

PROCEEDINGS

OF THE
EIGHTH ANNUAL UNDERGRADUATE
RESEARCH SYMPOSIUM



THE UNIVERSITY OF
TENNESSEE
KNOXVILLE

PROCEEDINGS

of the

Eighth Annual Undergraduate Research Symposium

April 1st, 2017
The University of Tennessee, Knoxville
Haslam Business Building

The Eighth Annual Undergraduate Research Symposium is organized by the Undergraduate Research Students' Association (URSA), which was founded in 2010 and is dedicated to expanding access to research for undergraduates at the University of Tennessee, Knoxville. The Symposium provides a space for undergraduates in all disciplines to give oral presentations of their work to an audience composed of the general public, their professors, and their peers.

More information about URSA can be found online at www.ursautk.org.

The Eighth Annual Undergraduate Research Symposium is sponsored by the Office of Undergraduate Research. We especially thank the Haslam College of Business and its staff for their gracious accommodations for this year's Symposium.

Schedule of Events

8:30 - 8:55 AM

BREAKFAST AND REGISTRATION

Please join us for coffee and breakfast pastries on the ground floor of the Haslam Business Building.

9:00 - 9:55 AM

SESSION I

10:00 - 10:55 AM

SESSION II

11:00 - 11:55 AM

SESSION III

12:00 - 12:55 PM

LUNCH

Lunch will be served on the ground floor of the Haslam Business Building.

1:00 - 1:55 PM

KEYNOTE SPEAKER

HBB 203

Professor Cary Staples, Professor of Graphic Design, School of Art

2:00 - 2:55 PM

SESSION IV

3:00 - 3:55 PM

SESSION V

4:00 - 4:15 PM

CLOSING REMARKS

HBB 203

ABSTRACTS

Alphabetical by Last Name

Assessing the Impact of Animal-assisted Interventions on Patients in the Clinical Setting

Emeri Allan

Faculty Mentor: Lizanne Elliott

University of Tennessee, Knoxville
Nursing

The human-animal bond is a mutually-beneficial relationship in which humans and certain animals participate. Health, previously regarded as the absence of disease, encompasses every aspect of human life including physical, social, and mental prosperity. To address holistic wellness, it is necessary to investigate the psychosocial effects animals have on people, specifically clinical settings where individuals experience declines in physical health. A systemic review of literature was conducted by keyword searching Pubmed and CINAHL Complete databases; fifteen references were retrieved and synthesized concerning animal-assisted interventions in clinical settings. Researchers have demonstrated that a beneficial relationship exists between animal-assisted interventions and biopsiologic outcome measures among patients of various ages with a wide range of illnesses. Several scientific gaps in the science exist; one such gap pertains to the lack of data on canine-assisted activity in the trauma setting. The purpose of this presentation will be to articulate the state of the science on animal-assisted interventions in the clinical setting as the foundation for a pilot project using a randomized control trial of a canine intervention in the inpatient trauma clinical setting. Data gained from this study may help improve psychosocial and physical outcomes among trauma victims.

Distress of Parents of NICU Graduates

Megan K. Borgmier

Faculty Mentors: Dr. Tami Bland and Dr. Sadie Hutson

University of Tennessee, Knoxville
Nursing

A neonatal intensive care unit (NICU) specializes in the care of premature or ill newborn infants. Within the NICU environment there are a variety of technological devices that are crucial to improving the health and survival rate of these infants; in the last fifty years this technology has become more advanced. Parents of infants admitted to the NICU can often find themselves in a state of distress that begins at the time of hospitalization, but can continue during the discharge process and beyond. The author conducted a literature review to elucidate the state-of-the-science regarding the needs of parents of NICU graduates post-discharge and effective strategies to reduce distress for parents. While there are a variety of support systems available for parents during the infant's NICU stay, a gap exists regarding support for parents post-NICU discharge. Specifically, the first month post-discharge. The findings from this literature review set the stage for future research in developing a technology-based support system intervention to meet parental needs of NICU graduates in the month following hospital discharge.

Effects of Language Immersion vs. Classroom Exposure on Advanced French Learners: An ERP Study

Alexandra Brito

Faculty Mentor: Dr. Harriet Bowden

University of Tennessee, Knoxville

College Scholars: Neuroscience, Neurolinguistics, and French

University students often report making significant gains in their second language (L2) ability after spending time abroad, immersed in a particular language. However, evidence for the role of language immersion in achieving advanced proficiency remains largely anecdotal, especially for language processing and neurocognition. By using empirical neurolinguistic techniques, we quantify the degree to which language immersion influences native-like processing of L2. In this study, participants (right-handed, age 18-35) are advanced French learners. Participants first self-evaluate their language proficiency, and then undergo two language evaluations to assess their French proficiency. Participants are separated into groups based on their degree of immersion, ranging from highly immersive learning experience to primarily classroom instruction. In the second part of the study, participants are asked to read French sentences, presented one word at a time, that are either correct or contain a subject-verb agreement error. In French, the error can be either silent (differ in spelling but not pronunciation) or phonologically realized (differ in spelling and pronunciation). Using electroencephalography (EEG), we monitor the brain's electrical activity during the sentence-reading task. The subsequent event-related potentials (ERPs) provide insight into how French syntax is being processed in the brain. By comparing these ERP signatures between the groups and to those of native speakers (as characterized in Carrasco-Ortiz and Frenck-Mestre 2014), we examine any differences in L2 processing. We predict that phonologically realized errors will elicit more robust ERP signatures as compared to silent errors. Secondly, we anticipate a difference in the processing of L2, with immersion participants showing more native-like ERP signatures as compared to equally advanced participants without such experience.

Production and Analysis of SNM Metal Alloy Surrogates

Duncan Brocklehurst

Faculty Mentors: Dr. Howard Hall and Dr. John D. Auxier

University of Tennessee, Knoxville
Nuclear Engineering

Analysis of interdicted special nuclear material is an ongoing effort that is of importance to a number of government agencies including the U.S. Department of Homeland Security. Special nuclear material is unique in that it is often alloyed with a variety of metals (e.g. Ga, etc) to provide the desired crystalline structure and resistance to forming unwanted oxidation. As an academic institution, working with SNM is difficult due to the safety and security concerns related to the material itself. This project seeks to highlight the initial development of surrogate SNM in an effort to develop a new set of forensic signatures that would be relevant to the nuclear forensics and nuclear safeguards community. The materials that have been analyzed are cerium-gallium (Ce-Ga) and cerium-lanthanum (Ce-La) alloys, which have been demonstrated or theorized to have similar metallurgical properties to that of Pu-Ga alloys. Two methods are being pursued to investigate the characteristics of these surrogate alloys, at varying atomic weight percent (0.5-10%); scanning electron microscopy and X-ray diffraction. X-ray diffraction techniques have confirmed the appropriate crystalline structure (fcc) of alloys produced and scanning electron microscopy has confirmed the homogeneity of freshly cast samples.

Collapse of The Colossus: America's Lost Promise to Refugees

Joshua Brown

Faculty Mentors: Dr. Tricia Hepner and Karla McKanders

University of Tennessee, Knoxville

Socio-Cultural Anthropology and Migration Studies

In 1883, Emma Lazarus—with the aim of raising funds for the creation of the newly gifted Statue of Liberty's pedestal—penned *The New Colossus*. This sonnet, later engraved at the foot of this "Mother of Exiles," aided in the transformation of the statue from a symbol of national pride to one of intense imagery for immigrants to the United States. Indeed, John T. Cunningham noted that, "The Statue of Liberty was not conceived and sculpted as a symbol of immigration, but it quickly became so as immigrant ships passed under the torch and the shining face, heading toward Ellis Island. However, it was [Lazarus's poem] that permanently stamped on Miss Liberty the role of unofficial greeter of incoming immigrants." Despite contentious points within American history directly contradicting this pervasive image—from the Chinese Exclusion Act of 1882 to Roosevelt's banning of Jewish refugees during WWII—the United States' record of supporting migrants has not always been exclusionary. Indeed, some 3 million refugees—many sharing similar racial, socio-political, religious, or political affiliations with the domestic US—have contributed to thriving diversity, economic development, and support within American communities. However, recent US policies relating to refugees and US immigration have sounded alarms for many that fear a repeat of history in the exclusion of refugees. Tropes that continue to portray refugees as economic burdens and job stealers have only complicated the lives of those fleeing disaster and violence abroad. These issues are systemic to a domestic refugee system that, as of late, has best performed as a seemingly random flinging of refugees across our nation, with the social networks of nine, mostly religious volunteer agencies (Volags) serving as the only roadmap for resettlement. The transfer of responsibility from the US government to grant-sponsored, non-state actors (Volags) represents a government/private partnership that is ripe for reform. Where Oxford scholars Dr. Will Jones and Alex Teytelboym proposed the use of 2012 Nobel Laureate Al Roth's "matching markets" theory to refugee admission and redistribution to address Europe's "refugee crisis," this presentation will analyze the methods by which a similar policy could be implemented domestically, given the unique structure of the US Refugee Admission Program (USRAP). Unless drastic reform is made, the current liminal pause may serve as the catalyst for the symbolic collapse of this new Colossus and the forgotten promise lain at its feet.

Using Discontinuous Galerkin Methods to Solve the Euler Equations in Curvilinear Coordinates

Jesse Buffaloe

Faculty Mentors: Dr. Eirik Endeve and Dr. Anthony Mezzacappa

University of Tennessee, Knoxville

Physics

The simulation of the core collapse supernova (CCSN) problem requires a hydrodynamics solver that can adequately handle both shocks and smooth flows. Discontinuous Galerkin (DG) methods construct solutions that are linear combinations of basis functions (e.g. polynomials) on intervals of the computational domain and are well-suited to handle problems with both shocks and smooth flows. Thus, a DG hydrodynamics solver may provide an improvement over current hydrodynamics solvers used within CCSN simulations. Our work extends the work of Zhang and Shu (2011; JCP, 230, 1238-1248) and consists of the development of a high-order DG solver for the Euler equations in generalized curvilinear coordinates. We provide a brief introduction to the CCSN problem, followed by an overview of DG methods and our use of them in solving the Euler equations in curvilinear coordinates. We also discuss the problem of ensuring positivity for non-negative physical quantities. Results from a suite of 1D test problems are presented, along with a consideration of the suitability of DG methods for these problems.

Brandon Barker is a student co-author of this research.

Effects of Grain Size on the Irradiation Response of Actinide Oxides

Will Cureton

Faculty Mentor: Dr. Maik Lang

University of Tennessee, Knoxville

Nuclear Engineering

Nuclear fuel materials, such as UO_2 , are routinely subjected to extreme conditions, such as high temperature and radiation, in a reactor during operation. These conditions can lead to physical and chemical changes in the materials, for which the underlying mechanisms are not fully understood. This study investigates the effects of grain size on the fission-fragment damage accumulation in fuel materials (UO_2 and ThO_2) and isostructural CeO_2 . Microcrystalline and nanocrystalline samples of UO_2 , ThO_2 , and CeO_2 were irradiated with 950 MeV Au ions and subsequently characterized using synchrotron X-ray diffraction and transmission electron microscopy. All materials retain the fluorite-structure after irradiation and exhibit an increase in unit cell parameter as a function of increasing ion fluence (except microcrystalline UO_2). The relative magnitude of volumetric swelling was in each case larger for the nanocrystalline samples as compared to the microcrystalline counterparts. The relative difference in radiation response between microcrystalline and nanocrystalline samples was smallest for ThO_2 . Larger differences were observed for CeO_2 and UO_2 . The grain size of nanocrystalline UO_2 and ThO_2 increased as a function of increasing ion fluence (grain coarsening), while CeO_2 showed a grain-size reduction with increasing radiation (grain fragmentation).

Raul I. Palomares, Jeffrey Walters, Cameron L. Tracy, Curtis Chen, Rodney C. Ewing, and Jie Lian are co-authors of this research.

The Voices of Photos: Transition to adulthood in lower income emerging adults with Type I Diabetes Mellitus

Michael Curtis, Jr.
Faculty Mentor: Dr. Samereh Abdoli

University of Tennessee, Knoxville
College Scholars

Emerging adulthood (18-30 years old) is a vital, constructive period presented by exploration, experimentation, and risk-taking. Emerging adults with Type 1 Diabetes Mellitus (T1DM) face unique challenges managing their illness due to the additional daily demands of diabetes care and navigating the life transitions of adulthood. Diabetes management can be more challenging for low-income emerging adults with T1DM living in Appalachia, an underserved area. This can place them at an increased risk for poor glycemic control, emergence of chronic diabetes complications, and premature mortality. However, there is a lack of science particularly about the experience of low-income emerging Appalachian adults with T1DM during transition to adulthood. Understanding the experience of this marginalized population will inform future empowerment interventions. This study will use photovoice, an innovative qualitative and participatory research to explore the challenges of lower income emerging adults with T1DM during transition to adulthood. Photovoice this study will entail putting camera in the hands of low-income emerging adults with T1DM in Appalachian Tennessee, and asking them to visually present their challenges in diabetes management during transition to adulthood. It may help health care providers appreciate an emerging adult's personal experience about their transition to adulthood.

Trust levels of physicians among rural Kenyans and factors influencing interest in healthcare

Charles Earles

Faculty Mentor: Dr. Debora R. Baldwin

University of Tennessee, Knoxville

College Scholars

While extensive research has been done on the role of trust in western medicine, its role is largely unknown in rural areas of sub-Saharan Africa. This study examined the construct of trust in regard to medical providers and factors influencing this trust among rural Kenyans. Participants were 139 adults (53 % females and 47 % males) who resided in the village of Tawa. They were asked to complete a 23-item survey. The survey measured levels of trust in medical providers as a function of age, gender, education, and nationality. It also measured nutritional beliefs and interest in receiving care. Mean overall trust was 4.53 on a 5-point scale. Younger adults (18-35) and less educated individuals (having completed 11th grade or less) were less trusting ($p < .05$) of medical providers compared to their counterparts. Respondents were more likely to trust medical providers who spoke their language ($p < .001$). On the contrary, neither gender ($p = .39$) nor nationality ($p = .80$) of the medical provider were significant factors. Moreover, there were no group differences in regard to the importance of receiving healthcare. Collectively, the results suggest that while trust may vary, Kenyans are very interested in receiving healthcare regardless of their age, gender, or education. These findings will provide additional information for healthcare providers serving in sub-Saharan Africa.

Turning the Tide: The Impact of the *USS Nautilus* and Operation Sunshine on American Popular Culture

Emma Evans

Faculty Mentor: Dr. Vejas Liulevicius

University of Tennessee, Knoxville

History, English

This thesis examines the ways in which the success of the Cold War American military mission Operation Sunshine was reflected in American popular culture, and how this reflection assuaged the American public's reservations towards nuclear energy. On August 3, 1958, the *USS Nautilus* (SSN 571) became the first nuclear-powered submarine to journey to the North Pole without surfacing from the sea. Accomplished under the leadership of Tennessee native William Robert Anderson, the success of this voyage—deemed Operation Sunshine by the US government—made international headlines and gave the United States a victory in the nuclear arms race against the Soviet Union. Upon its completion, this extraordinary feat not only confirmed the United States as a threat to the Soviets, but it also demonstrated the positive qualities of nuclear energy to the American public. In a post-war era marred by memories of recent atomic destruction, U.S. citizens were understandably wary of nuclear power. Despite these reservations, however, Americans embraced the success of the Operation Sunshine when portrayed in popular culture. As a result, many media companies and popular figures capitalized on the subject, creating media content specifically about the event. The Walt Disney Company created an informational cartoon about nuclear energy, applauding Operation Sunshine for its efforts to use nuclear power for good. Newsreels and radio shows covering the journey were broadcast across the country, reinforcing the importance of atomic energy for the advancement of nationalist ideals. Even Anderson wrote multiple books documenting Operation Sunshine and its unique and positive use of the atom. Overall, the success of Operation Sunshine contributed to Americans' acceptance of atomic energy due to its widespread coverage in American popular culture.

The Impact of Bread Production on Women's Roles in the Book of Leviticus

Alessandra Ferrero
Faculty Mentor: Dr. Erin Darby

University of Tennessee, Knoxville
Political Science, Philosophy, and Religious Studies

The book of Leviticus is rich in its ritual, legal, and moral instructions. Traditionally, Leviticus is said to have been written by Moses, which would date the text to the Middle Bronze Age. The text is supposed to consist of God's speeches to Moses that he was instructed to give the Israelites. However, most scholars believe that Leviticus was not completed until after the Jews returned to Jerusalem from exile, dating it to the Persian period. If this is the case, then the instructions would reflect the practices of that time. Among the topics of importance, one finds instruction and emphasis regarding bread and the transformation of grain to bread. Not only does it serve a ritual function, but it appears to be one of the primary sources of nutrition for the ancient Israelites. Other biblical passages and ethnographic studies imply that bread production primarily a woman's role. This presentation will explore the potential importance and impact bread production had on women's roles in Israelite public ritual through the analysis of the book of Leviticus and the language used within it. Beyond literary description and analysis, this presentation will focus on material culture remains to describe the actual presence of bread and grain in ancient Israelite cultural practice, drawing on data gathered from excavations of Jerusalem.

Epoxy Nanocomposites with Reduced Flammability Derived From Magnesium Hydroxide-Melamine Polyphosphate Hybrids

Alexandra Galaska

Faculty Mentor: Dr. John Zhanhu Guo

University of Tennessee, Knoxville

Chemical Engineering

Epoxy resin is one of the most important and applicable thermosetting resins that is lightweight and used in a wide range of applications with high mechanical properties, and chemical resistance. However, pure epoxy has high flammability, which is one of the major concerns challenging the real life application. Flame retardants can decrease the fire hazard and make epoxy more suitable for the desired products. In this research, two flame retardants are used to reduce the flammability of epoxy. Magnesium hydroxide as an inorganic flame retardant has been used in epoxy matrix rarely, while melamine polyphosphate is an effective phosphorus-based flame retardant commonly used in the industry, including in epoxy, and other resins. This study investigates the effects of flame retardant on polymer nanocomposites and comparison of pure epoxy and its nanocomposites through micro-combustion calorimetry (MCC), tensile test, differential scanning calorimetry, x-ray diffraction, and scanning electron microscopy (SEM) studies. In this paper, the test results show that the nanofillers are dispersed very well in epoxy resin and the thermal stability and flame retardant properties of polymer nanocomposites with different loadings of nanofillers are enhanced compared with pure epoxy.

Neutron total scattering analysis of temperature effect on cation inversion in MgAl_2O_4 and NiAl_2O_4 spinel

Igor Gussev

Faculty Mentor: Dr. Maik Lang

University of Tennessee, Knoxville
Nuclear Engineering

Spinel compounds (general formula $\text{A}^{2+}\text{B}_2^{3+}\text{O}_4^{2-}$) are complex oxide minerals forming in Earth's mantle under high temperatures and pressures. The spinel structure is rather complex, being cubic close packed with multiple cation sites. In the ordered ("normal") spinel, cations with higher valence, such as Al^{3+} , typically occupy octahedral sites, whereas lower valence cations, such as Mg^{2+} , ions occupy tetrahedral sites. In the disordered ("inverse") spinel, tetrahedral sites are instead occupied by higher valence B^{3+} cations and octahedral sites have shared occupancy between A^{2+} and B^{3+} cations.

This work presents neutron total scattering results on the temperature-induced order-disorder transformation of magnesium and nickel spinel analyzed by means of "small-box" modelling of pair-distribution functions. The originally ordered magnesium spinel undergoes significant changes in the degree of inversion above a threshold temperature, while nearly fully inverse nickel spinel maintains its level of inversion even at temperatures close to 1000°C .

The data demonstrates that the traditional approach of modelling disordered spinel as cubic close packed structure is insufficient at the very local range (1.5 to 10 \AA); instead a new tetragonal structural model is proposed to model inverse spinel more accurately.

Jacob Shamblin and Eric O'Quinn are co-authors of this research.

The Psychosocial Responses to and Decision Making Strategies of Hereditary Cancer Genetic Panel Testing

Gillian Harris
Faculty Mentor: Dr. Sadie Hutson

University of Tennessee, Knoxville
Nursing

Cancer genetic testing (CGT) is a powerful diagnostic test that improves prevention and early detection of individuals at high genetic risk of cancer. Since the completion of the mapping of the Human Genome Project, CGT has become increasingly accessible in the clinical setting. However, as gene discovery and sequencing technology improves, the impact of these advancements on patients is less understood. The use of multi-gene cancer gene panel tests has become increasingly more prevalent; as such, the likelihood of incidental or inconclusive findings has increased. This can cause confusion among patients. The author conducted a literature review to outline the science on cancer genetic testing methods, the psychosocial responses to testing among patients, and the unique role of nurses in this process. Forty-six references were identified via PubMed and CINAHL databases using the keywords "genetic testing," "panel testing," "genetic counseling," "psychosocial oncology," and "women." A significant gap in the literature exists regarding multi-gene cancer genetic panel tests and the associated experiences and decision-making processes among individuals who have had testing. Future research will specifically explore the experiences of young women with breast cancer who have undergone hereditary cancer risk assessment genetic panel testing that reveals incidental or inconclusive findings.

Dead or alive: How mycorrhizae influence survivorship of plants with neighbors

Helen Law

Faculty Mentor: Dr. Jeremiah Henning

University of Tennessee, Knoxville

Evolutionary Biology and Ecology

Helianthella quinquenervis is a sunflower that dominates the montane meadows of the Western Rocky Mountains along with bunchgrass, *Festuca thurberi*. Previous research has suggested that *Festuca* significantly affects the fungal communities that are associated with *Helianthella*, however, this effect is contingent on distance. Root associated fungi, like arbuscular mycorrhizal fungi or dark septate endophytes, are plant mutualists that regulate plant productivity and survivorship by exchanging nutrients for carbon. However, it is unknown whether *Helianthella* associated with *Festuca*'s fungal community comes with any tradeoffs in plant survival or productivity. To fill this knowledge gap, we constructed four different soil treatments which manipulated the activity of the fungal communities and legacy effects in soils that originated from different distances to *Festuca* in the field. This allowed us to test for possible mechanisms in how *Festuca* affects the soil communities of *Helianthella*. We hypothesized that *Helianthella* would have reduced biomass in soils that were pre-treated with *Festuca* because *Festuca* would create a fungal community that was less beneficial to *Helianthella* growth and survival. We found that *Helianthella* survivorship increased with original inoculum distance to *Festuca*. Surprisingly, *Festuca* had a stabilizing effect on *Helianthella* survival, holding it consistently at about 75%. We also found that the treatment with no *Festuca* and sterilized dirt tended to grow taller than other treatments, in spite of lower survivorship. Overall, our study suggests that contemporary and past neighbors can shape fungal communities within a focal plant species and these shifts in fungal communities can feedback to influence plant survival. Long-term monitoring is necessary to understand how plant-plant-mycorrhizal interactions will shape long-term plant community composition and ecosystem function.

The Experience of Access to Care Among Persons with a Low Family Income

Malerie Lazar

Faculty Mentor: Dr. Lisa Davenport

University of Tennessee, Knoxville
Nursing

Low family income presents a wide variety of problems for men and women seeking access to health care. Health care disparities among persons with a low family income (PLFI) continues to be one of the most complex and prevalent problems, particularly for rural America. Many barriers exist for PLFI who seek access to adequate health care in the United States (U.S.). A review of literature revealed common barriers to primary care to be a lack of education, complications with health insurance, and personal distrust of health care providers. Acknowledging the substantial barriers that prevent access to routine health care for PLFI is the first step towards determining future sustainable solutions. A gap in the literature indicates the voice of low-income persons and the meaning of access to care for them is unheard. Future research will examine the meaning of access to care to PLFI in order to provide insight to how healthcare providers can effectively assist those who are in need. A phenomenological approach will be used to explore the essence of the experience and meaning of access to care for those who receive services of non-profit medical organization clinics (such as Remote Area Medical Clinic), which becomes a typical source of care for low-income persons.

An empirical review of behavior interventions for children's behavior problems from 1997 to 2015: Baseline stability

Angel Lunceford and Alicia Blasini
Faculty Mentor: Dr. James Fox

Eastern Tennessee State University
Education

We are conducting an empirical review of applied research on students' behavior problems. When experimentally evaluating behavior interventions, researchers should establish stable baseline behaviors before intervening. We are analyzing 132 published studies from 1997 to 2015, evaluating whether researchers demonstrated stable baseline behaviors before intervening. We are conducting inter-rater agreement checks on these analyses and will evaluate the number, ages/grades, and disability of subjects; behavior problems, and observation procedures used; and, the number of baseline observations and stability of baselines.

***Histomonas* ELISA**

Jessica Martinez
Faculty Mentor: Dr. Richard Gerhold

University of Tennessee, Knoxville
Wildlife Health Management

Histomonas meleagridis is a protozoan parasite of avians and is the causative agent in Histomoniasis, commonly known as Blackhead Disease, in gallinaceous birds. Current methods for diagnosing the presence of *H. meleagridis* are limited to parasite culture or Polymerase Chain Reaction (PCR) to amplify target DNA. This project aims to develop an enzyme-linked immunosorbent assay (ELISA) for faster and more sensitive diagnosis of *Histomonas* infections. Cultures of *H. meleagridis* parasites were purified, and surface antigens were extracted using a spectrum of chemical solutions. The various antigen solutions were subjected to an ELISA, with serum from birds immunized for *H. meleagridis* as positive controls. The ELISA was measured for absorbency differences between positive and negative control serum samples. Preliminary results indicate Propanol as a promising treatment; however conclusive data necessitates additional ELISA analysis. Histomoniasis threatens the health of both wild and domestic bird populations. Control of this disease relies on quality management and diagnostic techniques. This ELISA will aid scientist, managers, and veterinarians in the study and eventual control of this disease, and also allow researchers the opportunity to understand the impact of *Histomonas* outbreaks and elucidate the attack rate of the parasite.

The Interaction between Ethanol Consumption and Stress and their Effect on Brain Derived Neurotrophic Factor and Tropomyosin Receptor Kinase B Expression

Katie Masters

Faculty Mentor: Dr. Rebecca Prosser

University of Tennessee, Knoxville

Biochemistry, Cellular, and Molecular Biology

According to the National Center for PTSD (<http://www.ptsd.va.gov/>), 7-8 out of every 100 people will experience post-traumatic stress disorder (PTSD) at some point in their lives. Many individuals with PTSD self-medicate with alcohol. Our experiments have found that ethanol consumption for 1 week prior to an acute social defeat (an animal model for PTSD) significantly increases stress susceptibility in mice compared to mice not consuming ethanol. In this study, we investigated the combined effects of stress and ethanol on the expression of brain derived neurotrophic factor (BDNF) and its receptor, tropomyosin receptor kinase B (Trk B). BDNF and Trk B are components of the signaling pathway that mediates stress- and alcohol-induced changes in the nucleus accumbens (NAc), ventral tegmental Area (VTA) and amygdala. We hypothesized that stress + ethanol increases BDNF and Trk B expression in these brain regions above levels in control mice and mice exposed to only stress or ethanol. We collected brain tissue from the NAc, VTA, and amygdala from mice treated as above to determine BDNF and TrkB protein expression levels using Western blots. Preliminary results revealed mature BDNF and full Trk B expression was significantly increased in tissue from mice exposed to stress + ethanol.

Then and Now: Long Term Land-Use Changes Impact Bobwhites

David Moore and Clint Shannon

Faculty Mentors: Dr. Robert Washington-Allen and Dr. Donald F. McKenzie

University of Tennessee, Knoxville
Geography

Northern Bobwhite Quail (NBQ) populations are declining in their 25 state range. This may be due to long-term changes in land-use/land cover (LULC) that degrades bobwhite habitat. However, stakeholders have the perception that LULC has not changed and this has impeded range-wide restoration of bobwhite habitats. Consequently, the purpose of this research was to test this hypothesis of LULC change within 13 of the 25 states where land managers have provided known sites of NBQ decline. The objectives of this study were to 1) classify historical aerial photos to determine the LULC within known areas of NBQ decline, 2) extract the LULC trajectories for these areas from the National Land Cover Database change maps from 1992 – 2011, and 3) determine if there is a common LULC trajectory across the 13 states over the last 50-75 years. We used image segmentation techniques including image filters with a maximum-likelihood cluster analysis of the historical photos to produce a LULC time series for the decline in abundance sites. We consolidated the LULC time series with the NLCD and aerial photos and used cluster analysis to identify common trajectories across the 13 states. We also related the LULC trajectories to NBQ population studies.

Preliminary Design for an Isothermal Gas Chromatography Apparatus for Inorganic Chlorides

Austin Mullen

Faculty Mentor: Dr. Howard Hall

University of Tennessee, Knoxville

Nuclear Engineering

The separation of Uranium fission products in a post-detonation scenario is instrumental in tracking the weapon to its place of origin, and thus is of great interest in the field of nuclear forensics and security. Current methods for separating the elemental constituents inside the detonation residue are slow, and increasing the speed of this process is instrumental. The gas-phase separation of these fission products is much faster than traditional methods, but previous procedures under study required attaching the elements in question to heavy organic ligands, which limited their accuracy and led to difficulties in their separation. The purpose of this current research is to develop the instrumentation and separation methodology for much lighter chloride compounds, which would greatly reduce the chemical processing time required to characterize the residue. No instrument designed with this purpose has yet been created, so the development of the apparatus is a non-trivial task. This presentation focuses on the preliminary design of this chloride apparatus. The main challenges presented by this new separation methodology are addressed with plans on how the new instrument can overcome them. Additionally, lessons learned from the previous gas phase separations design that will be incorporated into the new instrument are mentioned. Finally, the future implementation of the design and its methodology is presented.

Power Lines: The Digital Divide in East Tennessee

Caitlin Myers
Faculty Mentor: Dr. Paul Gellert

University of Tennessee, Knoxville
College Scholars

This study asks who is in favor of expanding internet access to rural and often poor Tennessee. There is a significant “digital divide” in rural Tennessee, with a recent study reporting that 34 percent of the rural population not having internet in their homes. A number of organizations concerned with rural development in Tennessee have made internet access their primary issue. Furthermore, in 2015, the FCC ruled in favor of “net neutrality” and declared broadband internet service to be a public utility. In order to understand local perspectives, this study investigates the range of opinions on broadband internet access in rural Tennessee. Based on 26 semi-structured interviews with community organizations in favor of public broadband, utility board staff, and a range of community members in Cooke and Carter Counties, I find that there is surprising commonality of perspective in favor of internet access as a necessity of 21st century life. However, there are also many who express worries about the negative effects of the spread of internet, and sometimes this stand is taken by the very same respondents. In addition, there remain grave doubts about whether internet will be managed as a public, private or partnership utility and what the cost to consumers will be. These uncertainties about price lead to doubt about whether the digital divide will be breached in the near future.

A Literature Review of Substance Abuse Among Anesthesia Providers

Stephanie Nabors

Faculty Mentors: Dr. Julie Bonom and Dr. Terri Durbin

University of Tennessee, Knoxville
Nursing

Research shows that anesthesia providers are more susceptible to substance abuse than other healthcare providers. Several preventative measures are being implemented in Certified Registered Nurse Anesthetist (CRNA) schools to educate these anesthesia providers about the risk factors and outcomes associated with substance abuse. Because the rate of substance abuse continues to pose a threat to CRNAs and anesthesiologists, more research is needed that is aimed at preventative strategies in the educational setting.

The purpose of this literature review was to examine the science related to pre-disposing risk factors, prevalence of substance abuse, and the preventative measures regarding substance abuse among anesthesia providers. References were identified using PubMed and CINAHL using the following search terms: "anesthesia," "student," "wellness," "stress," "substance abuse," "personality," and "nurse."

The existing science underscored that stress, career satisfaction, personality, genetics, and fatigue are the major risk factors for substance abuse among anesthesia providers. Both students and board-certified healthcare providers fall prey to substance abuse due to ease of access, high job-related stress, and the propensity to become addicted to opioids and other anesthetics. Finally, preventative measures currently include educational videos, peer support groups, wellness programs, and computerized documentation and accountability. A gap in the science exists about how effective these measures are. Future research should emphasize the integration of preventative strategies in the educational setting in order to create a safer environment for anesthesia providers and patients.

Perovskite Compound Synthesis via Solid State Reaction

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Physics

Pulsed layer deposition (PLD) is a technique used to grow thin films and orderly atomic layers upon a substrate via laser induced ejection of vaporized high phase purity precursor material. This research was conducted to find the optimal process to synthesize and condense pure phase Perovskite compounds to be used as precursor targets in later PLD experiments. We aimed to determine the optimal process to create CaZrO_3 , BaZrO_3 , CaTiO_3 , and BaTiO_3 precursor targets. Solid state reactions were used and involve the mixing and heating of stoichiometric amounts of initial powder material to create the desired compound. Different powder precursors, grinding intensities and heat cycles were experimented with to determine the best process for material synthesis. X-ray diffraction and X-ray spectroscopy were then used to determine the purity and composition of synthesized materials. Once a material of desired purity has been created, it was then pressed and sintered to form very dense pellets. The effectiveness of the use of a binding agent in the pressing of the pellets was explored as well as varying sintering temperature. A successful process for synthesis of very dense and pure CaZrO_3 and BaZrO_3 targets from precursors was found. A process for synthesizing CaTiO_3 and BaTiO_3 was also determined. It was observed that the use of a binding agent does result in denser pellets for sintering temperatures below 1500°C . This work provides the base material for future experiments to determine physical properties of materials.

Analyzing Binding Affinity of *Thermosynechococcus elongatus* BP-1 Ferredoxin mutants with Photosystem I by chemical crosslinking

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Biochemistry, Cellular, and Molecular Biology

In photosynthesis, the process of electron transfer from Photosystem I (PSI) to ferredoxin-NADPH reductase (FNR) is mediated by a small mobile carrier protein- ferredoxin (Fd). The binding affinity of Fd to PSI is weak in *in vivo* condition and in order to apply the PSI-Fd complex in the model dye-sensitized TiO₂ based solar cells, there is a requirement of an enhanced affinity between the PSI-Fd interface. This will enhance affinity and lead to a continuous electron transfer from the stromal subunits of PSI (PsaC/D/E) to Fd. We have previously engineered the WT- Fd from the thermophilic cyanobacteria- *Thermosynechococcus elongatus* BP-1 with a TiO₂ binding peptide, LSTB1. In order to enhance the binding affinity, we have computationally determined potential mutants viz. S63D/E/W and F38A/W for LSTB1-Fd. To test the affinity of WT-Fd, LSTB1-Fd and the respective mutants with PSI stromal subunits, we have performed chemical cross linking assay using a cross-linking agent, 1-Ethyl-3-(3-dimethylaminopropyl) carbodiimide (EDC). We have optimized the right conditions to run these cross-linked products in an SDS-PAGE in terms of time and temperature. Also, the purified Fd self-dimerizes which can be eliminated by using reducing agents such as *tris*(2- carboxyethyl)phosphine (TCEP), -mercaptoethanol (BME), dithiothreitol (DTT) and urea.

Analysis of Synthetic Urban Nuclear Melt Glass

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Nuclear Engineering

Post-detonation nuclear debris is formed as material surrounding the blast is fused in the heat of the fireball of an atomic blast. Due to limited quantities of declassified post-detonation debris available to the nuclear forensics community, a realistic surrogate debris is needed to develop better analysis techniques. Synthetic melt glass of urban environments is modeled and the elemental ratios are calculated from soil compositions, land use data, and vehicle contributions. The formula can be adapted to accurately replicate a variety of locations and scenarios. Melt glass produced in the laboratory is characterized by x-ray diffractometry and scanning electron microscopy. The surrogate debris is found to be similar to debris formed during the Trinity test and representative of the input matrix.

Advanced Gas-Phase Separations of Organometallic Fission Products

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Nuclear Engineering

The field of post-detonation nuclear forensics aims to characterize the design of a nuclear weapon after it detonates. The matrices of the debris contain signature traces that function as a fingerprint to the weapon itself. To successfully improve state-of-the-art analytical practices in post-detonation nuclear forensics, a new approach must demonstrate both improved accuracy and more timely results to be considered for implementation over current analytical methods. One of the most time-consuming aspects of technical nuclear forensic analysis is the chemical separation process. Therefore, it was deemed prudent to develop a more rapid approach to fission product separations of post-detonation debris samples. A gas chromatograph connected with an inductively-coupled plasma time-of-flight mass spectrometer, GC-ICP-TOF-MS, was developed to exploit the rapidity of gas-phase chemistry. Primary accomplishments in the development of this instrument are presented here. Much work was undertaken to overcome challenges in volatile organometallic sample preparation, kinetic and thermal continuity, and sample injection methodology. The solutions to these hurdles, as well as results from the instrument, are presented.

Selection of mycorrhizal symbionts in response to abiotic stress and competitive interactions between *Poa annua* and *Juncus drummondii*

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Environmental Soil Science

To thrive and be healthy, plants require certain macronutrients that are difficult to obtain by physiological mechanisms alone. Plants rely on mutualistic relationships with mycorrhizal fungi to obtain these limiting nutrients. Arbuscular mycorrhizal fungi (AMF) and dark-septate endophytes (DSE) are plant-associated fungi that often co-colonize root space, but may provide different nutrients to plants. Patterns of co-existence between AMF and DSE are commonly observed in plant roots, however it is unknown if plants mediate co-existence to alleviate nutrient stress. We hypothesized that plants would allocate resources to fungal partners that alleviated nutrient stress, for example, higher AMF when phosphorus limited, higher DSE when nitrogen limited. Additionally, because plant species differed in their ability to acquire limiting nutrients and benefits they received from fungal partners, we hypothesized that changes in fungal partners would alter interspecific and intraspecific competition. To test these hypotheses, we conducted a greenhouse experiment where seedlings of *Poa* and *Juncus* were grown with itself and with each other in soils that differed in availability of nitrogen and phosphorus resources. Surprisingly, we found differences in nutrient availability did not alter performance of either grass, although competitive interactions were strong. *Juncus* consistently out-performed *Poa* in every treatment, and *Juncus* performed better against *Poa* than when grown with itself. Plant-plant interactions as well as their interactions with the abiotic environment will scale to shape plant community composition and ecosystem function. In the high elevation ecosystems where *Poa* and *Juncus* co-occur, *Juncus* is typically the dominant plant species, likely because in the extreme conditions they live, *Juncus* is a superior competitor for limiting nutrients. As global change alters temperature and precipitation regimes and agricultural use of fertilizer introduces added nutrients to natural systems, changes in communities can scale up to affect ecosystem function on a wide-spread scale.

Effects of genetically modified switchgrass cultivation on soil carbon dynamics

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Environmental Soil Science

Though switchgrass is widely accepted as a bioenergy feedstock, there exists a major challenge in efficient conversion of switchgrass biomass to biofuel due to the high lignin content in its cell wall tissue. To solve this problem, transgenic switchgrass plants containing altered levels of lignin have been developed by genetic manipulation. However, lignin is an important component of soil organic matter (SOM), which is the backbone of sustainable production systems. Residue of plants with altered cell walls might alter SOM and nutrient cycling and overall soil quality. We hypothesized that soils planted with transgenic switchgrass would affect SOM cycling differently than soils planted with non-transgenic switchgrass. We collected soil samples from two transgenic switchgrass plots at the East Tennessee AgResearch and Education Center in Knoxville; both plots included replicates of transgenic and non-transgenic switchgrass plants. Results from microbially mineralized carbon (CO₂), active organic carbon and total SOM indicate no difference between transgenic and non-transgenic plots. We are continuing to examine microbial biomass carbon in soils from transgenic and non-transgenic plots. This research is expected to provide comprehensive understanding of the effect of genetically modified biofuel feedstock plants on soil processes leading to sustainability of production systems.

Staff Nurse Perceptions of Their Role in Hospital Reimbursement via Nursing Sensitive Indicators and Patient Satisfaction

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Nursing, Leadership Studies

Nurses make up a high percentage of healthcare personnel working in a hospital setting. As healthcare professionals, much of their daily work is the provision of direct patient care. Nursing-sensitive indicators serve as a way to measure the impact nurses have in the promotion of quality care delivered. Existing research highlights the value-based purchasing system implemented by the Affordable Care Act. Yet, very few studies have explored nurse involvement as a critical facet to this system.

This literature review provides a state-of-the-science addressing nursing-sensitive indicators regarding the delivery of quality care, hospital assessment related to value-based purchasing and the role of patient satisfaction regarding nursing care in the reimbursement of hospitals. The PubMed and CINAHL databases were queried using search terms such as “value-based purchasing,” “nursing sensitive indicators,” “quality care,” and “hospital reimbursement.” This review provides a synthesis of the existing data related to nurses’ roles in value-based purchasing and the way that nurses take part in reimbursement efforts.

A consistent theme in the literature is that the HCAHPS (Hospital Consumer Assessment of Healthcare Providers and Systems) survey accounting for 30% of the total performance score and thus impacting funds allocated by the Affordable Care Act depends on patient satisfaction and therefore on nursing quality. Other studies acknowledged that nursing sensitive outcomes depend on many patient variables that may depict nursing professionals negatively, such as age and culture differences. A gap in the science exists regarding the nurse’s perspective on their evaluation by these measures. Future research should serve to assess the clinical nurse’s perception of the way their care impacts the hospital reimbursement and healthcare costs. Results from such research improve hospital reimbursement by targeting nurse clinicians to provide them with a more comprehensive understanding of the system and their role in performance at the bedside.

Sources of Error in Wearable Step Counters

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Kinesiology; BCMB

Activity trackers are a common assessment tool for physical activity across research, clinical, and personal domains. Step counts are important because they are strongly related to health; however, validity across devices must be assessed. The purpose of this experiment is to determine sources of error in the step counting utility of ten activity monitors across different types of activities. Participants ($n=21$; 26 ± 9 yrs) wore ten activity monitors. Four devices were worn on the non-dominant wrist (Garmin Vivofit 2, Fitbit Charge, Withings Pulse Ox, and ActiGraph GT3X+), four on the hip (Yamax Digi-walker SW-200, Fitbit Zip, Omron HJ-322U, ActiGraph GT3X+), and two on the right ankle (Stepwatch with modified and default settings). Participants completed 15 activities for 2 min each. Hand count was used as the criterion. Statistical equivalence was determined by equivalence testing, and error was quantified by mean absolute percent error (MAPE). Ranges for MAPE: activities of daily living 46.2%-250.3%, treadmill ambulation 1.2%-47.1%, over-ground walking 6.4%-48.8%. The StepWatch (modified settings) was the only statistically equivalent device across all activities. During treadmill ambulation and over-ground walking, most devices performed well, but in activities of daily living, wrist-worn devices tended to over-count, and hip-worn devices tended to under-count steps.

Wood Charcoal Analysis from Coan Hall (44NB11)

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Anthropology, History

Ongoing excavations by the University of Tennessee, Knoxville and volunteers at Coan Hall (44NB11) are shedding new light on the lives of 17th-century English colonists on the Northern Neck of Virginia. Coan Hall was home to Colonel John Mottrom and his family. Mottrom was one of the first European settlers in the Northern Neck of Virginia. Historical records illustrate that a number of unrelated free, indentured, and enslaved people lived in the same structure. Moreover, the building was an occasional meeting place for the county court, a place for religious worship, and operated as a place of trade with Native Americans.

Wood charcoal is often the most abundant material collected in archaeobotanical samples, and is the result of burned wood. Identification of wood charcoal can reveal evidence of wood selection patterns for fuel wood and building materials. This paper presents identifications for a sample of wood charcoal, and also takes a deeper look at sampling methodology and strategies. Overall, this analysis works to identify and categorize the wood utilized by the individuals living at Coan Hall, while discussing the components of resource selection and environmental relationships.

Identification of a General Targeting Motif Guiding Interaction Between Nuclear-Encoded Plastid Precursors and the Translocon of the Plastid Outer Membrane

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Biological Sciences

Plant cells are defined by a collection of organelles and the membranes that surround them. When new proteins are synthesized in the cytosol, they must be transported to their destination at a specific organelle. Proteins targeted to the chloroplast contain a short N-terminal region called the *transit peptide* (TP). This region acts as a “zip code” recognized by translocons on the outer membrane of the chloroplast (Toc) as the first step of chloroplast protein import. The TP is particularly complex due to its lack of consensus sequence, but there are several physicochemical motifs that contribute to targeting and import. One of such motifs is a region that interacts with the Toc receptor proteins, which appear to promote TP binding, but cannot support import alone. This region is termed ‘FGLK,’ defined by the character of the amino acids it contains. To investigate the universality of this motif we designed a heuristic bioinformatics approach to identify other precursors containing this motif in the *Arabidopsis* genome. The consolidated output from localization prediction tools was integrated into a scoring algorithm to select the final 7 most confidently predicted chloroplast proteins, while avoiding potentially dual-targeted proteins to the mitochondria. We developed an *in vivo* assay to assess the import efficiency of precursor protein constructs by using a chimeric transit peptide-fluorescent protein (FP) construct. The FGLK domains have been substituted in each model TP to analyze their subcellular localization using fluorescence microscopy. The resulting fluorescence has been quantified and analyzed to further the understanding of the functional motifs in TPs.

Kristen Holbrook is a co-author of this research.

Parental knowledge of Adverse Childhood Events and the effect on health and substance abuse disorders

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Nursing

Events in a child's life, whether positive or negative, can have a deep, lasting impact. Adverse Childhood Experiences are any "stressful or traumatic" event experienced during childhood. This SAMHSA definition encompasses physical abuse, sexual abuse, emotional abuse, physical neglect, emotional neglect, mother being treated violently, substance misuse within household, household mental illness, parental separation or divorce, and an incarcerated household member. ACE are not uncommon events. After a literature review was conducted using references from PubMed and CINAHL databases, a gap in literature involving parental knowledge about links between ACE and substance abuse was identified. There is evidence connecting ACE to development of many health problems, including substance use disorders. While research shows that early intervention in combination with high levels of parental involvement may be the key to preventing substance use disorders and mental health disorders, there is not research concerning what parents actually know about Adverse Childhood Events and their potential lifelong effects. The specific gap being investigated is "What do parents know about the links between ACE and substance abuse and early intervention techniques to prevent substance abuse in the future?"

Emotional Coping in Individuals With Fibromyalgia

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Coping is a term used to define how an individual handles an issue or problem in their life. Several types of coping exist. Cognitive coping is divided into problem-focused and emotion-focused coping. Problem-focused coping has been more widely studied and is typically referred to as the ideal form of coping as it targets managing the source of stress. Emotion-focused coping refers to regulating emotions that arise under stress.

Fibromyalgia is a medical condition characterized by chronic widespread pain and a heightened pain response to pressure. Emotion-focused coping as a form of coping for individuals with fibromyalgia addresses the toll a chronic illness takes on a person when the illness is permanent because it is difficult to remove the source of stress. A review of the literature on coping with fibromyalgia revealed a high association of depression and anxiety as well as a relationship between emotional distress and pain. Few studies have examined how emotions influence behavior and coping strategies. Emotion-focused coping may be a viable strategy for individuals with fibromyalgia. Future research will examine emotion-focused coping by analyzing personal illness blogs among individuals with fibromyalgia, to see how these individuals are dealing with the emotional toll of their disease.

Recreated Culturally Acceptable Advance Directive for Persons Experiencing Homelessness

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Although the process of dying is a universal human experience, it often amplifies people's unique cultural differences. Persons experiencing homelessness (PEH) have unique barriers, challenges, and wishes for end of life care. Despite healthcare being considered a fundamental human right, PEH experience discrimination and multiple lifelong challenges accessing care. Therefore, PEH exhibit a greater need for dignified, meaningful advance care planning and advance directives (AD) completion. However, the literature reveals a gap in knowledge regarding these unique needs. This study will use the culture care theory and ethnonursing qualitative research method to discover if developing a culturally acceptable advance directive form for PEH positively impacts their completion of an AD and overall experience of advance care planning. Following a counselor-guided AD workshop, four to six PEH and a focus group of six to ten nursing students will be interviewed. Data will be transcribed and analyzed using thematic content analysis. Transcripts will be coded and examined for patterns and themes representing perspectives from the PEH and student nurse participants. Research to understand the unique advance care planning needs of PEH addresses this gap in knowledge and responds to the national call for reducing health disparity through culturally appropriate services. Findings may be useful for helping people of all cultural groups with dignified and meaningful advance care planning.

The Effects of Phosphorylation on RPS6 Ribosomal Protein in *Arabidopsis thaliana*

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Biochemistry, Cellular and Molecular Biology

Plants require light to produce the energy needed to survive, as well as use light to regulate numerous biochemical and molecular mechanisms. One such light influenced mechanism is protein synthesis, which is carried out by ribosomes. Ribosomes are multiunit complexes composed of RNA and ribosome specific proteins. Our research focuses on a ribosomal protein termed RPS6 in the plant model system *Arabidopsis thaliana*. RPS6, being a part of the ribosome, is required for protein synthesis, and is known to undergo a chemical modification called phosphorylation at multiple different sites. The genetic blueprint of this specific chemical modification has been highly conserved in yeast, plants, and animals even after millions of years of evolutionary change. Though phosphorylation of RPS6 has been studied in various organisms for over three decades, its immediate biochemical function has not yet been determined and specifically, very little is known about it in plants. From our experiments, we have observed that the phosphorylation of RPS6 is influenced by changes in dark-light conditions. In the presence of light, phosphorylation is associated with actively synthesizing ribosomes, whereas under dark conditions, it is associated with free RPS6 in the cytoplasm. Earlier studies from our lab have shown that the rate of synthesis of certain classes of proteins differs during the day and night. Our results suggest that there is a possible correlation between high levels of specific protein synthesis and RPS6 phosphorylation.

Preschool Children: What they know about asthma and how they learn

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Childhood asthma is a growing societal problem that causes suffering for children and families. Short of finding a cure, the best way to address this health concern is to give children with asthma the resources they need to control their condition. Unfortunately, research and resources for young children with asthma are lacking. The authors hypothesize using age-appropriate education via technology, which promotes self-regulation with psychosocial elements, could decrease exacerbations and establish healthy habits. This qualitative, descriptive study uses in-depth semi-structured interviews and direct participant observation to explore preliterate children's (3-5 years) understanding of asthma causes, symptoms, and treatments and educational strategies for this age group. Preliterate children who meet at least 3 out of 4 of the National Asthma Education and Prevention Program (NAEPP) criteria are interviewed to determine cognitive development and understanding of asthma and are then allowed a free-play period to help determine the children's preferences for entertainment and educational tools. A systematic evaluation of texts (e.g., field notes, transcripts) will provide qualitative data to categorize and identify themes. Additional analysis will determine what elements of the entertainment tools are most attractive to children in this age group by evaluating time spent with the toys and children's physical and verbal responses during the play period. These data are the foundation to develop future educational materials that enhance cognitive understanding and health-related behavioral regulation in preliterate children diagnosed with asthma.

The Effects of Cuddling in Neonatal Abstinence Syndrome

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The incidence of Neonatal Abstinence Syndrome (NAS) resulting from in-utero exposure to opioids and other substances has increased significantly in recent years and continues to grow globally. Treatment results in lengthy and costly Neonatal Intensive Care Unit (NICU) stays and, in areas with increased incidence such as Tennessee, the care needed to support these infants may exceed the availability of nursing staff. Pharmacological therapies are needed to help infants with NAS withdraw safely. The author conducted a literature review to explore the use of non-pharmacological treatments for infants with NAS. PubMed and CINAHL databases were searched using the following keywords: "neonatal abstinence syndrome," "neonatal withdrawal syndrome," "treatment," "intervention," and "nonpharmacological." While there is mention of non-pharmacological therapies to console infants experiencing NAS; a gap exists in the science pertaining to effectiveness of such therapies on infants or the impact they have on nursing staff. Future research will examine the effectiveness of one non-pharmacological intervention, cuddling of the neonate. Further, the author will elicit the perceptions of nursing staff using semi-constructed, in-depth interviews to identify common themes. This study will generate scientific data that can build the foundation for future research on non-pharmacological therapies in infants being treated for NAS.

Exploring Black Women's perceptions of midwifery and antenatal care in Knoxville

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Black mothers are 2.3 times more likely than White mothers to receive prenatal care late, or not at all. Southern Black women sustain a long history of midwifery-led antenatal care, but there is significant silence in current literature surrounding the role of midwives among this population. This study explores how Black women in Knoxville perceive midwifery as an approach to antenatal care, and what their personal experience of prenatal care has been.

A qualitative descriptive design, using semi-structured individual interviews. The sample consisted of 5 Black women who grew up in and currently live in Knoxville, TN, ages 18 and older. Participants were recruited through fliers placed in the community, as well as contacting key neighborhood leaders. Data was collected through one 60-90 minute guided interview with each woman, investigating the following areas: 1) Experience of antenatal care, 2) Perception of midwifery, and 3) Knowledge of granny midwives. A short demographic survey was also filled out. The interviews were transcribed, and qualitative analysis of the data were performed using NVIVO to visualize themes or trends.

Three themes and one emerging theme were identified using participant quotes. The first was "Perceptions" divided into the subthemes a) "I think most people associate midwives with homebirths," and b) "You don't feel like you have a choice." Theme 2 was "Mother/ Daughter," also with two subthemes: a) "Don't talk about it," and b) "We here, we alive, we made it." The last two were Theme 3: "Nobody learned how to midwife," and the Emerging theme: "They might be curious of how it happened."

These themes identified a lack of knowledge of midwifery among most of the Black women interviewed, as well as a perceived lack of resources for those who were interested in a natural birth. The results cannot be applied to the larger population because of the small sample size, however they do suggest a need for more education about midwifery as an antenatal care option.

Performing Ethnic Identity in Chinese Popular Music

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Music and Culture

China is home to 55 groups of ethnic minorities, all of which are subject to a state that dictates and categorizes these different groups in accordance with its political goals. The Chinese government frequently uses its minorities as an ancillary position to the narrative of a united nation, while erasing important aspects of their identities. In recent years, however, minority individuals have begun to seek active participation in mainstream representations of their own ethnicities, thus challenging these previous definitions. Despite pressure to apply Han ideas of ethnicity, musicians have begun to bring their own performances of identity into their celebrity personas to assert agency. As a performative medium, music gives these artists an avenue to create a self that can express feelings tied to their positions while subverting stereotypes cast by the state.

This presentation examines the works of two female Chinese musicians—Alan Dawa Dolma (Tibetan) and Daiqing Tana of Haya Band (Tibetan and Mongolian)—both of whom use visual, audio, and linguistic approaches in their works to perform ethnic identity within a Han Chinese dominated state. Extending Judith Butler's theory of performativity to the construct of ethnicity, I contend that both use self-defined ethnic markers to assert agency within a Han-dominated state. According to Butler, the concept of performativity provides a way of rethinking the relationships between dominant social structures and personal agency. Therefore, to negotiate notions of their own identities, these female singers must perform ethnic markers that come from their own definitions rather than from dominant social groups.

