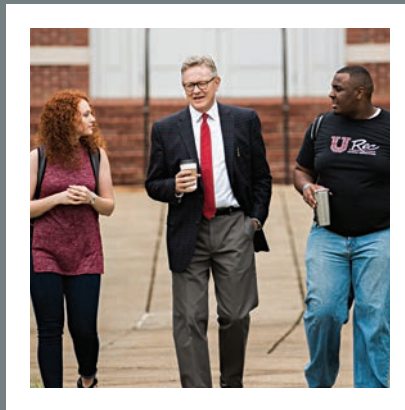
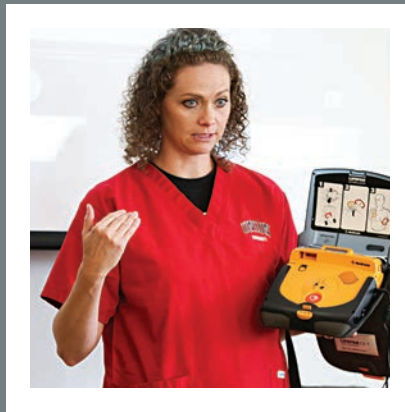




SYMP SIUM

FIFTEENTH ANNUAL UNION UNIVERSITY SCHOLARSHIP SYMPOSIUM

SYMPOSIUM



FIFTEENTH ANNUAL UNION UNIVERSITY SCHOLARSHIP SYMPOSIUM

TUESDAY, APRIL 24, 2018
Afternoon Concurrent Sessions

Poster Presentations (P)

Dept.	Room	Student Presenters	Time
Poster Displays	Grant Events Center	Taylor Griffith (AT-pg.5) Liam Munshi (AT-pg.5) Alexandra Forderhase (CHE-pg.14) Benjamin Pinkley (CHE-pg.14) Dallas Abraham (CHE-pg.15) Rebekah Guthrie (CHE-pg.15) Seth Thibado (CHE-pg.15) Clint Smith (CHE-pg.15) Cheyenne Harber (COM-pg.16) Daniel Porter and Ethan Morris (EGR-pg.20) Gabriel Garneau (EGR-pg.20) Angel McQuiston and Addison Turner (EGR-pg.20) Andrew Dougan, Ainsley Duncan, Nyla Gwan, Joshua Johnson, Luis Larrinaga, Jared Lavelle, Adam Lynn, John Mayer, Stuart Milam, Addison Turner, and Grant Wise (EGR-pg.20) Gabriel Garneau, Joshua Johnson, and Matthew Owen (EGR-pg.21) Carson Brown, Abbey Pfenninger, and Josh Shoemaker (EGR-pg.21) Gavin Hamann, Ethan Morris, Kaylee Owen, Matthew Owen, Daniel Porter, and Addison Turner (EGR-pg.21) John Mayer, Anthony Russo, and Grant Wise (EGR-pg.22) Palmer Bell, Andrew Dougan, and Joshua Johnson (EGR-pg.22) Ainsley Duncan, Jared Lavelle, Adam Lynn, and Stuart Milam (EGR-pg.22) Palmer Bell, Luis Dominguez, Andrew Dougan, Ainsley Duncan, Gavin Hamann, Jared Lavelle, Adam Lynn, Stuart Milam, and Anthony Russo (EGR-pg.22) Mark Carbonell, Thomas Foster, Gabriel Garneau, Nyla Gwan, Davis Johnson, and Joshua Johnson (EGR-pg.23) Cassie Clark, Maizee Kelley, and Caleb Wagler (NUR-pg.29) Jennifer Estes, Wendy Greene, and Kathryn Tims (NUR-pg.28) Marianne Kirk and Ashley McTyre (NUR-pg.28) Indya Daniels, Nahada Gudger, and Meggy Hayes (NUR-pg.28) Jason Bolt, Jack Fields, and Justin Harrison (NUR-pg.28) Cassie Clark, Maizee Kelley, and Caleb Wagler (NUR-pg.29) Christopher Mitchell, Benjamin Stephens, and Tyler Thompson (NUR-pg.29) BethAnn Jones, Natalya Malenko, and Qianwen Williamson (NUR-pg.29) Anne Gallion, Jessica Phillips, and Tracey Power (NUR-pg.29) Cathy Aslin and Hannah Shaw (NUR-pg.30) Paula L. Buckner, Dorothy E. Hiatt, and Bettina K. Shank (NUR-pg.30) Alaina Little, Jamia Moore, and Nicole Rivera (NUR-pg.30) Adam Bland, Jeremiah Cole, and Bradley Steg (NUR-pg.30) Paige A. Williams (NUR-pg.31) Racheal Howard, Shana Mosley, and Nicole Russell (NUR-pg.31) Meredith Tatarzycki (NUR-pg.32) Stacey S. Hodges (NUR-pg.33) Cody Pittman and Christopher Wright (NUR-pg.33) Aaron Lewis (NUR-pg.33) LeAnne Wilhite (NUR-pg.34) Patience Whitten (NUR-pg.34) Jehan R. Ellis (NUR-pg.35) Abigail Andrews (NUR-pg.35) Tiffany Hines (NUR-pg.35) Billie Browning and Tammie Vanstory (NUR-pg.36) Damani Johnson (NUR-pg.36) Daniel Bermea and Jazmin Santiago (NUR-pg.36) Jake Chandler and Jason Poletti (NUR-pg.36) Kevin Lum (NUR-pg.37) Naudia James (NUR-pg.37) Margaret Whitehead (NUR-pg.38) Megan Ruszczyk (NUR-pg.38) Christian Lopez (NUR-pg.39) Alan Richardson (NUR-pg.39) Nikole Jackson and Angela Warren (NUR-pg.39) Calvin Hocker (NUR-pg.39) Mary Crouse (NUR-pg.39) Fred Reed, III (NUR-pg.40) Grady Johnston and Joseph Sudderth (NUR-pg.41)	12:30– 2:00 p.m.

SCHEDULE CONTINUED »

SCHEDULE

CONTINUED FROM PAGE 1

Ifeoluwa Babatunde (PHRM-pg.42) | Sierra Bussey (PHRM-pg.42)
 Han Nguyen (PHRM-pg.42) | Cassie Rogers (PHRM-pg.42)
 Andrew Edmiston (PHY-pg.43) | Gabrielle LeBeau (PHY-pg.43)
 Nicholas Best, Karianne Boxell, Abigail Hamblen, Trenton Holloway, Olivia Schmitke, Ali Thompson,
 and Abbie Williams (PSY-pg.44)



Oral Presentations (O)

Dept.	Room	Student Presenters	Time
BIO Session Chair: James Kerfoot	WH 101	Yee Eun Lee (pg.8)	1:40 p.m.
		Ivan Isaacs (pg.7)	2:00 p.m.
		Nicole Morris (pg.9)	2:20 p.m.
		Charles Bryant Scott (pg.8)	2:40 p.m.
		<i>Break</i>	3:00 p.m.
		Lillie McCampbell (pg.6)	3:20 p.m.
		Ryan Neisler (pg.6)	3:40 p.m.
		Meredith Johnson (pg.7)	4:00 p.m.
BIO Session Chair: Andy Madison	WH 102	Rachel McCann (pg.8)	1:40 p.m.
		Micah Bullock (pg.7)	2:00 p.m.
		Kathryn Kelly (pg.6)	2:20 p.m.
		Sawyer Duffey (pg.9)	2:40 p.m.
		<i>Break</i>	3:20 p.m.
		Madeline Smith (pg.9)	3:20 p.m.
		Torie Benefield (pg.7)	3:40 p.m.
		Austin Rogers (pg.7)	4:00 p.m.

CSC/EGR/MAT Session Chair: Jim Kirk	PAC D-3	Jacob Cronin, Jacob Laster, and Peyton Woods (CSC-pg.17)	1:30 p.m.
		Hugo Gaspar (CSC-pg.17)	2:20 p.m.
		Tanner Cherry (CSC-pg.17)	2:50 p.m.
		Tylman Michael (CSC-pg.17)	3:20 p.m.
		<i>Break</i>	3:50 p.m.
		Corbin Anderson, Carson Brown, and Josh Shoemaker (EGR-pg.23)	4:00 p.m.
		Cory Johnson and Abbey Pfenninger (EGR-pg.23)	4:20 p.m.
		Amy Murdaugh (MAT-pg.26)	4:40 p.m.
ALNG/ICS Session Chair: Phillip Ryan	PAC D-54	Madison McMullen (ICS-pg.27)	2:00 p.m.
		Alice Wilkerson (ICS-pg.27)	2:20 p.m.
		Hannah Johnson (ICS-pg.27)	2:40 p.m.
		Janey Berends (ALNG-pg.4)	3:00 p.m.
		Katie Hail (ICS-pg.27)	3:20 p.m.
		Mary Tucker (ICS-pg.27)	3:40 p.m.
ENG Session Chair: Gavin Richardson	Theatre	Janey Berends, Samuel Edgren, Elise Galbreath, Jonathan Hall, Rachel Johnston, Charis Lancaster, Melissa Lieffers, Gabrielle Massman, Ryan Sinni, Kaitlyn Steele, Dana Viveros, and Joshua Welsch (pg.25)	2:00 p.m.
ENG/COM Session Chair: Chris Bailey	PAC D-53	Katie Chappell (ENG-pg.24)	2:20 p.m.
		Rebecca Duttweiler (ENG-pg.25)	2:40 p.m.
		Shea McCollough (ENG-pg.24)	3:00 p.m.
		J. Clark Hubbard (ENG-pg.24)	3:20 p.m.
		Hannah Brandt and Cayley Cantwell (COM-pg.17)	3:40 p.m.
HIS/BUS/ThM Session Chair: Ray Van Neste	JEN 325	Seth Reid (HIS-pg.26)	2:00 p.m.
		Brandon Harper (ThM-pg.45)	2:20 p.m.
		Jonathan Pope (ThM-pg.45)	2:40 p.m.
		Ryan Sinni (ThM-pg.45)	3:00 p.m.
		Russell Richardson (BUS-pg.13)	3:20 p.m.
		Ben Noland (BUS-pg.13)	3:40 p.m.
Graduate Session EDU/NUR/SW Session Chair: Brian Foster	BAC-43	Anita K. Langston (NUR-pg.41)	2:20 p.m.
		Paula L. Walker (NUR-pg.41)	2:40 pm.
		Lori Taylor (NUR-pg.40)	3:00 p.m.
		Breanne Vailes (SW-pg.44)	3:20 p.m.
		T. Celeste Turner (EDU-pg.19)	3:40 p.m.
		Beth M. Weed (EDU-pg.18)	4:00 p.m.
		Christopher L. Morris (EDU-pg.19)	4:20 p.m.
		Stacey M. Alexander (EDU-pg.18)	4:40 p.m.
Graduate Biology BIO	WH 101	Juan Rodriquez (pg.10)	April 23 12:00 p.m.
		Nar'Asha Randall (pg.10)	April 24 10:00 a.m.
		Mohammad Jafari (pg.10)	April 24 11:00 a.m.
		Gaige Vandezande (pg.11)	April 25 12:00 p.m.
		Alex Garey (pg.11)	April 27 10:00 a.m.
		Crystal Lyles (pg.11)	April 27 12:00 p.m.
		Christian Mitchell (pg.12)	April 30 12:00 p.m.
		Catrina White (pg.12)	May 2 12:00 p.m.

APPLIED LINGUISTICS

Language Matters in Deaf Education (O)

Presenter: Janey Berends

Faculty Advisor: Phillip Ryan

The path to language acquisition and literacy attainment is slow and arduous for most deaf or hard-of-hearing (DHH) children. Due to early linguistic deprivation, most DHH children enter school with a lower vocabulary and command of grammar than

their hearing peers, and only ten percent attain age-appropriate reading levels by the time they graduate from high school.

In this paper I describe three common models of language instruction for the DHH students. I discuss the ideology behind the choice of language, how each model addresses obstacles to language and literacy, and the advantages of the bilingual model in particular. ■



ATHLETIC TRAINING



Compounding Arm Injuries in a Teenage Baseball Pitcher (P)

Presenter: Liam Munshi

Faculty Advisor: Jennifer Farroll

Patient Data: Male, baseball pitcher, during final travel ball season at 18 (before going to college) developed elbow pain and forearm/hand numbness. Chief Complaint: Elbow pain and forearm/hand numbness. Results of Physical Exam: Non-impressive x-ray; discussed nerve issues and lateral elbow clicking/popping elicited with elbow extension; EMG and MRI ordered for ulnar nerve. EMG—positive for delayed firing of the ulnar nerve, MRI—showed plica at lateral elbow between lateral epicondyle and radial head. Diagnosis, Treatment and Clinical Course: Lateral elbow plica and ulnar nerve compression between medial epicondyle and coronoid process. Had plica excision and transposition of the ulnar nerve. Ulnar nerve was relocated to anterior to medial epicondyle. Uniqueness of this Case: The uniqueness of this case is attributed to the cascade of comorbidities as well as the repositioning of the ulnar nerve which is superficial and anterior, rather than buried below more superficial muscle tissue.

Multiple Shoulder Injuries in a Collegiate Softball Player (P)

Presenter: Taylor Griffith

Faculty Advisor: Jennifer Farroll

Patient Data: Female, 19-year-old, college softball player. During weight lifting session, while performing an upright cable row the patient felt a pop in her right shoulder. Chief Complaint: Shoulder pain, primarily anterior, during both rest and activity. Results of Physical Exam: Orthopedist's initial impression was SLAP tear, however, the MRI was non-impressive other than a bone bruise on the humeral head. Patient was sent for an MRI-arthrogram. MRA results showed a HAGL lesion (humeral avulsion of the glenohumeral ligament). Diagnosis, Treatment and Clinical Course: Post MRA diagnosis was a Humeral Avulsion of the Glenohumeral Ligament. Arthroscopy revealed a near 360 degree SLAP tear and a partial thickness tear of the posterior rotator cuff. Surgeon repaired the HAGL lesion, the SLAP tear, and the posterior rotator cuff tear. Uniqueness of this Case: This case is unique due to the combination of multiple injuries resulting from a rather simple, non-contact mechanism of injury. ■

BIOLOGY

The Effects of Hyperglycemia on Claudin-5 Expression in the Developing Choroid Plexus (O)

Presenter: Kathryn Kelly

Faculty Advisor: Hannah Henson

Hyperglycemia can have devastating impacts on brain development, but the mechanisms regarding these effects are vastly unknown. One mechanism may be due to the disruption of tight junction proteins. Tight junction proteins within the brain's choroid plexus epithelium, such as Claudin-5, are critical elements in maintaining proper homeostatic levels of the cerebral spinal fluid. By examining the conserved structure of Claudin-5 in zebrafish, a greater understanding of the neural impacts of hyperglycemia may be understood. In this study, zebrafish embryos were treated with glucose to induce hyperglycemia. Specimens were then collected and RNA was extracted. qPCR was performed to examine changes in Claudin-5 expression. This study will investigate the impact of early exposure to high glucose levels on Claudin-5 expression in the choroid plexus epithelium and provide a better understanding of Claudin-5's role in choroid plexus morphology and development. Results are pending.

Organogenesis of Cuban Mahogany (O)

Presenter: Ryan Neisler

Faculty Advisor: Mark Bolyard

Cuban mahogany (*Swietenia mahagoni*) populations are declining and becoming threatened by over-harvesting coupled with slow reproduction. Micropropagation techniques have been developed for several plant species to produce progeny plants for cultivation, bypassing natural population growth. With a correct ratio of cytokinin and auxin phytohormones, facilitation of organogenesis of leaf tissue cultures would be utilized to replenish native tree populations. Little is known about organogenesis of the Cuban mahogany or phytohormone concentrations necessary for regeneration. The purpose of this research is to evaluate the effects of varying levels of cytokinins and auxins on tissue cultures of Cuban mahogany. Utilizing a factorial grid system, the cytokinin Thidizuron (TDZ) was evaluated in conjunction with auxins: 2,4-Dichlorophenoxyacetic acid (2, 4-D), Indole-3-butyric acid (IBA), and 1-Naphthaleneacetic acid (NAA). TDZ in combination with 2,4-D and IBA proved successful in producing callus >25 mm, although more research is needed before we can rejuvenate the Cuban mahogany population.

Modification of Green Fluorescent Protein for Detection of Thrombin Inhibitors (O)

Presenter: Lillie McCampbell

Faculty Advisor: Mark Bolyard

Understanding and detecting blood coagulation and its inhibitors are necessary for the development of anti-thrombotic medications. Thrombin is a major protein associated with blood coagulation because of its role in fibrin activation, the basis for blood clot formation. This project attempted to modify green

fluorescent protein (GFP) to contain a structural location where thrombin would cut GFP and cause it to lose fluorescence. In addition, if thrombin inhibitors are present, GFP would continue to fluoresce. Because its gene is located on the pGLO plasmid, GFP can be manipulated through mutagenic polymerase chain reaction (PCR), a method which alters the plasmid DNA, causing the change in GFP structure. A successful development of modified GFP would lead to protein isolation and testing as a detector of thrombin inhibitors. Preliminary results indicate the development of a successful method for insertion of DNA through mutagenesis.



The Effects of Glucose on Clusterin Expression in the Choroid Plexus of Zebrafish (O)

Presenter: Micah Bullock

Faculty Advisor: Hannah Henson

Clusterin is a protein that has many functions and is found under certain stress conditions in the cell. Clusterin expression is increased in the brain and spinal cord to protect against neurodegeneration. It also reduces blood retinal barrier breakdown and retinal damage. Increased clusterin levels have been seen in Alzheimer's disease, diabetes mellitus, and diabetic retinopathy. High glucose levels in the liver and blood have also shown increased clusterin transcription. In zebrafish (*Danio rerio*), clusterin expression is localized to the choroid plexus, an epithelial-based structure that makes up the blood-cerebrospinal fluid barrier. Zebrafish embryos were treated with glucose to induce hyperglycemia and changes in clusterin expression in the choroid plexus were analyzed by qPCR. We hypothesized that the elevated glucose levels would induce a stress response in the choroid plexus, thus increasing clusterin levels. Results and conclusion are pending.

Analyzing Plastination Samples as Viable Tools for Teaching Dental Anatomy (O)

Presenter: Austin Rogers

Faculty Advisor: James Huggins

Plastination is a developing technique that has had a significant impact on the scientific community. The ability to take any biological sample and maintain its shape and structure allows us to greater understand the three-dimensional form of different anatomical specimens. The exact change of certain injuries or pathological diseases is an unexplored area of plastination. In this research, we induced dental and oral injuries in 28 grey squirrels (*Sciurus carolinensis*) to monitor the change of these injuries before and after plastination. The widths of the injuries were measured using an electronic caliper before and after plastination. The change of the injury size was statically analyzed to determine any significance in the change of the injuries. Proving that this plastination lab can maintain the injury size and shape would uphold its ability to produce samples for teaching human anatomy.

Thyroid Hormone Regulation in Breast Cancer Cells (O)

Presenter: Meredith Johnson

Faculty Advisor: William Thierfelder

Breast cancer and obesity are conditions that have significant impacts on the lives of millions in the United States. This study investigated the connections between the inflammatory state of obesity, breast cancer, thyroid hormone regulation, and the immune system. Obesity is a condition of chronic inflammation, leading to increased cytokine production, low T4 levels, hypothyroidism, and weight gain. DIO2 is an enzyme that converts T4 to T3. Thyroid hormone deficiencies cause

DIO2 expression to change. The MCF-7 breast cancer cell line responds to inflammation, and cytokines regulate immunity. MCF-7 cells were treated with pro-inflammatory and anti-inflammatory cytokines. After treatment, RNA was extracted and DIO2 expression was measured using RT-qPCR. Human monocytes were treated in culture to secrete either pro-inflammatory (M1) or anti-inflammatory (M2) cytokines. The supernatants were placed on MCF-7 cells to test if M1 or M2 macrophages change DIO2 expression. No consistent changes in DIO2 expression were observed.

The Effects of Temperature And Prey Type on the Feeding Behavior of *Lepomis macrochirus* (O)

Presenter: Ivan Isaacs

Faculty Advisor: James Kerfoot

The effects of low temperatures on feeding rates and activity has been well studied. It has been demonstrated that low temperatures can decrease the foraging rates of aquatic predators. The goal of the study was to find out what has a greater effect on feeding behavior temperature or prey type. The prey were live and dead Mosquitofish (*Gambusia affinis*). The predators were bluegill (*Lepomis macrochirus*). Bluegill are a common gamefish. This information will aid both fisheries biologists and anglers. Trials were conducted at 20 °C, 25 °C, and 30 °C. Each predator was given dead and live mosquitofish in a randomly chosen order.

Discovery and Identification of Parasitoid Wasps (Rhopalosomatidae) and Their Hosts (Gryllidae) From Cypress Grove Nature Park (O)

Presenter: Torie Benefield

Faculty Advisor: Jeremy Blaschke

Rhopalosomatid wasps are ectoparasitoids of crickets (Orthoptera: Gryllidae). Six species of family Rhopalosomatidae occur within the Nearctic region. Only two of these species, *Rhopalosoma nearcticum* and *Olixon banksii*, have known hosts, *Hapithus agitator* and *Orocharis saltator*, respectively. In search of new hosts, a cricket survey of Cypress Grove Nature Park was conducted using sweep nets in September–October (2016) and July–October (2017). A total of 115 crickets of 9 species were collected: *H. agitator* (36), *Anaxipha exigua* (31), *O. saltator* (4), *Allonemobius fasciatus* (22), *Cycloptilium slossonae* (1), *Phyllopalpus pulchellus* (10), *Cyrtoxipha columbiana* (1), *Gryllus pennsylvanicus* (7), and *Acheta domesticus* (3). Seven rhopalosomatid larva were identified on 2 different cricket hosts, 5 on *H. agitator* and 2 on *A. exigua*. Percent parasitism of *H. agitator* was 13.9% and *A. exigua* was 6.5%. The discovery of rhopalosomatid wasps on *A. exigua* represents a new host record for Nearctic Rhopalosomatidae.

BIOLOGY



Effect of Thermal Stress on Cortisol Level and Respiration Rate in a Temperate Species (O)

Presenter: Yee Eun Lee

Faculty Advisor: James Kerfoot

Temperature has a profound influence on the physiology of fish and a possible disproportionate effect on tropical species compared with temperate species due to their narrow temperature tolerance. The blackstripe topminnow (*Fundulus notatus*) is a temperate species that survives in 12oC - 41.6oC, while temperatures beyond this range can be detrimental. The objective of this study was to analyze the thermal stress of blackstripe topminnows in a temperature range that overlaps with tropical species. Topminnows were subjected to warm (24.5 oC) and cold (17.5 oC) temperatures and analyzed by quantifying respiration rates and cortisol levels from water samples using an enzyme immunoassay kit. Results indicated a significant difference in median respiration rates but not in the average cortisol concentration between experimental groups. Further studies on thermal stress of tropical species will confirm whether temperature has a disparate effect on tropical species compared with temperate species.

Developing a Mouse Model of Graves' Disease in BALB/c Mice Induced with TSHR-Tango Transfected RAW 264.7 Cells (O)

Presenter: Charles Bryant Scott

Faculty Advisors: Jennifer Gruenke and William Thierfelder

Graves' disease (GD) is an autoimmune disease that produces antibodies that bind to thyrotropin stimulating hormone receptor (TSHR) causing overproduction of thyroid hormones causing hyperthyroidism. This disease can be induced in mice by stimulating their bodies to respond against injected forms

of the receptor. We attempted to do this by injecting murine macrophage RAW 264.7 cells transfected with linearized TSHR-Tango plasmid into BALB/c mice over a period of several months. An ELISA was used to test for the presence of antibodies using collected plasma samples. The current results indicate that induction of GD was unsuccessful. Developing this model could help understand a possible role of macrophages in GD and methods of treatment. Further modifications to current procedure need to be made to increase the probability of creating a mouse model of GD in this manner which could be useful for further research into hyperthyroidism treatments.

Effect of Hyperglycemia on Choroid Plexus Development in Zebrafish (O)

Presenter: Rachel McCann

Faculty Advisor: Hannah Henson

Hyperglycemia has been shown to affect brain development, but specific effects on choroid plexus (CP) development are not known. The CP consists of epithelial cells that create a barrier between blood vessels and cerebrospinal fluid in the brain. Due to their transparent nature during early stages, ex utero development, and rapid maturity, zebrafish (*Danio rerio*) were used to investigate the effects of elevated glucose on CP development. A transgenic zebrafish line was previously generated expressing green fluorescent protein (GFP) in CP epithelial cells which allows for changes in CP development to be easily visualized under a fluorescent microscope. Using this transgenic line, we investigated the hypothesis that increased glucose levels in neonatal zebrafish will affect CP development. Zebrafish were treated with varying glucose concentrations, and CP formation was observed by measuring CP area using a fluorescent microscope and imaging software. Results are pending.

Antibacterial Effects of Assassin Bug (Heteroptera: Reduviidae) Venom on *Escherichia coli* (O)

Presenter: Madeline Smith

Faculty Advisor: Jeremy Blaschke

Antibiotic resistance in bacteria is on the rise, creating a need for new sources of antibiotics. This research analyzed the venom of assassin bugs (Heteroptera: Reduviidae) for potential antimicrobial activity by testing its effects on the growth of *Escherichia coli*. Four different species were collected and milked for venom. The venom was tested against *Escherichia coli* in nutrient broth in a microplate assay. A positive control containing Penicillin/Streptomycin and a negative control (NC) containing buffer were also included. Samples in triplicate were incubated at 37°C and absorbance readings were taken hourly for 24 hours to quantify bacterial growth. Venom of *Pseliopus barberi* noticeably inhibited the growth of bacteria (OD=0.385 vs. 1.069 for NC), while the venoms of *Phymata americana*, *Zelus sp.*, and *Sinea spinipes* showed no significant bacterial inhibition. Further research of *P. barberi* venom and isolation of the bioactive proteins could contribute greatly towards future antibiotic research.

The Immune Response of the Tobacco Hornworm (*Manduca sexta*) and Its Effect on Bacterial Growth (O)

Presenter: Sawyer Duffey

Faculty Advisor: Jeremy Blaschke

To examine how the immune system of the tobacco hornworm responds to bacterial infection, caterpillars were reared from eggs on an artificial diet under identical conditions. Fourth instars were divided into two groups. The first group (Infected) received an immune challenge from either *Escherichia coli*, *Staphylococcus*

epidermidis, or a mixture of *E. coli* and *S. epidermidis*, while the second group (Uninfected) included caterpillars who had either received an injection of buffer, a mechanical injury without injection, or no treatment. After 24 hours, hemolymph from each group was extracted, purified, and tested against the growth of *E. coli* and *S. epidermidis* in a microplate assay. The hemolymph from the infected group produced a noticeable immune response against *E. coli* up to 13 hours and against *S. epidermidis* up to 7 hours. The AMPs involved in *M. sexta* immune response may be useful in fighting drug resistant bacteria.

Deiodinase Regulation in the Liver Under Conditions of Inflammation (O)

Presenter: Nicole Morris

Faculty Advisor: William Thierfelder

Obesity involves an increase in the mass of adipose tissue, as well as the establishment of a state of chronic, low-level inflammation mediated by adipose macrophages. Thyroid hormones regulate multiple processes in the body including energy consumption, and are regulated in response to inflammation induced by infection. It is not known whether obesity-induced inflammation is also connected to thyroid hormone regulation. Deiodinases are the enzymes primarily responsible for regulating thyroid hormone in tissues. Our objective was to determine whether the transcription of deiodinase-1 (DIO-1), which activates thyroid hormone in liver cells, changes in response to pro- or anti-inflammatory macrophages or cytokines. Using reverse transcription quantitative polymerase chain reaction (RT-qPCR), we have not yet detected altered levels of DIO-1 mRNA in human HepG2 hepatocarcinoma cells under the conditions tested. Modulation of DIO-1 under these conditions could represent a mechanism linking obesity to regulation of metabolism by thyroid hormones.



BIOLOGY [GRADUATE]

Staphylococcus epidermis Biofilm Formation in Zebrafish Gut and its Effects on Claudin-15 RNA Expression (O)

Presenter: Juan Rodriguez

Faculty Advisor: Hannah Henson

Staphylococcus epidermidis is a bacterium of the human skin; however, it has become a prevalent infection associated with inserted medical devices. *S. epidermidis* on the skin has shown to result in a slight loss of tight junction proteins (TJP), but a better understanding of how *S. epidermidis* affects TJPs of other tissues, such as the intestine, is needed. In this study, zebrafish (*Danio rerio*) were used as an *in vivo* system to investigate potential effects these bacteria may have on TJPs regulating normal gut physiology. One TJ specifically expressed in the zebrafish intestine is Claudin-15. To investigate whether *S. epidermidis* exposure results in changes in *claudin-15* expression, zebrafish larvae were injected with *S. epidermidis*. RNA from zebrafish larvae was extracted and quantitative PCR was used to compare the amount of *claudin-15* RNA in both exposed and unexposed zebrafish. Results of this project are pending.

Immune Production of Potential Therapeutic Antimicrobial Peptides by Insects (O)

Presenter: Nar'Asha Randall

Faculty Advisor: Jeremy Blaschke

In the United States, approximately two million people per year acquire serious infections due to antibiotic resistant bacteria. In this review, a new approach to combat microbial resistance specifically through the application of insect-derived antimicrobial peptides (AMPs) is examined. Studies have revealed insect AMPs to be effective against antibiotic resistant bacteria. For example, peptide daptomycin damages membranes of Gram-positive multi-resistant *Staphylococcus aureus*. AMPs are classified by biochemical structure, function, and their membrane interaction with pathogens. After pathogen recognition, activation of signaling transduction pathways leads to the production of these antibody-like specific proteins. By examining AMPs target pathogen and mechanism, they could be potentially useful for administration alone, in combination with additional antimicrobials and drugs to improve potency, or to induce AMP production in vertebrate host cells. Increasing our understanding of the activation, production, structure, and mechanism of action of insect AMPs can lead to the development of novel life-saving antibiotics.

Periodontal Disease: The Common Denominator in the Spectrum of Chronic Inflammatory Diseases? (O)

Presenter: Mohammad Jafari

Faculty Advisor: William Thierfelder

Periodontitis is a chronic inflammatory disease, initiated by gram-negative bacteria that trigger host immuno-inflammatory response leading to tooth apparatus injury (Gaur and Agnihotri, 2015). It is clinically characterized by bleeding on probing

and clinical attachment loss. Periodontal disease is a common denominator in the spectrum of chronic inflammatory diseases; this has been under investigation for quite some time, as researchers wondered what the relationship between periodontal disease and systemic disease is. Many articles have shown a relationship between the two entities but not until recently has the specific mechanism through which these two are related become known. The oral spirochetes are often the dominant bacterial types observed in subgingival plaque removed from diseased periodontal sites. Spirochetes are gram-negative, motile, spiral bacteria, from 3 to 500 m (1 m = 0.001 mm) long. Once Spirochetes proliferate out of control, they become the instigator in most chronic inflammatory disease, and are able to produce immunosuppressant. There is an ongoing immune response as spirochetes are present in the tissue resulting in chronic inflammatory disease long term. Spirochetes and other bacteria are able to enter the immune cell and produce immunosuppressants with global effects so it is very difficult for the body to fight either cancer or anything else as long as we have spirochete disease or periodontal disease are present. Immune suppression is the common denominator in the spectrum of chronic inflammatory diseases, since if we check for C-reactive proteins they will be high, if we check for 25-hydroxyvitamin D we will find it low. Periodontal disease causes bone loss leading to Multiple Missing Teeth Syndrome. Periodontal disease has been also associated with cognitive problems, Alzheimer's disease, Depression, Rheumatoid Arthritis, Bone loss, and bears some relations to heart disease.



Novel Streamline Tagging System for the Efficient Tracking/Categorization of High Valued Plastinated Biological Specimens Using High Radio Frequency Identification Tags (O)

Presenter: Gaige Vandezande

Faculty Advisor: James Huggins

Recently, the utilization of plastinated cadaveric dissections has risen significantly in anatomy institutions, providing self-directed aids for inquiry of anatomical specimens within the biological and healthcare fields. Due to increasing access to plastinated aids, low-cost identification systems are being developed for the monitoring of their usage and handling. Radio frequency identification (RFID) technology has been used in the healthcare field and recent plastination studies for its automated identification and tracking of multiple artifacts. This study portrays a streamline “tag” system for biological specimens subjected to the S10 cold-temperature plastination process. Four commercially available RFID tag types were selected and embedded in biological specimens, further undergoing the entire plastination process. The results prove that the four types of tags selected are reliable and have the ability to sustain lengthy periods of time in the harsh plastination conditions. The 20 RFID tags embedded in varying tissue types represents a successful small-scale study for the implication of a streamline “tag” system. Comparison of the four RFID tag types reveals that there is no significant difference in the composition and successful readable performance after undergoing the plastination process. This study demonstrates that RFID tags are a feasible and low-cost option for the identification and classification of plastinated biological specimens.



Physical and Chemical Factors Affecting *Pseudomonas* Fluorescence Biofilm Formation (O)

Presenter: Alex Garey

Faculty Advisor: Esther Choi

The *Pseudomonas* genus is an important opportunistic pathogen and represents the most common source of infection on medical devices such as catheters, heart valve, and hip implants. They form multicellular communities, called biofilms, in a self-produced slimy matrix. If the problem with biofilms arises on any patient, the medical device needs to be removed promptly. Bacteria in biofilm express different genes at different levels than their free-living counterpart and show increased antibiotics resistance up to 1000 fold. The purpose of this study was to determine under what conditions *Pseudomonas* fluorescence, a widely used model organism, efficiently forms biofilm. Different media, temperatures, and incubation times were tested for biofilm formation. Investigation is underway to determine what genes are involved in biofilm formation. The molecular basis of biofilm formation of *P. fluorescence* are expected to lead to better treatments and prevention practices caused by biofilm-associated infection.

Comparison of Stress Responses Between Black Tetra (*Gymnocorymbus ternetzi*) Tropical Fish and Blackstripe Topminnow (*Fundulus notatus*) Temperate Fish Due to Variable Temperature (O)

Presenter: Crystal Lyles

Faculty Advisor: James Kerfoot

Tropical fish are known adapted to higher temperatures and stable thermal environments, whereas, temperate fish are adapted to a range of temperatures and thermal fluctuations. This study sought to investigate disparity in stress response between the tropical black tetra and the temperate blackstripe topminnow, as it relates to thermal stress. It was hypothesized that there would be a significant difference in cortisol levels and respiration rates between the tropical and temperate species. To test this hypothesis both species were assigned one of two treatments, increasing temperature (heated group) or decreasing temperature (cold group). Respiration rates were measured, and water samples taken to extract water-borne cortisol. Using an immunoassay kit, the cortisol concentration was measured for comparison. Preliminary results for the temperate species indicate that cortisol concentrations were not significantly different between temperature treatments; however, respiration rates were. Tropical species data is currently being gathered to complete the comparison between species.

BIOLOGY [GRADUATE]

The Thyroid Gland and Folate Metabolism: Using qRT-PCR to Study Gene Expression in Zebrafish Dosed with Riboflavin (O)

Presenter: Christian Mitchell

Faculty Advisor: Faith Zamamiri-Davis

A zebrafish model was used to study the effect of intraperitoneal injection of Riboflavin (Vitamin B2) on the expression of methylenetetrahydrofolate reductase (*mthfr*) and enzymes related to thyroid hormone metabolism (*dio1* and *dio2*). This was done by analyzing data acquired from QRT-PCR. Riboflavin, from the Vitamin B group, is an essential precursor to many coenzymes used for physiological functions within the body. For riboflavin specifically, it is related to folate metabolism through the stabilization of *mthfr* and riboflavin is thought to be regulated by thyroid hormones. Hypothyroidism is commonly accompanied by weak *mthfr* performance. The enzyme *mthfr* is responsible for the methylation of folate and folic acid into a form the body can use for protein synthesis and DNA methylation. The thyroid gland produces triiodothyronine (T3) and thyroxine (T4) in order to regulate body metabolism. The enzymes *dio1* and *dio2* are responsible for the conversion of T4 into T3, a more potent form of the thyroid hormone. Zebrafish serve as an effective model organism for laboratory experiments and have been used in numerous studies to identify molecular markers of human disease. The goal of this study was to quantitatively measure the expression of *dio1*, *dio2*, and *mthfr* in zebrafish which had received varying doses of riboflavin through an intraperitoneal injection. Analysis of the data shows that zebrafish are good candidates for further evaluating the expression of these biological markers and may serve as an effective model for future studies which utilize mutant forms of *mthfr*.

Competition in Fungal Biofilms (O)

Presenter: Catrina White

Faculty Advisor: Mark Bolyard

Biofilms are proposed to have existed for approximately 3.3 billion years. They can be defined as a mass of microorganisms in which cells congregate to each other and/or to a surface. These cells that aggregate create a matrix of extracellular polymeric substances (EPS). Biofilm EPS consist of DNA, proteins, and polysaccharides. These factors provide them with the ability to cling to certain environments. Since biofilms exist in wet and moist environments, they can be found in numerous places, including the human body. As such, biofilms can take on medical importance. Biofilm producing species can be divided into two categories, bacterial and fungal. Fungal biofilms can contribute to different infections/diseases within the human body. My research investigates two fungal biofilm producing organisms, which include *Candida albicans* and *Saccharomyces cerevisiae*. Recent studies have shown that *Candida albicans* are more efficient at biofilm formation than *S. cerevisiae* when they are cultured independently. The goal of my project is to examine how these two species interspecifically compete for biofilm formation in different conditions (pH, temperature, etc.) by using a microplate that is designed for fluorescence. *Candida* will be transformed to express a green fluorescent protein (GFP), and *Saccharomyces* will be transformed to express the fluorescent protein mCherry. ■





The Fund from the West and the Crisis in the East: An Examination of Economic Policies and Outcomes in Malaysia and Thailand (O)

Presenter: Ben Noland

Faculty Advisor: Colene Trent

This paper considers the economic policies and outcomes preceding and during the Asian Financial Crisis, looking specifically at the involvement of the International Monetary Fund. The Crisis came without warning at the end of the 20th century after a period of East Asian economic dominance, with its countries showing unprecedented growth. Nobel prize-winning economist Joseph Stiglitz argues that the actions of the International Monetary Fund were responsible in large part for the creation and exacerbation of the Crisis. Stiglitz's claims will be examined by comparing the economic policies and outcomes of Malaysia, which chose not to have an IMF program throughout the crisis, to those of Thailand, which followed all of the IMF's advice. Using the Chinn-Ito Financial Openness Index and World Bank data, this paper further evaluates how the IMF's involvement in East Asia has negatively impacted the region.

Political Liberalism and Democratic Capitalism: An Analysis of the Economic and Social Implications of the Evolving Definition of Liberty (O)

Presenter: Russell Richardson

Faculty Advisor: Hunter Baker

Early 17th century Frenchman Benjamin Constant argued in his essay, "The Liberty of the Ancients and the Liberty of the Moderns" the word "liberty" has changed meaning over time. For the ancients of Greece and Rome, a person was said to have liberty if they could participate fully in the polis. Prompted by more modern philosophical movements, the term "liberty" became reconceived to mean non-interference. The economic system of capitalism was born in an age of negative liberty. While quality of life in many areas undoubtedly grew through capitalism, many have protested the negative side-effects of individualism, consumerism, and "economicism" to human flourishing. The answer for Marx and others was to reject the system; however, the solution lies not in scrapping the system, but in reexamining its philosophical foundations. Revisiting the definition of liberty better addresses the harms of capitalism than eliminating the system entirely. ■

CHEMISTRY



Analysis and Verification of Alternate Industrial Volatility Testing Methods (P)

Presenter: Benjamin Pinkley

Faculty Advisor: Randy Johnston

The ASTM volatility testing method NOACK has long been subject to investigation and generally known to report highly variable data. Despite this, it is still an industry requirement for many product reporting standards. The industry must move away from this highly variable method and toward one with greater reliability and equal or greater accuracy in the collection and analysis of sample volatilities. This research project endeavored to investigate Thermogravimetric Analysis NOACK (TGA Noack) as a supplemental test method to NOACK and eventually phase out the old method. The emphasis of this experiment lay in the developing of a verification method for the TGA Noack as a viable test. Verification is a central part of how industrial research methods are established and can contribute to the forward progress of industrial knowledge. The analytical end of the verification must be highly thorough, testing products across the extreme ends of product ranges, at multiple locations, and must hold up against the standards of the original method. The TGA Noack method was found, through verification studies, to produce data with a dramatically improved accuracy and allow for modifications that raised said accuracy even more. The TGA Noack method passed the initial rounds of verification and then moved on to interlaboratory round robin examination.

Development of a Greener Method for Modifying Silica Gel with a Dendritic Precursor for Chiral Column Chromatography (P)

Presenter: Alexandra Forderhase

Faculty Advisor: Sally Henrie

Chiral column chromatography can be an efficient method to purify a mixture, and is used by the pharmaceutical industry to produce pure medicines. In previous research, a chiral adsorbent was developed that utilized a dendritic precursor attached to silica gel with vancomycin termini as the chiral selector. This method required using a poisoned Raney Nickel catalyst and produced an inadequate branch length for the vancomycin to attach to the termini. A greener method was needed to eliminate the use of the Raney Nickel catalyst and increase the length of the branches. In this research, a tri-branched dendritic precursor with nitrile-termini using acrylonitrile and Trizma® base was synthesized and attached to 3-aminopropyl-functionalized silica gel. Compared to previous research, this greener synthesis uses fewer steps, less hazardous chemicals and increases the branch length by two atoms. Future research will use this method to develop an efficient adsorbent for chiral column chromatography.

Using Thermogravimetric Analysis and X-ray Data to Determine Water Coordination in Seven Coordinate Complexes (P)

Presenter: Seth P. Thibado
Faculty Advisor: Jimmy Davis

In coordination of ligands about a metal center, it is sometimes difficult to detect water coordination due to a variety of causes. X-Ray diffraction, along with the technique of thermogravimetric analysis, was used to determine if one can find the water coordination while solving the crystal of a molecule. In solving the crystal, it was observed that there was one water molecule bonded to the metal center in our zinc complex, and this was confirmed through thermogravimetric analysis, successfully indicating the ability to find water coordination using X-Ray data.

Synthesizing the 7-Carbon Analog of Glucaric Acid (P)

Presenter: Dallas Abraham
Faculty Advisor: Michael Hayes

Glucaric acid belongs to the family of sugar diacids known as aldonic acids. It is a 6-carbon dicarboxylic acid that can be produced from the oxidation of glucose with nitric acid. Glucaric acid has gained much attention after being named a top 12 renewable building block chemical by the U.S. Department of Energy. With the rise of interest in “green” chemistry, industries are facing pressure to implement renewable feedstocks. Glucaric acid also has potential uses in detergents, corrosion inhibitors, concrete mixtures, and medicine. The aim of this project was to synthesize the 7-carbon analog of glucaric from sodium glucoheptonate using a process described in an expired patent for the oxidation of glucose. The desired compound was produced along with undesired by-products that prevented the product from being isolated and characterized beyond ^{13}NMR in the time available.

Synthesis of the Catalyst $\text{M}[\text{DAPTT}(\text{H}_2\text{O})_2](\text{ClO}_4)_2$ for Bleaching Cotton (P)

Presenter: Rebekah Guthrie
Faculty Advisor: Jimmy Davis

Hydrogen peroxide is often used to bleach cotton at high temperatures, high pH, and a large amount of time. Finding a good catalyst that can maximize the efficiency of bleaching under more reasonable conditions can richly benefit many industries. A ligand called DAPTT was paired with different metals to test its ability to take on the role of catalyzing hydrogen peroxide in bleaching cotton of natural impurities such as Morin which causes discoloration.

Visible Light-Induced, Regioselective, Remote Halogenation of 1,2-Diamino Benzene Derivatives (P)

Presenter: Clint Smith
Faculty Advisor: Blake Watkins

Aryl halides are invaluable tools for synthetic chemistry, having use as building blocks for organic molecules or as intermediates in a wide variety of coupling reactions and industrial processes. Issues with common methods of halogenation of arenes include harsh reagents and reaction conditions as well as the possibility of a mixture of products, so methods to obtain regioselective aryl halides would be highly beneficial. In this research, a method for the preparation of mono-halogenated diamino benzene derivatives was developed in a robust and efficient manner. Use of the greener halogenating reagent trihaloisocyanuric acid was explored. The reaction proceeded smoothly at room temperature, open atmosphere, and gave regioselective products in relatively high yields. The current conditions are tolerated with a broad range of substrates. ■



COMMUNICATIONS ARTS



Frankenstein Through the Years (P)

Presenter: Cheyanne Harber

Faculty Advisor: John Klonowski

Posters were originally displayed at play showings of *Frankenstein* by Victor Gialanella (March 16-20, 2018) to give the audience an interactive lobby experience. There are several sections of information on the posters, including: “*Frankenstein* and Entertainment (Play Adaptations and Film Adaptations),” “*Frankenstein* and Ethics/ Religion,” “*Frankenstein* and Science,” “The Origins of the Novel,” “The Author’s Background Information,” and “Victor Frankenstein’s Assistants.”

Staging the Medieval Morality Play (O)

Presenters: Hannah Brandt and Cayley Cantwell

Faculty Advisor: David Burke

A brief overview of the history of Medieval theatre will be presented, along with an explanation of the basic differences between the three types of Medieval production—mystery, miracle, and morality plays. The focus will be on the staging of the Morality play and how the intricate set design would aid in telling the story. Using a handcrafted scale model and extensive research, viewers will be able to see for themselves the detail and creativity that went into staging a 15th century Morality play. ■

COMPUTER SCIENCE

Programming You Can Hear: Audio Signal Manipulation in the C Language (O)

Presenter: Tanner Cherry

Faculty Advisor: James Kirk

When a person thinks of software development, the natural tendency is to think of a program which visually shows certain data or graphics. However, those “1s and 0s” in computers can be utilized to manipulate sound as well. Instead of receiving a digital data input, the program takes in an analog audio input, manipulates it into a digital signal, and returns it back as an analog output. This real-time digital signal processing (DSP) can then be used to manipulate the signal in such a way as to add distortion, delay, reverb, and countless other effects. To demonstrate this, an electric guitar pedal was designed and assembled to house the DSP chip and other components. The chip was then programmed using the C language to manipulate the audio signal received from the electric guitar and send the signal back into the amplifier.

Efficient Application that Manages Post Office Mailboxes (O)

Presenter: Hugo Gaspar

Faculty Advisor: Michael Camden Tracy

Prior to this application, there was no automated and technological process to manage how mailboxes were assigned to faculty/students by Union University's Post Office. The objective of this project has been to create an application that will manage the connection between faculty/students and their respective mailboxes. The main goals of this application are the assignment of an empty mailbox to a new student each semester, the deletion of the connection between students and mailboxes when students graduate or leave the University, and to keep track of students' addresses when they leave the University, in order to forward any mail.

Adapting Moodle to Manage Corporate Training (O)

Presenters: Jacob Cronin, Jacob Laster, and Peyton Woods

Faculty Advisor: Michael Camden Tracy

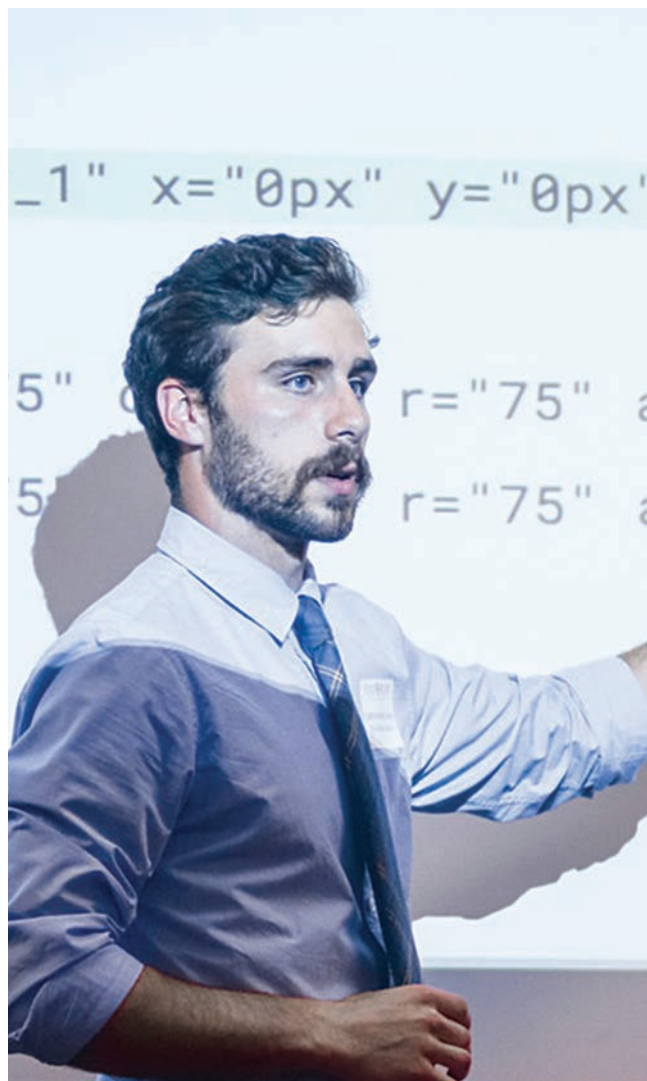
In today's workforce, obstacles arise in training employees. Typically, for human resources managers, safety officers, and training personnel, keeping track of a work associate's training and making sure it is up to date can prove to be a strenuous task, especially when a company has many workers. To alleviate the problem, a Moodle environment was created that helps staff keep track of the training for company employees. In addition, employees have been allowed to access their training online via user accounts in order to complete their training in a test-taking environment. It is hoped that by creating this environment, employee training has been made more convenient, and monitoring its progress more efficient.

PID Controller (O)

Presenter: Tylman Michael

Faculty Advisor: G. Jan Wilms

The goal of the project is to produce a PID (proportional-integral-derivative) controller compatible with Lego Mindstorms EV3 robots. This controller allows users to set a specific target distance for their program to achieve regardless of the current position of the motor or forces acting upon the motor. This approach allows for a faster, easier, and more accurate execution of certain EV3 programs. An example would be a lever arm picking up a ball of unknown weight and holding it at a certain height. Without the PID controller, it's possible for the motor to either be stuck without ever picking up a heavy ball or to pick up a light ball with too much force lift too high, thus dropping the ball. A PID controller will enable the lever arm to accurately lift the ball to a certain height and keep it there as long as needed. The controller will be created through the Lego Mindstorms developer environment using a runtime version of LabVIEW. ■



EDUCATION [GRADUATE]

Effective Teacher-Assigned Grades: An Analysis of Three High School Grading Practices (O)

Presenter: Beth M. Weed

Faculty Advisor: Ann Singleton

High school teachers determine grades using various grading practices. These grading practices fluctuate within a school and within a subject. This study examines the impact grading practices have on teacher-assigned grades. The grading practices studied were defined as open grading, common grading, and standards-based grading for students enrolled in Algebra II. These results of the study suggested open grading was the preferred practice with a more even distribution of grades over common grading and standards-based grading. Common grading and standards-based grading were equal, suggesting no statistical difference between the two practices. These results provide evidence that school districts should provide training and guidance on best grading practices. Student's GPAs would reflect equality among the student body and the letter grade would represent an accurate level of academic learning.

Relationships Among Trait Emotional Intelligence, Academic Achievement, and Athletic Participation in Eighth Grade Students (O)

Presenter: Stacey M. Alexander

Faculty Advisor: Dr. Ben T. Phillips

The role of emotional intelligence (EI), academic achievement, and sports participation in eighth grade students was examined. The aim was to determine if students with different academic achievement levels (as measured by the ACT Aspire Test) and different levels of school sports participation also had significantly different EI levels. Findings indicated that academic achievement could be predicted by the EI factor of Emotionality, which involves being able to form close personal relationships with peers and family members. The results also indicated that stronger academic students had higher levels of EI. In regards to sports participation, students who participate on between one and three sports teams during the three years of middle school have higher levels of EI.





The Effects of a Mentoring Program on the Academic Achievement of Eighth-Grade Females (O)

Presenter: T. Celeste Turner

Faculty Advisor: Carla S. Cushman

Schools continue to look for ways to enhance academic achievement for all students. Many schools have found that the use of mentoring programs aid in meeting the diverse needs of students. This research study addressed the impact of a mentoring program on the academic success of eighth-grade female students as measured by performance on Northwest Evaluation Association (NWEA) Measures of Academic Progress (MAP) Spring 2017 test scores while controlling for prior knowledge. The study compared math and reading percentiles of the eighth-grade girls who participated in a school-wide mentoring program at one middle school to the non-mentored eighth-grade girls at another middle school with similar characteristics. The study included the eighth-grade girls' and school-level mentors' perceptions of the effectiveness of the mentoring program. There were 63 mentored eighth-grade female participants and 61 non-mentored eighth-grade girls included in the study. The One-Way Analysis of Covariance (ANCOVA) was utilized to determine if there was a relationship between the eighth-grade girls' math and reading NWEA MAP scores and participation in the mentoring program. Results of the study revealed there was a statistically significant difference in Spring 2017 performance on the math NWEA MAP based on student participation in the mentoring program. There was no statistically significant difference in Spring 2017 performance on the reading NWEA MAP based on student participation in the mentoring program. Narrative responses from the 15 school-level mentors and 14 eighth-grade girls indicated various levels of effectiveness perceptions.

Analyzing Teachers' Job Satisfaction in West Tennessee Public Schools (O)

Presenter: Christopher L. Morris

Faculty Advisor: Ben T. Phillips

The purpose of this study was to investigate factors that influence teacher job satisfaction. First, the study sought to gauge whether relationships existed between years of experience and the nine subscales of the Job Satisfaction Survey (JSS). Results showed a weak negative relationship between years of experience and benefits ($r = -.163, p = .001$), and a weak positive relationship between years of experience and co-workers ($r = .098, p = 0.43$). This finding suggests that as teachers continue serving in schools, they are less satisfied with their benefits package but more satisfied with relationships with coworkers. Second, the study sought to gauge whether relationships existed between the teachers' self-reported likelihood of returning to the school the following year and the nine survey subscales. Results revealed significant positive relationships (ranging from weak to moderate correlation coefficients) between the likelihood of returning and all subscales of the JSS. Third, the study sought to determine whether differences existed in response to the JSS subscales among teachers with respect to gender and type of school (elementary, middle, or high). Results showed no significant differences between the satisfaction scores of male and female teachers regardless of the type of the school in which they served. Finally, the study sought to determine differences in teacher responses to the JSS with respect to their previous year's level of effectiveness based on the Tennessee Department of Education evaluation model. There were no meaningful differences in satisfaction scores for teachers of varying levels of effectiveness. ■

ENGINEERING

Safely Parachuting Army Men (P)

Presenters: Angel McQuiston and Addison Turner

Faculty Advisor: Jay Bernheisel

This project attempts to optimize the flight time of parachuting army men. This will be accomplished by altering several variables of the parachute designs, including, shape, material and folds. There will be limitations on the size of the parachute and will begin with a similar area cloth for each different designed parachute. The parachuting army men will be consistently dropped from a constant height and each sample parachute's flight time will be noted. This will help determine the optimum design for the slowest fall.



Analysis of Paper Airplanes (P)

Presenters: Ethan Morris and Daniel Porter

Faculty Advisor: Jay Bernheisel

The goal of this project is to analyze the flight times and distances of various paper airplanes. For the first part of the experiment, eighteen airplanes with various factors will be designed. A specification of High, Medium, and Low variable type has been assigned for each factor. The factors are adhesive, plane face, plane length, wingspan, wing fins, plane rear, weight, and rear fins. A Taguchi Orthogonal Array was used to determine the combination of factors and levels for each airplane. The testing involved using an electric motor launcher to catapult the airplanes, while using a stopwatch and tape measure to measure the flight time and distance, respectively. The second part of the experiment we be to determine which is the best airplane design from the first part based on our criteria and compare it to the design of the paper airplane that holds the world record for longest flight time.

Implementation and Analysis of Micro-scale Boundary Conditions for the Navier Stokes Equation (P)

Presenter: Gabriel Garneau

Faculty Advisor: Georg Pingen

The Navier-Stokes-Fourier, NSF, equations are an essential tool in analyzing flow systems with large Knudsen numbers – occurring for example at the micro-scale or in space applications. One area of particular interest is the relationship between the fluid and the stationary boundary. In systems with large Knudsen numbers, the traditional NSF equations and boundary conditions fail to account for the velocity slip and temperature jump at the interface. Therefore, implementing these conditions is crucial for large Knudsen number flow analysis. In collaboration with researchers at CU Boulder we have worked to add these boundary conditions to an existing NSF solver and will present the current state of this work.

AIR 1.0 Aerodynamic Improvement Research (P)

Presenters: Andrew Dougan, Ainsley Duncan, Nyla Gwan, Joshua Johnson, Luis Larrinaga, Jared Lavelle, Adam Lynn, John Mayer, Stuart Milam, Addison Turner, and Grant Wise

Faculty Advisor: Georg Pingen

Aerodynamic designs can lead to improvements ranging from better fuel economy to sports performance. Three aerodynamic enhancements were tested to three common shapes: a cube, a sphere, and a cylinder, to compare their respective forces of drag. These modifications include adding a trailer tail to the cube, adding golf ball dimples to the sphere, and reshaping the cylinder into an airfoil. These shapes were attached to the top of Dr. Pingen's car and used a load balance to obtain the force of drag.

Aerodynamic Analysis of Uvex Areo Helmet and Garneau Road Helmet (P)

Presenters: Gavin Hamann, Ethan Morris, Kaylee Owen, Matthew Owen, Daniel Porter, and Addison Turner
Faculty Advisor: Georg Pinggen

The goal for this project was to quantify the difference in drag between the two bicycle helmets. Specifically, to quantify any power advantage (in Watts) offered to the cyclist by the Uvex aero-helmet when compared against a traditional helmet. To do so, a 2 concomitant test was designed using the wind tunnel facilities at Young Touchstone, as well as full-scale and scaled models tested on the roof of Dr. Pinggen's van. Results will be discussed.

Rubber Band Airplane Design (P)

Presenters: Gabriel Garneau, Joshua Johnson, and Matthew Owen
Faculty Advisor: Jay Bernheisel

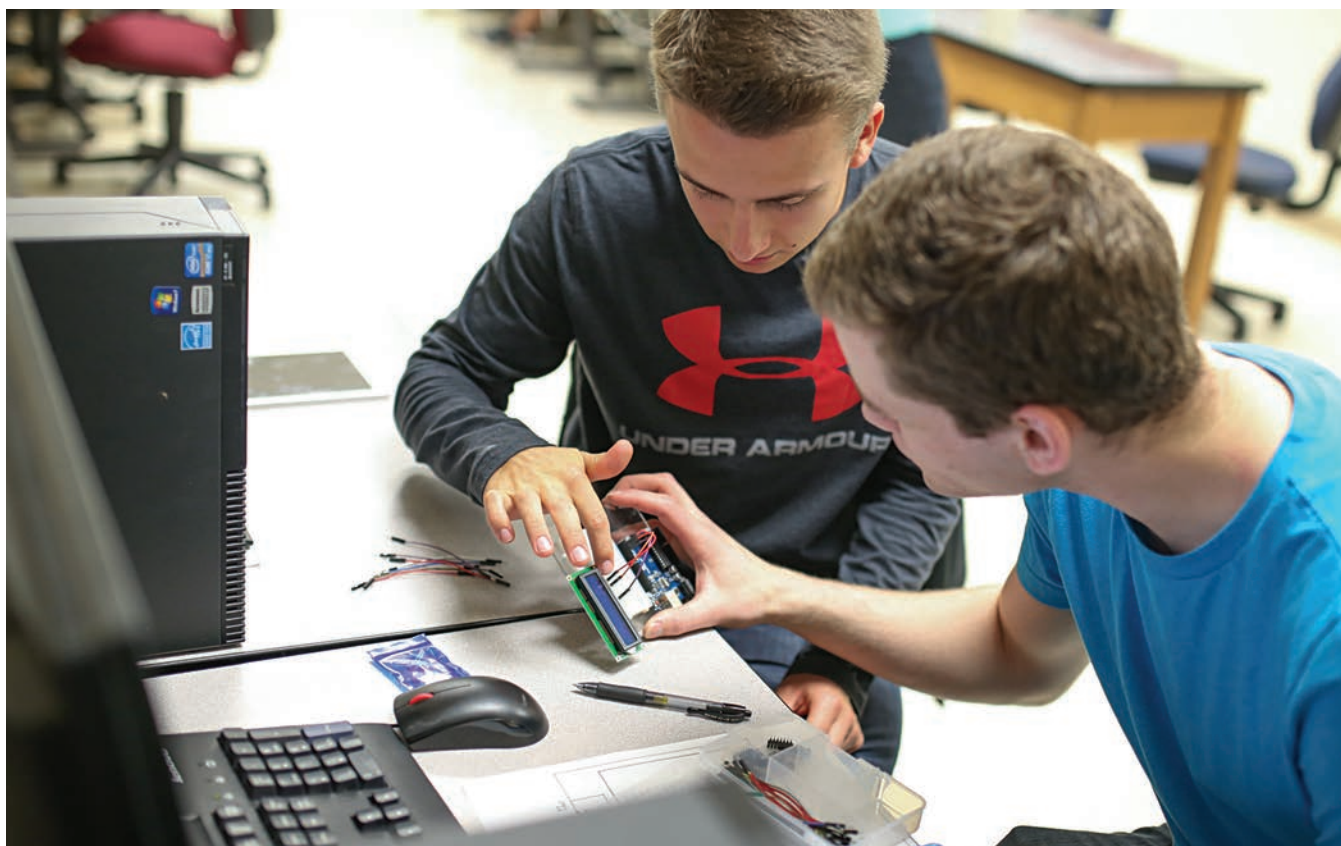
Rubber band powered airplanes will be tested to experimentally optimize airplane performance. Better performing airplanes will be defined as those that fly farthest and fastest. A collection of airplanes will be purchased that vary in different properties, such as airfoil design, dihedral angle, wing position, and

weight distribution. By changing these factors and determining their respective impact, we hope to learn about general flight principles on any scale.

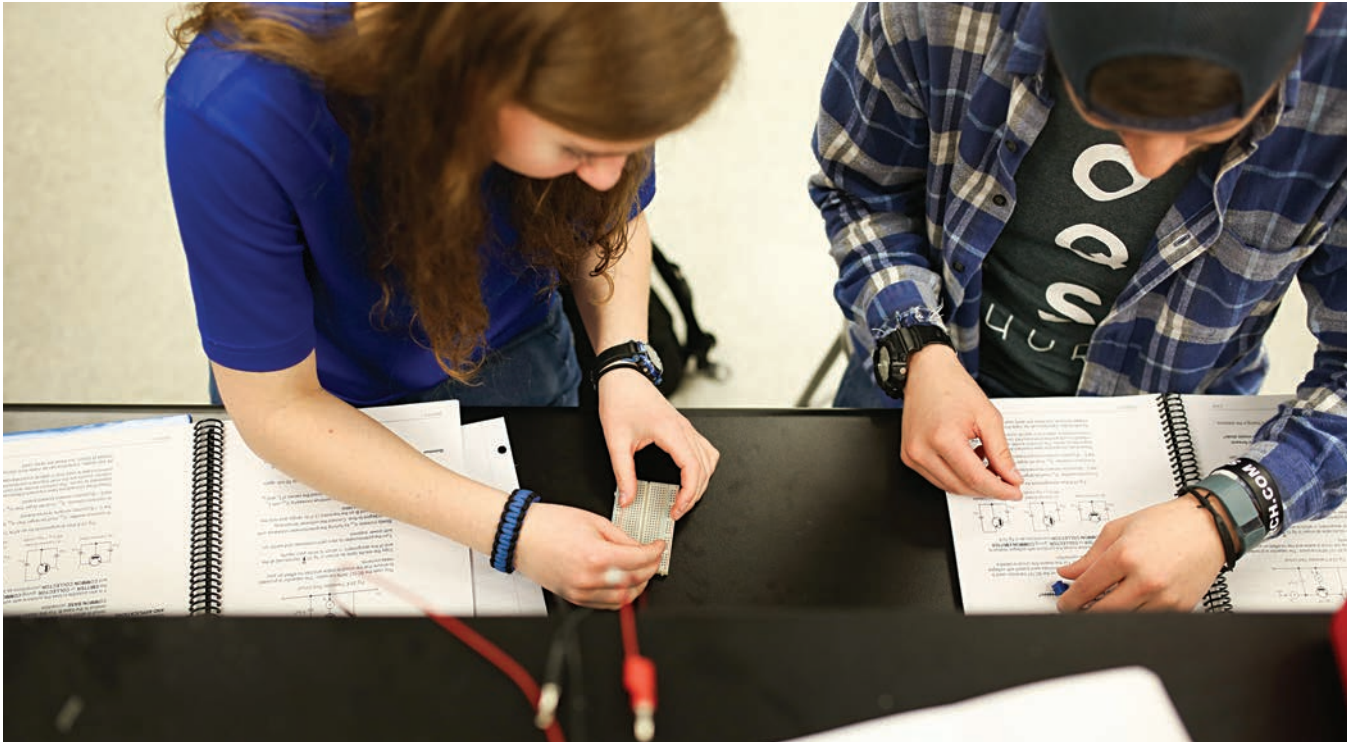
Condensing Water from the Air (P)

Presenters: Carson Brown, Abbey Pfenninger, and Josh Shoemaker
Faculty Advisor: Don Van

The phenomenon of the condensing phase change was studied in order to design a device that condenses water from the air to be used for humanitarian purposes. Air is heated in a container using solar energy. A fluid at the dew point temperature (the temperature at which the moisture in the air will condense) of the warm air is pumped through the warm air in a series of pipes. The humidity in the air condenses and collects on the pipes. The design uses a direct energy conversion to change the phase of moisture in the air to liquid water and could aid peoples in need of clean drinking water and water for sanitary, medical purposes. The condensed water is filtered and may be used immediately or stored in a tank for use at a later time. Depending on the exact water amount needed, the size of the device will change. For applications needing less water, the design is portable, while it may need to be stationary for applications requiring large amounts of water. At the Scholarship Symposium, we will present our design work to produce a minimum of one gallon of water a day.



ENGINEERING



Shifting with Circuits (P)

Presenters: Ainsley Duncan, Jared Lavelle, Adam Lynn, and Stuart Milam

Faculty Advisor: Jeannette Russ

Electronic frequency filters are quite popular today, especially when working with audio devices. However, for this specific project, filters will be manipulated to mimic automobile RPM control modules. A device that will take an electric signal to simulate shifting gears will be created. This simulation will be conceptualized with the help of P-SPICE and implemented with materials provided by the Union University Engineering Department. We will model RPMs as an AC voltage with varying frequency and use filters to isolate different frequency ranges.

Electronic Filters (P)

Presenters: Palmer Bell, Andrew Dougan, and Joshua Johnson

Faculty Advisor: Jeannette Russ

This project will explore the use of electronic circuits to build filters. An electronic filter will allow certain frequencies to pass through a circuit while blocking others. The filters will be used to make an audio equalizer, which controls elements such as bass and different pitches. How the filters are created from simple resistors and capacitors will be demonstrated. At least three different filters will be used to pass low frequencies, high frequencies, and a band of frequencies.

Optimization of the Cost and Efficiency of Solar Panels (P)

Presenters: Palmer Bell, Luis Dominguez, Andrew Dougan, Ainsley Duncan, Gavin Hamann, Jared Lavelle, Adam Lynn, Stuart Milam, and Anthony Russo

Faculty Advisor: Jay Bernheisel

Curious about residential solar power arrays? New developments and incentives have made solar power more affordable and accessible than ever. This project compares materials and technologies for power generation, installation methods, and financial considerations for grid-tied residential solar power arrays. Traditional panels, the Tesla company's roof tiles, fixed and movable arrays, tax incentives, and solar power purchase agreements (PPAs) are all reviewed.

Visual Sound (P)

Presenters: John Mayer, Anthony Russo, and Grant Wise

Faculty Advisor: Jeannette Russ

This project will analyze the benefits of DC filters in the development and control of audio signals. Using high pass, low pass or band pass filters, resistors and capacitors can be connected to output only a certain range of frequencies. In an active filter setup, these filters can also be combined with op-amps and second-order filters to allow for sharper frequency control. These filters will be used to control the output signals of an audio jack, and they will be tuned to respond to bass, mid-range, and treble frequencies. The final goal is to create an LED frequency analyzer along with additional display lights that respond to music tempo.

Bicycle Tire Rolling Resistance (P)

Presenters: Mark Carbonell, Thomas Foster,
Gabriel Garneau, Nyla Gwan, Davis Johnson,
and Joshua Johnson

Faculty Advisor: Georg Pinggen

The goal for this project was to quantify the difference in rolling resistance for bike tires of different widths. An experiment was conducted that allowed us to measure and quantify differences in the rolling resistance between three different tire widths. To ensure we achieved accurate results, two concomitant testing methods were used. The team then used data analysis skills learned in EGR 342 to obtain quantifiable results for the rolling resistance of each tire. Results will be discussed.

The Handy Helper (O)

Presenters: Cory Johnson and Abbey Pfenninger

Faculty Advisor: Randal Schwindt

The basis of this project was to create a device to help a cerebral palsy (CP) patient put on latex gloves as independently as possible since his work requires him to do so multiple times a day. The specific CP patient, for whom this project was conducted, has full use of his left hand and limited use of his right hand. In this project two design ideas were adapted from existing designs that were used for different purposes. The first possible solution was a 3D printed insert to expand the glove. This design required

a coworker to come in and pre-set inserts into the gloves. The patient would then use the pre-set gloves throughout the day. The second option was a vacuum chamber similar to what doctors use to put on sterile gloves. The gloves would be placed around the lip of the vacuum chamber by the patient. The gloves would then be inflated by a vacuum pump connected to a chamber. Both designs were tested with the CP patient to determine the best option.

YTEC Booster: Evaporative Cooling Research and Development (O)

Presenters: Corbin Anderson, Carson Brown, and
Josh Shoemaker

Faculty Advisor: Georg Pinggen

This presentation outlines the research and development of a nozzle misting system. This system uses the effect of evaporative cooling to decrease the temperature of the air entering a heat exchanger and improve the efficiency and effectiveness of the heat exchanger in emergency situations where temperatures exceed 120 °F. This project facilities and resources for experimentation were provided by Young Touchstone's Research and Development department, a company in Jackson, TN that manufactures radiators. A mathematical model was developed by the team to predict the temperature that can be achieved within certain parameters. This model was then used in the design of the final product. ■



ENGLISH

Menthols (O)

Presenter: J. Clark Hubbard

Faculty Advisor: Christine Bailey

While there are plenty of stories set in the apocalypse, there aren't many that ring realistic. With this in mind, J. Clark Hubbard has begun to craft a series of narratives which will all intertwine throughout his novel, exploring the theme of "purpose," especially "purpose when one's world has been turned upside down." In "Menthols," Eureka tries to ignore the apocalypse, choosing instead to focus her drive and desires on a singular goal: to find some cigarettes. Hubbard plays with structure, different narrative styles, and humor in the short story, hoping to grow in the Postmodern family of writing which he first discovered in David Foster Wallace, Don DeLillo, and Thomas Pynchon, among others. This short story will eventually be incorporated into Hubbard's as of yet untitled DSH thesis, a novel.

Homely Metaphor and Divine Otherness in Julian of Norwich's Showings (O)

Presenter: Shea McCollough

Faculty Advisor: Gavin Richardson

In May of 1373, Julian of Norwich received 16 visions, or *showings*, of Christ as she faced a life-threatening illness. In her *Showings*, Julian recounts these visions and the surrounding circumstances in two separate texts, relying heavily on metaphor and imagery in her attempt to describe Christ and his passion. This paper examines the use of metaphor and imagery in *Showings* and posits that Julian uses these figurative devices to ascribe to God a sense of homely relatability and simultaneously deconstruct the limitations of the prescribed medieval understandings concerning His character. In her use of language, Julian blurs the lines between the opposing binary of humanity and divinity, thus illuminating a theology that focuses on welcoming God as other: One who is infinitely different, yet intimately close.

Communal Identity and Matrilineage in Amy Tan's *The Joy Luck Club* (O)

Presenter: Katie Chappell

Faculty Advisor: Janna Chance

This essay analyzes the communal identity between Chinese women and their Chinese-American daughters in Amy Tan's *The Joy Luck Club*. The mothers' ability to conquer the linguistic and cultural boundaries that separate first-generation immigrant mothers and their second-generation daughters develops the theory that the mother-daughter relationship presented in this novel exists beyond words and occurs on a metaphysical level of intrinsic relationality and shared identity. Criticism on mother-daughter relationships in mythology and in Amy Tan's novels informed this essay's argument of the "multiple female consciousness" between the seven women (qtd. in Heung 599). Furthermore, this paper examines the cultural influence of ethnic identity and memory on the perception of matrilineage.





English 450 Medieval Mystery Play (O)

Presenters: Janey Berends, Samuel Edgren, Elise Galbreath, Jonathan Hall, Rachel Johnston, Charis Lancaster, Melissa Lieffers, Gabrielle Massman, Ryan Sinni, Kaitlyn Steele, Dana Viveros, and Joshua Welsch
Faculty Advisor: Gavin Richardson

This will be a “reader’s theater” presentation of a medieval mystery play. Students will read the play in Middle English from prompt copy. The star of the show will be the language, but students will do some light performing. Running time will be approximately 25 minutes. Performed by members of ENG 450: History of the English Language.

Annunciation as a Mystery Spot (O)

Presenter: Rebecca Duttweiler
Faculty Advisor: Christine Bailey

God’s grace and revelation exist not only in scripture and preaching but also in the objects and places encountered in the tangible world. Rebecca Duttweiler is interested in how the physical and the spiritual can interact and even be one and the same in her short story “Annunciation as a Mystery Spot.” In the work, a newlywed couple visits a tourist trap where the world is tilted on its side and the impossible is made possible. The story draws imagery from the scriptural account of the angel Gabriel’s appearance to Mary in Luke 1, as well as traditional paintings of the event. Much inspiration is taken from the poet Mary Szybist in both its poetic style and its desire to envision the story of the Annunciation in a unique way. ■

HISTORY



A Historical Reflection on Hope in the Life and Thought of C.S. Lewis (O)

Presenter: Seth Reid

Faculty Advisor: David Thomas

As a child, C.S. Lewis longed for what he did not know through unbidden moments of romantic delight, but his longing matured into a romantic and rational hope for Christ to bring the solid and glorious New Creation where pain is redeemed, harmony is perfect, and people are united with God. Lewis cared deeply for his longing and his Christian hope because they both connected him to a greater reality than merely the physical. In his longing, Lewis connected—albeit momentarily and in a vague manner—with a reality beyond himself. In his hope, Lewis connected with this greater reality by looking forward, past the merely physical, to the coming of this greater reality. This paper presents the development of Lewis’s hope and its portrayal throughout Lewis’s life. ■

MATHEMATICS

Determining Unique Local Minima in Complex Systems (O)

Presenter: Amy Murdaugh

Faculty Advisor: George Moss

When fitting models of complex systems, local minima of the cost function, which measures the fit of the model to the data, pose problems both for fitting algorithms and for model interpretation. The surface of the cost function is usually assumed to be rough, but this characteristic may be overstated. Local minima produced by a fitting algorithm may actually lie in the same basin of attraction, due to differences in the algorithm’s stopping criteria and numerical resolution. To examine this, we construct geodesic paths between local minima produced by a fitting algorithm. We solve the geodesic equation numerically in Julia as a boundary value problem, using the Shooting and Multiple Shooting Methods. Convergence is improved by interpolating between parameter space and the model manifold using a Levenberg-Marquardt parameter, λ . Evaluating the cost function along the geodesic paths allows us to differentiate between distinct minima and find unique basins of attraction. This work has implications for characterizing models based on the number of distinct local minima present and technical results for algorithm development. It also may provide insight into the existence of low-dimensional effective theories in the complex system. ■



INTERCULTURAL STUDIES

Cultural Values and Governmental Regulations: An Interdisciplinary Analysis of the FDA's Relationship to Psychoactive Substances (O)

Presenter: Alice Wilkerson

Faculty Advisor: Phillip Ryan

This presentation is an intercultural analysis of the Food and Drug Administration's approval process for psychoactive substances as insight into U.S. cultural values. In this presentation, an overview of the process itself, including the role that pharmacy lobbies play in this process is provided. Next, key U.S. cultural values that contribute to this process, resulting in an approval and rejection process many argue is scientifically arbitrary are highlighted. Finally, the implications of this research on the FDA and future laws regarding psychoactive substances and how they relate to U.S. cultural values are considered.

Is the Media Killing Culture? An Interdisciplinary Analysis of American Mass Media in Latin America (O)

Presenter: Madison McMullen

Faculty Advisor: Phillip Ryan

This research presentation is based on a semester-long interdisciplinary study of the cultural implications of American mass media in Latin America. In this presentation, some examples are offered of the presence of American media in Latin America, focusing specifically on advertisements. Context is then provided for the research, including a historical overview of Latin America and the mass media, a look at the cultural contexts, as well as the political power structures at play between Latin America and the United States. Further analysis is continued of the influential power of mass media and different theories regarding cultural change. Finally, the future of Latin American cultures in a mediatized society is considered.

International Adoption Among White Evangelicals (O)

Presenter: Hannah Johnson

Faculty Advisor: Phillip Ryan

This study analyzes international adoption among white evangelicals; exploring laws and policies, issues of familial bonds, white evangelical Christian culture and doctrine, and the psychosocial well-being of the adoptee, including possible detachment and abandonment issues. For this research, qualitative data collected from white evangelical adoptive couples in the Jackson community who had adopted internationally was integrated with interdisciplinary theory and research to better understand this complex phenomenon. This presentation first provides a context for the research, including historical, sociopolitical, and denominational factors. Next, the qualitative and interdisciplinary methods used to collect and analyze the data are reviewed and analyzed, along with emergent themes. Finally, the implications of this research for evangelical communities and how they can support adoptive families are considered.

Intercultural Training for Short-Term Missions Programs: A Qualitative Study of Young Life Expeditions (O)

Presenter: Katie Hail

Faculty Advisor: Phillip Ryan

This presentation addresses intercultural training for Young Life Expeditions. Young Life is a relational ministry for high school students in the United States and abroad. In Young Life Expeditions, volunteers go abroad to assist international Young Life staff. For this research, qualitative data from individuals who have participated in international Expedition trips and from on-site field personnel abroad who coordinate these trips was integrated with interdisciplinary theory and research on intercultural training and ministry. The presentation first provides an overview of Expeditions and then a review of the integrative intercultural approach to this research. Next, major themes, including gender roles, debriefing, and indirectness versus directness are explored, along with different cultural training methods. Finally, recommendations are made for cultural training within Young Life Expeditions.



Race Issues at Predominantly White Universities (O)

Presenter: Mary Tucker

Faculty Advisor: Phillip Ryan

This research presentation explores the complexities of racial reconciliation initiatives at predominantly white institutions. To begin this presentation, a context for the research will be provided, including institutional, historical, and cultural factors. Next, the interdisciplinary research process that was used to collect and analyze the data will be reviewed. Key complexifying factors involved with reconciliation initiatives, such as the status of minorities at predominantly white institutions, the lack of diversity among faculty and staff, and the effects of systemic racism will also be reviewed. Finally, the implications that this research has for predominantly white institutions as they seek racial reconciliation on their campuses will be considered. ■

NURSING [GRADUATE]



India's Healthcare System (P)

Presenters: Jennifer Estes, Wendy Greene, and Kathryn Tims

Faculty Advisors: Shari Wherry and Cathy Ammerman

Healthcare in India is continually changing and growing. It is projected to be within the top three health care markets in the world by the year 2020. Despite this rapid growth, a major problem within the country is adequate insurance coverage for all citizens. It is projected that more than 90% of India's population do not have health insurance benefits, which brings on tremendous debt for families (Dang, Likhar, & Alok, 2016). The purpose of this project is to compare India's healthcare system to other nations, including aspects such as: payer system, financing, reimbursement, provider choice, challenges, WHO ranking, and Gross Domestic Product spending on healthcare.

France's Healthcare System (P)

Presenters: Marianne Kirk and Ashley McTyre

Faculty Advisors: Shari Wherry and Cathy Ammerman

Providing healthcare for all is a theme that can be seen when examining France's healthcare system. Public health insurance is covered for the legal residents of France. Statutory health insurance (SHI) is available to all residents and financed by employers, taxes, state subsidies, and Social Security. Residents who are ineligible SHI coverage are afforded health insurance through the state. Private health insurance is used as a complement to SHI to help pay for copayments, dental, and vision work (Durand-Zaleski, 2016). The purpose of this project is to examine: payer system, financing, reimbursement, provider choice, challenges, world ranking, and gross domestic product spent of French healthcare. Once ranked number one by the World Health Organization (WHO) in healthcare, France's healthcare continues to provide balanced and well-rounded care to all residents, not just citizens (WHO, 2018).

Spain's Healthcare System (P)

Presenters: Indya Daniels, Nahada Gudger, and Meggy Hayes

Faculty Advisors: Shari Wherry and Cathy Ammerman

The General Healthcare Act of 1986 granted all citizens of Spain the right to healthcare. The Spanish healthcare system is separated into the central, autonomous community, and local government levels. The system is primarily funded through taxes utilizing 9% of the country's Gross Domestic Product (GDP). In addition to the public system, approximately 10% of Spaniards obtain private healthcare (Avanzas, Pascual, & Moris, 2017). This poster will present a comparison of Spain's healthcare system to that of the United States. It will outline the finances, provider choice & availability, benefits, and challenges of a healthcare system that continues to be ranked 7th of 191 countries by the World Health Organization. (Tandon, Murray, Lauer, & Evans, n.d.).

Egyptian Healthcare System (P)

Presenters: Jason Bolt, Jack Fields, and Justin Harrison

Faculty Advisors: Shari Wherry and Cathy Ammerman

The purpose of this presentation is to outline the current Egyptian healthcare system as it relates to the public, economy, and government. As of 2015, 58% of Egyptians relied on public health insurance, and with a privately insured population of less than 10%, there is a significant number of citizens left without coverage (Abbas, Abul-Magd, Elmekawy, & Abaza, 2016). Two out of five citizens live in poverty, and out-of-pocket costs comprise most of the personal healthcare related transactions in Egypt (Rashad & Sharaf, 2015). Therefore, these costs have the potential to devastate a household's financial security. There is a plan to establish universal healthcare (UHC) in Egypt by the year 2020 with the intention of covering the 97 million citizens of the country (Abbas et al., 2016; Central Intelligence Agency, 2018).

Australia's Health Care (P)

Presenters: Anne Gallion, Jessica Phillips, and Tracey Power

Faculty Advisors: Shari Wherry and Cathy Ammerman

According to the Australian Institute of Health and Welfare, in 2014-2015, "85%" of Australian citizens 15 years old and older, rate their health as "good or better" (AIHW, 2016). The article also states that the leading cause of morbidity and mortality for Australians is cancer, accounting for 44,100 deaths in 2013. Australia's healthcare is a combination of a universal health care model provided by federal, state and local government and private insurance (Commonwealthfund, 2016). The authors have examined the economic and political factors affecting health in Australia for the Nursing Health Policy and Economics course. The purpose of this presentation is to provide information about the payer system, financing, reimbursement, provider choice, challenges, world ranking, and gross domestic product spent on healthcare in Australia.

Canadian Healthcare System (P)

Presenters: Cassie Clark, Maizee Kelley, and Caleb Wagler

Faculty Advisors: Shari Wherry and Cathy Ammerman

In contrast to the healthcare system in the United States, Canada provides universal coverage to the country's population on the basis of need rather than the ability to pay. Medically necessary services are provided by Canada's publicly funded system. In 2016, Canada spent far less of its gross domestic product on health care than did the U.S. — 10.4% compared with 17.8% in the U.S. ("Is Canada the Right Model," 2017). The medical care system provides its residents with access to all "medically necessary hospital and physician services" at a fraction of the per capita cost of the U.S. system (Ridic, G., Gleason, S., & Ridic, O., 2012). The purpose of this presentation is to provide an overview of the Canadian healthcare system in comparison to the United States. The following topics will be discussed: payer system, financing, reimbursement, provider choice, challenges, world ranking, and gross domestic product spent on healthcare.

Germany's Healthcare System (P)

Presenters: BethAnn Jones, Natalya Malenko, and

Qianwen Williamson

Faculty Advisors: Shari Wherry and Cathy Ammerman

Germany was the "first country in the world to establish a social health insurance system based on solidarity" (Busse, Blumel, Knieps, & Barnighausen, 2017, p. 883). Since 1883, Germany's 135-year-old healthcare system has seen sustained growth and enhancement and offered to its citizens "universal coverage and a generous benefits package" (Busse et al., 2017, p. 883). Since 2012, the German healthcare system has been undergoing several reforms aiming to provide more equitable services and expanding eligibility to the underprivileged population (Blumel & Busse, 2018). According to the World Health Organization (2017), Germany ranks 25th in the world in overall health care. This project examines Germany's healthcare system and analyzes the political,

economic, and social factors that impact its healthcare landscape. A poster will be presented to include the following aspects: payer system, financing, reimbursement, provider choice, challenges, World Health Organization ranking, and gross domestic product spent on healthcare.

Comparison of International Health Care Systems: Mexico (P)

Presenters: Christopher Mitchell, Benjamin Stephens, and Tyler Thompson

Faculty Advisors: Shari Wherry and Cathy Ammerman

In Mexico, access to both public and private healthcare systems is available. Each healthcare system comes with its own set of healthcare workers and healthcare centers. The entrance to either system is dependent upon how much the patient can afford to pay. The public healthcare package is accessed through an employer and includes both the worker and their dependents. The plan provides health, economic, and social benefits (Dobova, Borja-Aburto, Salgado-de-Snyder, & González-Block, 2018). The most commonly used public health care plan is the government-controlled Mexican Institute of Social Security (IMSS). In contrast, the private healthcare system is independent of the government and is available to those who can afford to pay healthcare costs out-of-pocket. This project details healthcare limitations and access within Mexico's healthcare system and will compare the Mexican healthcare system with that of the United States.



NURSING [GRADUATE]

The Dominican Republic: Healthcare System (P)

Presenters: Alaina Little, Jamia Moore, and Nicole Rivera

Faculty Advisors: Shari Wherry and Cathy Ammerman

The Dominican Republic (DR) is home to approximately 10.2 million individuals (Unicef, 2013). There have been dramatic reforms in the DR's healthcare system since 2001 to improve the overall health of the nation (InterNations, n.d.). In an effort to better understand these changes and their impact on the population, a thorough review of the current payer system, financial reimbursement for medical services, and provider options for patients will be provided. This poster will also highlight the economic and political challenges embedded within the DR's current system. Furthermore, statistics will be provided identifying the nation's World Health Organization ranking and the gross domestic product spent on healthcare.

Russian Federation Healthcare System (P)

Presenters: Paula L. Buckner, Dorothy E. Hiatt, and Bettina K. Shank

Faculty Advisors: Shari Wherry and Cathy Ammerman

In a ranking of healthcare systems by the World Health Organization, the Russian Federation is positioned as 130th out of 191 countries (WHO, 2000). In 1991, the Russian Federation passed a law mandating obligatory medical insurance, the intent of which was to provide free public healthcare for all Russian citizens (Gordeev, Pavlova, & Groot, 2011). In 2015, approximately 97% of Russian citizens were insured under the Russian mandatory medical insurance system, although the government spent only 5.6% of their gross domestic product on healthcare that same year (IMR, 2016; OECD, 2017). By reviewing the Russian Federation, it can be seen that the right to healthcare does not equate access to care or stipulate that quality care must be provided. This poster presentation will more closely examine the Russian Federation's payer system, financing/supply, reimbursement, production, provider choice, and challenges.

Japan's Healthcare System (P)

Presenters: Adam Bland, Jeremiah Cole, and Bradley Steg

Faculty Advisors: Shari Wherry and Cathy Ammerman

In regards to the overall performance of their healthcare system, Japan is currently ranked 10th by the World Health Organization (WHO) out of a total of 191 countries (World Health Organization, 2000). Furthermore, it has been determined that Japanese citizens have the longest life expectancy when compared to all other countries (Fair Reporters, 2016). The healthcare system is tightly regulated by the Japanese government under a universal Statutory Health Insurance System (SHIS) (Matsuda, 2018). In 2013, Japan spent roughly 10.2% of its gross domestic product (GDP) on healthcare (OECD, 2015). The purpose of this presentation is to analyze Japan's health care system through examining the following topics: payer system, financing, reimbursement, provider choice, and challenges.

Comparison of International Health Care Systems: China (P)

Presenters: Cathy Aslin and Hannah Shaw

Faculty Advisors: Shari Wherry and Cathy Ammerman

All Chinese citizens have access to government-financed healthcare. Universal healthcare coverage, achieved in 2011, has resulted in great health improvements for the population (Sun, Gregerson, & Yuan, 2017). In 2013, a survey of the population showed that the majority of citizens reported they were satisfied with China's healthcare system, but nearly a quarter were dissatisfied with high costs, inadequate facilities, poor primary care, and unprofessional conduct by medical professionals (Duckett & Munro, 2016). According to the World Health Organization (2000), China's healthcare system has an overall health system performance ranking of 144 of 190 ranked member countries of the World Health Organization. The purpose for this presentation is to examine the economic and political factors affecting health care in China and to present both the strengths and weaknesses of China's universal healthcare system.



South Korea Healthcare System (P)

Presenters: Racheal Howard, Shana Mosley, and Nicole Russell

Faculty Advisors: Shari Wherry and Cathy Ammerman

Over the last 29 years, South Korea has experienced remarkable growth in health reform. Korea now faces the challenges of an ageing population and the rise of chronic medical condition (OECD Health Care, 2012). Looking to improve on quality of care, South Korea has started initiatives to enhance the reform of their healthcare system (OECD Health Care, 2012). The purpose of this presentation is to provide a comparison of the universal healthcare in South Korea to the healthcare policies of the United States in the following areas:

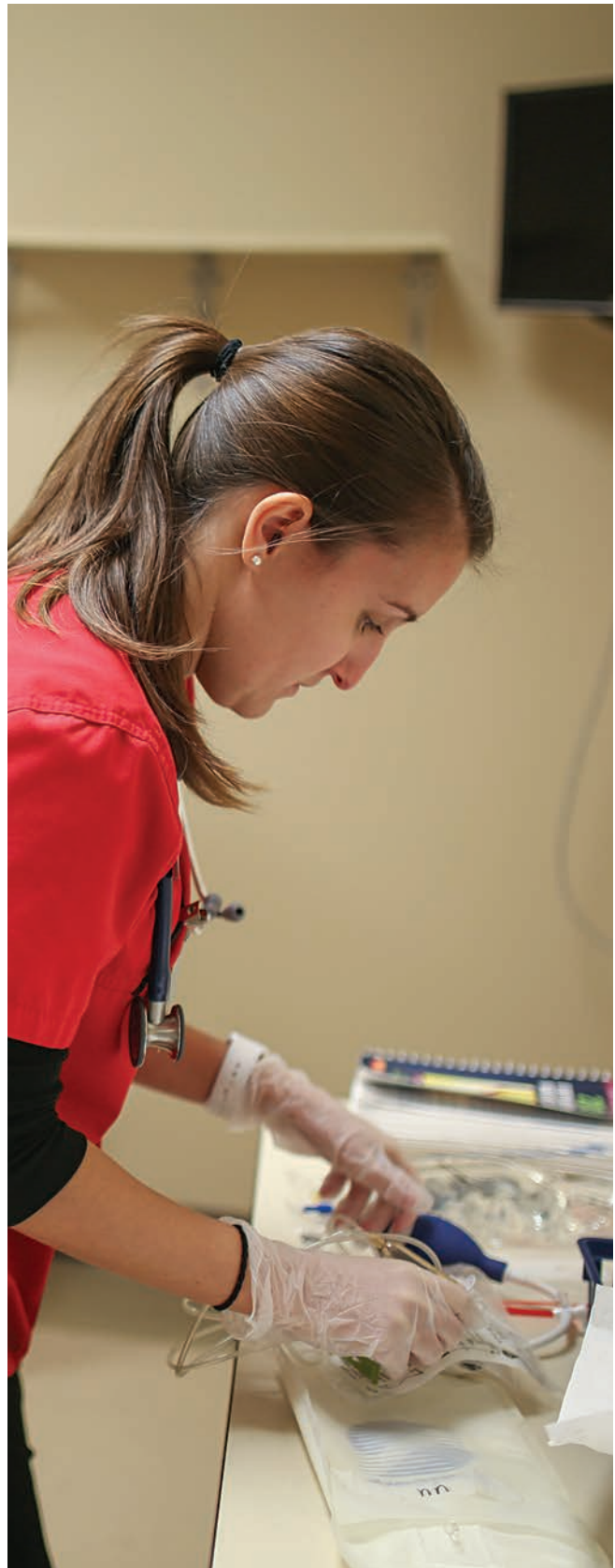
- Payer System
- Financing
- Reimbursement
- Provider choice
- Challenges
- WHO Ranking
- Gross Domestic Product spent on Healthcare

Analysis of Endotracheal Cuff Inflation Techniques Among Student Registered Nurse Anesthetists: Literature Review, Formal Investigation, & Practice Guideline Recommendation (P)

Presenter: Paige A. Williams

Faculty Advisor: Melissa Lefave

Cognitive deficits and clinical technique variances related to endotracheal tube cuff management are prevalent among anesthesia providers. The purpose of this evidence-based practice project is to assess the ability of senior student registered nurse anesthetists (SRNAs) to utilize a manometer as the primary technique for endotracheal tube cuff inflation to achieve the recommended cuff pressure. The study examined whether an educational intervention would improve the accuracy of endotracheal cuff pressures. A pre-intervention knowledge assessment collected data related to participant demographics, baseline knowledge, individual practice techniques, and attitudes regarding cuff pressure measurement using manometers. Twenty-four participants, blinded to study purpose, demonstrated inflation of an endotracheal tube cuff on a laryngotracheal model. After an educational intervention, participants were asked to repeat the endotracheal tube cuff inflation using the manometer technique on the model. An ideal cuff pressure range of 20-30 cmH₂O was used for control comparison as determined by literature review. The study revealed that prior to the educational intervention, participants lacked knowledge of appropriate endotracheal tube cuff pressure as well as the ability to implement the gold standard technique for cuff inflation (17% pre-intervention vs 95% post-intervention). Findings indicated significant improvement in participants' abilities to obtain the recommended cuff pressure using a manometer, suggesting that the educational intervention was successful.



NURSING [GRADUATE]

Music in the Operating Room: A Simulation-based Study with Student Nurse Anesthetists (P)

Presenter: Meredith Tatarzycki

Faculty Advisor: Melissa Lefave

Background: The benefits cited in the literature in support of playing music in the OR include less patient anxiety, lower analgesia and sedation requirements, greater staff satisfaction, and improved surgeon focus. Many healthcare professionals have questioned if the benefits and minimal cost of playing music outweigh the risks introduced to patient safety. Anesthesia providers depend on alarms in order to be vigilant and ensure patient safety. The clinical usefulness of alarms is dependent on the physical environment including the music, speech, and noise level in the OR. With just aural signaling, the anesthetist can be informed of a patient's oxygen saturation level, heart rate, regularity, and distal perfusion. The fact that anesthesia providers seem to have lost control of the acoustic environment in the operating room is a significant problem. There is a new device available called the CanaryBox™ that automatically reduces the level of music being played or silences it completely when clinically appropriate. **Purpose:** The purpose of this project is to assess if modulation of the volume of operating room

music by the CanaryBox™ in response to vital sign changes can improve response times among student nurse anesthetists in a simulated operating room environment. **Methods:** Participants were randomly assigned to one of two groups. Both groups received the same OR scenario, but the control group received music and regular OR noise, while the experimental group received music, regular OR noise, and the CanaryBox™. **Incomplete disclosure** regarding the purpose of the study was utilized so as not to influence response times. Participants were told that the purpose of this project was to evaluate SRNA performance in delivering a safe anesthetic in a noisy operating room environment. Three vital sign changes occurred during the scenario including SpO₂ drop, HR drop, and NIBP drop. **Results:** Statistical analyses included T-tests and one-way ANOVA. Participants randomized to the CanaryBox™ group responded faster than the control group when NIBP dropped to 65/40. **Conclusions:** The CanaryBox™ could lead to much needed advances in patient safety. Future research is needed; however, there is minimal risk associated with use of the CanaryBox™. It is essential that all anesthesia providers are aware of the psychoacoustic effects of the noise, speech, and music in the OR in order to maximize patient safety and reduce the rate of medical error.





A Retrospective Chart Review to Determine if the Presence of Comorbidities Affects Colorectal Cancer Screenings in African Americans (P)

Presenter: Stacey S. Hodges

Faculty Advisor: Laurie Bagwell

Colon cancer is the third leading cause of cancer related death in African Americans (American Cancer Society, 2016). For the last 29 years, the incidence of colorectal cancer has been higher in African Americans than in Caucasians (American Cancer Society, 2013). Many barriers are identified, however, the presence and effects of comorbidities have not been fully explored. The incidence of cancer and comorbid conditions tends to occur at a higher rate in certain ethnic groups (Sarfati, Koczwara, & Jackson, 2016). Comorbidities like diabetes, hypertension, and obesity place African Americans at a higher risk of cancer-related death (NCCN, 2017; Yuhara et. al., 2010). Although there is a well- documented correlation between comorbidities and cancer, there is no standard method to determine their effects on cancer (Sarfati, Koczwara, & Jackson, 2016). The additional burden these factors place on patient outcomes must be quantified in order to prevent unnecessary morbidity and mortality.

Identification and Therapeutic Treatment of Post-Operative Delirium (P)

Presenters: Cody Pittman and Christopher Wright

Faculty Advisor: Melissa Lefave

Postoperative delirium (POD) has been associated with increased healthcare cost, length of stay, morbidity, mortality, safety risk, nursing home placement, and delayed rehabilitation time. The purpose of this integrative review was to develop a protocol for identification and treatment. The search included ScienceDirect, CINAHAL, and Medline. Inclusion criteria included articles that were published in the English language and within the last five years. The selected population includes patients who develop postoperative delirium following surgery. POD is a multifactorial and pharmacologic treatment to shorten the duration cannot be recommended. Nonpharmacologic intervention can effectively shorten the duration and severity when implemented early. If pharmacologic treatment is required, it should be the lowest effective dose and for the shortest possible duration. Pharmacologic treatment should be reserved for those who are a danger to themselves. Clinical practice should focus on treatment of any known cause for POD and nonpharmacologic intervention.

The Effect of Timing of Zofran Administration on Postoperative Nausea and Vomiting (P)

Presenter: Aaron Lewis

Faculty Advisor: Melissa Lefave

Research involving current and past studies performed on Zofran administration timing, specifically the best timing to prevent postoperative nausea and vomiting, were examined. Recent studies have shown that the timing of Zofran administration in patients receiving general anesthesia is significant in decreasing the onset of postoperative nausea and vomiting. The results indicate that the timing of Zofran administration is significant to the reduction, onset, or elimination of long-term postoperative nausea and vomiting. Specifically, in the patient population with increased risk factors for postoperative nausea and vomiting (based on Apfel scoring assessment tool). This integrative research review revealed that the timing of Ondansetron is not significant in the prevention of postoperative nausea and vomiting in surgical procedures less than 2 hours in duration. In surgical procedures lasting 2 hours or greater, Ondansetron should be administered 30 minutes prior to surgical completion to provide the most effective long-term prevention of postoperative nausea and vomiting.

NURSING [GRADUATE]

Transitioning to Practice: Does a Summer Externship Program Improve Students' Perception Related to Competency, Interprofessional Collaboration, and Role Transition from Student to Nurse (P)

Presenter: LeAnne Wilhite

Faculty Advisor: Cynthia Powers

An integral component of nursing programs is the practical experience gained by clinical rotations through varied health care settings. Offering a diverse student experience in the hospital setting prior to graduation fosters a continued growth for the student exposing them to the nursing culture including interprofessional development and skilled communication. A summer externship program allows continued exposure to bedside nursing as well as a more comprehensive understanding of the team approach necessary for successful patient care. This qualitative phenomenological study attempts to identify common themes among the students related to their summer externship experience and the impact on their perceptions related to competency, interprofessional collaboration, and role transition from student to nurse.

Professional Quality of Life Perceptions Among Nurse Practitioners Who Provide Care in the Oncology Setting (P)

Presenter: Patience Whitten

Faculty Advisor: Joyce Snyder

Healthcare professionals who provide care in the oncology setting often experience recurrent exposure to death and dying and grief, inadequate time to cope with loss, rapid turnover in patients, and even feelings of depression and guilt. There is a great deal of literature recognizing how recurrent exposure to stressful circumstances negatively impacts a healthcare professional's quality of life, but little targeting nurse practitioners. This study focused on identifying professional quality of life perceptions among nurse practitioners who provide care in the oncology setting. The Professional Quality of Life Scale (ProQOL) was administered and utilized to evaluate these perceptions in the participants. The survey employed an array of thirty questions that specifically measured compassion fatigue and compassion satisfaction—which are the components that make up professional quality of life. The results to this study revealed a strong negative correlation between compassion satisfaction and compassion fatigue.



Sugammadex Rendering Contraceptive Use Ineffective (P)

Presenter: Tiffany N. Hines

Faculty Advisor: Melissa Lefave

This doctoral paper is intended to evaluate evidence-based literature that is associated with the elimination of contraceptives following the administration of Sugammadex. In addition to this informational literature, methods that may be utilized to increase patient and provider awareness will also be presented. Sugammadex is a specialized neuromuscular reversal agent; it is the first of its class (Nag, et al., 2013).” Sugammadex binds to and encapsulates steroidal neuromuscular blocking agents such as, rocuronium and vecuronium. Though the elimination of neuromuscular blocking agents is greatly desired near the completion of a surgical procedure, Sugammadex has been proven to reduce the effectiveness of contraceptive drugs that contain progesterone (Et, et al., 2015). Although anesthesia providers develop a strategic, individualized anesthetic plan of care, the initial plan is subject to change with unexpected events; including the unexpected administration of Sugammadex. Consequently, there is a lack of patient and provider awareness of the removal of contraceptives upon the administration of Sugammadex. This effect places the patient at risk for unintended pregnancies.

The Effects of Intraoperative Lidocaine Infusion Adjunct for Postoperative Control in Open Abdominal Surgeries (P)

Presenter: Abigail Andrews

Faculty Advisor: Brian Foster

Background: The control of postoperative pain is a major concern in the surgical and anesthesia fields. Postoperative pain is associated with many physiological consequences and optimal postoperative pain management is associated with less cognitive impairment, improved quality of life, and a reduced risk of developing chronic pain leading to increased complications. Lidocaine has shown to provide adequate pain relief in individuals undergoing abdominal procedures and decrease hospital stay, postoperative nausea and vomiting (PONV), respiratory depression, ileus, and urinary retention. Objective: To examine current available evidence and assess the outcomes and benefits of continuous lidocaine infusions for postoperative pain control and return to normal physiologic function in patients undergoing abdominal surgery. Conclusion: Despite current updates in research and technology, adequate pain control continues to be a challenge. More than half of the individuals undergoing surgical procedures explained that they experienced moderate to severe postoperative pain. Regional anesthesia has proven to be effective in decreasing postoperative pain, however, there are risks associated with this anesthesia and not every patient is a candidate for it. Opioids consumption has also demonstrated adverse side effects with continued use. Opioid dependence and tolerance continues to be a concern for anesthesia providers. Lidocaine is able to provide analgesic,

anti-hyperalgesic, and anti-inflammatory effects for patients undergoing surgical procedures. At bolus doses of 1-1.5 mg/kg followed by a continuous infusion of 1.5-2 mg/kg/hr lidocaine has shown its ability to decrease opioid consumption, provide adequate pain control, and decrease postoperative pain.



Develop an Evidence-Based Guideline to Improve Discharge Readiness and Family Satisfaction in the Newborn Center: An Integrative Research Review (IRR) (P)

Presenter: Jehan R. Ellis

Faculty Advisors: Cynthia Powers and Denise Thornton-Orr

Discharge planning in a neonatal unit (NICU) should begin on admission to empower parents and identify their educational needs. It requires a balance between patient and caregiver readiness based on the infant's physiologic stability, caregiver competence and confidence, and the home environment (McGowan et al, 2017). The problem is that families are not adequately prepared to take their infant(s) home. The purpose of this integrative research review is to evaluate current evidence in regards to preparing families for discharge home. The goal is to improve discharge readiness and family satisfaction in the Newborn Center. A thorough review of literature was conducted using databases from EBSCOHost, CINAHL, MEDLINE and an Internet search for articles and grey literature. Terms used to search for sources included discharge readiness, discharge planning, NICU checklist, transition to home, and NICU toolkit. A table of literature was created and assessed for commonalities. The IRR indicated a need for a provision in our approaches to foster family involvement and discharge preparedness for a safe transition home. A nursing guideline and educational handouts were developed to gradually introduce educational content (admission to discharge) to allow families enough time to absorb the knowledge, develop the necessary skills, and decrease anxiety.

NURSING [GRADUATE]



Adjunct Use of Ketamine: To Avoid the Dangers of Opioids (P)

Presenters: Jake Chandler and Jason Poletti
Faculty Advisor: Molly Wright

Opioid abuse, addiction, and dependence have become one of the biggest problems in healthcare. The side effects of opioid use, both short term and long term, are also problematic in the outcomes of patients. Finding a safe alternative to replace or augment opioid therapy for effectively managing pain, without the detrimental side effects, is a continuous battle in operating room and postoperative recovery areas. The Integrative research review details the findings for use of ketamine as an adjunct to opioids for intraoperative and postoperative pain control. Ketamine is as effective as opioids for intraoperative and postoperative pain control, without causing the harsh side effects or potential for addiction that comes with opioid use. We recommend implementing education on the use of Ketamine as an opioid adjunct and integration of Ketamine in all appropriate anesthetic plans of care for safer, yet effective, intra and postoperative pain management.

Anesthesia Awareness: Prevention Considerations in Specific Anesthesia Populations (P)

Presenters: Daniel Bermea and Jazmin Santiago
Faculty Advisor: Molly Wright

Background: Anesthesia awareness has been associated with anesthesia since it was first introduced, and continues to affect thousands of patients a year (Pennsylvania Patient Safety Authority, 2017). There are certain risk factors and causes that anesthetists should be aware of in order to decrease anesthesia awareness. Objective: To examine current evidence and assess the cause of anesthesia awareness in the at-risk population, as well as determine how to better prevent it. Conclusion: All members of the anesthesia team should be educated in factors that are more likely to cause awareness, so they can understand how their actions can increase a patient's risk of experiencing awareness. After reviewing these studies, we conclude that there needs to be an increase in education provided to anesthesia staff on the risk factors for anesthesia awareness, as well as guidelines in place at facilities to promote early recognition of patients at higher risk for awareness.

Optimizing and Minimizing Medical Mistakes During Post Anesthesia Care Unit Handoff (P)

Presenters: Billie Browning and Tammie Vanstory
Faculty Advisor: Molly Wright

Background: Studies have shown pertinent information is continuing to be lost during post anesthesia care unit (PACU) handoff. Providers are required to pass on pertinent information within a narrow time frame. Due to this time crunch, relevant information is being overlooked or omitted during PACU report. The purpose of this study is aimed towards improving PACU handoff by including all necessary information in a time efficient manner. This review will also include a mnemonic/checklist to remind the provider exactly what information should be included during report in a systematic setup. Elements to be included will be based upon safe anesthesia PACU handoff, pertinent anesthesia information, as well as the PACU mnemonic/checklist that will enhance patient care and safety during this critical recovery time. The intent of this project is to make anesthesia providers aware of the importance of PACU handoff and to provide a simple yet concise transition.

The Effects of Intravenous Ketamine on the Mental Status of Schizophrenics (P)

Presenter: Damani Johnson
Faculty Advisor: Brian Foster

There are many drugs available to the modern anesthesia provider. Ketamine is one drug that is often chosen for certain patient populations because of the unique effects it has on the human body. Ketamine provides cardiac stability, does not depress the respiratory drive and provides significant dissociative amnesia. There are over 3.5 million people diagnosed with schizophrenia in the United States. Anesthesia providers should

be aware of this unique population and how these patients could respond to anesthetic doses of intravenous ketamine. This study was conducted to assess how ketamine would affect the cognitive function of schizophrenics after an intravenous infusion of ketamine. In patients with a known or suspected history of schizophrenia, providers should be aware that the research indicates that ketamine will dependably exacerbate temporary psychotic symptoms. Ketamine should only be used with provider discretion after thorough assessment.

Development of a Practice Guideline for the Safe, Minimum Effective Dose of Dexamethasone in Adults Undergoing General Anesthesia for Post-Operative Nausea and Vomiting (PONV) (P)

Presenter: Kevin Lum

Faculty Advisor: Brian Foster

Dexamethasone (Decadron) is one of the most common medications used to treat postoperative nausea or vomiting (PONV). Unfortunately, there are inconsistencies in terms of what constitutes a safe minimum dose of Dexamethasone, with recommendations ranging from 4-10 milligrams (mg). Such inconsistency makes it difficult for healthcare providers to determine how best to administer the drug. This practice guideline reviews a variety of literature - including textbooks, 14 medical journal articles, and other sources - to determine a safe, minimum effective dose of Decadron for the prevention

of PONV. The ultimate conclusion was there is no definitive minimum recommended dosage of Dexamethasone for PONV, and that further research is needed to establish such a protocol.

Examining the Anxiety Levels of Parents Pre and Post-Participation in Parent-Present Anesthesia Induction for Children Ages One to Eighteen Undergoing Outpatient Ear, Nose, and Throat Surgical Procedures at Le Bonheur Children's Hospital (P)

Presenter: Naudia James

Faculty Advisor: Laurie Bagwell

On a yearly basis, millions of children undergo anesthesia for various surgical and non-surgical purposes. Anesthesia induction has been noted as one of the most stressful and anxiety provoking procedures for both the parent and child. The level of anxiety peaks in a child at the time the anesthesia provider introduces the face mask for induction. Parental anxiety also impacts the level of anxiety in the child. Studies have revealed minimizing anxiety in the child and parent during anesthesia induction may reduce adverse psychological and physiological outcomes. Hospitals have utilized premedication and multiple distraction techniques to allay the anxiety levels of children. Through the collaboration of hospital administration and the Family Practice Council (FPC), parental presence during anesthesia induction was an intervention introduced to assist with decreasing anxiety at Le Bonheur Children's Hospital (LBCH).



NURSING [GRADUATE]



Development of a Cross-Sectional Plastinate Model of the Adductor Canal for the Evaluation of Anatomical Competency of Anesthesia Providers (P)

Presenter: Margaret Whitehead

Faculty Advisor: Brian Foster

The objective of this project was the development of a plastinate cross-section of the mid-thigh that can be utilized to evaluate provider knowledge of anatomical features of the adductor canal block (ACB). Ultrasound-guided regional anesthesia (USGRA) techniques are employed by anesthesia providers to optimize the placement of the ACB for the management of perioperative pain. Sonoanatomy recognition requires providers to understand the cross-sectional anatomical relationships of structures. In this project, cross-sections were made of the thigh before undergoing plastination. A specimen representing the distal one-half to one-third of the thigh was chosen for anatomical study. Features associated with the ACB were labeled, and the model was authenticated by an expert in the field of USGRA.

Efficacy of Lidocaine Infusion for Intra-Operative and Post-Operative Pain in Laparoscopic Abdominal Surgery (P)

Presenter: Megan Ruszczyk

Faculty Advisor: Melissa Lefave

Objectives: Examine current evidence regarding lidocaine infusion and its efficacy in regard to pain control and the reduction of narcotic consumption in laparoscopic abdominal surgeries. Methods: Databases searched included CINAHL, Ebsco, OVID, PubMed, and the Vanderbilt library. Inclusion criteria included publications within the last decade (2007-2017), population aged 18 and greater that received a lidocaine infusion intraoperatively for abdominal surgeries. Results: Results indicated that lidocaine infusion perioperatively could have a place in pain control for surgery in multi-modal approach. The studies varied with many reporting small but significant decreases in post-operative pain, decreases in nausea and vomiting, and decreases in length of stay as well as decreased opioid consumption. These results varied regarding statistical significance.

Benefits and Optimal use of Manometer when using an Laryngeal Mask Airway (P)

Presenter: Christian Lopez

Faculty Advisor: Molly Wright

The aim of this study is to determine the benefits and how to appropriately use a Manometer when assessing intra-cuff pressure in a Laryngeal Mask Airway during general anesthesia. Studies have shown that the intraoperative use of subjective methods for assessing Laryngeal Mask Airway cuff pressure leads to increased risk of pharyngolaryngeal complications. However, anesthesia providers fail to routinely use objective methods, such as a manometer, to assess Laryngeal Mask Airway cuff pressure. The objective is to determine the benefits and how to appropriately use a manometer when assessing cuff pressure in a Laryngeal Mask Airway.

Pre-emptive Gabapentin for Post-operative Pain Control in Orthopedic Procedures (P)

Presenter: Calvin Hocker

Faculty Advisor: Molly Wright

To examine the effectiveness of pre-operative gabapentin on post-operative pain scores and opioid consumption in patients undergoing orthopedic surgeries involving the hips, knees, shoulders and lower extremities. Pain management after orthopedic procedures varies and has been studied extensively in recent years. Gabapentin is an anticonvulsant known to be effective in seizure prevention, as well as diabetic peripheral neuropathy, herpetic neuralgia, and post-amputation phantom limb pain treatment. Recently, it has been used pre-operatively in orthopedic procedures as part of a multi-modal approach as well as being the sole pre-operative analgesic. This systematic review was conducted to examine the most effective dose of pre-operative gabapentin across a range of orthopedic procedures. This systematic review can help determine the efficacy of various gabapentin dose amounts in these orthopedic procedures when used independently as well as serve as a better guide with dosage amounts when used in a multi-modal approach.

Increasing Compliance with the Use of Preoperative Fasting and Pharmacologic Agents to Reduce the Risk of Pulmonary Aspiration (P)

Presenter: Alan Richardson

Faculty Advisor: Brian Foster

Preoperative fasting and the use of pharmacologic agents is beneficial in reducing the risk of pulmonary aspiration throughout the perioperative setting when patients have compromised airway reflexes. This research examined the 2017 updated *Practice Guidelines for Preoperative Fasting and the Use of Pharmacologic Agents to Reduce the Risk of Pulmonary Aspiration: Application to Healthy Patients Undergoing Elective Procedures* by the American Society of Anesthesiologists (ASA). Research articles from the ASA's *Practice Guidelines* were further examined. The ASA's *Practice Guidelines* supports the following fasting

times: 2 hours for clear liquids; 4 hours for breast milk; 6 hours for infant formula, non-human milk, and light meals; 8 hours or more for fried, fatty foods and meat. Shorter fasting periods and the use of preoperative oral carbohydrate solutions have shown to improve patient satisfaction, decrease gastric fluid volumes, increase gastric fluid pH, lessen postoperative insulin resistance and the inflammatory response to surgery while mitigating the risk of aspiration. Understanding the literature used by the ASA which is supported by scientific evidence can possibly increase provider compliance with the fasting recommendations.

A Primary Care Provider Database for Mental Health and Substance Abuse Treatment Centers in West Tennessee (P)

Presenters: Nikole Jackson and Angela Warren

Faculty Advisor: Patsy E. Carihfield

The growing population of individuals with mental and behavioral health disorders in West Tennessee has increased demands on primary care providers (PCP) (AHRQ, 2014). The patient encounters are time consuming and require an appropriate referral. Unfortunately, the lack of mental and behavioral health treatment centers mandates the integration of these services into all areas of healthcare (CDC, 2018). The 21 counties of West Tennessee are mostly rural, and there are fewer treatment centers when compared to urban areas (TN Department of Health, 2018). Appropriate referrals require a knowledgeable and efficient PCP and accessible mental health resources. The purpose of this project is to compile a database of mental health and substance abuse treatment centers in West Tennessee, which may expedite the referral process for rural primary care providers. Such a service will aid in preventing significant treatment delays, which improves clinical outcomes and better serves the mental and behavioral health communities.

Occupation Exposure: Guidelines for the Pregnant Anesthesia Provider (P)

Presenters: Mary Crouse

Faculty Advisor: Melissa Lefave

Many female anesthesia providers become pregnant during the course of their career. These providers continue to work throughout most of their pregnancies. Research has indicated that exposure to anesthetic gases, radiation, or methylmethacrylate have the potential to be harmful to a pregnant woman and her fetus. However, current guidelines for reducing occupational exposures during pregnancy do not exist for anesthesia providers. This project reviews current literature to assess potential occupational pregnancy risks and offers guidelines for reducing hazardous occupational exposure. Specific guidelines for the pregnant anesthesia provider can help reduce occupational exposure and allow safe working conditions throughout pregnancy.

NURSING [GRADUATE]

Practice Guideline Recommendation for the Adult Patient with Bipolar (BP) and Major Depressive Disorders (MDD) (P)

Presenter: Fred Reed, III

Faculty Advisor: Brian Foster

Objective: The purpose of this project is to develop a Practice Guideline Recommendation for the administration of Ketamine into the anesthetic plan of the patient with Bipolar and Major Depressive Disorders. **Background:** Recent study has revealed that Ketamine may reduce depressive symptoms in adult patients with diagnosed Bipolar and Major Depressive Disorders. **Design:** The conceptual model is a Practice Guideline Recommendation. **Methods:** Utilized search databases included ScienceDirect, CINAHL, Ovid MEDLINE, and PubMed. Inclusion criteria were publication within the last twenty years (1997-2017); population included adult patients with Bipolar and Major Depressive Disorders; outcomes following the administration of Ketamine including reduction in depressive symptoms were included in study. **Results:** The results indicate that a single intravenous infusion of Ketamine 0.5 mg/kg for a 40-minute timespan reduces the onset of depressive symptoms as well as the scores of Montgomery-Asberg Depression Rating Scale (MADRS) and Hamilton Depression Rating Scale on patients with documented Bipolar and Major Depressive Disorders. **Conclusions:** Research supports the practice guideline recommendation that Ketamine

0.5 mg/kg intravenously is effective in reducing depressive symptoms in adult patients with Bipolar and Major Depressive Disorder. There is no evidence of the effectiveness of Ketamine as treatment for other types of Depression. **Relevance to clinical practice:** Clinical practice should focus on enhancing patient outcomes, reducing depressive symptoms in the adult patient with Bipolar and Major Depressive Disorders, and rendering the safest, highest quality of care to the patient.

Medical Edutainment: The Effect of Advertising Evidenced Based Practice Concepts in Patient Waiting Areas (O)

Presenter: Lori Taylor

Faculty Advisor: Shari Wherry

Myths and misconceptions surrounding the influenza vaccine have existed since its inception, and they continue to abound. This pilot study examines the effect of a form of patient education that has been previously proven effective in altering the public's perceptions on a wide variety of topics, and has been seen to also affect behavior: advertising. Having shown the uniquely produced, commercial-type entertainment video to the willing patient popular at a local urgent care clinic, data was collected which reflects that this type of educational medium may be a viable medium for influencing patients to choose to be vaccinated.





A Retrospective Chart Review of Pneumonia Diagnosis in Elderly Long-Term Care Residents Using the Society for Healthcare Epidemiology of America Guideline (O)

Presenter: Paula L. Walker
Faculty Advisor: Shari Wherry

Pneumonia is one of the leading causes of mortality in the elderly population residing in long-term care facilities (LTCF). An accurate diagnosis of pneumonia is vital, and utilization of evidence-based guidelines are essential when providers are diagnosing and treating elderly LTCF residents. Using the Society for Healthcare Epidemiology of America (SHEA) guidelines, a retrospective chart review was conducted in a rural LTCF. The purpose was to determine if the providers at the LTCF were applying SHEA guidelines when diagnosing pneumonia in the elderly residents. Participants included individuals who were diagnosed with pneumonia, resided at the facility, and were 65 years or older during the one-year study period. The results of this study found that the SHEA guidelines were not consistently utilized when diagnosing and treating patients with pneumonia in this facility.

An Evaluation of Nurse Practitioners' Perception of Autonomy in Relation to the Clinical Practice Setting (O)

Presenter: Anita K. Langston
Faculty Advisor: Joyce Snyder

The perception of the nurse practitioner's (NP's) level of autonomy is influenced by numerous factors, such as the level of practice authority within the state, the location of the

practice (urban versus rural), and the type of clinical practice setting. The purpose of this study is to measure the perception of autonomy of the NP, using the Dempster Practice Behavior Scale (DPBS) tool, and examine the relationship of autonomy to the clinical practice setting. Survey results indicate NPs in the primary care setting do perceive a higher level autonomy ($M = 137.1$, $SD = 10.7$) based on the DPBS tool as compared to the NPs in the acute care setting ($M = 107.1$, $SD = 18.2$). The overall significance (.082) and the readiness subscale (.072) had borderline significance to the clinical practice setting. The subscales of empowerment (.280), actualization (.187) and valuation (.209) were not significant.

A Toolkit for Anesthesia Providers to Use Patient Surveys for Quality Improvement (QI) Projects (P)

Presenters: Grady Johnston and Joseph Sudderth
Faculty Advisor: Brian Foster

Background: With our current healthcare system placing heavy emphasis on patient satisfaction and outcomes, quality improvement efforts are necessary to meet these demands. However, few resources exist to guide quality improvement efforts for anesthesia providers. Objective: We have developed an evidence-based toolkit utilizing psychometrically valid patient surveys. Conclusion: Implementing quality improvement projects requires time, effort, and leadership. Understanding the patients' perspective of quality is difficult but is necessary to meet expectations and to improve patient outcomes. A piloted implementation of our toolkit revealed its usefulness to improve the ability to carry out quality improvement projects. We believe disseminating this toolkit to all anesthesia providers would improve patient and anesthesia outcomes. ■

PHARMACY

Ascorbic Acid Induced Cell Death in Human Breast Cancer MDA-MB-231 Cell Lines via EGFR, Caspase 3, and MMP (P)

Presenter: Cassie J. Rogers

Faculty Advisor: Lunawati L. Bennett

Breast cancer is the leading cause of cancer related death among women worldwide. Vitamin C, commonly referred to as ascorbic acid (AA) is naturally occurring antioxidant has been used in complementary and alternative medicine exhibiting paradoxical effects on cancer. Under normal cellular environments, antioxidants scavenge and neutralize free radicals, such as reactive oxygen species (ROS), maintaining them within narrow boundaries. The objective of this study was to investigate and understand which cell signaling pathways are affected by AA in breast cancer MDA-MB 231 cell lines. Two strengths of ascorbic acid were used (0.8mM and 1.6mM, which was determined previously via MTT). After 24 hour exposures to the ascorbic acid, cellular protein was collected and a Western Blot was performed to detect genes involved in the cell signaling pathways. The results suggested down regulation of EGFR, MMP2, MDM2, and cyclin D1 with higher concentrations (1.6mM) of AA. Upregulation was noted in ER-alpha and caspase 3 at 1.6mM AA. Further investigation is needed to determine other pathways involved in MDA-MB 231 cell signaling with AA treatment.

The Effect of Vitamin C on Human Colorectal Adenocarcinoma Cells (caco2) is through Up-regulation of APAF-1 and PTEN (P)

Presenter: Sierra Bussey

Faculty Advisor: Lunawati L. Bennett

The incidence of colorectal cancer continues to plague the world as the second leading cause of cancer for both men and women. Current research is involved in prevention and treatment of this cancer. High dose of vitamin C, ascorbic acid, has been shown to have an effect on certain cancers. The intention of the current study is to investigate the apoptotic nature of vitamin C in the colorectal cancer CaCo2 cell line. Using vitamin C at the concentration of 0.4 mM and 0.8 mM (previously determined by MTT method), we determined what genes are being up- or down regulated by Western Blot method. The conclusions of this study showed that vitamin C at 0.8mM caused optimal toxicity in causing cell death in CaCo2 cells via upregulation of APAF-1 (apoptosis initiator) and PTEN (tumor suppressor gene) and down-regulation of Histone.

Vitamin C Induced Apoptosis on Human Mesothelioma (MSTO-211H) Cells via MMP2 and Caspase 3 (P)

Presenter: Ifeoluwa Babatunde

Faculty Advisor: Lunawati L. Bennett

Lung cancer is the leading cause of cancer-related mortality in the United States. Poor survival rates and adverse events from

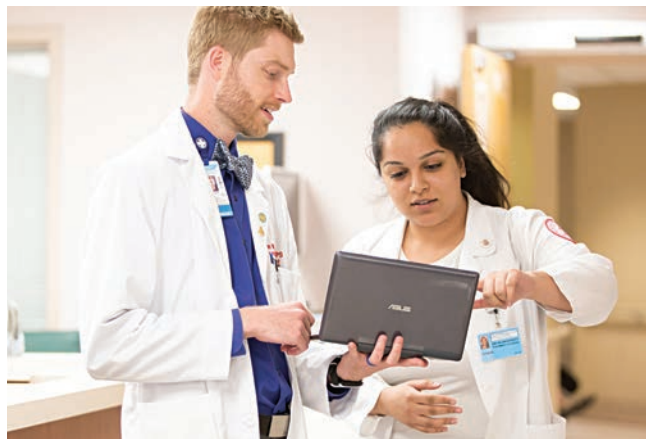
current treatment strategies have indicated a need for a more effective and tolerable chemotherapy agent. High doses of water-soluble vitamin C (ascorbic acid, or AA) has been shown to have effect on certain cancers. The study aims to identify the effect of vitamin C on cell death “apoptosis” signaling pathways in MSTO cell line. Two strengths of ascorbic acid were used (5mM and 15mM, previously determined via MTT). After 24 hours of exposure to AA, cellular protein was collected, and a Western Blot assay was performed to detect protein expression by genes involved in the cell signaling pathways. The results suggested the down regulation of MMP2, MDM2, and MDR/ABC, while the upregulation of cyclin beta, P21 and cleaved caspase 3 was noted in the higher dose (15mM). Further investigation is needed to determine other pathways involved in MSTO-211H cell signaling with ascorbic acid treatment.

Vitamin C Induced Cell Death via EGFR and MMP2 in Human Liver HepG2 Cancer Cells (P)

Presenter: Han N. Nguyen

Faculty Advisor: Lunawati L. Bennett

In the recent years, there are many studies to prove that free radicals in the body can lead to many physiochemical changes and pathological diseases. Free radicals such as reactive oxygen species (ROS) and reactive nitrogen species (RNS) can cause many diseases. Administration of external source antioxidants can help in minimizing this oxidative stress. The role of dietary antioxidants as functional foods in the management of human diseases has been the topic of interest for many researchers. Antioxidants interact and prevent damages cause by the free radicals. High doses of water-soluble vitamin C (ascorbic acid, or ascorbate) have been shown to have effect on certain cancers. In this research, we investigated the antineoplastic effect of vitamin C at 3mM and 6mM (previously determined by MTT assay) to study which protein pathway/genes being expressed or suppressed by Western blot method. EGFR which promotes cell growth and proliferation and MMP2 which cause metastasis were downregulated by 6 mM of vitamin C. Further studies are needed to categorized other genes being up or downregulated by vitamin C. ■



PHYSICS

Exploring Low-Cost Planetarium Construction Techniques (P)

Presenter: Gabrielle LeBeau

Faculty Advisor: Fonsie Guilaran

There are currently more than 20 schools in Jackson, TN catering to grades K-12 with relatively little access to facilities for scientific education within a 60-mile radius. To help instill in kids a love of learning, the goal of this project was to create an engaging, immersive, and interactive educational environment. The chosen solution was to design and build a portable planetarium cheaper than those available on the market today. Over the course of six months, a fully functioning planetarium was constructed for 4.4% the cost of the cheapest one sold online. Although it was not necessarily portable, it was movable. The structure and design will hopefully be a prototype for future projects and attempts to build affordable, portable planetariums which will hopefully be marketed to elementary, junior high, and high schools in the community.

Circuits and Espionage: Can You Outsmart the Motion Sensor? (P)

Presenter: Andrew Edmiston

Faculty Advisors: Fonsie Guilaran and Ethan Wilding

Whether a person has noble goals (such as national security or human flourishing), or nefarious schemes (such as hacking or morally dubious business practices)—the time-honored process of reverse engineering is often an indispensable tool for scientific learning. The goal of this project was to reverse engineer solar-powered, motion-sensitive lights, in order to see (1) What they do, (2) How they do it, and (3) How well they do it. One of the key questions guiding this project was, “What would it take to avoid being detected by this sensor?” In other words, what are the product’s strengths and weaknesses? Experiments included circuitry analysis, voltage and current testing, measuring brightness of the lights, and testing the limits of the motion sensor. Inspiration for this project was based in large part on the work of Ken Shirriff, who used reverse engineering to analyze the design of Apple iPhone chargers. ■



PSYCHOLOGY



Emerging Adults: The Influence of Birth Order, Achievement Motivations, and Sociability (P)

Presenters: Nicholas Best, Karianne Boxell, Abigail

Hamblen, Trenton Holloway, Olivia Schmitke, and Abbie Williams

Faculty Advisor: Jinni Leigh Blalack

In this study, researchers examined the relationship between birth order, academic motivation, and introversion. Birth order was categorized by first born children and those born after are later-borns. Academic motivation was assessed in two areas, performance and mastery goals as well as intrinsic and extrinsic motivation. Data was gathered from 219 undergraduate students enrolled in psychology courses at Union University during Fall Semester 2017. Students varied in academic levels of psychology courses offered at the university. Surveys of participants who were only children, younger than 18 or older than 24 were omitted from the study to control for confounding variables and relevance. Statistical analysis was performed on the data using Independent samples t-tests. Results supported the hypothesis in part, showing significance in the relationship between first-borns and introversion and separately a relationship between introversion to mastery goals through the mediator of intrinsic motivation. ■

SOCIAL WORK [GRADUATE]

International Student Recruitment: Purpose, Strategies, and Ethics (O)

Presenter: Breanne Vailes

Faculty Advisor: Elizabeth Wilson

What benefits do international students bring to a university campus? How does an institution attract them? International students enhance a campus socially and academically, and, with globalization, domestic students' intercultural competence is becoming essential within the workforce. No doubt, a larger international student population would enrich a university that spends the resources to reach them. Based on historical data, Union's international student population has declined in the past 10 years, and many who are enrolled have deep discounts. Moving forward with a strategic recruitment plan would help to broaden the campus culturally as well as bolster it financially. Learning objectives: (1) Demonstrate the benefits of recruiting international students. (2) Describe the global climate for international student recruitment. (3) Understand the current and historical trends in international student enrollment and recruitment. (4) Articulate three strategies for international student recruitment. ■



THEOLOGY AND MISSIONS



Harry Potter and the Power of Words (O)

Presenter: Brandon Harper

Faculty Advisor: Hal Poe

In J. K. Rowling's Harry Potter series, we see a variety of spiritual principles come into play, including the integral power of speech. Through her usage and formation of various etymological methods, Rowling crafts a philosophy of words that speaks to the seemingly limitless potential of our communication. From live-giving incantations to death-bringing curses, we see in Harry Potter (but even moreso in Scripture) that careless words can have drastic consequences, while intentional and loving communication can provide revival.

God, His People, and Mission to the Nations: A Biblical Theological Exploration of the Theme of Mission in the Old and New Testaments (O)

Presenter: Jonathan Edward Pope

Faculty Advisor: Ray Van Neste

Though there is a plethora of biblical theological themes that constitute the complex infrastructure of Scriptures, few are more important and multifaceted than the theme of mission. The theme of mission lies at the heart of God's story, which is why the church has viewed the Bible as the narrative of God's redeeming and shaping a people for his own possession. But understanding this theme in its Old and New Testament

contexts raises certain questions: what is the relationship between the people of God and the nations? Did ethnic Israel have an evangelistic mission to the nations? How does mission shift from the Old to the New Testament? The goal of this project is to examine particularly significant texts concerning the theme of mission in each major epoch of redemptive history in the hope that we might address these questions adequately and acquire a deeper understanding of how God's mission of salvation for the nations fits into the overall story of the Bible.

John Calvin and the Real Presence of Christ in the Lord's Supper (O)

Presenter: Ryan Sinni

Faculty Advisor: Justin Barnard

This paper addresses the question of whether there is room for a view of the Lord's Supper that is both a Calvinistic/Reformed view and a "real presence" view. The paper consist of an exegesis of Calvin's view of the real presence of Christ in the Lord's Supper, an overview of ideas about the real presence throughout church history, and an argument that there is room for a Calvinistic real presence view. The paper contrasts a Calvinistic view of the Lord's Supper with memorialist views on the one hand, and substantialist views on the other. The paper concludes that understanding Calvin's view of the Lord's Supper as a real presence view requires an ontology that prioritizes events over substances. ■

FALL 2017 POSTER SESSION



Analyzing the Physiological Stress Responses of the Blackstripe topminnow (*Fundulus notatus*) to a Startle cue and in the presence of Schreckstoff (P)

Presenter: Jennifer Vo

Faculty Advisor: James Kerfoot

Production of stress hormones, such as cortisol, in vertebrates causes elevated heart rates, increased blood pressure, and elevated glucose levels to prepare the organism for a fight or flight response. For some species of prey fishes, a chemical alarm signal, Schreckstoff, is produced when predators are present, increasing conspecific vigilance. Blackstripe topminnows are known to produce Schreckstoff, however, it is unknown how the presence of this alarm cue affects cortisol levels. The objective of this study was to analyze the physiological stress responses of blackstripe topminnows (*Fundulus notatus*) through the measurement of water-borne cortisol levels and the escape velocity of the minnows in combinations of Schreckstoff and startle cues. Cortisol levels were taken from individual minnows before and after each treatment, and escape velocities of minnows to stimulus recorded. Preliminary data indicate individuals were more active in the presence of Schreckstoff potentially leading to elevated cortisol levels.

The Effects of Inflammation on Deiodinase-2 by the Permanent Stimulation of NF- κ B in Mammalian Cells (P)

Presenter: Jonathan Bowman

Faculty Advisor: William Thierfelder

Converting the thyroid hormone thyroxine (T_4) to the more-active hormone triiodothyronine (T_3) is a key mechanism regulating metabolism. Enzymes, called deiodinases, manage this hormone regulation within cells. Inflammation may influence T_4 to T_3 conversion by affecting type II iodothyronine deiodinase (DIO2) levels or activity. The purpose of this research was to examine inflammation's influence on the relationship between DIO2 and T_4 to T_3 conversion. The procedure included culturing a RAW cell line, and integrating a plasmid that permanently stimulated I κ B α , the inhibitor of the pro-inflammatory transcription factor, NF- κ B. Plasmid transfection of RAW cells was successful. After exposing parental and plasmid-integrated cells to pro-inflammatory lipopolysaccharide (LPS), DIO2 expression was measured on a western blot and analyzed using a chemiluminescent imager, with expectations of increased DIO2 expression in plasmid-integrated cells. RNA will be extracted and examined using reverse transcription quantitative polymerase chain reaction (RT-qPCR), allowing observation of changes in DIO2 RNA levels.

Wetland Mitigation Site (P)

Presenter: Kili Walsh

Faculty Advisor: Andy Madison

Recently, the construction of a roadway in Buena Vista, TN, by the Tennessee Department of Transportation (TDOT) resulted in the destruction of a highly productive wetland ecosystem, leading TDOT to enter an easement with local landowners to replace the lost site through compensatory mitigation. The purpose of this study was to use bird counts to compare avian communities between a bottomland hardwood forest and an adjacent wetland mitigation site prior to restoration. Local breeding bird populations were assessed using point-count surveys at 8 on-site locations within the established mitigation wetland and reference wetland. Surveys were conducted twice weekly in 10-minute intervals between 30 minutes before sunrise and 1000 hours. Results showed that while a greater number of birds were observed in the mitigation sites, the total species diversity was greater within the reference forest; the proportion of specialist species was also greater within the forested sites than in mitigation sites.

Effects of Vehicular Disturbance on Escape Behavior in American Crows, Turkey Vultures, and Black Vultures (P)

Presenter: Chelsey Sauls

Faculty Advisors: James Kerfoot and James Huggins

American crows, turkey vultures, and black vultures are essential stabilizing components of ecosystems as scavengers. Roadkill is an increasingly abundant food source for these species, so they spend significant time and energy foraging on roadsides and interacting with automobiles. It is important to understand their response to vehicles to properly manage anthropogenic effects on the species and their ecosystem. This study examined 4 components of foraging and escape behavior: escape velocity, takeoff angle, distance from road, and flight initiation distance. We hypothesized that higher vehicle speeds would increase these values. Cameras were mounted in 3 vehicles to capture escape responses, and each video was analyzed for the above measurements. A multiple regression analysis showed that speed did not significantly affect escape behaviors for crows or vultures. This reveals that vehicle speed is not the primary factor influencing escape behavior and raises questions about potential extraneous variables and familiarization with vehicles.



FALL 2017 POSTER SESSION



Assessment of Herpetofaunal Biodiversity in a Bottomland Hardwood Forest Mitigation Site (P)

Presenter: Susanna Mann

Faculty Advisor: James Kerfoot

Herpetofauna are an essential part of almost every ecosystem. Reptiles and amphibians serve as vital components of food webs and as biological indicators for ecosystem health. I performed a survey of herpetofauna in the Mebane Wetland Restoration Site (MWRS) in Carroll County near Buena Vista, Tennessee, being monitored by the Union University Biology Department. Both the mitigation site and reference site were sampled for reptiles and amphibians to assess succession from farmland to bottomland hardwood forest habitat. Sampling methods included transects used for visual encounter surveys, funnel traps with drift fences, and coverboards. There were 20 total observations with 9 different species of herpetofauna identified. The Shannon-Wiener index, representing species richness and evenness, was 1.31 for the mitigation site and 1.68 for the reference site. The Jaccard's index showed 11% similarity in the species richness between sites. These results reveal the mitigation site is still succeeding to bottomland hardwood habitat.

Competition Study of *Microstegium* and Grasses Native to West Tennessee (P)

Presenter: Jessica Massey

Faculty Advisor: Michael Schiebout

Microstegium vimineum, an invasive warm season grass native to Asia, was introduced into the U.S. in the 1900s. Since then, *Microstegium* has become established in many eastern states and is spreading, able to quickly overtop and crowd out native plant species. In a greenhouse study, the native grasses *Panicum virgatum* and *Elymus canadensis* were grown with *Microstegium* to determine the effectiveness of these species in direct competition with *Microstegium*. The growth of *Microstegium* showed a significant decrease when grown with *Elymus canadensis* compared to *Panicum virgatum* for both above ground ($P < 0.001$) and below ground biomass ($P = 0.009$) at the end of the growth period. A one growing season field study was also conducted in the Union woods, to determine the competitive effectiveness of these native species on *Microstegium vimineum* stands in a natural setting. None of the native grasses became established in these field plots. ■

RESEARCH GRANT RECIPIENTS

Fall 2017

Undergraduate

James Kerfoot and Kristin Smith
"An Investigation of the Relationships between
Riparian Zone, Land Usage, and Macroinvertebrate
Communities in West Tennessee"

William Thierfelder and Meredith Johnson
"Molecular Pathways Linking Breast Cancer, Obesity,
and Thyroid Hormone Regulation"

Jeremy Blaschke and Torie Benefield
"Discovery and Identification of Parasitoid Wasps
(Rhopalosomatidae) and their Hosts (Gryllidae)
from Cypress Gove Nature Park, TN"

Jimmy Davis and Seth Thibado
"Seeing Inside the Crystal: Determining Whether
Thermogravimetric Analysis (TGA) Data Can
Indicate How Water is Bonded in Seven-
Coordinated Complexes"

Sally Henrie and Alexandra Forderhase
"Development of a Greener Method to Modify
Silica Gel with a Dendritic Precursor for Chiral
Column Chromatography"

Georg Pinggen and Gabriel Garneau
"Fluid Design Optimization using Boltzmann's
Equation and Discontinuous Galerkin Methods"

G. Jan Wilms and Tylman Michael
"Creation a PID Controller that Gives Absolute
Positioning of a Lego Mindstorms Motor and Make
this Function Available as a Block in the LabView
Visual Programming Environment"

Mark Bolyard and Lillie McCampbell
"Modification of Green Fluorescent Protein for
Detection of Thrombin and Factor Xa Inhibitors"

Hannah Henson and Kathryn Kelly
"The Effects of Hyperglycemia on Claudin-5 Expression
in the Developing Plexus"

Graduate

James Huggins and Gaige Vandezande
"Tracking and Categorization of High Valued
Plastinated Biological Specimens Using a Radio
Frequency Identification System"

Mark Bolyard and Catrina White
"Development of a Tool to Identify Novel
Anticoagulants"

Hannah Henson and Juan Rodriguez
"Development of an in vivo Model System
to Analyze Biofilm Formation in
Staphylococcus epidermidis"

James Kerfoot and Crystal Lyles
"The Effect of Thermal Stress on Cortisol Levels and
Respiration Rates in Temperate and Tropical Fishes"

Faith Zamamiri-Davis and Christian Mitchell
"Exploration of Potential Connections between the
Enzymes Involved in Thyroid Hormone and Folate
Metabolism in a Zebrafish Model"

Esther Choi and Alex Garey
"Dual Nature of *Staphylococcus epidermidis*;
Commensal and Infectious Lifestyle of the Bacteria"



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