomon acts as a pseudonymous character who represents my own encounters with the ideas and images expressed in the work. These voyages of my imagination bring me to the shores and streets of continents and cities that are impossibly distant from my own universe. Yet because of unexplained mysteries experienced throughout history, the possible and the impossible remain undeniably intertwined.

## Georges Rouault's 1939 Painting: *Crucifixion*

**Presenter:** Colby Stinebaugh  
**Faculty Advisor:** Haelim Allen

Art critics and historians agree that Georges Rouault had a powerful effect on art, especially religious art, over the last century. While most other artists avoided religious subject matter in their work, Rouault engaged it. By looking at the work of the artist, specifically his 1939 painting *Crucifixion*, you see his religious subject matter and a glimpse to the source of his historical, conceptual, personal, and religious significance. Through his biography his significance is given roots, and through his schooling his historical importance is established. For Rouault, all parts of the painting held significance. This significance is personal and is evident in his concept. By looking at this piece in the context of his work as a whole, his concept of how to illustrate Christ's charity for our depravity is brilliantly full. Rouault's effect on art is evident in his work's longevity, rooted in his biography, and meaningful on a personal level. ■



# biology

## The Use of Scent Stations to Estimate Animal Activity and Relative Abundance in a Particular Area

**Presenter:** Matthew Beshires  
**Faculty Advisor:** James Huggins

Use of scent stations help determine animal activity and relative abundance in specific study areas. Motion sensitive cameras were used to capture the activity and relative abundance of animals in Chester County, TN. The cameras were placed in two locations Chester County. One camera was placed in a bottomlands environment while the other was in an uplands environment. The stations were fixed having a stake covered in a particular scent for a week's period and then changed to another scent. The stations were checked to examine the level of activity to each scent. Bobcat (*Lynx rufus*) and wild boar (*Sus scrofa*) are the scents that were used.

## The Effectiveness of Common Antiseptic Mouth Rinses on the Inhibition of *Streptococcus mutans* Activity

**Presenter:** Micheala L. Anderson  
**Faculty Advisors:** Andy Madison and Cathy Huggins

Satisfactory oral hygiene is usually a very hard task to maintain. To help accomplish suitable oral hygiene most people perform tasks such as: the use of oral rinses, brushing, and flossing to prolong the longevity of their oral health. In this research experiment the effectiveness of common antiseptic mouth rinses was evaluated to determine which rinse had optimal performance in inhibiting the activity of microorganisms and/or destroying the microbes completely; specifically, in this experiment, the bacteria *Streptococcus mutans*. Three different brand name mouth rinses recommended to be beneficial in its antiseptic capabilities were selected. The oral rinses chosen were Listerine, Crest, and Lavoris brand mouth rinses. Most research that has been conducted on these products was performed to test their ability in successfully performing alone but not to test their competitive efficiency against each other. In this experiment, the 3 selected antiseptic products were each

separately applied to my chosen oral bacteria, *Streptococcus mutans*, at varied concentrations. Once the ideal concentration of the antiseptic agent was determined for each selected brand, viable cells of the *Streptococcus mutans* bacteria were transported via nutrient broth into a sterile Petri dish. Next the samples were plated in Tryptic Soy agar and the antiseptic was added via a saturated sterile disk. The samples were then incubated at ~37°C and recorded at the selected 24hr and 48hr time intervals, using measured zones of inhibition. Lastly, all the samples were used for comparison to determine the best and most efficient brand of mouth wash in the prevention of *Streptococcus mutans* activity and therefore, which brand better assisted in the decreasing of the harmful oral bacteria. The two conspicuous stages of the experiment were both tested in trials of 3.

## The Effects of Caffeine on the Liver of a Mouse

**Presenter:** Micah Thomas  
**Faculty Advisor:** James Lockett

Many foods and drinks contain a stimulant known as caffeine, *1,3,7-trimethylxanthine*. It has been demonstrated to cause intense irritability and insomnia. Caffeine affects nearly every system (e.g. nervous and cardiovascular) in the human body, and is metabolized by the liver. This study focused on the effects of caffeine on the liver of mice. Nine mice (6 male, 3 female) were randomly divided into 3 groups (2 experimental and a control). Each group contained 2 male and 1 female mice assigned to a treatment. The experimental groups were given either 0.15 mg/mL or 0.30 mg/mL of caffeine administered *ad libitum*. Sections of liver were prepared, stained using hematoxylin and eosin, and observed using light microscopy, in order to detect the effects of caffeine on liver tissue. No liver damage was observed using this method.



## Assessment of the Effect of Drying Method on Bomb Calorimetric Analysis

**Presenter:** Ellen Bone  
**Faculty Advisor:** Andrew Madison

This research sought to assess whether using heat to prepare organic matter for bomb calorimetry altered the analysis and if that could be reduced by freeze drying samples.

The hypotheses evaluated in this research were as follows:

- H<sub>1</sub>: Using heat to dry organic matter will alter its bomb calorimetric estimate.
- H<sub>2</sub>: A longer drying time will alter the caloric estimate of a sample
- H<sub>3</sub>: The same species of crickets, dried corn, or collard greens from one source will yield a different bomb calorimetric estimate than the same species from a different source.

Drying method and drying time were not found to have an effect on calorimetric estimate, but sample source did. This means that when preparing samples for bomb calorimetry, the most convenient drying method may be used regardless of length of drying time.

## The Effect of Acoustic Frequencies on the Fluorescence of Green Fluorescent Protein

**Presenter:** Kathryn LaMar  
**Faculty Advisor:** Mark Bolyard

My research examined the effect of audible frequencies of 50-8,000Hz on the fluorescence of GFP in the presence of urea. GFP was extracted and purified from *E.coli* containing the pGlo plasmid. The GFP concentration was then determined using the Nanodrop2000. The concentration threshold at which urea begins to denature GFP was investigated to test whether acoustic frequencies would cause GFP to lose fluorescence, but a rough estimate was used to implement the experiment because a clear urea denaturation peak was not observed. A GFP solution treated with 0.6M urea was exposed to frequencies of 50-8,000Hz and microfluorometry was used to examine the effect of audible frequencies on the fluorescence of GFP. Small fluctuations were observed in microfluorometry readings. This could be due to the denaturing of GFP, or it could be only disturbances of the components of the microfluorometer. The results are inconclusive and require more research to determine whether sound has an effect on the fluorescence of GFP.

## Identification of *Yersinia pseudotuberculosis* and *Y. enterocolitica* in beavers by LAMP amplification and PCR

**Presenter:** Hannah Staggs  
**Faculty Advisor:** Carol Weaver

Yersiniosis has been a growing threat to humans in recent years. *Yersinia pseudotuberculosis* and *Y. enterocolitica* are 2 similar bacteria that cause fever, abdominal pain, and diarrhea. They can be contracted by consuming contaminated food or water. Beavers (*Castor canadensis*) can be infected by both bacteria and thus were studied to check for *Yersinia* in West Tennessee waterways. Loop-mediated isothermal amplification and PCR were performed on 49 DNA tissue samples from beavers of West Tennessee waterways to check for *Y. pseudotuberculosis* and *Y. enterocolitica*. A total of 12 positive samples were identified with PCR, 3 of these samples were also found to be positive with LAMP. PCR was found to be slightly more sensitive in detecting the presence of the bacteria. Since *Yersinia* was detected in the West Tennessee beaver population, more research is necessary to test for the amount present in the water. Precautions should be taken to prevent the spread of yersiniosis to the human population.

## Determining Relatedness in *Bubalus bubalis*, Common River Water Buffalo, by Comparing Mitochondrial DNA

**Presenters:** Lindsey Bock, Joanna Hull, Abioseh Kamara, Erin Spencer  
**Faculty Advisors:** Mark Bolyard and James Kerfoot, Jr.

This study sought to investigate the relatedness of individuals of *Bubalus bubalis* in order to aid the preservation of the heterozygosity of the species in captive environments. Mitochondrial DNA from three blood samples were separated by centrifugation and a series of PCR reactions were conducted using primers developed for the genes HVR I, HVR II, Cyto I, and Cyto II. These genes show variation in their sequences, making them reliable for testing relatedness. Samples were then sent to Washington University, St. Louis for sequencing. Previous studies have indicated that the mitochondrial DNA of related individuals show strong similarities that should be presented in the test results. The results of this study will provide the necessary relatedness information for agencies that breed captive individuals, in order to prevent the occurrence of inbreeding. Detailed breeding registries and DNA information would ensure the genetic variability, and, ultimately, the vitality of a given species.

# biology

## Development of a Tool to Test for Anticoagulant Capabilities Against Factor Xa and Thrombin

**Presenter:** Carson M. Rider  
**Faculty Advisor:** Mark Bolyard

The primary objective of this project was to develop a tool to test for inhibitors of Factor Xa and Thrombin, which are vital enzymes in the blood-clotting cascade in humans. These enzymes are potential targets of anticoagulants, which are substances that have proven valuable in treating patients with blood clotting or coronary disorders because they help to prevent heart attacks and strokes. Recognition sequences for Thrombin and Factor Xa were previously inserted into DNA encoding the green fluorescent protein (GFP), which is found on the pGlo plasmid, and a polymerase chain reaction (PCR) was conducted to both amplify the DNA sequences and confirm that they were present. Positive clones were sequenced by Washington University in St. Louis, Missouri. GFP was then expressed and purified from each of the clones. The ability of Thrombin and Factor Xa to cleave the purified protein was then demonstrated to determine if this method could be used to identify inhibitors of Thrombin and Factor Xa.

## Mechanistic Analyses of Novel Compounds That Reactivate Latent Hiv-1 Expression

**Presenter:** Marci Davis  
**Faculty Advisor:** Dr. Nicolas Sluis-Cremer, University of Pittsburgh School of Medicine

Combination antiretroviral therapy (cART) has been effective in reducing the viral load in HIV-1 infected patients. However, cART cannot eliminate latent HIV-1 in resting CD4+ T-cells and other reservoirs. Therefore, new treatment strategies must be designed to completely eradicate HIV-1 infection. Previous work identified 7 natural compounds that were capable of reactivating HIV-1 expression in a latently infected Jurkat cell line. The goal of the current study was to determine whether any of these 7 compounds reactivate latent HIV-1 expression via known signaling pathways. Five of the compounds activated pathways with known roles in activation of

HIV-1 gene expression. All of the compounds activated other pathways that have not previously been linked to reactivation of HIV-1 expression. Taken together, these studies will help determine the mechanisms by which these compounds reactivate latent HIV-1, and may significantly impact the discovery and development of new antiretroviral therapies targeted to cure HIV-1 infection.

## Regeneration of *Khaya senegalensis* by Leaf Tissue Cultures

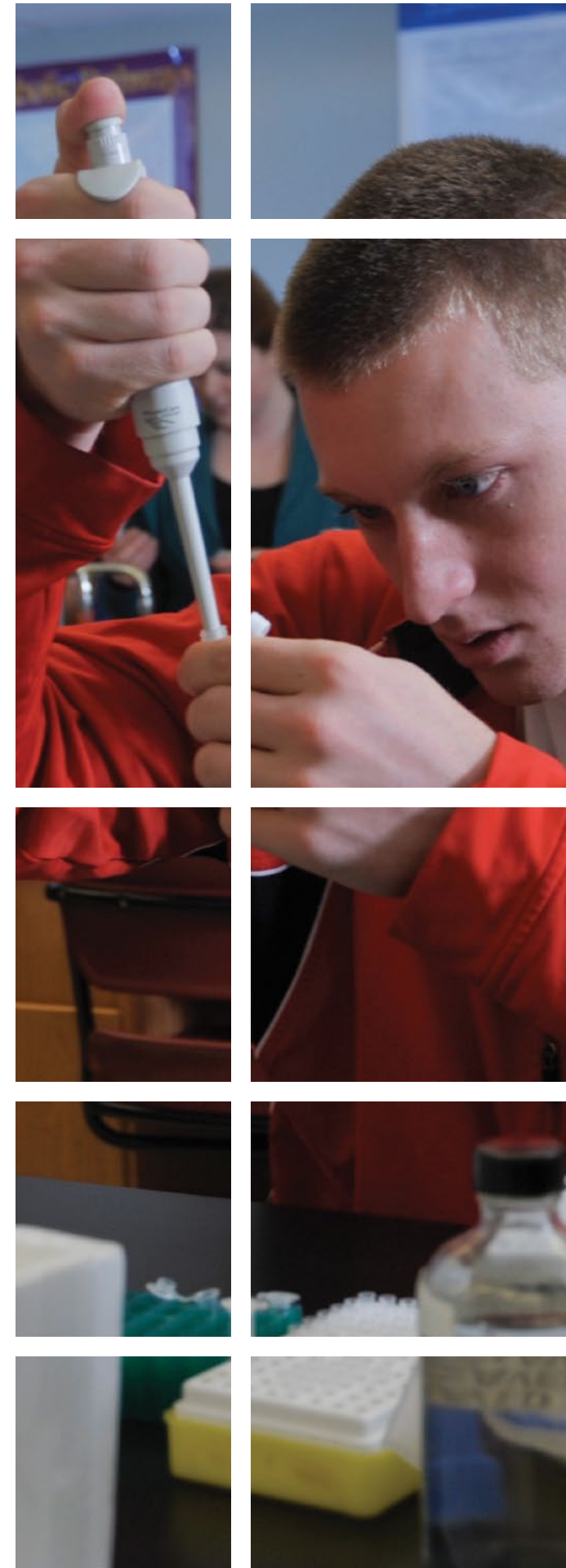
**Presenter:** Danielle Blackstone  
**Faculty Advisor:** Mark Bolyard

African Mahogany (*Khaya senegalensis*) is a valuable tree for furniture and other ornamental uses, and is widely grown across central Africa. This research developed the initial steps of a micropropagation technique for regeneration of *Khaya senegalensis* from leaf explants. Surface sterilization of leaf explants was achieved by exposing the leaves to 10% bleach with 0.1% Tween-20 for 10 minutes. The production of callus, a critical intermediate in the production of new shoots, was achieved using Murashige and Skoog medium supplemented with the plant hormones naphthaleneacetic acid and thidiazuron at concentrations between 0.1  $\mu\text{M}$  and 5.0  $\mu\text{M}$ .

## Ontogenetic Scaling of the Feeding Mechanism in Pike Killifish (*Belonesox Belizanus*)

**Presenter:** Thomas Duncan  
**Research Advisor:** James Kerfoot Jr.

*Belonesox belizanus* is an introduced species to south Florida that is known to decimate native prey populations quickly. This study sought to investigate the ontogenetic scaling of the feeding mechanism of pike killifish. It was hypothesized that linear measurements of the jaw would scale isometrically and that estimates of mechanical advantage, the trade-off between velocity and force transmission of the lower jaw, would have no relationship as the individual grows. Preserved species from age zero to 21 days post hatch were cleared and stained to allow for observation of the skeletal elements. To test the hypotheses,



jaw levers were measured and ratios calculated and regressed against standard length. Results indicated that no scaling relationships were observed in the lever ratios and body size, rejecting the hypothesis of isometric growth through ontogeny. Further investigation indicated no significant relationship between mechanical advantage and standard length.

## Testing the Link Between Diet and Phenotypic Plasticity In the Feeding Mechanism of *Lepomis microlophus*

**Presenter:** Aaron Davidson  
**Faculty Advisor:** James Kerfoot, Jr.

Phenotypic plasticity is an important concept to understand how a species adapts and survives in certain environments. This study was designed to investigate the variation in pharyngeal jaw and muscle morphology of *Lepomis microlophus* due to differences in diets, and examine the role phenotypic plasticity plays in enabling *L. microlophus* to manipulate various prey items. It was hypothesized that individuals fed a diet of hard-bodied prey would have differences in their feeding morphology compared with those fed soft-bodied prey. The hypothesis was tested using a common garden experimental design, randomly separating a cohort into two different diet treatments. Results of a Principle Component Analysis (PCA) combined with a series of T-tests indicated no significant differences in pharyngeal jaw anatomy and musculature between individuals fed different diets. Ecomorphological studies seek to determine how species can adapt to heterogeneous habitats and manipulate various prey resources.

## Detection of *Aspergillus* and *Candida* Species in Raptor Throats Using PCR

**Presenter:** Laura Finley  
**Research Advisors:** James Mahan and James Huggins

*Aspergillus* and *Candida* species are opportunistic pathogens, causing infections typically in an immunocompromised host, and are the main sources of invasive fungal infections within raptor populations. Traditional diagnostic methods for aspergillosis and candidiasis lack sensitivity and do not provide rapid results, which are necessary for initiation of appropriate antifungal therapy. Using PCR to detect fungal DNA may provide a better method of identifying pathogenic agents in raptors. The Pan-AC assay was developed to rapidly

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# biology

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and reliably detect a number of medically important *Aspergillus* and *Candida* species from a relatively small sample. This can be used to demonstrate the presence or absence of specific fungal flora in raptor throat swabs.

## The Influence of Diatomaceous Earth on the Endoparasite Levels of Zebras (*Equus zebra*)

**Presenters:** Katelyn O’Roark, Katherine Long, Devon Sledd, Jordan Float  
**Faculty Advisor:** James Kerfoot, Jr.

A major problem facing livestock-based industries is the presence of endoparasites. Endoparasites dwell inside their host, extracting nutrients and leaving the animal weak and susceptible to disease. Diatomaceous earth is a dietary supplement thought to reduce the levels of endoparasites. This study examined the difference in endoparasite load between zebras given a diatomaceous earth-supplemented diet and those with normal feed. It was hypothesized that there would be a significant difference in the parasite loads of the two groups of zebras. Fecal samples were collected from both groups and counts of endoparasitic eggs and cysts were measured. Preliminary results indicate that there is a significant difference in the level of eggs and cysts between the two groups. Based on these results, diatomaceous earth is an effective, affordable option for reducing parasite levels. Future studies could compare diatomaceous earth with vaccinations or other methods, examining factors such as cost-efficiency and effectiveness.

## The Effect that Riparian Zones Have on Fish Species Diversity and Richness

**Presenters:** Lauren Parlow, Emmitt Blankenship, Treston Humphreys  
**Faculty Advisor:** James Kerfoot, Jr.

Riparian zones are areas of vegetation that border bodies of water, influencing the temperature and chemical composition of the water. This study sought to understand the relationship between riparian zones and fish species diversity in creeks throughout Middle and West Tennessee. It was hypothesized that as the size of a riparian zone decreases, so will the diversity of fish populations

present. To test this hypothesis, 1.2 m cast nets were used to sample six different sites. Sites were selected based upon presence or absence of a riparian zone. Species diversity was estimated using the Shannon-Wiener Index, and preliminary results indicate a correlation between fish diversity and richness and size of the riparian zones surrounding the creeks. Studies like this can aid in determining the influence of human development on stream ecosystems and results could be potentially used to establish better conservation management practices.

## “Intestinal Helminths of the Mourning Dove (*Zenaid macroura*) in Central Alabama and Western Tennessee”

**Presenter:** Kayla Hauss  
**Faculty Advisor:** Marc Lockett

Intestinal helminths regularly parasitize digestive tracts of many avian species. Helminth infections decrease nutritional uptake and increase disease susceptibility in their host. Our research surveyed the intestinal helminth fauna of the mourning dove (*Zenaid macroura*) from central Alabama and western Tennessee. Mourning dove samples were obtained and a necropsy, egg floatation, and crop dissection was performed on each sample. Adult parasites were observed in 2 of the 14 doves, both of which were collected from Madison County, Tennessee. All adult worms were located in the most anterior portion of the small intestine and in the abdominal region of the body cavity. Eggs were seen in the corresponding fecal samples, resulting in relative counts ranging from 1 to 127 eggs. By comparing helminth prevalence using the Mann-Whitney Test, we determined that intestinal helminth prevalence does not vary geographically in mourning dove populations.

## Identification of Gibberellic Acid Induced Bacteria in *Populus tremula* Axenic Shoot Tip Cultures

**Presenter:** Carrie Moore  
**Faculty Advisor:** Mark Bolyard

Plant tissue culture depends on the removal of surface contaminants for success. However, collaborators in Lithuania have noted endogenous bacteria emerging

from sterile shoot tip cultures of European aspen native to Lithuania with the addition of gibberellic acid (GA). Using microbiological technique, three microbial species have been isolated from the plant. Our goal was to identify and characterize the bacterial species using microbiological assays. To this point we have identified these organisms as a *Bacillus*, an *Erwinia*, and an unknown yeast. We will attempt to confirm our results using polymerase chain reaction. Knowledge of bacterial species aids in the understanding of symbiotic relationships between plant and bacteria. This knowledge is of use for researchers striving to improve the use of European aspen as a pulp and fuel source, as well for other researchers using woody plants as their study model.

## Development of Mouse Anti Human IL-7R $\alpha$ Hybridoma

**Presenter:** Katie Borucki  
**Faculty Advisor:** Jennifer Gruenke

BALB/c mice were immunized with IL-7R and or ovalbumin to generate an anti-IL-7R and or anti ovalbumin antibody load so that hybridomas could be made with plasma cells secreting anti-IL-7R and myeloma cells. Three different adjuvants were used: Freund’s incomplete adjuvant alone, TiterMax Gold<sup>®</sup>, and Freund’s complete and incomplete adjuvants together. TiterMax Gold<sup>®</sup> gave the highest antibody response to IL-7R. Fusions were attempted with several different fusion agents: PEG alone, with CPZ, with trypsin, and in a hypotonic solution. Preliminary results indicate that CPZ is not an effective fusion agent, and that trypsin may aid fusion. An anti-ovalbumin hybridoma was made using TiterMax Gold<sup>®</sup> as adjuvant and PEG alone as the fusion agent.

## Effects of Cp-33 Buffer Zones on Populations of Northern Bobwhite and Other Upland Birds

**Presenter:** Russ Duck  
**Research Advisor:** Andy Madison

The northern bobwhite (*Colinus virginianus*) has experienced a rapid decline throughout its geographic range in the last 50 years. The primary cause of this reduction is due to habitat loss associated with changes in agricultural practices. The CP-33 program was designed to encourage landowners to designate part of their property for northern bobwhite habitat. This research project assessed the effectiveness of the CP-33 program in restoring northern bobwhite habitat and numbers. Researchers visited each CP-33 field, and its associated control field, 3 times during the month of June for two consecutive years. While there, researchers monitored and recorded birds observed, either by sight or sound. The data

was then analyzed to determine if fields enrolled in the CP-33 program contained higher densities of upland birds.

## The Effects of Dietary Vitamin E and Other Selected Antioxidants on Prostate Cancer Risk Among African Americans

**Presenter:** Chace Franks  
**Faculty Advisor:** Dr. Flora Ukoli, Meharry Medical College

The influence of vitamin E and other antioxidants on possible cancer risk is unknown among the African American community. In the present case-control study, the correlation between the amount of dietary vitamin E and other selected antioxidants and prostate cancer risks was examined. The intake of dietary vitamin E and other antioxidants was determined using dietary questionnaires that were administered by this researcher and other members of the Meharry Medical College research team. The results were analyzed statistically using SPSS<sup>®</sup> software. The results were controlled for a number of other variables that might alter the risk of cancer. It was hypothesized that higher intake of dietary vitamin E would be found in the control (non-cancerous) group than in the group with cancer. It is hoped that information gained from this study will help to reduce race-related health disparities.

## Energy Properties of Seeds and Food Preferences in Northern Bobwhites During Simulated Autumn Conditions

**Presenter:** Faris Bakeer  
**Faculty Advisor:** Andy Madison

Northern bobwhite (*Colinus virginianus*) populations have declined in recent years, and food plots are one strategy that serves to alleviate this loss. In my experiment, 6 different seed types were tested to determine which were best for supplemental feedings by measuring seed consumption and apparent metabolizable energy (AME). The seeds used were WGF sorghum (*Sorghum vulgare*), buckwheat (*Fagopyrum esculentum*), wheat (*Triticum aestivum*), browntop millet (*Panicum ramosum*), black oil sunflower (*Helianthus annuus*), and bob oats (*Avena sativa*). The quail consumed millet, sorghum, and wheat the most at >35 g; buckwheat and sunflower moderately (25±2.3 g and 24±2.6 g, respectively); and bob oats the least (3.6±2.3 g). The average AME was greatest in wheat, sorghum, millet, and finally sunflower. Supplemental feeding for bobwhite quail during autumn months should be able to meet energy demands, be readily consumed, and help build fat insulation for winter. With these criteria, wheat is highly recommended, followed by sunflower and sorghum; millet and buckwheat are moderately recommended. ■

# business administration

## Teaching Managerial Responsibilities for Internal Controls: The Disconnect Between Accounting and Management Professors

**Presenters:** Benjamin Fulton, Michael Anderson, Eboni Murphy  
**Faculty Advisor:** Karen C. Miller

This research examines the perceptions of accounting and management professors across the United States concerning the understanding of who is ultimately responsible for establishing and maintaining internal controls over financial reporting and finds a statistically significant difference of opinion between these two groups. A large number of management professors surveyed relegate this role to the internal auditors instead of management. These findings indicate management professors may not be fully aware of the responsibilities placed on managers of publicly traded companies for internal controls over financial reporting by the Sarbanes-Oxley (SOX) Act of 2002. The survey also finds a statistically significant difference in the perceptions of accounting and management professors concerning where the topic of internal controls should be taught and who is most qualified to teach internal controls to non-accounting business majors. Management professors believe accounting professors are most qualified to teach non-accounting majors, while accounting professors believe management professors are most qualified. This disconnect between management and accounting professors could potentially generate a business curriculum that leaves non-accounting business majors with no exposure to the roles and responsibilities of managers concerning internal controls over financial reporting upon entry into the world of corporate governance.



## Computerized Optimization Increases Efficiency of Student Care Package Program

**Presenter:** Matthew Parker  
**Faculty Advisor:** Andrew Tiger

The Student Care Package program is a fundraising project conducted by Union University SIFE. The most arduous aspect of the program is the calculation of raw materials. In order to reduce the amount of time and effort required for material calculation, SIFE students utilized computer optimization software. Incorporation of Microsoft Excel add-in What'sBest! by Lindo Systems enabled students to reduce the time spent calculating materials and develop more efficient purchasing plans. The concepts of adjustable cells, best cells, and constraints are applied through What'sBest! to generate the optimal solution. Through optimization software, SIFE members are able to achieve higher levels of efficiency, sustainability, and profitability for the Student Care Package program.

## Identifying and Minimizing Key Risks in a Not-for-Profit Entity

**Presenters:** Debbie Lai and Benjamin Fulton  
**Faculty Advisor:** Karen C. Miller

This study examines the key processes of a not-for-profit (NFP) entity, Tennessee Homeless Solutions, to determine the risk appetite of the entity and to design the necessary internal controls needed to minimize unacceptable key risks for such an entity. The study utilizes process mapping to identify risks and a risk matrix to determine the likelihood and impact of each risk. The process map with the identified risks and related controls, which have been incorporated into the key processes, are presented to management. Management reviews this information and establishes and maintains those internal

controls considered necessary to minimize key risk based on the residual risk appetite of management and the NFP. This study allows accounting students to study and examine the key processes, risks, and internal controls of an actual NFP entity, while providing the NFP with a beneficial assessment of their key processes.

## The Economic Development of Argentina

**Presenters:** Mary Ellen Poe and Dennis Regalado  
**Faculty Advisor:** Walton Padelford

Argentina has had an unfortunate economic history, especially during the twentieth century. The South American country went from being a world leader at the beginning of the 1900s to a country plagued by economic crisis. Although Argentina is well endowed with natural resources and a highly educated society, the country has struggled to escape inflation, debt, and financial ruin. The country, accustomed to emphasizing exports of commodities—a shadow of the colonial heritage—was crippled because of fluctuating world demand for its main exports. Throughout the last century, Argentina suffered because of political corruption and turmoil as well as fiscal mismanagement and debt, which prevented the country from being able to excel in the increasingly global marketplace. ■



# chemistry

## Free Radical Intermediates in the Cytochrome bc<sub>1</sub> Complex

**Presenters:** Savannah P. Whitted  
**Faculty Advisor:** Charles Baldwin

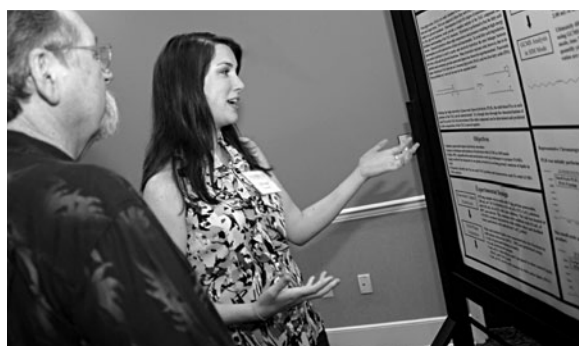
The cytochrome bc<sub>1</sub> complex is a central component of the respiratory electron transport chain (ETC) in the mitochondria of animals and most bacteria. The radical, semiquinone, generated by the cytochrome bc<sub>1</sub> complex is an intermediate in the Q-cycle and was trapped inside the Q<sub>o</sub> site by rapid freeze quenching. Pulsed EPR and solid-state ENDOR spectra were recorded to study the interactions of the protein with the ubisemiquinone radical in an effort to understand how the protein safely processes the semiquinone. EasySpin was used to perform spectral fittings in order to obtain *g*-values and hyperfine couplings of protons on the ubisemiquinone radical.

No large anisotropic couplings were found suggesting that the radical is the radical anion form of the semiquinone and is not strongly hydrogen bonded to the protein.

## Development of a *Phytophthora sojae*-Sensitive Polydiacetylene Liposome Biosensor

**Presenter:** Lauren Quick  
**Faculty Advisor:** David Wing

*Phytophthora sojae* is a pathogen that is known to infect and kill the roots of *Glycine max*. The development of a biosensor, specific to *P. sojae*, would alert farmers of its presence, before all crops are infected. Recently, there has been research using polydiacetylene (PDA) liposome sensors to detect the presence of specific gram-negative bacteria. This experiment investigated the application of this technique to develop a PDA biosensor that would be specific to *P. sojae*.



## Isolation of Yeast Alcohol Dehydrogenase

**Presenter:** Megan Mathis  
**Faculty Advisor:** David Wing

Three dye-affinity resins were compared for effectiveness in a project to develop an affinity chromatography-based purification experiment for yeast alcohol dehydrogenase for the biochemistry laboratory course at Union University. Dry yeast spores were activated in 0.25M sucrose buffer for 30 min at 42°C. Cell extracts for the column were prepared from the yeast cells using Y-PER<sup>®</sup> Yeast Protein Extraction Reagent followed by 8% polyethylene glycol (PEG) treatment. 1 mL of PEG supernatant was applied to each of three affinity columns: Cibacron Blue 3GA-agarose, Reactive Red 120 agarose, or *m*-Aminophenylboronic acid-agarose. 15 mL of isolation buffer was applied to each column to wash out non-retained proteins, and then ADH was eluted with 10 mL of 1.0 M arginine in isolation buffer. Arginine was the eluant of choice because elution with NADH, was found to significantly reduce the protein's activity, unless removed. Fractions from each column were pooled and tested for protein and enzyme activity. The specific activity of enzyme eluted from the Cibacron Blue, Reactive Red, or *m*-Aminophenylboronic resins was 5.72, 4.95, and 1.88 Units/mg respectively. Cibacron Blue 3GA-agarose resin was found to be best for isolating alcohol dehydrogenase.

## Hydrogen Bonding in Substituted Naphthalenes II

**Presenter:** Molly Mitchell  
**Faculty Advisor:** Charles Baldwin

Hydrogen bonding is defined as intermolecular bonding between an electron deficient A—H donor group and an electron rich acceptor atom B. Previous experiments with variable temperature <sup>1</sup>H NMR and X-ray crystallography on ethyl 1-methyl-2-bromomethyl-4,5-diphenylpyrrole-3-carboxylate indicated intramolecular hydrogen bonding between a bromomethyl hydrogen and the ester carbonyl. When ethyl 2-bromomethylbenzoate and ethyl 2-bromomethyl-1-naphthoate were studied in the same manner, no



intramolecular hydrogen bonding was indicated. Thus it was concluded that the highly substituted pyrrole scaffold promoted intramolecular hydrogen bonding in a way not yet understood. The objective of the research performed was to synthesize ethyl 1-bromomethyl-2-naphthoate and ethyl 4-bromo-1-bromomethyl-2-naphthoate to determine if the addition of an electron withdrawing group to the ring would render the bromomethyl carbon electron deficient enough to encourage intramolecular hydrogen bonding between a bromomethyl hydrogen and the ester carbonyl. Synthetic paths to these molecules will be presented. However, successful synthesis of the target molecules was unsuccessful.

## Synthesis of an "Optical Tongue" Biosensor Using Various Amino Acid Derivatives

**Presenter:** Trey Smith  
**Faculty Advisor:** David Wing

Polydiacetylene liposomes were used to synthesize an "optical tongue" that could be used as a biosensor for detecting the pathogen *Phytophthora sojae*. Various amino acid derivatives were then attached to the compound. These amino acids would respond with a visible color change when exposed to the desired analyte. The amino acids that were used in the synthesis of the biosensor were Glycine, Toluene, and Phenylalanine. Spectral data was taken to support the formation of the desired derivative.

## Synthesis of Functionalized Cyclopentadienide Manganese Complexes

**Presenter:** Jonathan Boyd  
**Faculty Advisor:** Randy Johnston

The synthesis of four tetramethyl substituted cyclopentadienide (Cp\*) manganese complexes of the form Mn(CO)<sub>3</sub>Cp\*R was attempted, where R was of the form (CH<sub>2</sub>)<sub>n</sub>XCH<sub>3</sub>, or (CH<sub>2</sub>)<sub>n</sub>N(CH<sub>3</sub>)<sub>2</sub>, where X was either S or O. Multiple synthetic pathways were attempted, the first of

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# chemistry

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which involved nucleophilic substitution between the lithium salt of 2,3,4,5-tetramethylcyclopent-2-enone and a halogenated form of the desired substituent. An alternative pathway for ligand synthesis was characterized by a Grignard reaction of allyl magnesium bromide with 2,3,4,5-tetramethylcyclopent-2-enone followed by multiple functional group transformations. The ligand was then reacted with NaH to form an aromatic intermediate, which was reacted with  $\text{Mn}(\text{CO})_5\text{Br}$  to form the tricarbonyl metal complex of the ligand. IR,  $^1\text{H}$  NMR, and GC MS were used to characterize intermediates and products.

## Aspects of Hydrogen Bonding in Highly Substituted Pyrroles II

Presenter: Joshua W. Cooper

Faculty Advisor: Charles Baldwin

Previous research probed the existence of intramolecular hydrogen bonding in a number of highly substituted pyrroles with some success. This focus of this research is on determining the existence of hydrogen bonding between the carbonyl oxygen of the ethyl acetate side chain and a hydrogen on the 2-bromomethyl group in ethyl 2-(2-(bromo-methyl)-1-methyl-4,5-diphenylpyrrol-3-yl)acetate. Previous attempts to synthesize the target compound have not met with success. Several synthetic methods, including a variation on the Paal-Knorr synthesis, followed by acid-catalyzed hydrolysis, and phase transfer catalysis will be discussed. The results of hydrogen bonding studies with dynamic  $^1\text{H}$  NMR, will be reported.

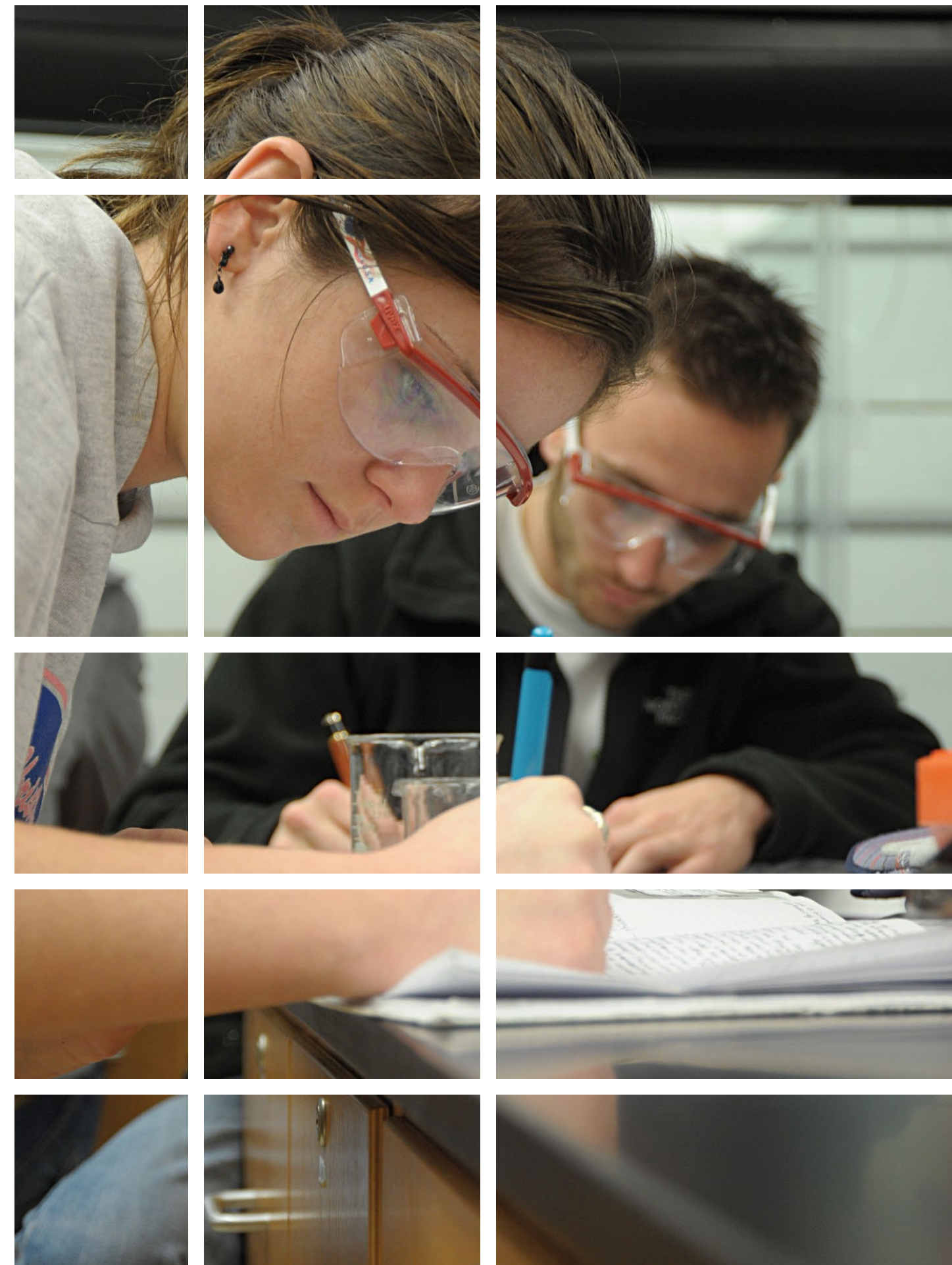


## RF-Powered Micro-extractor Sample Injection Protocol Development

Presenter: Jill Frank

Faculty Advisor: Charles Baldwin

In preparation for the future NASA *in situ* Mars Exploration missions, an RF-powered micro-extractor is being developed to extract specific biomarkers of life from Martian regolith. The 180 MHz micro-extractor power source disrupts water's translational energy, causing water to act as a pseudo organic solvent due to its decreased dielectric constant. To facilitate RF micro-extraction, injection protocols have been developed for a broad range of common Martian mineral and analog soil samples. Sample injection efficiencies were analyzed for each sample at varying injection parameters, consisting of particle size (MSL required  $< 150 \mu\text{m}$ ,  $< 53 \mu\text{m}$ ), sample density (0.1, 0.25, 0.5, 1.0 g/mL), tubing size (PEEK (ID 500  $\mu\text{m}$ ), teflon (ID 500  $\mu\text{m}$ ), silica (ID 250  $\mu\text{m}$ )), and flow rate (4, 40, 400  $\mu\text{L}/\text{min}$ ). Though samples exhibited unique injection affinities, medium to low density injections at 40  $\mu\text{L}/\text{min}$  through PEEK tubing optimized sample injections. ■



# communication arts

## Social Media and its Place in Public Relations Education and the Professional World

**Presenter:** Ellen Reinhard  
**Faculty Advisor:** Ashley Blair

Public relations thrives on the ability to communicate with different audiences. There are countless tactics used in public relations, one of them is the use of social media. With this fairly new outlet for conversation, one can ask four questions: What exactly is social media and do people understand its true capabilities? Is there current use of social media by public relations practitioners? And is the use of social media in public relations being properly taught to those entering the future PR world?

The researcher gathered a controlled population of *U.S. News and World Report's* 37 universities in the south listed with majors in "public relations, advertising and applied in communication." Professors were surveyed on current use of social media in the classroom and its importance in the professional world.

The study confirmed the idea that social media should be used in higher education and there is enough curriculum for a semester class to be taught solely on social media. The study helped understand just how to define social media and all the professors surveyed value, to some degree, the place it has in the practice of public relations.

## Graphic Design Student Embarks on Adventure to Restore Antique Printing Press

**Presenter:** Sarah Palmer Goff  
**Faculty Advisor:** Michael Chute

As a journalism major, I have learned that to get a job in the media industry today, I will need to know how to do a little bit of everything — writing, photography, video and online management. To demonstrate my ability to do this, I have taken on a multimedia project this semester. My friend, Ryan Oetting, has the opportunity to restore an antique printing press shop (including a Linotype machine, Ludlow machine, photo engraver and letterpress) back to working condition. He stumbled upon this opportunity by chance. As a graphic designer, it is a dream come true for him to be able to work with this rare equipment. In addition, Dr. John Freeman, owner of Green Frog (the historical village where the press is located), is excited about Oetting's work because his goal is to preserve history and see the old equipment come back to life for educational purposes.



## Female Body Image in Chinese Fashion Magazine Advertising

**Presenter:** Katherine Pullen  
**Faculty Sponsor:** Michael Chute

Because of the increase in the number of international women's magazines in China, a flow of global constructions of beauty is changing perceptions of ideal body image for Chinese women. Advertisements portray false realities and depict unattainable beauty ideals for women. Casanova (2004) says it is possible that "the media are the most important determinants of abstract ideals of beauty" (p. 289). The objectification of women in advertising can, and often does, lead to negative body image, low self-esteem, rampant dieting and eating disorders. The research question posed is: "Are the images of women in advertising in Chinese fashion magazines based in North America and Europe presenting an unrealistic and unattainable body image for Chinese women?" Research is currently in process. A content analysis will be performed on advertising from the top five Chinese fashion magazines based in North America and Europe. Each ad will be coded for race, pronounced body parts (i.e. breasts, posterior, legs), and body positioning. For all ads where the race of the prominent female figure is coded as "Asian," an additional coding sheet will be used to examine facial features and skin tone. ■



# computer science

## Improving Efficiency through a Distributed Computer Repair System

**Presenter:** Benjamin Fulton

**Faculty Advisor:** Haifei (Max) Li

Union University's Association of Computing Machinery (ACM) is well known around campus for its inexpensive computer repair services, and has consequently gained a significant following among students, staff, and faculty. Unfortunately, such high demand has caused administrative nightmares for its managers, as the paper-based system they use to track repairs is time consuming and prone to errors. The ACM has requested that I develop a website to coordinate computer repairs from start to finish—including the initial submission of the problem, scheduling and tracking of the repairs, and final payment. Through automation and intelligent scheduling, the website will ease the burdens on customers, administrators, and repair technicians. Such a system will allow the ACM to focus on providing students with high-quality computer repairs at affordable prices. Once finished, the website will be shared on sourceforge.net as an open source project, allowing others with similar difficulties to benefit from our work.

## Speech to Sign Language Using a LEGO Robotic Hand

**Presenter:** Grayson Hardaway

**Faculty Advisor:** G. Jan Wilms

Assistive technology aims to utilize technology in order to make everyday life easier for those with disabilities. With the advent of speech-to-text recognition and robotics, an attempt is being made to combine these to create a speech-to-sign language mechanism allowing those who have no knowledge of sign language to communicate with those who have no verbal communication.

Using readily-available LEGO mechanical parts, a robotic human hand is being constructed to facilitate the visual component of the apparatus. The hand aims to demonstrate a very small subset of the American Sign Language (ASL): the ASL alphabet.

## An Android-Based Location Finder

**Presenter:** Mikias M. Seid

**Faculty Advisor:** James Kirk

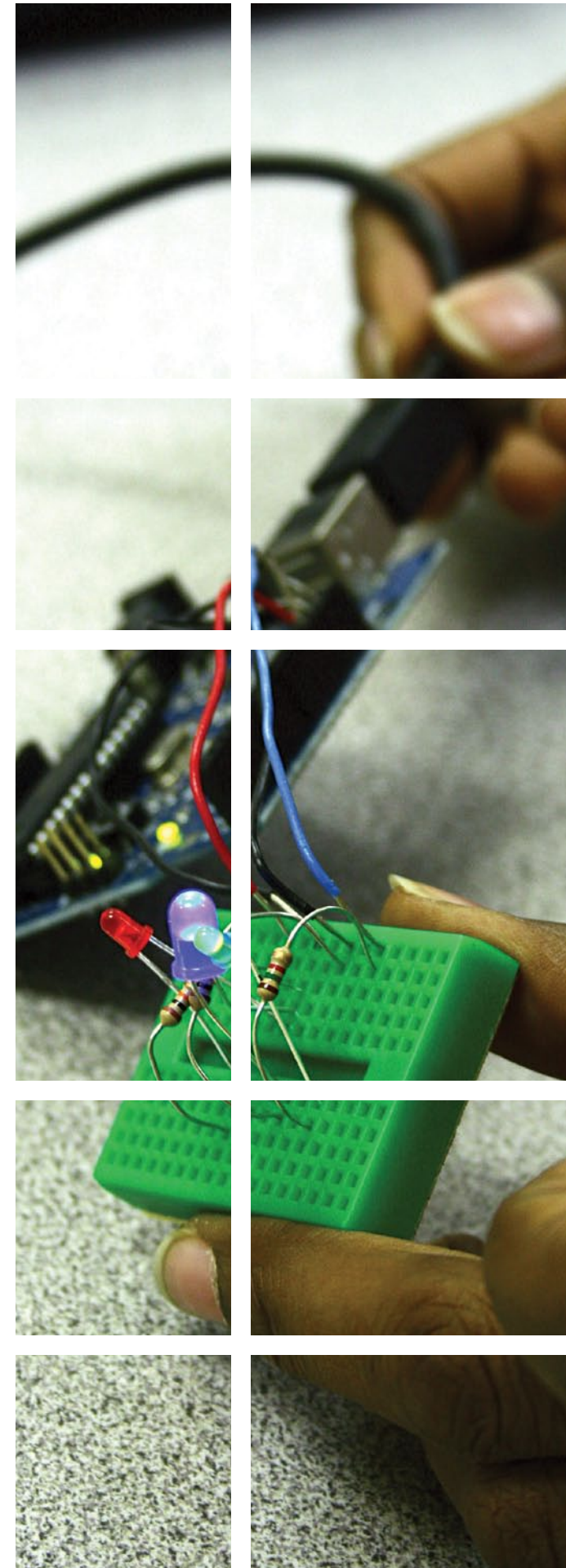
Since Google and the Open Handset Alliance released a new mobile platform called Android, the market share and use of Android based systems has been continually growing. Android is open-source software for mobile devices which provides developers and manufacturers the means to design, build and distribute their product. There are thousands of apps for Android mobile devices that can be used for a wide range of purposes. This presentation will show how the open development environment and the Android Location based API was used in developing an application which can find one's location on Google Maps and locate a friend or an address in a specific area.

## A Time Clock App for Android

**Presenter:** Chase Steinmann

**Faculty Advisor:** Jim Kirk

Over the last year, Google's Android phone has flooded the market and become a strong rival for the iPhone. Taking note of Apple's App Store's success, Google launched its own store known as the Android Market. Unlike Apple, much Android software is open source. This makes the Droid much more developer friendly because anyone can get access to the tools to develop apps. This project solves the problem of logging work



hours for Cornerstone IT Consulting. A time clock app has been developed which will allow one to clock in and clock out from an Android phone. The app connects to a MySQL database on Cornerstone's web server and stores the employees' time punches.

## iPad Applications for STAR Instructional Services

**Presenter:** Drew Long

**Faculty Advisor:** James Kirk

The STAR Center of Jackson, TN is an assistive technology center as well as an instructional facility for children and adults with disabilities. This presentation will focus on iPad applications that have been personally developed to assist instructors who teach students with disabilities. The project has been conducted with assistance from lab instructors at the STAR Center with years of experience in their fields of instruction. They have cooperated in providing vital behavioral analysis as well as areas of need for students. The applications provide methods for improving reading comprehension through an interactive learning medium. Also the applications will provide a therapeutic means for improving sensory integration as well as motor skills. The iPad applications will be demonstrated during the presentation. ■



# digital media studies

## Branding 175 Years: Overcoming the Challenges of Church Marketing

**Presenter:** Ryan Oetting  
**Faculty Advisor:** Cam Tracy

In the US, Capitalism has created a fierce climate of competition that makes standing out a challenging-must. The church seeks to impact lives, helping people to know Christ and engage them through evangelism and discipleship. Businesses spend considerable time investing in their image in hopes of communicating their brand to consumers and the same may be true for churches today. In the context of First Baptist Church of Jackson, a congregation rooted in nearly 175 years of history and tradition, developing a new brand that speaks to who they are and communicates where they are headed is no easy task. The campaign is complex but this project brands First Baptist with an identity, print, web and video presence that honors both their history and their heritage, while at the same time seeks to move them forward as they communicate to the city of Jackson who/what they are as a church.

## An Exploration of Android Application Development

**Presenter:** Jordan Hatchell  
**Faculty Advisor:** Cam Tracy

This project will encompass the creation of an Android application from initial research to completion. The application produced will be a fully functioning GPS check-in program that allows the user to develop a character, based on their check-in habits, and then compete with their friends using this generated character. The purpose of this project is multi-faceted inasmuch as it serves as an introduction to Android application programming, explores the capabilities of some currently

available Android compatible Application Programming Interfaces (APIs) such as the Google API and the Bump API, and finally allows for the introduction of basic gamification into the locational based application market.

## There's No X in Espresso: An XML Menu and Multiple Outputs for Barefoots Joe

**Presenter:** Rob Simpson  
**Faculty Advisor:** Cam Tracy

Have you ever wondered what goes into your favorite coffee beverage? This project will utilize XML to creatively present menu information for Barefoots Joe, including price and a breakdown of what makes each drink so delicious. By storing content centrally in an XML document, all output formats can be updated simultaneously. Changes made to the XML will dynamically update both mobile and web outputs, as well as an InDesign file that can be reprinted with ease. The project will explore the opportunities and challenges of working with multiple styles.

## Utilizing PHP to Organize and Filter iDMAa's Data

**Presenter:** Colt Dixon  
**Faculty Advisor:** Cam Tracy

The goal of this project was to supply the International Digital Media & Arts Association with an easy to navigate and update website and database. Every year, iDMAa surveys their member schools and collects relevant data about their digital media programs. Through the power of a MySQL database and PHP this project presents a searchable database that is simple to update for future editions of the survey and is flexible to navigate for specific information. This project could potentially be used to present to organizations or individuals that would



like to know more about universities and colleges that offer a digital media program.

## Beneath the Substrate

**Presenter:** Tyler Litton  
**Faculty Advisor:** Chris Blair

“What is a substrate”, you may ask. It is the layer of a Digital Video Disc (DVD) that refracts the player’s laser, making the content of said disc readable. A better question to ask though is, “what is beneath the substrate”. This project will explore this and the inner-workings of a complex Blu-ray DVD. Content from the Union Film Society’s short film “Enough” will be crafted into a working menu, navigation structure, and physical disc for prospective students and future film minors to have. The disc will include the full 30-minute short film as well as special features and commentary. A Mac computer will be used to create this project even though it doesn’t encourage or support the creation of Blu-Ray. The project will utilize FinalCutPro, Adobe Illustrator, Compressor, Photoshop, Adobe AfterEffects and Adobe Premiere to create this disc and manage the large amount of content.

## Compiling Student Publications for Online Access

**Presenter:** Erica Davis  
**Faculty Advisor:** Cam Tracy

Archives of the *Cardinal & Cream*, *Lest We Forget* and other student publications exist in various locations on the Internet. The goal of this project is to link them all to one central location. The project will be built in ColdFusion and have a similar look to Union’s Video Project. As publications are added to

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# digital media studies

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a SQLite database from a password accessible section of the site, they will automatically appear on the site. The project will feature a custom style sheet for iPads. The site will initially focus on Union's yearbook, *Lest We Forget*, and its student newspaper, *Cardinal & Cream*, but other publications can be added in the future.

out while keeping the room safe and secure.

### Multimedia Showcase Application and custom tab for Facebook

Presenter: Nicole McCoy  
Faculty Advisor: Cam Tracy

This project will consist of a facebook application in which users can upload multimedia content—video, photos, and potentially mp3—to Facebook and Google's app hosting service to display it in a custom and more visually appealing manor for the purpose of a facebook multimedia portfolio. The application and page will utilize Facebook tools such as Facebook Markup Language, FBML, and Facebook Javascript, FBJS to accomplish an easy upload system into a portfolio laid out page that can be displayed on business and artist FB pages. In addition to FBML, HTML, Javascript, FBML, and FBJS will be used to accomplish the final result.

### Social Media Audit: Lifeline Blood

Presenter: Ryan Griffin  
Faculty Advisor: Chris Blair

In today's society, one of the most important aspects of any organization is its web presence; however, a website is not enough. With social media changing the way society views customer relations, a personal connection between the organization and the customer is vital. This is especially true for non-profit organizations who depend heavily on donations and community support. This project will conduct a social media audit of Lifeline Blood Services and other blood centers in Tennessee, providing recommendations of best practices in social media among the blood center community.

### RPG Character Tracker for the Android OS

Presenter: Joshua Stephenson  
Faculty Advisor: Cam Tracy

This project involves developing an app for the android OS. The app will be a character tracker for role playing games such as Dungeons & Dragons, Gurps, and other similar game systems. This app will only use the Gurps system to show the functionality of the App. It will aid players and Game Masters in creating characters and storing them for future reference. After the creation of a character the user will be able to save and view the character sheet as well as editing the character after creation for when they "level up". It will have the ability to add more game systems in the future. ■

### RFID Adventure

Presenter: Scott Goff  
Faculty Advisor: Chris Blair

This project will create a secure and easy way for students to check out camera equipment from the Communication Arts Department. The door will be secured with a Radio Frequency Identification (RFID) and key code entry system. All of the equipment in the room will be tagged with another set of RFID "metal mount" tags and a second RFID reader will be installed near the door. The combination of these RFID systems will allow students to check the necessary camera equipment in and

# education

## Factors Affecting the Dropout Rates of High School Teens in Mississippi

**Presenter:** Amanda Jean Spencer  
**Faculty Advisor:** Terry Weaver

The research was a result of legislation from President George W. Bush and the No Child Left Behind legislation. Every state and school district in the United States of America was forced to look at the number of students that were dropping out of high schools across the nation. This also forced the educational system to take a hard look at what methods were being used to combat the dropout rates and how school districts were calculating graduation rates. This research analyzes the data from the first school year (2005/2006) Mississippi school districts adopted and developed dropout prevention plans and compares it to the data from four years after implementation (2009/2010). The areas that were researched include: Dropout Rates, Graduation Rates, Truancy Rates, Does the School District have a Dropout Coordinator, and Does the District have a Truancy Officer? The research will show what areas of current district dropout prevention plans are working and which areas of the district's plans are ineffective. The research will also show which methods are most effective.



## A Study of the Effectiveness of Before-School and After-School Programs with Low-Performing Middle School Students

**Presenter:** Jamie Sanders  
**Faculty Advisor:** Terry Weaver

The purpose of this study was to determine if students are benefiting from after-school and before-school programs designed to provide additional academic support. This study consisted of 6th-8th grade low-performing students enrolled in a rural school system in West Tennessee. Students' T-CAP reading and T-CAP mathematics scores were used throughout the study. To answer all research questions, low-performing students were coded as either male or female and either Caucasian or African American. Also, students were coded as either attending an after-school, before-school, or both types of programs, or attending neither after-school nor before-school programs. The study showed no differences in achievement between types of programs. The data showed that a low-performing student will continue to be low-performing even if a program is attended by the student. Also, the data showed that ethnicity and/or gender do not play a role in a student's low-performance.

## The Journey from PL-94-142 to IDEA 2004; Finding What Matters Most

**Presenter:** Brenda S. Powell  
**Faculty Advisor:** Terry Weaver

Since the major landmark legislation in 1975, the field of special education has been a consistent "work in progress." Litigation and legislation has been the engine that drives the process from least restrictive environments to the current push for full inclusion for all. Public institutions are struggling to meet the mandates of the new legislation without a confirmed roadmap. This presentation is comprised of a discussion of key legislation and litigation that has moved public education to the point where all children, regardless of their disability or developmental delay are placed in general education classrooms unless an alternate



placement is clearly justified by a multidisciplinary team. Also included will be a discourse about how best practices have contributed to the process. Finally, the conclusion will focus on how optimal learner outcomes can headline and underscore this transitional process.

## DIBELS and AIMSweb: A Predictability Study

**Presenter:** Sondra Kiser  
**Faculty Advisor:** Terry Weaver

*Dynamic Indicators of Basic Early Literacy Skills (DIBELS)* (Good & Kaminski, 2002) is a set of formative assessments for students in kindergarten through sixth grade and provides assessment for each of the five areas. *AIMSweb* (Shinn & Germann, 2006) also measures the five areas of basic early literacy skills through standardized methods. The purpose of this study is to examine the predictive relationship of *DIBELS* end-of-year benchmark scores as compared to similar reading achievement scores from the *AIMSweb* for students in kindergarten through second grade. The study examined the predictive relationship between *DIBELS* end-of-year benchmark score and *AIMSweb* end-of-year benchmark score for kindergarten, first, and second grade; determined whether student's gender, race, and socioeconomic status could predict *AIMSweb* end-of-year grouping category in kindergarten, first, and second grade; and, examined emerging themes from K-2 teacher comments regarding the assessment process involving *DIBELS*. ■



# engineering

## Renewable Energy Hammam

**Presenters:** Tayo Adedokun, Ian Allen, Claire Elmlblad, Robert Lynn  
**Faculty Advisor:** Don Van

Our presentation will be a summary of our engineering senior design project. The goal of this project is to design a Hammam (a bath house) for use in North African villages. Hammams are central meeting places in North African culture. Aspects of our design have already been implemented in North Africa villages during a Union engineering development trip. Due to a lack of traditional energy sources, such as wood and electricity, there is a need in many villages for new or improved Hammams. Our design uses renewable energy sources (e.g. wind and solar) to meet all of its electric and heating needs.

## Building a Basic Utility Vehicle

**Presenters:** Daniel Sikes, Chris Hayes, Paul Morris  
**Faculty Advisor:** Don Van

This project consists of designing and building a Basic Utility Vehicle (BUV) that can be used in developing countries to assist the community for their everyday needs. The idea of building a BUV came from Will Austin in 1998 as he was visiting Patagonia for business purposes. Will eventually founded the Institute for Affordable Transportation, and shortly afterwards, began a competition for building a BUV. This competition is open to the public and tests the built BUV in many aspects such as endurance, durability, and affordability. The design challenge is to develop a multi-purpose, off-highway "truck" for rural Africa where the design can also be used for small scale factory operations in Africa. Our design is more focused on safety and less on winning the competition.

## Senior Design Robot Project

**Presenter:** Kyle Harris, James Jones, Bailey Moore, Rhett Woody  
**Faculty Advisor:** Don Van

Our project group decided to build a robot to meet

the guidelines specified for the IEEE Southeastern Convention Hardware Contest. The Convention's focus this year was on disaster relief. Our objective was to create an autonomous robot to navigate a course with four rooms, locate victims and hazards in the rooms, determine the condition of the victims, and report the location and condition of the victims and the location of the hazards. Our robot uses a microcontroller programmed in BASIC and a combination of SONAR sensors and RFID card readers to accomplish these objectives.

## RESERVED: An Electronic System for Room Reservation in the Bowld Student Commons

**Presenters:** Jeff Maharrey, Karl Magnuson, Nate Peterson, Rachel Quinn, Grayson Hardaway  
**Faculty Advisor:** Jeanette Russ

The Bowld Student Commons is a beautiful building with wonderful amenities, but as with any new building, there are always things that are left out, or need improvement. One of these areas of improvement includes upgrading the pencil and paper system for reserving tv rooms with an integrated, easy to use electronic system. The design allows for students to use their student ID number to reserve a tv room for period of time through an electronic system. Our project uses concepts from digital logic and electronics engineering courses to implement such an electronic solution. The completed project includes a working prototype and has been presented to Residence Life for possible future implementation.



# engineering

## Attractive Forces

**Presenters:** Chris Hayes, Jacob Hodge, James Avery  
**Faculty Advisor:** Jay Bernheisel

The goal of this project is to build an electromagnet and determine the best combination of variables to create the strongest magnet. Electromagnets have been popular among science classes, built with a nail, wire, and a 9-Volt battery. We will vary aspects of the electromagnet design such as the magnet cores, length of wire used to wrap the magnetic cores, and the voltage supply. The data obtained will be used to determine the best and worst case scenarios for building a magnet. The strength of the magnet will be determined by how much weight it can pick up.

## From Litter to Livelihood: Alternative Cooking Fuels for Developing Nations

**Presenters:** Aaron Porterfield, Rob Calvert, Eric Olson  
**Faculty Advisor:** Jay Bernheisel

With fossil fuel prices continuing to rise, the need for alternative fuel solutions is greater than ever. In most countries, propane or charcoal is used for household tasks, such as cooking. Our project intends to further the development of a cost-effective alternative fuel source. The project focuses on converting waste paper into compact briquettes that can be used as cooking fuel. The goal of the experiment is to optimize the burn efficiency of paper briquettes in the hope that they are a viable alternative to charcoal. The experimental factors the project are: briquette geometry, binding agents, and preparation methods. Replicating cooking conditions similar to a widely used African clay charcoal stove, or *jiko*, will be used to test the efficacy of the briquettes.

## Investigating Twist: A Study of Turbine Blades

**Presenters:** Eric Olson, Aaron Porterfield, Rob Calvert  
**Faculty Advisor:** Don Van

Wind turbines are a rapidly growing source of renewable energy and are the focus of many current

government research efforts. The objective of this project is to build an iconic 50:1 scale model of an industrial wind turbine blade. The blade will be designed to operate on a 1 megawatt wind turbine under the high end of wind power class #5 at standard atmospheric pressure and temperature. The purpose of this project is to investigate wing geometry of a 40 percent efficient blade, specifically the relationship between the change in the angle of attack and the amount of energy the turbine extracts from the wind.

## Lattice Boltzmann Modeling

**Presenters:** Rachel Carbonell and Caroline McConnell  
**Faculty Advisor:** Georg Pinggen

The Lattice Boltzmann Method is an alternative to traditional Navier-Stokes based fluid dynamic analysis that has gained increasing attention in recent years. It is useful for simulating the behavior of single and multiphase fluids as they react to complex boundaries, temperature changes, and other situations. The Lattice Boltzmann Method uses a particle distribution model to simulate fluid flow, analyzing particle collisions, and streaming to provide a powerful way to study fluid flows. As part of our EGR 250 course, we have studied the application of LBM by creating a MATLAB program to model the velocity of fluid in a channel, with various boundary conditions. We have expanded this work by studying temperature and phase changes as part of the Lattice Boltzmann method. These components will be incorporated into the existing MATLAB program to create a tool that can be used to more completely model fluid flows.

## Continuation of Solar Oven Research and Implementation in North Africa

**Presenters:** Jonathan Gwaltney, Ky Bailey, Wilson Holland, Matt Wilson, Phillip Johnson  
**Faculty Advisor:** Georg Pinggen

As a follow up to the North Africa GO trip, we are working with a non-profit organization that specializes in relief and developing nations to design a small scale

version of a solar oven that will be used by handicapped people in a bakery in North Africa, as well as modify and test a portable solar-powered cooker. Due to the scarcity of wood as a fuel source, there is a great need for renewable energy in third-world countries. We will be modifying and analyzing an already made portable solar-cooker, and coming up with two new designs to meet the specific needs of a bakery. These designs must also be simple enough to be constructed with the materials available in North Africa. We will present our designs, show a thermal analysis and display a prototype of a solar cooker.

## Solar Water Heater Improvements

**Presenters:** Scott Kahler, Brady Sheppard, Jason Mileham, Ryan Substad  
**Faculty Advisor:** Georg Pinggen

The Union University Department of Engineering has a solar water heater that was designed and built by students during the Fall 2010 semester. The water heater is used for labs and heat transfer demonstrations and served as an example to build water heaters on the North Africa GO Trip. The purpose of the project is to redesign the solar water heater to improve functionality and efficiency, and to make structural improvements. We will first explain the greenhouse effect and how it is utilized in the solar water heater. Furthermore, we will present the design changes, provide an engineering analysis, and present experimental data for the redesigned water heater.

## The Windy Tunnel

**Presenters:** James Avery and John Hall  
**Faculty Advisor:** Georg Pinggen

While common in nature, the details of air flow are hard to understand because the human eye cannot observe them. Wind tunnels and flow visualization techniques are industry-wide techniques that are being used to gain insight into fluid flow over objects and permit engineers to generate more insightful and improved designs. As part of our EGR-250 course on Fluid Thermal sciences, we are designing a small

scale wind tunnel which we will use to focus on flow visualization. We are going to discuss our wind tunnel design, perform a basic flow analysis and show examples of flow visualization for different objects such as a model car or truck, a golf ball or a model plane.

## Wind Turbine Blade Model

**Presenters:** Ian Allen, Jacob Hodge, Chris Hayes, Daniel Kennedy  
**Faculty Advisor:** Don Van

In this poster presentation, we will present an iconic wind turbine blade that meets the design constraints supplied by Dr. Van. The model cost must not exceed \$50.00. It must be non-toxic in storage, portable, and presentable. The model will meet the following constraints:

- (scale 70:1) of a wind turbine blade for 2M-Watt wind turbine
- Standard atmospheric pressure
- Air temperature of 20 degree C
- Wind speed is the high end of wind power class #5
- 40% efficiency
- Counterclockwise rotation

The goal of the presentation is to research into on-going work to improve blade design to maximize wind energy conversion. We will use the model to explain why we came up with the designed shape. Finally we will show how our calculations guided our shaping of the blade to extract the most energy out of the wind. ■



# english & history

## ENGLISH

### **"Noah's Flood," a Reader's Theater Performance of a Medieval Play from the Chester Mystery Cycle**

**Presenters:** Clark Benedetti, Joshua Creswell, Amanda Ellis, Gillian Frank, Treasure Hightower, Hannah Marsh, Abigail Nolen, Holly West  
**Faculty Advisor:** Gavin Richardson

This will be a "reader's theater" presentation of the medieval play "Noah's Flood" from the Chester Mystery Cycle. Students will read the play in Middle English and may do some light performing of roles such as God, Noah, Noah's wife, and their children. The comedic highlight of the play, of course, is the famous struggle Noah undergoes as he tries to persuade his shrewish wife to get on the boat before the storm comes.

### **Resolving The Mystery of Edwin Drood II**

**Presenters:** Caitlin Roach (project editor), Elaura Highfield, Cameron Puckett, Randall Simpson, Taysha Cadenhead  
**Faculty Advisor:** John Netland

Due to Charles Dickens' unexpected death in 1870, his final novel, *The Mystery of Edwin Drood*, remains incomplete. The novel ends shortly after the title character has disappeared, suspected to have been murdered. In addition to the fate of Drood, the unfinished novel offers tantalizing hints about the London underworld, colonial enterprises, and cathedral politics. For a class project in ENG 337: The Novel, three student groups have attempted to write the conclusion to the novel. The opportunity to complete the novel provides an unparalleled opportunity both to understand the craftsmanship of the novel from

the perspective of the novelist and, through historical research, to enter into the surprisingly turbulent world of English society at the height of the British Empire.

This group works from the premise that Drood is still living and is to be found in the far-flung reaches of the British Empire.



### **Resolving The Mystery of Edwin Drood II**

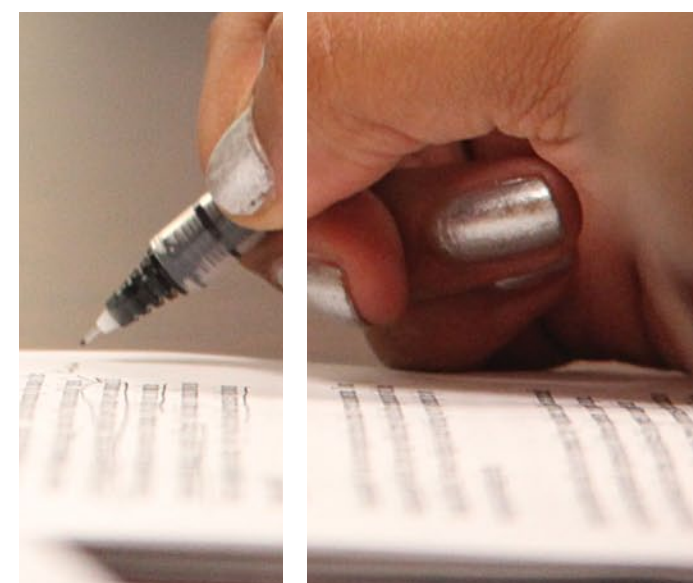
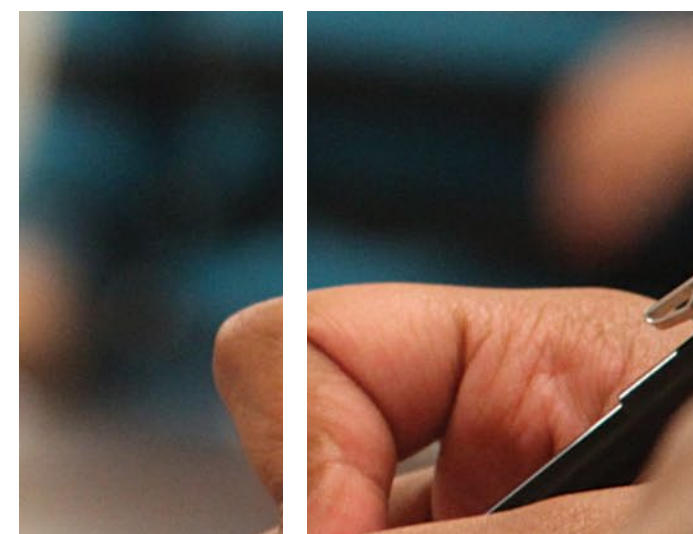
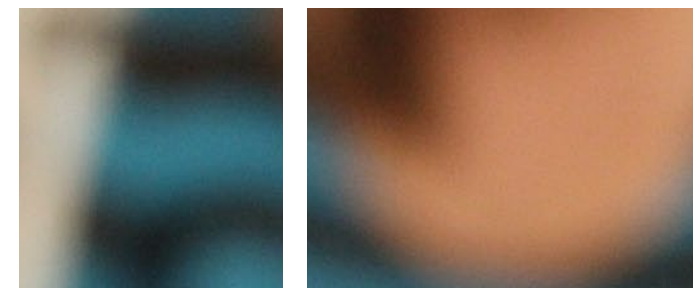
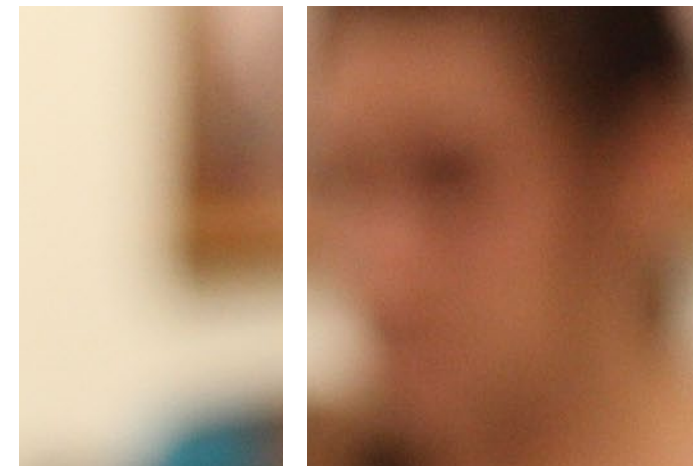
**Presenters:** Erika Dean (project editor), Caroline Sellers, Chelsea Carrier, Eric Sparks, Rachel Moore  
**Faculty Advisor:** John Netland

This group unravels evidence of a crime but from a surprising suspect whose ambiguous cultural background reveals how the British Empire was changing the face of English society.

### **Resolving The Mystery of Edwin Drood III**

**Presenters:** Amanda Bennett (project editor), Dwight Davis, Michael O'Malley, Whitney Williams, Hannah Wakefield  
**Faculty Advisor:** John Netland

This group finds the mystery of Edwin's disappearance in that most Victorian setting of drug abuse—the opium dens of London. ■



## HISTORY

### **A Black and White Gospel: The Theology of Fred Shuttlesworth and Its Effect on his Leadership of the Civil Rights Movement in Birmingham**

**Presenter:** Hunter Bragg  
**Faculty Advisor:** Keith Bates

Fred Shuttlesworth, a pastor and civil rights activist in Birmingham, Alabama, possessed a conservative theology based on his understanding of the Bible as the word of God. This theology was rooted in his childhood and young adult experience in the black church and in his exposure to black pastors who impressed him with their pious and moral living. Because Shuttlesworth's Christianity affected both the soul and the body, he believed that the Christian gospel without noticeable social action was no gospel at all. This social activism drove Shuttlesworth to form the Alabama Christian Movement for Human Rights in 1956 and challenge segregation in the Birmingham and in the South by preaching and enacting the "social implications of the gospel." ■



# international & intercultural studies

## Mitigating the Impact of Refugee Trauma on Resettled Children

**Presenter:** Jennifer Escue  
**Faculty Advisor:** Cynthia Jayne

Each year, thousands of children are resettled in the United States through the Refugee Resettlement Program. These children have experienced war, forced migration, life in refugee camps and the often jarring process of resettlement. This presentation will provide an overview of significant findings on the impact of these experiences on children and will put forth an interdisciplinary model of services that seeks to mitigate the impact of trauma while addressing cultural considerations.



## Seeing the Soul: The Dehumanization of Women in India

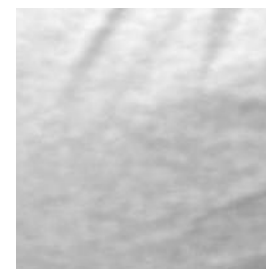
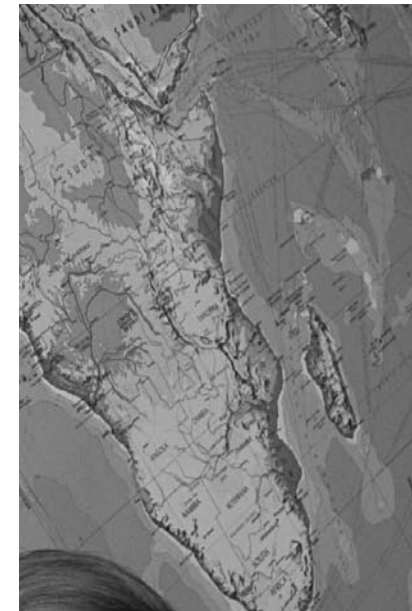
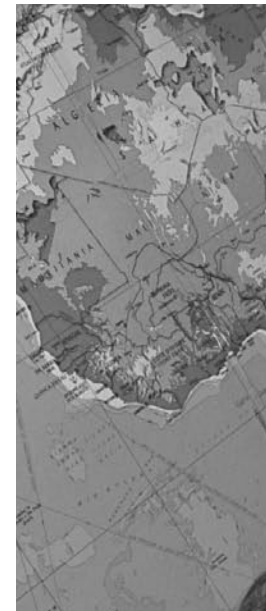
**Presenter:** Melissa Chirino  
**Faculty Advisor:** Cynthia Jayne

The dehumanization and culturally sanctioned demise of women in India is a multifaceted phenomenon that has its roots in how the nation's predominant worldview, Eastern pantheistic monism. A worldview shapes what constitutes ultimate reality, what is really "real" and what is not, and affects how people are viewed and treated in culture. Worldview answers the fundamental questions about what is reality, who God is, who people are, and what is the primary purpose in life. Eastern pantheistic monism creates a hierarchy in which men are more "real" than women, and women are dependent upon men. This belief is built into institutions that socially and economically dehumanize and demean women's roles and incentivizes particular practices to kill females. This research examines killings at three specific life stages of Indian women: shortly after birth, upon entering marriage, and when a woman is widowed.

## Perceptions of Freedom

**Presenter:** Kelly Bogdanovich  
**Faculty Advisor:** Cynthia Jayne

Is Freedom of Speech a human right? If so, do the Chinese have that right? The growing attention on the controversial opinions and situations of people such as human rights activist Liu Xiaobo and artist Ai Wei Wei raises speculation on whether there is any freedom of speech in China.



The goal of this research was to determine whether the issue of freedom of speech in China is as controversial within the country as it is often perceived to be by outsiders. Research and analysis of case studies are used to explore the concept of freedom from the perspectives of the Chinese and their reactions to dissidents. In this interdisciplinary approach, economics, political science, and culture also contribute to developing understanding of specific and general perceptions on the concept of freedom of speech.

## Coffee as Metaphor: The Cultural and Economic Value of Coffee for Ethiopians

**Presenter:** Mikias M. Seid  
**Faculty Advisor:** Cynthia Jayne

Coffee, indigenous to Ethiopia, is an essential part of Ethiopia's economy and culture. In addition to being the country's most exported good, coffee is an integral part of the social and cultural life of Ethiopians. We Ethiopians have a whole ceremony associated with coffee. In Ethiopian, there is a special and specific time and place for coffee. Needless to say we Ethiopians are coffee crazy. From gender relations to time orientation, Ethiopian beliefs and cultural values are embedded, often humorously, in the Ethiopian coffee ceremony. This cultural activity encapsulates deeper social, cultural, and religious meanings. Its centrality to Ethiopian life and understanding Ethiopian culture is undeniable. Hence, in this paper I use coffee as a metaphor to explore Ethiopian life. ■



# language & music

## LANGUAGE

### A Freirean Approach to Cross-Cultural Missions

Presenter: Emily Alm  
Faculty Advisor: Phillip Ryan

What is the mission of the missionary? Missionaries exist to proclaim the truth of the Gospel to a lost world. By doing so, many missionaries choose to live and to work in cross-cultural spaces. Since religion and language are so fundamental to a person's identity, missionaries must mindfully and sensitively engage their work. Otherwise, they could unintentionally harm the people group's culture or identity. Paulo Freire, a theorist renowned for his literacy pedagogies, developed several philosophies regarding culture, literacy, education, and critical consciousness. This presentation will examine how these philosophies, when interpreted from a Christian worldview, can positively influence cross-cultural missions. ■



## MUSIC

### Dead Queens, Dark Songs: Libby Larsen's "Try Me, Good King"

Presenter: Gillian Frank  
Faculty Advisor: Joshua Veltman

Contemporary American composer Libby Larsen is well known for her distinctive characterizations of literary and historical figures. Larsen wrote the song cycle "Try Me, Good King: Last Words of the Wives of Henry VIII" in 2000. Larsen drew on her grade-school fascination with the Tudors and created a cycle of five songs, each capturing the individuality of a separate historical character. Larsen focuses on "the intimate crises of the heart" suffered by Henry's wives. She brings them to life through choice of texts, through detailed motivic and thematic elements in the accompaniments, and by weaving four Tudor-era lute songs into the song cycle. The rich intertextualities of the cycle both enhance the characterizations of the queens and tie the cycle together. An understanding of the historical and personal background of these five women is vital to the performer and will help the audience appreciate this song cycle better. ■

## Wii Balance Board As Predictor of Falls

**Presenter:** Deon Ring  
**Faculty Advisor:** Kelly Harden

The purpose of this study was to determine the efficacy of the Wii Balance Board (WBB) as a clinical tool for measuring the risk for falls in the elderly population. A pilot study was conducted which utilized 50 participants from the Citizens of Lake County Healthcare organization. A descriptive correlation design was used to seek clarification of the clinical usefulness of the Wii Balance Board as an indicator of fall risk in adults 65 years and up.

The current analysis estimates the Wii Balance Board to have a predictability value of 66% based on the sample data presented. Many falls may be prevented which could have a significant impact on our practice and healthcare system. The combination of the WBB values with other fall assessment tools can increase the likelihood of predicting a fall before it occurs.

## Evaluation of a Healthcare Practice Model

**Presenter:** Patricia Bird  
**Faculty Advisor:** Kelly Harden

Many studies have ascertained that a large percentage of adults with high LDL-Cholesterol (LDL-C) levels are untreated or are unsatisfactorily treated despite current treatment recommendations and research that indicates the relation between elevation of LDL-C and cardiac events. Barriers to management of high blood cholesterol, specifically elevated LDL-C levels, may include cost, lack of patient compliance with prescribed therapy, the inconvenience and repercussions of taking time off from work for evaluation, treatment and follow-up, a paucity of primary care providers, the primary care provider's lack of awareness of lipid management guidelines, and primary care providers without hours of operation convenient to the employees. The purpose of this project was to evaluate the effects of access to a worksite clinic on lowering the LDL-C according to the National Cholesterol Education Program (NCEP) goals. Electronic medical records of employees that access the worksite clinic were reviewed retrospectively for elevated baseline

LDL-C levels. Overall baseline LDL-C levels were compared to follow-up LDL-C levels up to a period of one year (2009-2010). This research demonstrates that access to a worksite clinic can improve LDL-C levels based on the National Cholesterol Education Program goals.

## Evaluating Initiation of Insulin Pump Therapy in Type 1 and Type 2 Diabetic Patients Based on Results of the iPro Continuous Glucose Monitoring System

**Presenter:** Kimberly Brasfield Byrd  
**Faculty Advisor:** Patsy Crihfield

This study was conducted at a diabetes clinic to evaluate initiation of an insulin pump based on the results of the iPro glucose monitor as compared to previous treatment regimens based on traditional labs. Data from 40 patients at routine visits were reviewed and A1C values were collected prior to the use of the iPro continuous glucose monitor. Crosstabulation, Chi-square and Wilcoxon Signed Ranks were used in study.

Patient demographics included 58.1% females and 44.2% males in an age range of 18-74. Data from 26 patients who used the iPro indicated no insulin pump was ordered. There was a significant trend ( $p < 0.05$ ) comparing before and after utilization of the iPro. The study reported a significance of .197, indicating no relationship between insulin pump and A1C prior to iPro. Further research in continuous glucose monitoring is needed to determine when devices can prove beneficial.



## Emergency Department Throughput

**Presenter:** Tijuana Terrell  
**Faculty Advisor:** Denise Thornton-Orr

This report describes a triage protocol which has the potential to decrease patient wait times in an Emergency Department. A comparison was made of wait times for 2281 patients for (June 2010) pre-implementation and (November 2010) post implementation of the triage protocol. The data revealed that the average patient wait time was 67 minutes prior to implementation of the triage protocol. The patient wait times were significantly decreased to 55 minutes post implementation of the triage protocol. There was an average 12 minute decrease in patient wait times for patients presenting to the Emergency Department when utilizing the new triage protocol. This could make the difference between life and death of a patient experiencing a medical emergency such as a ST Elevated Myocardial Infarct (STEMI).

## Comparison of International Health Care Systems: United States

**Presenter:** Denise Thornton Orr

According to Edwin G. Dolan, economist, textbook writer and educator, "Most Americans, even those critical of the health care system as a whole, report that they are satisfied with the care they personally receive..." (Dolan, Feb. 28, 2011, Blog). The DNP class of Nursing Health Policy and Economics has examined the economic and political factors affecting health care in the United States. To compare the United States Healthcare to other nations, the class will present posters for Japan, Dubai, India and the Dominican Republic which will include:

- Payer system
- Financing
- Reimbursement
- Provider Choice
- Challenges
- World Ranking
- Gross Domestic Product spent on Healthcare

## Health Care Providers' Perceptions of Quality of Care: Spiritual Interventions and Medical Missions

**Presenter:** Shari D. Wherry  
**Faculty Advisor:** Bradley Harrell

The purpose of the project was to document and analyze the perceptions of health care providers in relation to spiritual interventions provided to patients on medical mission trips. This was a qualitative project

with a descriptive correlated cross-sectional design. A 29-question survey was developed using several methods of inquiry including 5-point Likert Scale and multiple choice questions. Participants were invited to participate through on-line professional networks and communities. The sample was composed of 77 Registered Nurses who have participated in previous medical missions. Nurse Practitioners made up 59.7% of the survey respondents. More than 75% of the participants agreed that patients did better physically and mentally after spiritual interventions than without spiritual intervention at all. The more mature, experienced health care provider who is actively involved in clinical care has established a positive perspective due to spiritual interventions during their own medical mission experience.

## The A & P (Anatomy & Physiology) of a Single Payer System – Examining and Unraveling the Canadian Health Care System

**Presenters:** Carey Ann Bosold, Cevette Hall, MeKonnen Kidane, Tiffany Lofton  
**Faculty Advisor:** Denise Thornton-Orr

There are myriad ways to assess the performance of a health care delivery system. According to the Commonwealth Fund, high performing health care systems address five dimensions of health care. These dimensions include quality, access, efficiency, equity, and long, healthy, and productive lives (Commonwealth Fund, 2010). What country has the best prescription for the health care of its people? Does one treatment plan work for all? This poster presentation will examine and compare the US health system with the Canadian health care system. In addition, a number of political, economic, and environmental factors affect the health care of a nation. Does a single-payer health care delivery system result in improved health care quality for a nation and its citizens? Take a look as we dissect the Canadian health care system in the following areas:

- Payer system
- Financing
- Reimbursement
- Provider Choice
- Challenges
- World Ranking
- Gross Domestic Product spent on Healthcare

The Commonwealth Fund. (2010). Mirror, Mirror on the Wall: How the performance of the US health care system compares internationally. Retrieved from <http://www.commonwealthfund.org/Content/Publications/Fund-Reports/2010/Jun/Mirror-Mirror-Update.aspx?page=all>

# nursing

## Peri-operative Analgesic Efficacy of Intravenous Acetaminophen

**Presenters:** Chris Graham, Melissa Hayden, Joshua Smith, Ryan Shephard  
**Faculty Advisor:** Jill Webb

The purpose of the project was to identify the efficacy of intravenous acetaminophen as an adjunct analgesic approach for postoperative pain control. Question: In adult patients undergoing orthopedic surgery, will the inclusion of IV acetaminophen as part of the multimodal anesthetic plan result in reduced opioid consumption in the first 72-hour postoperative period, as compared to an anesthetic plan without IV acetaminophen? Conclusions: Intravenous acetaminophen is an effective adjunct to the multimodal anesthetic plan for postoperative analgesia in orthopedic surgical patients. Recommendations: Intravenous acetaminophen adjunctively reduces morphine consumption and provides satisfactory analgesia for those undergoing orthopedic surgery.

## Osteoporosis: Are We Screening Soon Enough?

**Presenter:** Lisa Medlin  
**Faculty Advisor:** Kelly Harden

The purpose of this study is to explore the relationship between FRAX and previous fractures in perimenopausal and postmenopausal women. The Fracture Risk Assessment Tool (FRAX) provides guidelines for the initiation of osteoporosis treatment. Existing medical records and correlational statistics describe the relationship between FRAX scores and previous fractures. Logistic regression and nominal-by-interval ratio Eta determined if correlation exists between the FRAX and previous fractures. Sample size was N=42. Nominal-by-interval ratio, Eta ( $\eta$ ) = 0.771 and  $\eta^2$  = 0.595. Logistic regression, Nagelkerke R Square ( $R^2$ ) = 0.435. The prediction equation,  $Z=5.717-21.485(\text{FRAX})$ , determined the model to correctly predict that the dependent variable would occur 88.6% of the time. A positive association between FRAX and previous fractures existed. It was also noted that in 80%

of the study participants who had sustained a fracture, the FRAX was > 20. Implications for Nurse Practitioners include increased awareness of osteoporosis, risk factors, and FRAX scores for early intervention.

## Esmolol and Attenuation of the Sympathetic Response in Adults Undergoing General Endotracheal Anesthesia (GETA)

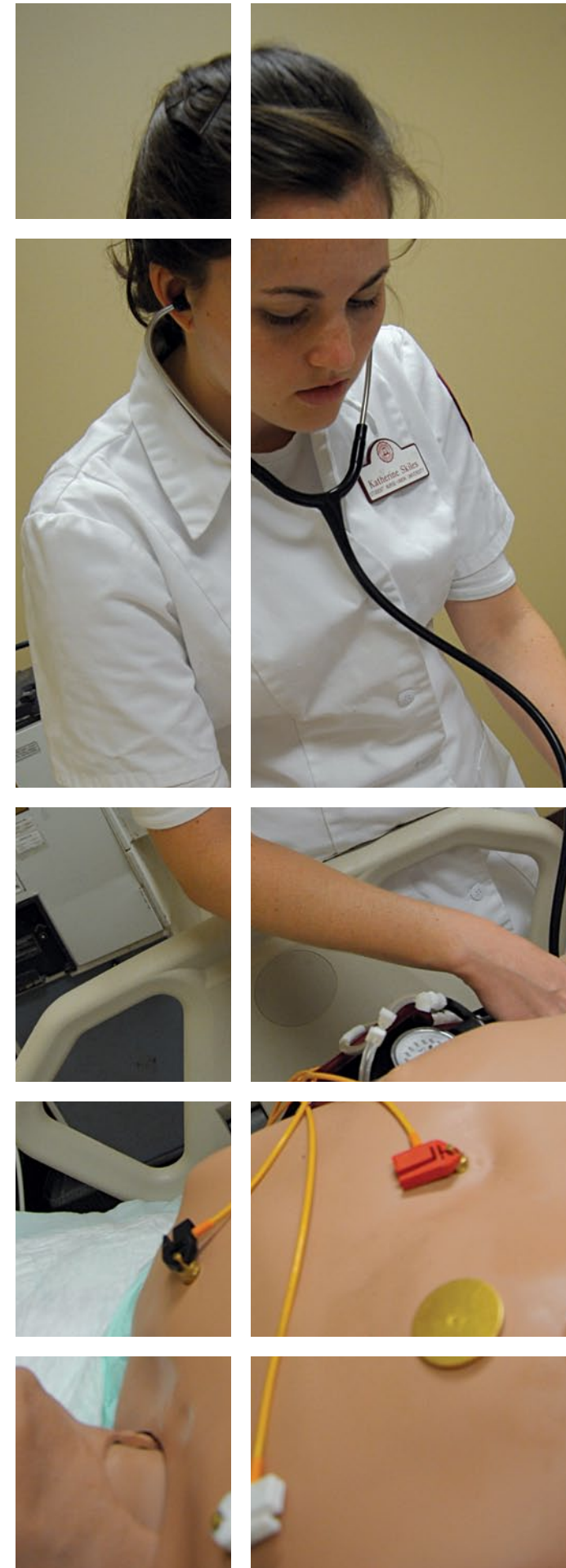
**Presenters:** Blake MacKey, Lauren Mallard, Delena Sanders, Andrew Santoro, Tracey Wilson  
**Faculty Advisor:** Jill Webb

The purpose of this study was to determine the efficacy of esmolol as an induction drug which attenuates the sympathetic response to intubation. Clinical Question: In adult patients undergoing general endotracheal anesthesia (GETA), does IV Esmolol attenuate the sympathetic response to endotracheal intubation? Methods: CINAHL, Google Scholar, PubMed, and Medline were searched. The synthesis method includes tables of findings and logical comparisons of esmolol with competing drugs related to attenuating hemodynamic responses to intubation. Findings: Esmolol is effective in attenuating the sympathetic responses to laryngoscopy and intubation. Compared nitroglycerin and diltiazem, esmolol was found to be superior in attenuating rises in heart rate (HR), blood pressure (BP), and mean arterial pressure (MAP). Conclusions: Esmolol is a valuable asset in the CRNAs drug arsenal to use in regular practice on induction to combat sympathetic response.

## Healthcare in India – An Overview

**Presenters:** Carol Sykes, Florence Jones, Terry Sumpter  
**Faculty Advisor:** Denise Thornton-Orr

The healthcare system in India is one comprised of many paradoxes. India has successfully wiped out mass famines yet malnutrition and associated illnesses are prevalent in rural areas. Adequate sanitation facilities and supplies of safe drinking water are also lacking; however, India's healthcare system includes quality standards that meet or surpass international guidelines. There are



established healthcare centers of excellence yet they are unable to meet the needs of the Indian population. This poster presentation will explore India's healthcare system and will include:

- World Ranking
- Healthcare Spending on Gross Domestic Product
- Payer Source
- Financing
- Reimbursement
- Production
- Provider Choice
- Challenges

India faces many challenges and opportunities in their pursuit of insuring affordable healthcare to the country's billion-plus population.

## Comparison of International Health Care Systems: Dominican Republic

**Presenters:** Debra Buckle and Debra Hendren  
**Faculty Advisor:** Denise Thornton-Orr

The Dominican Republic shares the Caribbean island of Hispaniola with Haiti. The population is 9.4 million (Central Intelligence Agency, 2011). Extensive health care reform has been proposed in recent past. With the election of President Leonel Fernandez Reyna in August 2004, many of these proposals are being implemented. This poster provides an international comparison of the health care system of the Dominican Republic. Approximately 70 % of Dominican population depend on the public health system but private health care is widely used (U.S. Agency for International Development, 2011). This poster briefly summarizes the payer system, financing, reimbursement, provider choice, challenges, world ranking, and gross domestic product spent on healthcare in this country.

# nursing

## Guidelines for Maintaining Privacy and Dignity in an Outpatient Setting

**Presenter:** Kim McIntosh  
**Faculty Advisor:** Denise Thornton-Orr

The student produced guidelines concerning the maintenance of privacy and dignity in an outpatient setting. Field experts suggest that guidelines not only increase quality of care; but also, provide a quality indicator of care with greater patient satisfaction as one of its goals, (Grol, 2001; Institute of Medicine, 2001; Nayeri & Aghanjani, 2010). The HIPAA Privacy Rule provides the standard for privacy maintenance. The culture and policies of a community hospital were considered in light of federal standards. The guidelines are evidenced-based from a critical review of literature. The guideline headings are:

- Brick and Mortar
- Social Media
- Education
- Choice

The student applied the Privacy Rule as it related to the privacy of personhood and not just the confidentiality of data. The student concluded that a universal definition of privacy was needed.

## An Evaluation of Current Geriatric Practice Guidelines for Diabetes Control in a Long Term Care Facility: Establishing Practice Change

**Presenter:** Mollie Headrick  
**Faculty Advisor:** Brad Harrell

The intent of this project was to analyze variables with complications of diabetes such as cardiovascular events. More specifically, the intent was to identify how to improve geriatric practice by adopting geriatric guidelines for the management of diabetes in a long-term care facility. This project is a quantitative retrospective chart review of electronic medical records from 85 patients whose average age was 75. The Pearson 2two-sided test yielded a significant level of .694 indicating stroke or no stroke was independent of tightly controlled hypoglycemia. A logistic regression analysis tested

prediction of stroke and findings were not significant with ( $r = 0.549$ ) indicating that stroke could not be predicted. Further analysis with logistic regression statistics poses this model is a favorable model to predict Myocardial infarction when controlling both diabetes and cardiovascular risk factors. Establishing standards of care will lead to improved management of chronic diabetes and enhanced quality of life.

## Evaluating the Relationship between Preoperative Anxiety, Spiritual Beliefs, and Intraoperative Anesthesia Administration

**Presenter:** Terry Sumpter  
**Faculty Advisors:** Brad Harrell and Tim Smith

The purpose of this project is to correlate the anxiety levels of patients preoperatively with the presence of a spiritual belief system and with the amount of anesthesia required during the maintenance phase of anesthesia. Prior to receiving general anesthesia, patients often cannot verbalize the components of fear or distress. Patients' anxiety levels are rarely assessed objectively, and the association of a spiritual belief system with anxiety and anesthesia administration has not been explored. The amount of anesthesia delivered to the patient is affected by preoperative anxiety level. Anesthesia amounts are adjusted on an individual basis. Literature reveals very little concerning the association of a spiritual belief system and its association with anxiety and subsequent demand for the amount of anesthesia administered. Taking into account the anxiety level, amount of anesthesia administered during maintenance, and the spiritual belief system, this project intends to establish a correlation between these variables.

## Health Care in Japan

**Presenters:** Rachel Brown, Martha Davis, Garnett Miller, Molly Wright  
**Faculty Advisor:** Denise Thornton-Orr

The health care system in Japan is essentially one of universal coverage. The citizens of Japan have 3 choices

of coverage: national health care insurance, employment-based insurance, or the government managed insurance. Due to a continuing aging and retired population, the nation will soon be facing an economic squeeze to continue providing this broad coverage. Further burdening the health care system is the recent 9.0 earthquake and tsunami on March 11, 2011 that ravaged the northeastern coastal communities of the country. The World Health Organization status report of March 23, 2011, estimated 263,915 evacuees, 9,301 deaths, and over 13,000 missing. The region not only suffered loss of life, but loss of health care facilities and health care professionals. Lack of clean water, food, medical care, shelter and now radiation exposure are very real needs. Currently the % of GDP expenditure on health care is 7.9%. The future of health care in Japan will face many economic challenges due to this environmental crisis of 2011.

## A Randomized Pilot Study to Determine Hemodynamic Stability and Patient Satisfaction Differences with Intravenous vs. Inhalational Inductions in Adult Surgical Patients

**Presenter:** Janie Jones  
**Faculty Advisor:** Tim Smith

Due to a recent recall of propofol, an alternative approach is needed to anesthetize patients for surgical procedures. A non-experimental two group interrupted time-series design enrolled 40 healthy adult subjects scheduled to receive general anesthesia for elective surgery. Twenty subjects received propofol intravenously as the induction agent and twenty subjects received inhalational agent via mask as the induction agent. Pre and post induction hemodynamic values were recorded. Postoperative patient satisfaction score was obtained prior to discharge. Results: There was no significant difference in the mean blood pressure and mean heart rate change



between the two groups, respectively ( $p = .663$ ;  $p = .823$ ). There was no significant difference between the two groups in the postoperative patient satisfaction score ( $p = .330$ ). Conclusions: The results provide preliminary evidence that inhalational agents serve as a suitable alternative to propofol as an induction agent for general anesthesia.

## Using the Revised Nursing Work Index (NWI-R) to Measure Nurse's Perception of Their Professional Practice Environment in a Hospital Seeking Magnet Recognition

**Presenter:** Cynthia F. Powers  
**Faculty Advisor:** Zoila Sanchez

Nursing leaders need to know how direct care nurses perceive their practice environment since job dissatisfaction among nurses has been linked to turnover, burnout, medication errors, and other negative patient outcomes (Institute of Medicine, 2004). The purpose of this quantitative descriptive survey study was to measure nurse's perception of their professional practice environment using the Nursing-Work Index-Revised (NWI-R). This study utilized a convenience sample of nurses ( $n = 104$ ) working in a facility seeking Magnet recognition through the American Nurses Credentialing Center's (ANCC, 2010). The NWI-R consists of 57 questions, ranked "strongly agree" to "strongly disagree" and includes subscales that measure nurse's perceptions of *autonomy*, *nurse-physician relationships*, *organizational support*, and *control over practice*. Conclusion: Analysis of collected data is in progress. The results will provide information for nursing administration to use in their gap analysis and as a foundation for strategic planning.

## Oxygen Toxicity Related to the Administration of 100% Oxygen During the Maintenance Phase of General Anesthesia

**Presenter:** Rachel Brown  
**Faculty Advisor:** Brad Harrell

The administration of 100% oxygen during the induction and emergence phases of anesthesia is common, if not standard practice. However, prolonged administration of 100% oxygen during the maintenance phase of general anesthesia has been shown to contribute to the phenomenon of oxygen toxicity, which can lead to tracheobronchial irritation and pulmonary atelectasis. The purpose of this survey is to increase understanding among anesthesia providers about the foundational causes of oxygen toxicity during the maintenance phase of general anesthesia, and to promote discussion and further research

CONTINUED >

# nursing

CONTINUED FROM PAGE 43

on the topic. This project will survey CRNA's who administer 100% oxygen during the maintenance phase of general anesthesia by measuring CRNA perceptions and perceived barriers related to the use of 100% oxygen. This project will bring together background and foundational information, recent clinical and experimental studies, and clinical snapshots of CRNA practice.

## Frogs and Snails and Puppy Dog Tails...A Health Promotion Project for BSA Troop #412

**Presenters:** Sherrie Turner, Kimberly Burse, Elizabeth Card, Susan Clifton, Kimberly Keel, Nadia Wilson  
**Faculty Advisor:** Cindy Powers

The BSN to RN students at Union University developed and implemented a health promotion project to address the risk for injury, nutritional habits, and hand hygiene practices for boys 11-18 years old that are members of Boy Scout troop 412 in Hernando, Mississippi. According to census data, Mississippi residents have the highest obesity rates in the country and increased infection and accident rates. These factors were selected as early interventions based on the following: good hand hygiene is the most important preventative measure to decrease illness, early education of good nutrition and physical fitness practices can lead to lifelong healthy habits and choices, and education



for accident prevention can raise awareness to decrease incidents. The project consisted of a pre-survey, followed by an interactive educational presentation, and post-survey. The results are presented in this poster.

## Performing Breast Cancer Risk Assessment in a Community Breast Center

**Presenter:** Cindy Snyder  
**Faculty Advisor:** Patsy Carihfield

The purpose of this project was to implement a screening breast cancer risk assessment program utilizing the National Cancer Institute's Breast Cancer Risk Assessment Tool for women having screening mammograms at a community breast center affiliated with a community not-for-profit hospital system. The goal of this team was to provide coordinated care along the continuum from screening to diagnosis and survivorship with an objective to identify women at increased risk for breast cancer. **Results:** The team met monthly over a period of 10 weeks. During this time, evidence-based information on breast cancer risk assessment was presented and reviewed. The risk assessments were implemented in all mammography facilities on November 1, 2010. There were 19 MRIs done in November 2010. This is nine more than compared to November 2009. None of the MRIs were a direct result of the screening risk assessments that began on November 1, 2010; however, three of the women who had MRIs had the risk assessment done on the day of the MRI. **Conclusions:** A comprehensive risk assessment program includes a process for accruing patients from the screening mammogram population. This presents the opportunity for community based breast centers to provide an initial screening risk assessment by utilizing the National Cancer Institute's Breast Cancer Risk Assessment Tool, raising awareness of risk factors and including high risk screening through the addition of MRI. When implementing change in a community hospital system, communication and providing supportive evidence are essential to overcoming challenges and barriers. Ongoing evaluation of the program will provide evidence of improved screening for women at high risk for sporadic breast cancer. ■



# pharmacy

## Influence of an Educational Intervention Based on Social Cognitive Theory to Improve Adolescents' Knowledge of Over-the-Counter Pain Medications

**Presenter:** Erica Rogers  
**Faculty Advisor:** Sean King

The Objective of this study was to evaluate the influence of an educational intervention based on Social Cognitive Theory (SCT) to enhance adolescents' knowledge of OTC pain medications.

Ten classrooms were recruited from a rural, Southern school. Five classrooms were randomly assigned to the control (n=103) and five classrooms to the SCT-based intervention (n=100). Pretest and posttest data were collected from study participants one week before and one week after the intervention. Six scales measured the SCT constructs. Descriptive statistics, chi-squares and ANOVA were generated to examine the data. Results: Significant improvements over time for the experimental group when compared to the control group were observed for outcome expectations ( $p \leq 0.05$ ) and behavioral capabilities ( $p \leq 0.05$ ). No significant changes were observed for situational perception, outcome expectancies, or self-efficacy.



**Implications/Conclusions:** By altering outcome expectations an adolescent population places on the consumption of OTC pain medications, a SCT-based intervention may assist in the development of the behavioral capabilities necessary for proper consumption.

## Solution-Phase Parallel Synthesis of Small Molecule Inhibitors of Protective Antigen (PA): A Novel Anti-Toxin Approach for Combating Anthrax

**Presenters:** Nicholas W. Van Hise, Jonathan Mitchell, Neil Hunter, Devipriya Mohan  
**Faculty Advisors:** Ashok Philip and Blake Watkins

The primary goal of our research involves the synthesis of small molecules to selectively inhibit proteolytic activation of Protective Antigen<sub>83</sub> (PA<sub>83</sub>) taking advantage of potential interactions with various amino acids of the binding pocket. Synthesis of the target carbamate library is in progress utilizing an efficient solution-phase, parallel synthesis protocol. Structural diversity at positions R<sub>1</sub> and R<sub>2</sub> is incorporated utilizing a variety of commercially available substituted primary amines and alkyl, cycloalkyl, aryl and arylhalide isocyanates, respectively. J-Kem™ Personal Reaction Station is used to accomplish parallel synthesis of target compounds. Sequential purification of the library, using a Teledyne/Isco CombiFlash™ Rf-200 automated flash chromatography system, and structural characterization; <sup>1</sup>H NMR, <sup>13</sup>C NMR, UPLC/MS, and IR, will be followed by measurement of their binding affinity for PA.

## Structure-Based De Novo Design of Small Molecule Inhibitors of Protective Antigen (PA): A Novel Anti-Toxin Approach for Combating Anthrax

**Presenters:** Neil Hunter, Devipriya Mohan, Jonathan Mitchell, Nicholas W. Van Hise  
**Faculty Advisors:** Ashok Philip and Blake Watkins

The continued threat posed by anthrax towards human health highlights a need for identifying effective ways



to combat this lethal disease. Current treatment options are limited to antibiotic therapy and a vaccine, available only to military personnel. The fatal pathophysiological effects of anthrax are caused by proteolytic activation of the Protective Antigen<sub>83</sub> (PA<sub>83</sub>) by furin protease. Based on a molecular understanding of the cleavage site, "a virtual lead" compound and several structural analogues were designed utilizing molecular modeling tools; Sybyl 6.9, Homology module of Insight II v 2000, LUDI, and Gold v 2.0. Synthesis of the virtual lead and its structural analogs is currently in progress using an efficient solution-phase, parallel synthesis protocol. Structure Activity Relationship (SAR) results will be validated through docking studies and binding affinity data.

## Progress Towards the Total Synthesis of Crotogoudin: A Potent Cytotoxic 3,4-seco-atrisane from *Croton goudotii*

**Presenters:** Allorie T. Smith and Brent A. Pierce  
**Faculty Advisor:** Blake Watkins and Ashok Philip

Crotogoudin is a natural product recently isolated from *Croton goudotii*, a plant native to Madagascar. *C. goudotii* is commonly used for chronic blennorrhoea, cough, and as an aphrodisiac. Crotogoudin belongs to the 3,4-seco-atrisane compound class. Crotogoudin was observed to be strongly cytotoxic to murine lymphocytic leukemia p388 cells with 100% inhibition at 10  $\mu\text{g}/\text{mL}$ . Crotogoudin is cytotoxic to the K562 human leukemia cell line by arresting the cell cycle in the G2/M growth stage. When compared to docetaxel, crotogoudin exhibits similar cytotoxic activity against human oral epidermoid carcinoma, colon adenocarcinoma, lung adenocarcinoma, and promyelocytic leukemia. A limited supply of the natural product as well as the interesting cytotoxic activity of crotogoudin compelled us to undertake a total synthesis in an effort to further study its anticancer potential. ■

# physics, psychology & sociology

## PHYSICS

### Magnetic Field Signal Filtering Using the Discrete Fourier Transform for the Power Line Urban Sentry Program

Presenter: Kimberly Lukens  
Faculty Advisor: William Nettles

In recent years, Air Force Research Laboratories and Defense Research Associates, Inc. have partnered with hopes of developing fully autonomous unmanned aerial vehicles (UAV). In order to reach their full potential, these UAVs must avoid obstacles, navigate cluttered environments and find power to recharge. To this end, the Power Line Urban Sentry program aims to create a UAV capable of locating power lines. Current work with commercial-off-the-shelf magnetic field sensors has allowed for successful navigation of an unmanned ground vehicle. Unfortunately, noise in the magnetic field signals makes this technique unfeasible in higher dimensions. Work this summer aimed to reduce the effects of electromagnetic noise so that the project may continue.

### Scanning Tunneling Microscopy and Low Energy Electron Microscopy of Ir and Ag adsorbed on Ge(110) and Ge(111) Surfaces

Presenter: Emilie Huffman  
Faculty Advisor: William Nettles

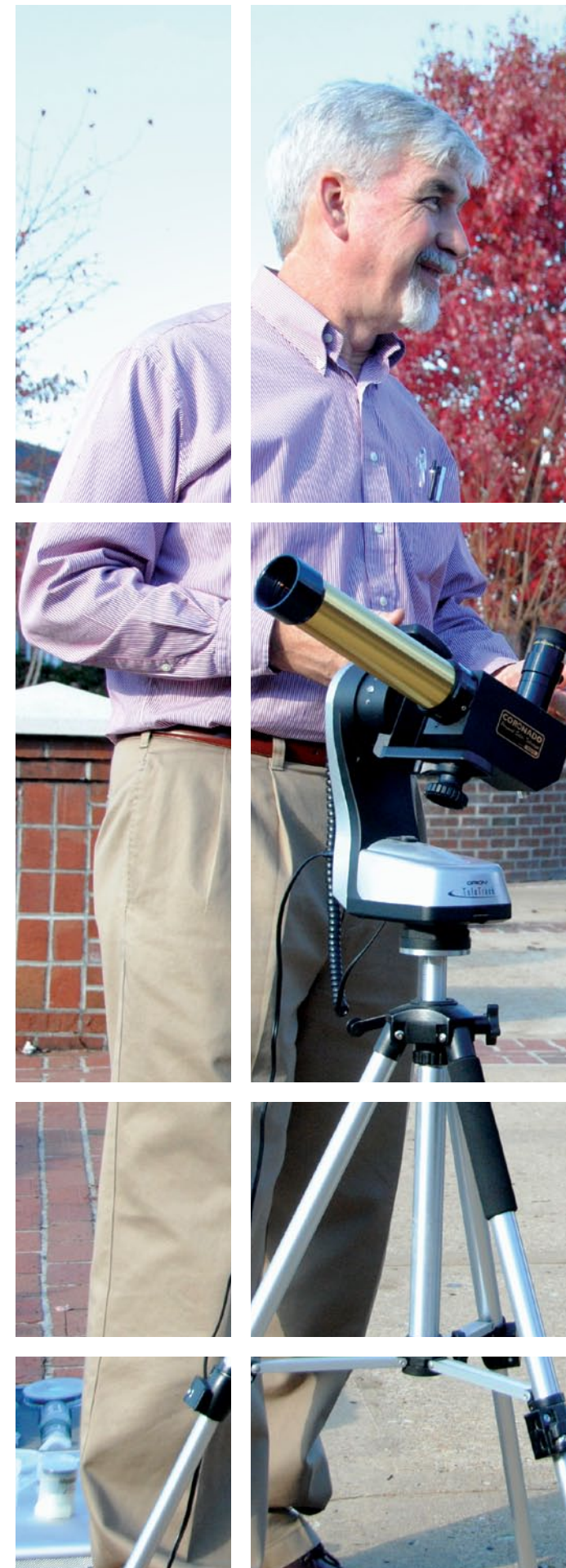
Surfaces often exhibit structural behavior that is difficult to predict due to the complex distribution of forces among the atoms, complicating the problem of obtaining

precise descriptions of atomic behavior. However, such descriptions are progressively growing in importance for industries such as electronics, where devices are becoming increasingly smaller, ever raising the proportion of surface area to volume. Scanning Tunneling Microscopy (STM) and Low Energy Electron Microscopy (LEEM) are two means for experimentally determining surface structure and behavior. STM is a static measurement that achieves atomic or near-atomic resolution, while LEEM has lower resolution but acquires images fast enough to make “movies” of the surface behavior. The two techniques complement each other by providing both detailed structural and dynamical information. These microscopes were used to study the surface behavior of Ge(111) and Ge(110) with adsorbents of Ag and Ir, materials representative of the metal-on-semiconductor interfaces common to the electronics industry.

### The Speed of a Rising Bubble

Presenter: Rebekah Montgomery  
Faculty Advisor: William Nettles

The rising of a gas bubble within a closed, fluid-filled tube is a complex process involving the size of the tube, the viscosity of the fluid, and the angle of inclination of the tube. For this research project, the speed of a bubble was investigated at various inclination angles for three different tubes of oil. The distribution of velocity versus angle will be presented and possible models of the behavior discussed. ■



## PSYCHOLOGY

### Academic Satisfaction and Performance as Functions of Optimism, Sleep, and Perceived Stress

Presenters: Corey Brawner, Tiffany Best, Amanda Neibel, Cari Speer, Holly Stevens  
Faculty Advisor: Jinni Leigh Blalack

The purpose of this study was to investigate academic satisfaction and performance as functions of optimism, sleep, and stress. Data from 201 undergraduate students was gathered electronically using Qualtrics and analyzed using Excel and SPSS. The survey consisted of revised versions of the Life Orientation Test – Revised, the National Sleep Foundation’s Sleep Disorders Inventory, and the Perceived Stress Scale. It was hypothesized that students who scored higher on the LOT-R would also report higher academic satisfaction. It was also hypothesized that students who reported sufficient amounts of sleep and low levels of stress would report higher academic performance and satisfaction. Data revealed that students who reported sufficient sleep (N = 86) and low perceived stress (N = 98) also reported higher academic performance and satisfaction. Furthermore the majority of participants were classified as optimistic, and when moderate scores were excluded, optimism showed the highest predictive relationship with satisfaction. ■

## SOCIOLOGY

### My Gendered Self

Presenter: Alyssa Karr  
Faculty Advisor: Roman Williams

Gender relations in society are complex, variable and deeply entrenched in culture. In this research project I attempt to understand the intricacies gender roles in society place on me as a person and the way that these expectations help define me as an individual through a visual essay. To do so, I use photographs from everyday life to explore my own experiences and societal expectations of gender. I discuss the influences in my life that have made me the person I am and the raw sources of gendering that I have been taught through culture and relationships. The content in the pictures allow for analysis beyond the actual picture. Through manifest content, the fact or obvious conclusion, and latent content, the hidden, subconscious or symbolic meanings, I analyze the extent to which the things in my life impress meaning to the “social me.” ■

# social work

## Haven of Hope: Offering Treatment Instead of Punishment to Victims of Sex Trafficking

**Presenter:** Katie Mitchell, Candice Adams, Tynessia

Love, Krissie Shells

**Faculty Advisor:** Todd Stanfield

Victims of sex trafficking are frequently prosecuted for prostitution not because the court system wants to punish them, but because incarceration is the most readily available method of protecting them. We are proposing legislation that would give victims a choice: incarceration or a safe house. Victims going to jail is not beneficial for anyone, it is a waste of tax dollars and also gives them no guidance in life. Therefore, when they are released from jail, they have no job skills, and will likely go back into the sex industry. In contrast, a safe home will actually benefit the victims as well as teach them practical skills. This should reduce the probability of victims going back and therefore help stop the cycle. The safe home will provide counseling, education, trade skills, etc. Safe homes are the first step to allowing victims to get back to a normal life.

## Preserving Tennessee's Social Service Infrastructure

**Presenters:** Christopher Taylor, Katrina Long,

Johnna Cosby, Elise McNutt

**Faculty Advisor:** Todd Stanfield

The social service infrastructure that protects vulnerable Tennesseans is at risk during the current economic and political climate. This is primarily because of our existing funding structure that relies upon revenues from sales tax. This results in inadequate resources for community-based mental health programs, the inability to protect our children, thereby our future, and restrictive access to health care for low income and vulnerable Tennesseans. We address the funding structure by offering modifications to sales tax revenue generation coupled with a change to a fairer tax structure where all Tennesseans and businesses contribute. We discuss benefits of eliminating food tax, reasonably increasing the tax on tobacco and alcohol, implementing an internet

tax while closing corporate loopholes, and implementing a state income tax as a means of increasing revenue and balancing the state budget.

## The Death Penalty & Persons with Severe and Persistent Mental Illness

**Presenter:** Elizabeth Wilson, Latonia Brooks, Veronica

Morrow, Greg Ginn

**Faculty Advisor:** Todd Stanfield

There are several current issues concerning the death penalty that are being debated in the state of Tennessee. A man with severe and persistent illness (SPMI), Abu-Ali Abdur'Rahman, is on death row. His attorney has been interviewed, stating that if he knew of the mental illness issues, he may have been able to keep his client off of death row. There also have been meetings and protests of those against the death penalty who are also victims of crimes committed by those with SPMI. Recent statistics have shown that the overall consensus of Tennessee would rather abolish the death penalty. Five suggestions have been made for the death penalty concerning the death penalty and those with SPMI: clinical documentation, a specialized court system, certification for those in the court system, life without parole, and a specialized detention center.

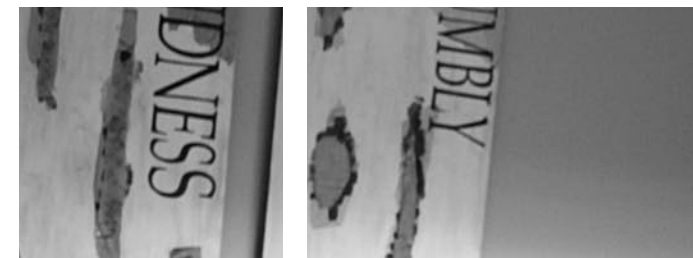
## Preserving a Safety Net for Mental Health Through TennCare

**Presenters:** Andrea Newman, Debra Gibbs, Arnzie

Johnson, Denise Kelley, Temesha Polk-Howard

**Faculty Advisor:** Todd Stanfield

The benefits of the recipients of the State of Tennessee's Medicaid program, TennCare, are being cut. Similar programs in other states are being cut as well in order to balance state budgets. TennCare cuts will affect thousands of people, including those living with a mental illness. This review analyzed TennCare's current policy to identify the program's strengths and limitations, and include proposed recommendations based on efficiencies and inefficiencies discovered in our analysis.



Furthermore, this analysis identifies vital safety nets for the mentally ill through alcohol recovery programs, peer centers, and other resources.

## The Need for Mandated School Social Workers in Tennessee

**Presenters:** Andi Schreiber, Mary Elizabeth Carnell,

Lavanda Ross, Caroline George

**Faculty Advisor:** Todd Stanfield

Currently there are no policies that require school districts in the State of Tennessee to employ school social workers in their system. The recommendations for our policy are as follows: every school must have one school social worker in the state of Tennessee, there will be one MSW level social worker in every district, and for every five hundred students there will be one BSW social worker. Also, every social worker must complete the school social worker certification requirements and every social worker's primary focus is to be on the needs of the at-risk population. The targeted populations are the poor, addicted, abused, disabled, those who are nutritionally deprived, the neglected, and any other client deemed in need of help. Our policy will educate school social workers on areas such as counseling, resources for change, behavior contracts/plans, food resources for nutritionally deprived, bully prevention, teen pregnancy prevention, and educating teachers on effective classroom management. ■





# theology & missions

## Bonhoeffer's Middle-Term

Presenter: Zachary Thomas Settle  
Faculty Advisor: Taylor Worley

Bonhoeffer picks up on Kierkegaard's notion of Christ as the 'middle-term' or 'mediator' of human relations, and he incorporates it into his Christology and theological anthropology. But he does not merely re-hash Kierkegaard's understanding. He develops this thought much further, teasing out numerous implications. For Bonhoeffer, Christ is not the 'middle-term' of human relations, but he is the 'middle-term' for all human relations. That is, he mediates and therefore enables interactions and relations between man to God, man to man, and finally man to the world. There are no direct encounters for man. Any sort of human interaction only takes place through Christ as 'middle-term.'

## The 'Heart Turned in Upon Itself' in the Thought of Dietrich Bonhoeffer and Martin Luther: Why It Is Important for Today

Presenter: John Winfree  
Faculty Advisor: Taylor Worley

This research paper is an examination of the *cor corvum en se* (heart turned in upon itself) found in both Dietrich Bonhoeffer's and Martin Luther's thought. The goal of this paper will seek to analyze this idea in both thinkers and draw practical conclusions for the church today as well as raise questions for further discussion. The main section of the paper will focus upon comparing and contrasting this idea in the two thinkers. Finally, this paper will seek to demonstrate that the self-centered heart is primarily a soteriological problem. The individual is trapped in a self-contained existence unable to escape. This will be shown to stem to several areas: our need for Christ, our ability to love the "other", and finally in our ability to reason. The only way this problem of the *cor corvum en se* can be corrected is by a divine act, namely Christ.



## The Implications and Possible Application of "Christ the Center" in the Christology of Dietrich Bonhoeffer

Presenter: Skipper Boatwright  
Faculty Advisor: Taylor Worley

The research for this paper began with asking the following question: "What are the implications of Bonhoeffer's theology of vicarious representative action culminated in his 1933 Christology lectures as *Christ the Center*, and what do these implications look like when applied to the church?" From there, I developed my thesis, which is that the form of Christ (Word, Sacrament, and Church) and the place of Christ (the center of human existence, the center of history, and the center between

# theology & missions

God and nature), which Bonhoeffer put forth in his lecture, results in the Christ *pro me*. This assertion can be properly summed up in the term created by Charles Marsh: "Trinitarian Self-Becoming." For the remainder of my paper, I will attempt to show what this phrase means for the church, namely when applied to confession.

## Being A Christian Without Religion

**Presenter:** Jeremy Seward  
**Faculty Advisor:** Taylor Worley

The primary purpose of this paper is to show what religion does to Christianity. It will also exhibit the power that religion has and the power that Christianity has. In doing so, the reader should be able to see a major difference in the two, as well as which one is the most significant. With that being said, it is, however, impossible to overlook the phrase 'a world come of age' while discussing being religious and Christian in our world. The world we live in has a lot to do with our Christianity or being religious. So the emphasis of this will be showing the importance of being a Christian without being religious.



## Christ as Hermeneutic: The Christological Underpinnings of Dietrich Bonhoeffer's Interpretation of Genesis 1-3

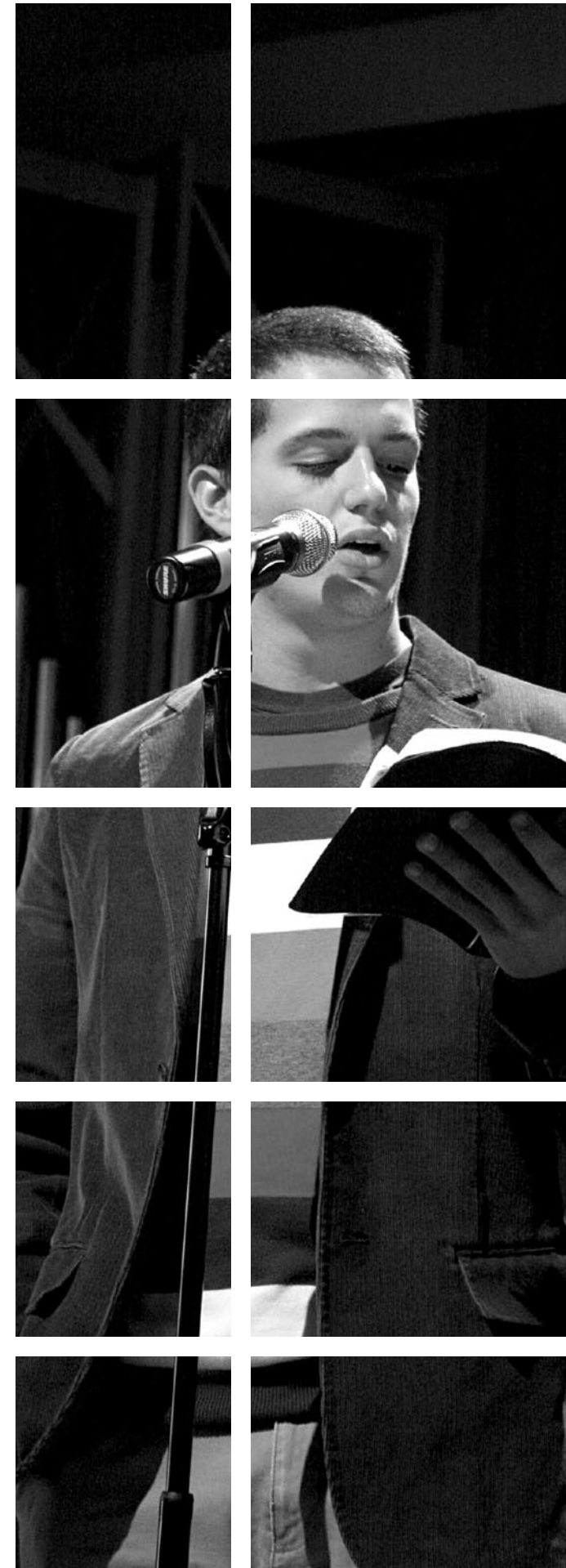
**Presenter:** Dwight Davis  
**Faculty Advisor:** Taylor Worley

The primary question this paper deals with is as follows: How do Bonhoeffer's works *Sanctorum Communio* and *Christ the Center* influence his Christocentric reading of Genesis 1-3 in *Creation and Fall*? I set about answering this question with the assertion that without the theological architecture of Bonhoeffer's works *Sanctorum Communio* and *Christ the Center*, it is impossible to accurately interpret and fully understand his work *Creation and Fall*. I critically engage with the Christology presented in Bonhoeffer's early theology and show that it is consistent with his hermeneutic for interpreting Genesis 1-3. I intend to demonstrate that *Creation and Fall* is Bonhoeffer practicing his early theology in a hermeneutical fashion.

## Sola Fide: N.T. Wright and John Piper on Justification

**Presenter:** Dwight Davis  
**Faculty Advisor:** Brad Green

The primary questions influencing this study are as follows: What are the primary disagreements between John Piper and N.T. Wright? How can each view contribute to a deeper understanding of the nature of our justification? Finally, can there be any synthesis between the two views? I approach these questions with a look at the primary literature involved in the debate: *What St. Paul Really Said and Justification* by N.T. Wright (along with various articles) and *The Future of Justification: A Response to N.T. Wright* by John Piper. I attempt to show the primary disagreements between the



two men. This paper does not necessarily set out to bring anything new to the discussion, but to provide a helpful summary of the positions while offering a critique of each position. I will point out both strengths and weaknesses to each argument and attempt to propose a possible synthesis between the two views.

## "Being and Authenticity: Dietrich Bonhoeffer's Philosophy of Embodiment"

**Presenter:** Robert Andrew Norman  
**Faculty Advisor:** Taylor Worley

Dietrich Bonhoeffer's theological career begins by examining personhood and the structure of metaphysics and human ontology. Bonhoeffer argues that the philosophical categories and principles of German idealism are neither intellectually satisfying nor logically sound. His theological stance polemically counters the dogmatism of idealist philosophy by proposing a radically divergent understanding of ontology, reframing human being as *essentially Christological* and therefore *necessarily ethical-social-communal*. Bonhoeffer rehabilitates the a-theological doctrines of modernism, inaugurating a distinctively *Christo-centric philosophy of human being and embodiment*. The contention and purpose of this study asserts that there is a prophetic and authoritative voice in Dietrich Bonhoeffer's visionary synthesis of theology and philosophy which speaks to the questions and problems of personhood and human embodiment frustrated by the contemporary moment. ■

**Fall 2010 Undergraduate Research  
Grant Recipients**

Dr. Andy Madison and Faris Bakeer  
“Energetics of Seeds and Food Preferences  
in Northern Bobwhite Populations During  
Autumn Months”

Dr. Marc Lockett and Micah Thomas “The  
Effects of Caffeine on the Liver of a Mouse”

Dr. G. Jan Wilms and Grayson Hardaway  
“Creation of Robotic Hand that Can Perform  
(a subset of) Sign Language of Spoken  
Input Using Lego Mindstorms and  
Speech Recognition”

Dr. Marc Lockett and Audrey Garneau  
“Effects of Toxoplasma gondii Infection on  
the Behavior of Mice (Mus musculus)”

Dr. Mark Bolyard and Carrie Moore  
“Identification of Gibberellic Acid Induced  
Bacteria in European Aspen Shoot  
Tip Cultures”

Dr. Mark Bolyard and Carson Rider  
“Development of a Tool to Test for  
Anticoagulant Capabilities Against Factor  
Xa and Thrombin”

Dr. Jennifer Gruenke and Hunter Price “The  
Effect of the Immune System on Stress-  
Related Psychiatric Disorders: Does a Th2  
Immune Response Cause Anxiety in Mice?”

Dr. J.R. Kerfoot and Thomas Duncan  
“Ontogenetic Scaling of the Feeding  
Mechanism in Pike Killfish  
(Belonesox Belizanus)”

Dr. J.R. Kerfoot and Aaron Davidson  
“Testing the Link Between Diet and  
Phenotypic Plasticity in the Feeding  
Mechanism of Lepomis Microlophus”

**Fall 2010 Graduate Research  
Grant Recipients**

Dr. Sean King and Erica Rogers  
“Evaluation of a Brief Student Pharmacist-  
Directed Intervention Based on Social  
Cognitive Theory to Improve Knowledge of  
Over-the-Counter (OTC) Pain Medications  
Among Adolescents”

Dr. Kelly Harden and Lisa Medlin  
“Osteoporosis: Should We Screen Earlier?”

**Spring 2011 Undergraduate Research  
Grant Recipients**

Dr. Karen Miller and Benjamin Fulton  
“Management Responsibility for  
Internal Controls”

Dr. Chris Blair and Scott Goff  
“RFID Adventure”



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