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RNA Purification Through Fluorous Affinity

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Introduction/Background

RNA is a critical component of many biological systems and is often used in a variety of applications. However, the purification of RNA is a challenging task due to its high reactivity and the presence of many contaminants. Fluorous liquid-liquid extraction (FLLE) is a powerful technique for the separation and purification of compounds based on their solubility in fluorous solvents. This poster describes the development of a fluorous affinity-based method for the purification of RNA.

Method

The method involves the use of a fluorous liquid-liquid extraction system to separate RNA from a complex mixture. The RNA is first complexed with a fluorous-tagged molecule, which is then extracted into a fluorous solvent. The purified RNA is then isolated from the fluorous phase.

Results

The results show that the fluorous affinity-based method is highly effective for the purification of RNA. The purified RNA is of high quality and can be used in a variety of applications. The method is also scalable and can be used for the purification of large quantities of RNA.

Conclusions

The fluorous affinity-based method is a powerful technique for the purification of RNA. It is highly effective, scalable, and can be used for the purification of large quantities of RNA. This method represents a significant advance in the field of RNA purification.

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Literature Cited

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A woman with long dark hair, wearing a green button-down shirt, is smiling and standing next to a large scientific poster. The poster is titled "The Effect of Temperature on the Rate of Enzyme Activity" and features a bar graph showing enzyme activity at different temperatures. The graph has three bars of increasing height, with the third bar being the tallest. The poster also includes a title, a hypothesis, a procedure, and a conclusion section. The woman is positioned to the left of the poster, and the poster is mounted on a wall.

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All Abstracts Organized by Poster Number

1. Portrayal of Dracula's Love Interest in Film Parallels the Feminist Movement

Natalie Abernethy, Dept. of Art Foundation, with Prof. Mary Boyes, VCU Honors College

This paper examines the portrayal of the primary love interest as submissive victim or independent woman in the following Dracula films - the 1922 German film *Nosferatu*, the 1931 American film *Dracula*, the 1958 British Film *Dracula/Horror of Dracula*, and 1992 American film *Bram Stoker's Dracula*. By studying the cinematography, the portrayal of Dracula, the portrayal of the female love interest, and the score, the role of the love interest as a submissive victim or independent woman is clarified. The films were created in Germany, America, or Britain and the role of the woman in relation to her male counterparts parallels the feminist movement in each film's country of origin. In the 1922 film, the female love interest sacrifices herself to *Nosferatu* to save the town. This independence parallels the new freedom for women to vote in America in 1920 and for women to vote in Germany, the country in which this film was made, in 1918. Beginning in 1929 was the Great Depression in America, which put a halt to the feminist movement. Paralleling that, the female love interest in 1931's *Dracula* becomes a victim of the Count, only saved when another man kills Dracula. In 1950's Britain, high emphasis was placed on the nuclear family and the woman's place in the home. The 1958 film *Horror of Dracula* reflects this through Mina's falling victim to one of Dracula's tricks. Again, she is only saved from doom upon Van Helsing's killing of Dracula. In *Bram Stoker's Dracula* (1992), Mina, the primary love interest of the Count, leaves the role of submissive victim and secures her spot as an individual by making the choice to join the Count as a vampire by choosing to drink his blood. This parallels the state of third-wave feminism in America in the 1980s and 1990s, with the image of an independent, free woman.

2. Redefining the Past: Women in Classical Mayan Culture

Lucia Aguilar, Dept. of Anthropology, with Dr. Bernard Means, Department of Anthropology

It is important to acknowledge that a majority of research done in archaeology and anthropology or most sciences has had a strong androcentric bias. In my own personal experiences I noticed growing up taking history classes that always taught women in the past were primarily responsible for their household and children or other typical roles women were constantly simplified to. There were always the occasional exceptional women in society that we hear about who "pushed boundaries" or "broke barriers" stepping into male roles, but what about taking a second look at the past without a Western androcentric bias. In some ancient societies, like the Mayans, there weren't as many strictly structured gender roles. Through interpreting the variety of roles women played and flexible gender roles in Classic Mayan culture, one can better develop less myopic interpretations of the influence women had on the past and their roles in societies.

3. Examining a Link between Paraquat, Alpha-Synuclein Fibrillation and Neurodegeneration: A Review

Nikhil Ailaney, Depts. of Biology and Psychology, with Prof. Mary Boyes, VCU Honors College

Parkinson's disease is a progressive and chronic disorder that causes motor system dysfunction due to a lack of dopamine in the central nervous system. Although this disorder has been researched extensively, the etiology of Parkinson's disease remains unknown. Paraquat, a commonly used pesticide, is a known neurotoxin and is used extensively worldwide. In order to determine if people who live in agricultural regions that use paraquat are more susceptible to Parkinson's disease I examined a possible link between paraquat, the fibrillation of the protein alpha-synuclein and neurodegeneration. To conduct this review, I analyzed epidemiological studies on the correlation between pesticides and Parkinson's disease, research on the link between pesticides and the protein alpha-synuclein and research on the link between alpha-synuclein and Parkinson's disease. From this review, I found that areas that are exposed to high levels of paraquat experience elevated rates of Parkinson's disease in their populations, that paraquat is positively correlated with the aggregation of alpha-synuclein, and that an increase in alpha-synuclein causes neurodegeneration due to an imposed neurotoxicity or through an oxidative stress pathway. This review clearly points to a strong correlation between paraquat exposure and the pathogenesis of Parkinson's disease. This review leads to the recommendation of future research that solely tests the effect of paraquat on alpha-synuclein fibrillation and neurodegeneration in mice. This work would clarify the definitive link between paraquat and the pathogenesis of Parkinson's disease thus informing the practices of those who use pesticides.

4. Gender and the Doctor-Patient Relationship

Ishmam Alam, Dept. of Biology, with Prof. Bonnie Boaz, University College

In the modern field of medicine, doctors and patients must develop a healthy relationship. This relationship hinges on many aspects. However can gender play a sizeable role in this connection? In this paper I have inquired if gender differences can influence patient-doctor relationships. The research includes scientific studies on how the gender of the patient or the doctor can impact the relationship that is formed between the two parties. Many researchers have stated that the two genders have different methods of treatment that ultimately influence the bond between the patient and the doctor. Specifically, a source from Johns Hopkins concluded that women and men have certain skillsets that make them more efficient in different situations pertaining to medicine. These skillsets include women asking more personal questions about their patients and their past experiences, whereas men tend to analyze the present problem. Another work from the Geneva Hospital mentions that when spoken language is not used, patients prefer a doctor to the same gender of that patient. This is because men and women use vastly different body languages. Women have a more passive body language which makes the patient feel secure and trusting, but men have a more upbeat and aggressive body language which shows that he is serious about the illness of the patient. Through the many sources, it is completely viable that gender can indeed affect the relationship between the doctor and the patient.

5. Presumptive Analysis of Cannabimimetics and "Bath Salts" by Ultraviolet-Visible Spectroscopy

Kylie Alford, Dept. of Forensic Science, with Dr. Michelle Peace, Dept. of Forensic Science

In recent years, there has been a rise in the consumption of popular designer drugs synthesized from cathinones known as “bath salts”. There are also synthetic drugs, known as cannabimimetics, used as a substitute for classic drugs, such as marijuana. The increasing popularity and dangerous health risks associated with these drugs require fast and effective analytical protocols for analysis. Twelve “bath salt” or cannabimimetic samples in powder and plant form were purchased online. They were extracted in either methanol or ethanol and analyzed with Ultraviolet-Visible Spectroscopy (UV-Vis). Methanol was an efficient extraction solvent for the plant material, while ethanol was more suitable for the powder product. UV-Vis was determined to be a quick and effective instrument for presumptive analysis of “bath salts” and cannabimimetics.

Key Words: cannabimimetics, bath salts, UV-Vis, cathinones

6. Prevalence and problematic outcomes associated with dating violence in emerging adults.

Elisabeth Alison, Dept. of Psychology and Biology, Chrissy Ammons, Dept. of Psychology with Rachel Garthe, Dept. of Psychology

Dating violence is a prevalent problem among emerging adults. As young people explore novel romantic relationships, conflicts inevitably arise that sometimes escalate to the point of violence (Salvatore, Collins, & Simpson, 2012). It is important to understand the prevalence of dating violence among emerging adults and the negative implications that may result. The current study explored the predictive relationship between sexual, psychological, and physical forms of dating violence in both perpetrators and victims on internalizing outcomes. Participants included 209 undergraduate students (78% female) at Virginia Commonwealth University enrolled in an Introduction to Psychology course, between the ages of 18 and 25 ($M = 19.38$). Participants were 50% Caucasian, 23% African American, 15% Asian American, 7.2% multiracial, and 4.8% other; 9% indicated Hispanic ethnicity. Preliminary results indicated that dating violence was a prevalent concern among this sample of emerging adults; 53% of participants experienced at least one instance of dating violence perpetration, and 45% had experienced victimization. In addition, multiple regression analyses indicated that dating violence perpetration significantly predicted internalizing outcomes, $F(3, 205) = 5.10$, $p < .01$, $R^2 = .26$. The model for dating violence victimization also significantly predicted internalizing outcomes, $F(3, 205) = 8.40$, $p < .001$, $R^2 = .33$. Finally, differential results emerged between the various forms of perpetration and victimization. From our analyses, the results strengthen the notion that we need to examine each form of dating violence separately to understand how different forms of dating violence contribute to problematic outcomes in emerging adults.

7. Creating a teachUNICEF Curriculum Using Survey Data from Target Population

Sahil Aggarwal, Hasan Alkhairo, Monita Ashna, Sage McNett, UNICEF, Virginia Commonwealth University

UNICEF at VCU is a student-led campus service organization that promotes the survival, protection, and development of children worldwide. This is done through education, advocacy and fundraising as a Campus Initiative group through the U.S. Fund for UNICEF. As part of its education campaign, UNICEF at VCU has committed to teaching students in elementary, middle and high schools about the importance of promoting child welfare globally. However, it is difficult to assess what topics these students are interested in without a systematic and empirical analysis. To obtain that empirical data, middle school students at Martin Luther King Junior Middle School were given surveys to better assess the focus areas of UNICEF that interested them. The focus areas that the students could select as the most interesting were (1) Emergency Preparedness, (2) Gender Inequality, (3) Poverty, and (4) None of the Above. Out of the 86 students that responded, the majority of the students wished to learn more about emergency preparedness. Based on this data, an emergency preparedness curriculum was created that will be presented at an assembly format at the Martin Luther King Junior Middle School, as well as Thompson Middle in the Fall of 2014.

8. ATM regulates glioma migration and invasion primarily via MEK-ERK and not AKT signaling

*Jasmine L. Allen, Alison F. Wagner, Jason M. Beckta, Laura Biddlestone-Thorpe, James Watson, Sarah E. Golding, and Kristoffer Valerie
Department of Radiation Oncology, Massey Cancer Center, Virginia Commonwealth University*

Glioblastoma multiforme (GBM) is a lethal brain cancer with a life expectancy of only 12-15 months. Current standard treatment for GBM is surgery and chemoradiation. However, there are many difficulties when it comes to treating this aggressive brain cancer due to inherent radio- and chemo-resistance. Hence, there is a critical need for new therapeutic approaches to make radiation/chemotherapy more effective. Ataxia telangiectasia (A-T) patients are extremely sensitive to ionizing radiation. The protein mutated in A-T, ATM (A-T mutated), controls the cells' response to radiation and is referred to as the DNA damage response (DDR). ATM is a master protein kinase that targets numerous proteins during the DDR including regulators of cell cycle checkpoints, DNA repair, and apoptosis. In addition, we have shown that without any radiation, ATM might regulate glioma dispersal. Using a highly specific inhibitor of the ATM kinase (ATMi), we recently showed that ATM regulates both ERK and AKT signaling and controls glioma cell migration and invasion in vitro. In order to determine whether MEK-ERK and/or AKT signaling regulate migration and invasion downstream of ATM, glioma cells were exposed to a MEKi (PD0325901) or AKTi (MK-2266) in 'scratch' and invasion assays. We found that MEKi inhibited both migration and invasion whereas AKTi did not affect migration and only partially (~40%) inhibited invasion. To take these studies further, we used a genetic approach and knocked-down ATM in human glioma cells. In vitro growth and survival studies showed that ATM KD cells were more radiosensitive and grew slower than control cells. Furthermore, we recapitulated the findings with the ATMi, MEKi, and AKTi and showed that ATM KD cells have reduced ability to migrate and invade in vitro suggesting that ATM regulates glioma migration and invasion primarily via MEK-ERK and less so via AKT signaling. Ongoing studies are determining whether orthotopic ATM KD tumors grow slower and are less invasive than matched control tumors.

9. EXAMINING THE ROLE OF SUPPRESSOR OF IKK ϵ (SIKE) AS A RECENTLY CHARACTERIZED SUBSTRATE OF TANK BINDING KINASE 1(TBK1)

Danice M. Alston, Dept. of Psychology, with Dr. Jessica K. Bell and James D. Marion, Dept. of Biochemistry and Molecular Biology

Innate immunity is the body's first protection against invading organisms. When the host is threatened, a cohort of responses is initiated. A protein known as Toll-like receptor 3 (TLR-3) recognizes double stranded RNA, which is produced during viral replication, and activates a signaling pathway. Importantly, this pathway activates a kinase, TANK Binding Kinase 1 (TBK1). TBK1 phosphorylates several targets. These targets are critical for mediating host defenses. We discovered SIKE is a TBK1 substrate. However, the function of SIKE remains unknown. In this work, we began to investigate the function of SIKE by examining SIKE's expression and its role in cell migration. To examine SIKE's expression, we probed for SIKE expression in epithelial (HEK293, DOV13) and myeloid (RAW 264.7) cells using an $\square\square$ SIKE antibody via Western blot technique. Our data showed that SIKE is expressed in all tested cell lines and stimulation with dsRNA did not affect SIKE expression. To examine SIKE's role in cell migration, we completed scratch assays. First, we defined cell number (density) for our experiments and the percentage of FBS required to maintain cells, but minimize cell proliferation. We then completed scratch assays using our defined conditions with RAW 264.7 and DOV13 cell lines +/- dsRNA. These data provide the baseline cell migration measurements for continuing experimentation with SIKE, overexpression, mutants or knockdown. This work was supported by the IMSD Summer Research Program.

10. Effect of Caregiver Alexithymia on Child Life Satisfaction and Emotional Expression

Chrissy Ammons, Swetha Mannem, Briseida Castillo, Shehzad Sadiq, Dept. of Psychology, with Dr. Lena Jaggi, Dept. of Psychology

Prior research has indicated that an individual's emotional expression can affect their life satisfaction (Henry et. al. 2006). Research has also shown that parent's emotional expression influence their child's emotional competency (Carlo, Goodvin, & Torquati 2006). However there is limited research on a parent's emotional expression effecting a child's life satisfaction. This study looked at the relationship between caregiver's alexithymia (their inability to understand and name emotions) and child's life satisfaction. The study also examined the child's emotional expression as a mediator of that relationship. Data from 268 caregivers and youth dyads were analyzed from the first three waves of a larger study investigating risk and resiliency in urban youth. Parent alexithymia was assessed using The Toronto Alexithymia Scale. Child's emotion expression and life satisfaction was assessed using the Emotion Expression Scale and The Life Satisfaction Scale respectively. The mediation model for parent's alexithymia effecting child's life satisfaction through the child's emotional expression was not supported. However, a path model was found showing that a caregiver's difficulty identifying feelings effected a child's expressive reluctance ($\beta = .068$, $p < .05$). It also showed a child's expressive reluctance effected their life satisfaction ($\beta = .197$, $p < .05$). It was also found that a caregiver's alexithymia effected

the parent's life satisfaction ($\beta = -.254$, $p < .05$). Even though the main model was not supported we found a significant path model. The study's longitudinal aspect and diversity of the sample provides information and opportunities for more research to be done.

11. InGaN LEDs for General Lighting: Overcoming Efficiency Droop at High Injection

Nicolas Andrade, Dept. of Electrical and Computer Engineering, with Dr. Umit Ozgur, Dept. of Electrical and Computer Engineering

According to the Energy Information Administration's Annual Energy Outlook report in 2011, the United States alone consumed 97.8 quadrillion Btus (quads) of primary energy in 2010. Roughly 41% of this energy was consumed for electricity use, with 18% of the electricity being dedicated to lighting. This means that general lighting accounts for 7% of the total energy consumed annually in the United States. In a separate report, the International Energy Agency (IEA) estimated light consumption of this scale translates to CO₂ production equivalent to 70% of the emissions from all of the world's light passenger vehicles. Indium gallium nitride (InGaN) blue light emitting diodes (LEDs) provide significant energy savings in general lighting. In addition to offering high color rendering LEDs are much more efficient than other forms of lighting: at a low current drive they are over 50% efficient, while incandescent and long fluorescent tubes are 5% and 25% efficient, respectively. However, LEDs currently account for less than 0.1% of the installed lighting, residential and industrial, in the United States, and much less than 0.1% worldwide. The greatest factor that has limited the widespread use of InGaN LEDs is the nearly 20% reduction in efficiency at high current injection, which is known as efficiency droop. As high current injection is necessary for high optical output, overcoming efficiency droop is of utmost importance; however, the root cause of this phenomenon is still not completely understood. Among the suggested origins are carrier leakage, weak hole transport, junction heating effects, carrier overflow, and nonradiative Auger recombination, the latter two being the leading theories. Recent experimental data has shown that the amount of efficiency loss attributed to Auger recombination has likely been overstated. While Auger recombination remains an important mechanism in explaining efficiency droop, due to the recent strong theoretical and experimental support the primary explanation lies mainly with carrier overflow. There is no clear solution to this problem as of yet. Among the proposed methods for addressing the reduced efficiency are electron blocking layers and electron injectors. Each of these solutions has its advantages and disadvantages including increasing the chances of thermalization and reducing carrier mobility respectively. In this paper, I will review and critique these proposed solutions with the objective of analyzing the effectiveness of each method in increasing efficiency.

Keywords

Carbon dioxide emissions, efficiency droop, electron blocking layer (EBL), electron injectors

12. How to Mold Minds: The HIV Testing Attitudes

Danielle Armstrong, UROP Summer Fellow, Dept. of Psychology, with Dr. Faye Belgrave, Dept. of Psychology

African Americans remain disproportionately affected by HIV, comprising 14% of the U.S. population but representing 44% of new HIV infections in 2009 (CDC, 2011). As such, it is important to identify the barriers to positive behaviors like HIV testing. The main purpose of this study was to examine the factors associated with HIV testing attitudes. Religiosity and select demographic variables such as sexual orientation, gender, and SES were examined. Also, this study sought to determine if religiosity moderated the relationship between sexual orientation and testing attitudes. 169 African American college students between the ages of 18 to 24 participated in the Raise 5 project, a HIV and substance abuse prevention program carried out on VCU's campus. Participants took part in one of three evidence based interventions: Nia, Sista, or Safe in the City. They were given surveys which examined their attitudes towards HIV testing and a variety of other measures. Results of this study did not find a significant relationship between testing attitudes and religiosity and the interaction between religiosity and sexual orientation was also nonsignificant. Implications for research and HIV prevention efforts are discussed.

13. Space, Time and the Origins of Central American Civilizations

Oliver Aurand, Dept. of Anthropology, with Dr. Bernard Means, Dept. of Anthropology

This research project will attempt to unravel the various threads of cultural influence that existed in Archaic Mesoamerica. Of particular interest will be to test the validity of the theory that there is a "mother culture," usually posited as the Olmec, which was responsible for the innovations that led to the social complexities of later cultures such as the Mayans and Aztecs. Alternately, it is possible that innovations developed by several different cultures were shared through diffusion due to strong trade networks and other methods. Historical data will be examined to see if there is any bias towards one of these viewpoints. Finally, several archaeological case studies will be examined to attempt to fit the evidence within one of these theoretical frameworks.

14. INFLUENCE OF SWSN-9 GENE ON ACUTE FUNCTIONAL TOLERANCE DEVELOPMENT IN C. ELEGANS

Makeda Austin, Dept. of Biology, with Dr. Jill C. Bettinger and Laura Mathies, Dept. of Pharmacology and Toxicology

Alcoholism is a major problem affecting individuals with worldwide health implications. It is known that variation in acute ethanol response between individuals has a significant impact on addiction development. The aim of this study was to determine what effect the Switch/Sniff (SWI/SNF) chromatin remodeling complex has on acute ethanol response phenotypes. The action of the SWI/SNF complex is to modify transcription by modifying the position of nucleosomes influencing the cell's ability to convert DNA to RNA, thus altering gene expression. One member of the SWI/SNF complex is SWSN-9, and we tested its role in ethanol responses. We used the genetic model, *Caenorhabditis elegans*, to examine the behavioral effects of SWSN-9. We tested the effect of SWSN-9 on the development of acute functional tolerance (AFT) in response to ethanol exposure. AFT is a decrease in the intoxicating effects of ethanol during a single continuing exposure to the drug that reflects a neural adaptation to the effects of ethanol. Locomotion speed assays were conducted, and we observed the development of AFT by observing an increase in speed on ethanol over the time course of the assay. We compared the AFT of wild type, N2, and the experimental strain, RA503 *swsn-9(ok1354)*, which is missing the DNA sequence corresponding to SWSN-9. We observed that RA503 *swsn-9(ok1354)* had a

consistently lower speed of locomotion in comparison to N2 at 0mM and 400mM concentrations of ethanol. Relative speed comparisons indicate that AFT development by RA503 *swn-9(ok1354)* mutants has a statistically significant defect relative to wild-type. This was followed by a phenotypic rescue analysis to ensure that the observed affect was the direct consequence of SWSN-9 absence. We conclude that SWSN-9 is influencing the development of ethanol tolerance in *C. elegans*, and further study is needed to determine how, and where within the organisms this change is expressed.

15. Understanding the Green Revolution and Cancer in Rural Punjab

Gurgas Bajaj, Dept. of Biology, with Prof. Faye Prichard, VCU Honors College

The Green Revolution, an initiative led by the Indian government in the 1960's, was created as a way to modernize the agriculture of many Indian states such as Punjab through the introduction of improved machinery, GMO crops, and chemical fertilizers and pesticides. Many of these agricultural changes have led to an increase in environmental and health issues, the most severe of which is cancer. As a result of the widespread prevalence of cancer in Punjab, a phenomenon known as the "Cancer Train," has occurred, where every night hundreds of patients are taken to hospitals throughout India as a result of their conditions. The predominance of cancer in Punjab demonstrates a major change to traditional rural life because of modernization. The aim of this paper is to determine what agricultural changes need to be made to prevent cancer in Punjab and to keep the situation from worsening. This exploration used four original studies and four meta-analyses to demonstrate the impact of Green Revolution changes on Punjab health. The four studies aimed to estimate the prevalence of nitrogenous waste in soil, estimate pesticide pollution in waters, estimate pesticide residue in cooked foods, and compare cancer rates in two villages with different environmental factors as a means of determining what leads to cancer. The meta-analyses discussed include determining the various environmental and health costs caused by agriculture in South Asia, a discussion of environmental health as a result of the Green Revolution, water management in India, and an analysis of pesticide use and necessary changes in Green Revolution states. While the Green Revolution created gains in agricultural output, the cancer throughout Punjab is a result of recently introduced chemicals, and the replacement of chemical fertilizers and pesticides with organic farming and education are necessary to keep the situation from worsening. Suggestions include stricter control of chemical substances used in farming, especially those of which are banned in most industrialized nations, as well as the introduction of government led, formal agricultural education which is accessible to the many rural villages in Punjab.

16. Impacts of urbanization on Dogwood population fitness

Gabriella Balasa, Dept. of Biology, with Dr. Rodney Dyer, Dept. of Biology

Pollination is the key factor in the success of plant populations. Urbanization overall has diminished pollinator species as well as urban plant communities due to habitat loss (Williams and Winfree 2013). Maintaining plant populations in urban environments is vital to the success of insects and other organisms that rely on plants for food and shelter. There are many specific factors influencing the dynamic of ecological urban communities. Plants can be negatively affected by many paved areas which allows less available space for growth, and more run off water concentrated to specific areas that can either deliver too much water to roots or not enough. The heat island also affects plants in that the slight increase in temperatures, compared to areas outside of the urban area, in the winter months, can cause the plants to begin flowering sooner and have a longer growing season. This can be a positive aspect as far

as reproduction capability; pollination can occur for a longer period of time increasing chances of reproductive success. In conducting research for this semester, I will be looking at the effects of the urban environment on the rate and timing of flowering as well as the abundance of pollinators on a group of dogwood trees located in the fan district of Richmond, Virginia. From this we are hoping to determine which landscape features and tree location has the greatest effects on the reproduction capabilities of individual trees. In leading up to this research, last semester, approximately 400 dogwood trees around the fan were identified and placed on a map in google maps. Mature seeds were collected from about 40 trees. In collecting data for this semesters work, the map will be used to locate already identified trees and the number of buds/flowers located on 10 different groups of flowers will be recorded. The number of pollinators found on each of the groups will also be counted. This information will provide for the comparison of the number of flowers in relation to the number of pollinators present. If more flowers are present, this possibly increases the presence of pollinators, therefore the individual has better chances of reproductive success. In identifying the landscape features that correlate to the abundance of flowering and pollinator species present on a certain individual, GIS analysis will be conducted.

17. A Beta-Testing of an Intervention Workbook to Promote Humility

Fatemah Barghamadi and Caroline Lavelock, Dept. of Psychology

Background: Humility is a virtue that minimizes the importance of the self in the interest of others. It has been associated with a host of benefits, including better self-rated physical health, better relationship quality, higher academic performance, higher patience and empathy, and higher ratings of job performance (Davis et al., 2013; Krause, 2010; Peters, Rowatt, & Johnson, 2011). Lavelock et al. (under review) tested a workbook intervention to promote humility, and in its inaugural efficacy study, this workbook promoted trait humility in its participants over and above alternative virtue workbooks, a positivity workbook, and a non-action control group. **Objective:** The present study seeks to replicate the results of Lavelock et al. (under review) with an updated version of the same humility workbook intervention. We hypothesized that this 8-hour self-directed workbook would produce higher levels of trait humility than in positivity workbook or a non-action control condition. **Method:** Participants ($N = 72$) completed a workbook intended to promote humility ($n = 24$) or enhance general positivity ($n = 24$), or they were assigned to a non-action control condition ($n = 24$). Assessment occasions occurred at pre-test and two-week follow-up. **Results:** The humility workbook did indeed significantly increase trait humility between pre-test and follow-up. Participants in the positivity and non-action control condition participants did not improve in trait humility. **Conclusion:** We conclude that this workbook intervention to promote humility appears efficacious in its beta-testing.

Keywords: virtues, interventions, workbooks, humility, positivity

18. Identification of superinfection exclusion genes in *Staphylococcus aureus* bacteriophage 80a

Azhar Bashir, UROP Summer Fellow, Dept. of Chemistry, with Dr. Gail Christie, Dept. Microbiology and Immunology

Bacteriophages are viruses that specifically infect and lyse bacterial cells. Bacteriophages are the most abundant biological entities on the planet, and play important roles in bacterial ecology, evolution, and pathogenesis. In this project we studied *Staphylococcus aureus* bacteriophage 80α, a prototype member of a large family of staphylococcal bacteriophages that carry and/or mobilize known virulence factors of the staphylococcal bacteria. These virulence factors are critical for staphylococcal pathogenesis, i.e. the development of staphylococcal diseases. Studying this phage and understanding its biology can lead to new methods for treating and preventing staphylococcal infections. This project will help us learn more about the genome of bacteriophage 80α as well as the interactions between two phages of similar families. The main aim of this project is to determine which open reading frames (ORFs) of 80α code for the phage's exclusion factors. When a temperate phage infects a bacterial cell the DNA of the phage can get stably integrated into the DNA of the bacterium, becoming a prophage. In this state, most of the phage genes are turned off. However, a few genes are expressed in the prophage state. One of these is the phage repressor, which keeps the lytic functions of the integrated phage from being expressed. Other genes may be also expressed which confer new properties on the bacterial host – a phenomenon termed “lysogenic conversion.” One class of lysogenic conversion genes helps to protect the bacterial cell from superinfection with other bacterial viruses. These genes, known as superinfection exclusion genes, encode proteins that interfere with various functions necessary for infection.

19. Hydroxocobalamin as an antidote for Carbon Monoxide Poisoning

Kyla Bass, Dept. of Chemistry, with Dr. Bruce Speiss, M.D., Anesthesiology Core Lab and VCU School of Allied Health Professions.

Carbon Monoxide poisoning is a persistent problem in today's world. The body naturally utilizes carbon monoxide in its daily functions; however, too much can lead to a systematic shutdown that can lead to death. Currently, there is no substantial treatment for carbon monoxide poisoning. Reduced hydroxocobalamin has been used to treat cyanide poisoning. Because cyanide and carbon monoxide share similar properties, hydroxocobalamin can be used to convert carbon monoxide to carbon dioxide that can be expelled from the body.

20. What Does the Future Hold for Patients Who Suffer From Treatment Resistant Depression?

Matt Beckwith, Dept. of Biomedical Engineering, with Dr. Elizabeth Kreydatus, University College

Treatment Resistant Depression (TRD) is a form of severe depression that does not respond to two or more forms of pharmaceutical treatment. Electroconvulsive therapy (ECT), a controlled electric shock to the brain, has been a standard response to this disorder since the 1980s. However, ECT does not always work and it involves disturbing side effects, like retrograde amnesia. Recent discoveries have shed light on the issue of TRD, such as: trans-cranial magnetic stimulation, stimulation of the vagus nerve, deep brain stimulation, and other approaches. Deep brain stimulation (DBS) is a surgical procedure that electrically simulates an area in the brain that is overactive in TRD patients; it proves to be the most promising of these new treatments. Review of the current scientific publications, which research these various procedures, reveals that Deep Brain stimulation (DBS) performs statistically better than any other new procedure for TRD. While a relatively new procedure, DBS has made the majority of

trial patients see improvement, and 26% go into remission (long periods without symptoms). Some studies find that 100% of successful surgeries cause patients to go into remission. There is much that scientists don't understand about TRD and this new treatment, bigger studies are currently being done to test the efficacy of DBS, and even VCU's medical center is involved in the research trials. This new treatment is giving hope to the hopeless. TRD is a severely debilitating disorder that involves extreme sadness; some patients can't even remember the feeling of happiness, deep brain stimulation may give them the chance to enjoy life.

21. Combined manipulation of leaf litter and microbial larvicide enhances local control of Culex mosquitoes

Katie Bellile, Dept. of Environmental Studies, with Dr. James Vonesh, Dept. of Biology

Bacillus thuringiensis israelensis (Bti) is a naturally occurring insect pathogen widely used as a microbial larvicide for mosquito control. The toxicity of Bti is specific to mosquitoes and a few other dipterans. It is applied to aquatic habitats colonized by mosquitoes and produces proteins that paralyze the digestive system of larvae that consume it. While Bti is an effective larvicide, it can also deter oviposition by female mosquitoes. Thus, reduced production of adult mosquitoes at the local (i.e., pond) scale may reflect both reduced colonization and reduced larval survival. It is important to distinguish between these mechanisms. While deterring oviposition can reduce local mosquito production, these eggs may be redirected to other suitable habitats and contribute to adult recruitment at the landscape scale. In contrast, larval mortality reduces both local and regional recruitment. Thus, to maximize mosquito control across spatial scales, we should attract rather than deter oviposition to Bti treated habitats, creating mosquito "sinks". As mosquitoes often preferentially deposit eggs in aquatic habitats rich in organic matter, we hypothesize that increasing leaf litter to attract oviposition will increase the efficacy of Bti treatment. We tested this hypothesis using a 2 x 2 factorial experiment in which we manipulated litter abundance and Bti presence and quantified *Culex* spp. mosquito oviposition, larval abundance, and adult emergence. Each treatment was replicated 7 times in aquatic mesocosms arrayed in an old field at the VCU Rice Center. Bti had no effect on mosquito oviposition or larval abundance. In contrast, increasing leaf litter 50% resulted in a fivefold increase in egg rafts and mosquito larvae. The effect of Bti on adult emergence depended upon leaf litter. Bti reduced emergence by 75% in high litter treatments, but had no effect in low litter treatments. In summary, high litter combined with Bti application increased mosquito colonization fivefold but produced no more adults than low litter treatments. Thus, even though we found no evidence that Bti deterred oviposition, attraction to litter resulted in increased efficacy of Bti application. Our results suggest a potential cost effective, chemical insecticide free approach to enhanced mosquito control.

22. A Review of Life Stories for Themes of Agency and Communion Within an Undergraduate Population

Courtney Jane Belmonte, UROP Summer Fellow, Dept. of Psychology, with Dr. Jennifer Wartella, Dept. of Psychology

Career decision-making and exploration are important activities for graduating undergraduates, yet previous studies reveal many students have not initiated this process in part due to lack of identity formation at this stage of development. A life story review exercise

has been identified as one possible strategy for solidifying identity formation and increasing career decision-making and exploration. The Life Story exercise is a writing project that prompts students to write about key experiences that shape their identity. Previous research has demonstrated that these stories often revolve around themes of agency and communion. A recent study indicated that students that completed the Life Story exercise demonstrated significant increases in career decision-making and trend toward increased identity formation as well. This current study seeks to further understand the relationship of these variables. Further analysis for the presence of life stories themes (agency and communion) revealed that students who included themes of agency (the agency theme achievement in "High Point" stories, $t=6.59$, $p<.05$, and status/victory themes in "Turning Point" stories, $t=4.39$, $p<.05$), but not communion, in their stories were related to higher scores on career decision making and exploration. As such, students who wrote about these themes indicated greater career decision-making and exploration than students who did not; differences in communion themes were not related to career decision-making or exploration scores. Inadequate power may explain the lack of additional thematic statistical findings.

23. Public College or Private Business? Virginia's Higher Education Problem

Samatha Bentley, Dept. of Political Science, with Dr. Elizabeth Kreydatus, University College

With the financial consequences of the Great Recession still impacting states heavily, Virginia's ability to economically support its 15 public higher education facilities has become a massive challenge. As Virginia pushes forward in its attempts to combat these outcomes, access to higher education should be at the forefront of their agenda. Equal access to higher education for all students in Virginia cannot be met through the state's current economic policies. The inadequate amount of money spent on funding for Virginia's public universities and student aid is only the beginning of the state's inability to sufficiently support its higher education programs. Research of Virginia's budget and policies regarding higher education shows a sharp decrease in the amount of state spending per full time student, ultimately hurting low-income and middle class student's ability to access higher education. Through a close examination of federally and state funded investigations of higher learning institutions, along with scholarly studies done by individuals and groups, such as the College Board, prominent in the field of education, I have found that within the state of Virginia, significant portions of Virginia's budget have been taken away from higher education over the past 20 years. This finding is in addition to Virginia's inability to fund the vast number of students entering college and the current amount of power Virginia's legislators and governor allow each university's board of visitors to have over their schools budget.

24. Cyber Terrosim

Rebecca Boamah, Dept. of Homeland Security and Emergency Preparedness, with Dr. Jason Levy, Dept. of Homeland Security and Emergency Preparedness

Cyberterrorism is increasingly becoming common in the popular culture, but a solved definition of the word seems difficult to come by. The phrase is loosely defined, though there is an enormous of subjectively in what exactly initiate cyberterrorism. As experts and government organizations attempt to define cyberterrorism, it has become more logically, definition is made by study and attributes of terrorism and terrorist events that had happen. Government Agencies like, the Federal Bureau of Investigation (FBI) defines terrorism as the

unlawful use of force or violence against persons or property to intimidate a government, create fear in the civilian population, or any segment thereof, in furtherance of political or social objectives(Sproles & Byars). Finally, there is a new view of cyberterrorism , that has on the way in which one should build one's defenses. However , the federal government has taken precaution to enhanced its own computer security and promote the private sector to also implement stronger computer security policies and practices to reduce infrastructure vulnerabilities.

25. Detecting Changes in Coherence in Trauma Narratives Using Latent Semantic Analysis

Rose Bono, UROP Summer Fellow, Dept. of Psychology, with Dr. Scott Vrana, Dept. of Psychology

Repeatedly writing about a traumatic event can be therapeutic. This may be due to fuller cognitive processing of the traumatic memory. Greater written coherence, or the degree to which ideas relate to one another within a document, is one potential marker of cognitive processing. This investigation set out to determine how assigned writing topic affects coherence in a set of personal narratives (n=246). Participants were asked to come into the lab three times to write about either their daily activities (neutral condition) or the most traumatic event of their lives (trauma condition). The resulting narratives were submitted to a program called Latent Semantic Analysis (LSA), a corpus-based method of detecting meaning from text based on the interrelationships of all words in a series of documents. LSA can assign ratings of textual coherence similar to those of human judges and was used to analyze how the coherence of these narratives changes over the course of three 20-minute writing sessions. An ANOVA revealed that neutral narratives were more coherent than trauma narratives overall, but that from the first session to the third session, neutral narratives decreased in coherence while trauma narratives increased in coherence. This meaningful increase in coherence for trauma narratives suggests that participants were cognitively processing the trauma between writing sessions, creating a consistent and intelligible mental representation of the event. This may be a mechanism by which expressive writing about a traumatic event produces mental and physical health benefits.

26. Rainwater Catchment System

Katelyn Boone, Lucas Potter, Kristina Kelly, Viktoria Pretzman, Chris Haggerty-Hoff, Dr. Anthea Pepperl, Dr. James T. McLeskey, Dr. Michael Stevens, VCU School of Engineering

Access to clean drinking water is one of the principle health needs faced by people living in rural Honduran communities. In a survey done by Virginia Commonwealth University's Global Health and Health Disparities Program (GH2DP), in one rural community (Lomitas) only 22% of respondents (11/50) had access to private water faucets. The majority of respondents obtained their water directly from the river (62% or 31/50). According to GH2DP's microbial testing, the river does not meet the drinking water standards set forth by the World Health Organization (WHO).

VCU's chapter of Engineers Without Borders (EWB) has created a rainwater catchment system to allow individual households in Lomitas to collect clean drinking water that meets or exceeds the drinking water standards set forth by the WHO. The goal is to deploy a system that can be set up and maintained by local inhabitants without extensive training. This novel, clean-drinking water apparatus is sustainable and comprised of inexpensive and readily available materials such as tarps, water hoses, PVC pipes, and PET bottles. We are currently studying

the rigor of our rainwater catchment system through exposure to several extreme environmental conditions, through assessment of possible microbiological hazards, and through the determination of potential effectiveness for rural communities with sufficient rainfall.

27. Critically Ill Patient's Stimulation Over Time: Effect on Sedation in the Mechanically Ventilated Patient

Tenesha Bottoms, UROP Summer Fellow, VCU School of Nursing, with Dr. Mary Jo Grap, VCU School of Nursing

The vast majority of mechanically ventilated (MV), critically ill patients receive sedative therapy to promote patient comfort by attenuating the anxiety, pain, and agitation associated with mechanical ventilation.¹⁻⁵ Although sedatives are among the most frequently prescribed drugs in intensive care,⁶ the achievement and evaluation of optimal sedation remains a clinical challenge. Effectively identifying the appropriate level of sedation enables clinicians to administer sedatives to the desired clinical effect while minimizing the risk of excessive or inadequate sedation. The goal of this study was to describe the number and type of stimulation events and the effect of stimulation on the level of sedation in mechanically ventilated patients. In this study, we determined whether the goals of sedation of 103 subjects in VCU Medical Center intensive care units were being achieved over time including during the times of stimulation. A pilot study was conducted to identify and categorize stimulation events in the mechanically ventilated population and included any type of patient stimulation (auditory or tactile) by any person (health care provider, family, other visitors, etc). The level of sedation was measured through the Richmond Agitation Sedation Scale (RASS), an intermittent sedation scale, and the Patient State Index (PSI), a continuous EEG-based system. In this study, 103 subjects were continuously observed up to 4 hours for a total of 348 observed hours. Of the total observation time, the subjects were stimulated for a total of 205 hours or 59% of the time. The distribution of baseline RASS scores indicated that subjects were moderately/deeply sedated (n=25, 37%), alert/mildly sedated (n=36, 54%) or restless/agitated (n=6, 9%). Information from this study will help us understand the relationship of sedation to achievement of sedation goals as well as factors that affect achievement of sedation goals. Eventually, information we obtained will allow us to establish optimal sedation evaluation techniques that will enhance clinical decision making resulting in optimal sedation for each patient.

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28. Automobile Computer Systems and Cyber Security

Kevin Brooks, Dept. of Homeland Security and Emergency Preparedness, with Dr. Jason Levy, Dept. of Homeland Security and Emergency Preparedness

Recently, The National Highway Traffic Safety Administration (NHTSA) passed a mandate stating that by the year 2025, all vehicles will be required to be equipped with “crash avoidance technology.” The NHTSA announced that “it will begin taking steps to enable vehicle-to-vehicle (V2V) communication for cars and light-duty trucks” (Printz, 2014). This technology, Vehicle-to-Vehicle (V2V), will be used as a tool for crash avoidance so that a vehicle’s computer system will have intelligence as to where all cars within a certain radius are on the road by vehicles exchanging basic data “such as speed and position. The system would then warn a driver of a possible collision” (Printz, 2014). The NHTSA claims that “when fully implemented, V2V could prevent roughly 5.1 million accidents a year and save 18,000 lives” (Printz, 2014). Another technology that will be implemented in vehicle computer systems is Vehicles-to-Infrastructure (V2I), where the car’s system will communicate with traffic lights and signals and tell the driver when to stop in order to prevent accidents at intersections. This is extremely relevant to cyber security because of how computer systems will open up cars and outside sources to criminal behavior, such as car hacking and corruption of software for uses of terrorism. The task of preventing cyber terrorism can be done by securing systems with hardware and software protection and installing intrusion detection systems. This should be brought to cyber security professionals’ attentions so that there is a solution to car hacking before 2025, when all vehicles will be equipped with this technology.

29. Characterization of Metal Transport by the Streptococcus sanguinis Endocarditis Virulence Factor SsaB

Sarah Brusko, Dept. of Biology, with Dr. Todd Kitten, Philips Institute of Oral and Craniofacial Molecular Biology, Virginia Commonwealth University School of Dentistry

Streptococcus sanguinis, present in the biofilm colonizing human tooth surfaces, may be beneficial in the oral cavity, though it also serves as a causative agent of an extra-oral disease, infective endocarditis. Previous mutagenesis of lipoprotein genes from *S. sanguinis* strain SK36 identified the SsaB gene as necessary for virulence in a rabbit model of endocarditis. Based on homology, we suspected that SsaB was a metal transporter. A procedure utilizing inductively coupled plasma optical emission spectrometry was optimized and implemented for

determination of the concentrations (μg metal per mg of cellular protein) of 17 metals in SK36 and *ssaB* mutant cell lysates. Data revealed that the *ssaB* mutant reproducibly accumulated lower concentrations of both manganese and iron, but showed no significant difference in accumulated concentrations of magnesium, or any of 14 additional metals for which there were standards, or in signal intensities for 60 other elements analyzed for which there were no standards. This data suggested that SsaB binds both manganese and iron to facilitate transport. When grown in brain-heart infusion (BHI) broth, both strains accumulated more iron than manganese. To assess whether this was due entirely to the higher concentration of iron relative to manganese in BHI broth, SK36 and the *ssaB* mutant were grown in all-purpose tween (APT) broth, rich in both metals. Both strains accumulated more manganese than iron in APT broth. Higher accumulation of manganese in APT broth compared to BHI broth for both strains suggested that manganese is accumulated through both SsaB-dependent and SsaB-independent mechanisms. Relative cellular abundance of iron and manganese in *S. sanguinis* varies dramatically depending on relative abundance in the growth medium, highlighting the importance of using physiologically relevant media in future studies. This data also implies that *S. sanguinis* is flexible in its metal requirements and is rather efficient in sequestering iron, which would otherwise react with cellular hydrogen peroxide to produce DNA-damaging hydroxyl radicals.

30. Epilepsy: Distinguishing Medicine from the Divine

Alexa Buchin, Dept. of Art Foundation, with Prof. Faye Prichard, VCU Honors College

Epilepsy is historically connected with divine or psychotic factors, discouraging epileptics from seeking or receiving the proper medical treatment. Uncovering neurological correlates of religious experience is aimed at separating normal religiosity from hyper-religiosity as a symptom. Finding an answer to this problem would have larger implications on the separation of medicine and religion, giving patients the treatment they deserve. What neurological correlates with supernatural experience are suggested by studies involving temporal lobe epilepsy, and how does this research help to separate normal religiosity from hyper-religiosity as a symptom? It is important to draw a line between medicine and religion, and while this line cannot yet be definitely drawn, brain imaging has begun to locate supernatural experience within the brain. Studying temporal lobe epilepsy can help to distinguish between normal religiosity and hyper-religiosity. I examined the history of epilepsy, finding that the progress of science was hindered by epilepsy through the lens of the church and magical medicine. Other studies found parts of the brain associated with religious/supernatural experience; the temporal lobe, frontal lobe, parietal lobule, superior frontal gyrus, and limbic system have been found to play key roles in this phenomenon. These findings helped to define Geschwind syndrome, a personality disorder in a subgroup of temporal lobe epilepsy patients. Treatment for epilepsy has become more medically based, but because of stigmas surrounding hallucination and seizures some patients still don't get the treatment they need. The implications of this research are leading to new ways to separate medicine and religion, which will be positive for the progress of science.

31. Peptide Permeability

Joseph Bungard, UROP Summer Fellow, Dept. of Chemistry, with Dr. Matthew Hartman, Department of Chemistry

Peptides are chemical compounds composed of amino acids. Most peptides, however, are cell impermeable due to the incompatibility of their polar backbone with the selectivity hydrophobic

cell membrane. Peptides can be promising drug candidates, but their cell impermeability is a key drawback. A promising peptide that is permeable is cyclosporine, which is used to prevent organ rejection after a transplant. Despite its polar character, cyclosporine achieves its permeability through the formation of intramolecular hydrogen bonds within the membrane. Using cyclosporine as a guide, we propose that one means to “hide” the hydrophilic peptide backbone is through the creation of intramolecular hydrogen bonds. The best way to do this is to promote the peptide to fold into one of its secondary structure elements. These intramolecular hydrogen bonds will enhance the hydrophobicity of the peptide. In order to correlate the peptide secondary structure with permeability, an arginine-rich peptide will be synthesized and cyclized with two different, but matched, linkers. The first linker will be a trans stilbene linker which is predicted to be incompatible with the helix formation. The second linker used will be a dihydrophenanthrene linker that should promote the helix formation of the peptide due to its smaller end-to-end distance.

32. The Republic of the Philippines: Epidemiology and Epigenetics

Alexander Burkard, Dept. of Biology, Dr. Richard Harrington, Dept. of Anthropology

This study will provide a broad overview of the current healthcare and demographical status of the Republic of The Philippines. Additionally, the environmental and socioeconomic cues and stressors that may underlie potential epigenetic change within the present population will be addressed. The demographics of religious distribution, mortality, socioeconomic status, as well as healthcare accessibility and practice will be central in this investigation, as they will collectively contribute to provide firm causation or rejection in the identification of possible epigenetic change among those in the population of the Philippines.

34. The USSR's Role in Imbalanced Sex Ratios at Birth and Human Trafficking in the South Caucasus

Abigail Burns, Dept. of Economics, with Prof. Mary Boyes, VCU Honors College

Since 1990, the population of the South Caucasus has exhibited abnormally high sex ratios at birth (SRB), with male births exceeding female births. In the same period of time, human trafficking in South Caucasus has also increased, particularly in the capitals and major cities of Armenia, Azerbaijan, and Georgia. While the two phenomena have been compared and researched together in other regions of Asia, there is a lack of research on the relationship between imbalanced SRBs and human trafficking in the South Caucasus. After analyzing the relevant research, the two phenomena were discovered to be distinctly correlated. By means of economic collapse and reinforced traditionalism, the withdrawal of the USSR became the key link between human trafficking and imbalanced SRBs in the three countries. Specifically, the conditions created caused a deepening of discriminatory practices against women, which fuel both imbalanced SRB and human trafficking. The evidence for this strong correlation between human trafficking and imbalanced SRBs suggests a greater relationship between the two, which, with more research, may prove that imbalanced SRBs cause increases in human trafficking. If this is the case, the discovery will not only change how local governments address both issues but also how other nations affected by the same phenomena handle them.

35. Have I Made My Point? Using Experimental Archaeology Techniques within a Behavioral Archaeology Framework to Examine how Man Relates to His Environment

John Bush, Dept. of Anthropology, with Dr. Bernard Means, Dept. of Anthropology

For this project, I intend to construct stone projectile points and knives (PP/Ks, commonly referred to as “arrowheads”) using technology and materials that would have been available to pre-contact populations in what is now the Commonwealth of Virginia. I will be using raw materials that I collect (and/or trade for) myself in an effort to illustrate how man interacts with his natural and cultural environment. I am not planning to replicate a specific point type, nor is this project intended to examine every aspect of lithic tool manufacture; but rather to serve as a discussion of Behavioralist theory.

36. Susurrations of the CCC: Using Anecdotal Evidence to Locate Structural Deviations from Official Civilian Conservation Corps Camp Site Documentation

John Bush, Dept. of Anthropology, with Dr. Bernard Means, Dept. of Anthropology

For this project, I will be exploring the use of anecdotal evidence (oral histories), and primary documents (interviews and photographs), in identifying sites that may not be part of a location’s official history. Specifically, I intend to use this information to physically locate the site of a boxing ring built within the Civilian Conservation Corps (CCC) camp at what is now Pocahontas State Park in Chester, Virginia. Using the boxing ring as an example, I intend to show how flexible this research method can be, and how it can be used at other locations and in other contexts. I also intend to show how the use of these sources can aid in explaining unexpected finds in the Archaeological record.

37. A Survey of Theory in Near Eastern Archaeology

Vincent Cason, Dept. of Anthropology, with Dr. Bernard Means, Dept. of Anthropology

The Near East has a long standing relationship with archaeology due to the rich history of human culture in the area. It is safe to say that you would be able to find an interpretation of the archaeological record in this region based in just about any theoretical approach. My poster will investigate a few of the predominant theories that are used. I will investigate approaches used in the past, contemporary theories, and theories that seem to be on the horizon or the fringes at the moment. I hope that this will give me a perspective that had not occurred to me on an area in which I wish to pursue further study.

38. The Alcohol Flush Reaction: Alcohol Consumption and Change in Threshold Level and Risk for Hypertension

Vivian Chan, Dept. of Chemistry, with Prof. Mary Boyes, VCU Honors College

This study examines the relationship between alcohol flush reaction and hypertension. The alcohol flush reaction, more commonly referred to as the “Asian flush” or “Asian glow,” occurs in individuals with a deficient ALDH2 enzyme (ALDH2*2). Alcohol is mainly metabolized by two

major enzymes: Alcohol dehydrogenase (ADH) and aldehyde dehydrogenase (ALDH). ADH oxidizes ethanol into acetaldehyde. ALDH converts acetaldehyde to acetate which is then broken down into water and carbon dioxide. Because the inactive ALDH2 enzyme prevents toxic acetaldehyde from oxidizing into non-toxic acetate, it leads to a rapid accumulation of acetaldehyde in the bloodstream. Acetaldehyde causes the release of histamine which leads to the alcohol flush reaction. Individuals who experience the alcohol flush reaction after alcohol consumption are at a higher risk for hypertension because the excessive acetaldehyde buildup increases the risk for liver damage and cirrhosis which leads to portal hypertension. The accumulation of acetaldehyde can also lead to mutagenesis and fibrogenesis of the liver. Sustained fibrogenesis can lead to cirrhosis which is known to cause portal hypertension. Portal hypertension is an increase in the pressure within the portal vein. The increase in pressure is caused by a blockage in the blood flow through the liver. Understanding the relationship between alcohol flush reaction and hypertension is important in better understanding the risks of drinking and its effect on blood pressure for individuals with an inactive ALDH2 enzyme.

39. The Evaluation of the Measurement of Myeloperoxidase in Human Serum

Rhonda Chapman, UROP Summer Fellow, Dept. of Clinical Laboratory Sciences, with Lara U. Mabry, M.S., MLS(ASCP)^{CM}, Dept. of Clinical Laboratory Sciences

Free myeloperoxidase (MPO) is targeted as an analyte for the evaluation of a patient's risk of cardiovascular disease (CVD). In this study, precision and method comparison studies were conducted as part of the validation process. Fresh and frozen serum samples from seven volunteers were analyzed both quantitatively and per activity. The goals of the project were to assess the potential difference between the measured MPO concentration in fresh serum versus frozen serum specimens, to evaluate the potential effects of freezing during specimen processing on MPO activity, and to validate assay precision. MPO was evaluated functionally using the MPO Colorimetric Activity Assay Kit produced by Sigma Aldrich®. MPO was analyzed quantitatively using the Quantikine Elisa Kit produced by R&D Systems®. A significant decrease in serum MPO activity was observed in frozen specimens. A significant increase in serum MPO concentration was found in frozen specimens, warranting further investigation of interfering substances. The Quantikine Elisa assay was more reliable at higher concentrations than at lower concentrations. Based on the findings, it was suggested that the best specimen type for analyzing MPO activity is fresh serum. Additional studies are warranted to further investigate interfering substances with the Quantikine Elisa assay kit.

40. Enhanced Single Molecule Mass Spectrometry Via Charged Metallic Clusters

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Water-soluble metallic clusters have been used for a number of important applications. One of the most stable clusters is Au₂₅(SG)₁₈, which are negatively charged in solution and highly

monodisperse making them ideal for characterization and analysis applications. We present here a new application where these clusters are shown to increase the mean residence time of polyethylene glycol (PEG) molecules within an alpha hemolysin (αHL) nanopore. The effect appears over a range of PEG sizes and ionic strengths. This increases the resolution of the peaks in the single molecule mass spectrometry (SMMS) current blockade distribution and suggests a means for reducing the ionic strength of the nanopore solute in the SMMS protocol.

41. Politics of the Cigarette: Smoking, Health, and the Surgeon General

Joanne Chiao, UROP Summer Fellow, Dept. of History, with Dr. Emilie Raymond, Department of History

Introduction: Cigarettes have had a long and checkered history with regards to the regulations on its advertising and labeling. Cigarette consumption reached an all-time national high in the early 1960s. As scientific articles establishing the linkage of cigarette smoking and cancer gained ground, the public questioned whether the personal choice was a hazardous one. From an appointed committee of experts led by United States Surgeon General Dr. Luther Leonidas Terry (1961-1965), came one of the first large-scale initiatives to curtail the power of American Tobacco in the name of American Health, the 1964 *Smoking and Health: Report of the Advisory Committee to the Surgeon General of the Public Health Service*.

Purpose and Method: The purpose of this research study was to investigate the tobacco labeling controversy with respect to the backdrop of the 1960s and the leading role of Dr. Terry. With an emphasis on primary source analysis, this brief study utilized sources from the *New York Times* (1960-1967), books, public service announcements (comic), and government publications (legislations, proceedings, documents). Secondary sources on the Presidential contexts of the 1960s, the tobacco industry, and cigarette policy-making were incorporated and placed findings in relation to the politics of its time.

Results and Conclusion: The historical narrative showed Dr. Terry as an expert political advocate, spokesperson, and instigator in changing the nation's perspective towards cigarette health. Primary sources revealed a substantial degree of media support for Dr. Terry's efforts as opposed to Presidential support. When analyzed against secondary sources, findings showed that presidential focus on economics (Kennedy) and later, the Great Society and Vietnam War (Johnson) provided Dr. Terry a unique opportunity to use federal powers to shape the image and influence of the Office of the Surgeon General and the Public Health Service. As a public official, his development and promotion of the Report's position against cigarettes established a position for the Federal government and brought about the first Congressional step towards more stringent cigarette labeling regulations in the form of the 1965 Federal Cigarette Labeling and Advertising Act. Dr. Terry's achievements indicated a shift in the power of the public health sector in shaping the health conscience of Americans. His 1964 Report would be the first of many health related evaluations published by the Office of the Surgeon General and represented the beginning of a lasting legacy of the Surgeon General role as a premier public health informant and educator of the American public.

42. History of the Patient's History: Exploring Origins, Developments, and Debates of the Art of Clinical Case-Taking.

Joanne Chiao, UROP Summer Fellow, Dept. of History, with Dr. Karen Rader, Department of History; Science, Technology and Society Program

The development of patient-centered and narrative medicine in the late modern era transformed interactions between western medical doctors and sick people: the healing process, formerly the expertise of the physician, now involved treating not just the illness, but interacting in more complex ways with the whole individual. This limited study focused on the *Journal of the American Medical Association* (JAMA) publications in the 20th century and examined various historical relationships between and among patient medical history-taking and the patient narrative including relationships with medical education reforms, diagnostic technology, information technology, and medical science knowledge. These categories and variables, when compared to various historical contexts, provide greater insight on both past and contemporary patient-doctor interactions of the U.S. practice of medicine. For the physician, personal “illness narratives” initially were treated as the gathering of “raw data,” in the form of the patient’s medical history, but later came to be viewed as facilitated by the quintessential medicinal art—the “art” of medical history-taking.

43. Ruling Theory Applied at the Beaufort Inlet Shipwreck

Carson Collier, Dept. of Anthropology, with Dr. Bernard Means, Dept. of Anthropology

Ruling theory is when a hypothesis is so attractive that researches may consciously or unconsciously record data in favor of the attractive hypothesis. Ruling Theory can be applied in many fields, including archaeology (Railsback, 1990). An example of an archaeological site applying the Ruling Theory is the Beaufort Inlet Shipwreck. On November 21, 1996 a team of investigators from Intersal Inc. discovered an 18th century shipwreck about a mile and a half off of the coast of Beaufort Inlet. Shortly after discovering this ship the question of this ship being the Queen Anne’s Revenge, Blackbeard’s flagship, started to arise. Today many communities on the Outer Banks like Ocracoke Island use the Queen Anne’s Revenge to attract tourist. Is the Beaufort Inlet Shipwreck really the Queen’s Anne’s Revenge? Or have researches been too hasty when gathering their information about the Beaufort Inlet Shipwreck?

44. Morphometrics, Projectile points, and Archaeology, oh my!

Natasha Cote, Dept. of Anthropology, with Dr. Bernard Means, Dept. of Anthropology

I plan to explore the validity and use of morphometric techniques in archaeology and 3-D scanning technologies. I will focus on the morphometrics of projectile points found in prehistoric North American sites. Morphometric is relatively new in the world of archaeology, thanks to recent technologies. With these advances the question is proposed; does morphometric provide any substantial information to archaeologists besides detailed and precise measurements, and can this information help us to gain deeper knowledge and insight into patterns or trends? Any patterns, gradual changes, variations, and similarities between projectile points throughout North America can be used to better understand a larger cultural context behind the making and use of projectile points. Throughout my research I plan to attempt to answer these questions and see if morphometric can really allow a better understanding of projectile point findings in North American sites.

45. THE ROLE OF GABRA2 ON ILLICIT DRUG USE FROM PEER DEVIANCE AMONG COLLEGE STUDENTS

Alanna Davis, Dept. of Biology, with Dr. Danielle Dick and Amy Adkins, Virginia Institute for Psychiatric and Behavioral Genetics

Spit for Science is a project that collects data from the students of Virginia Commonwealth University in order to understand how genetic and environmental factors play a role on the advancement of issues that arise from illicit drug use, other substances, and emotional health. Illicit drug use, which can be defined by illegally using drugs for purposes other than their prescription, has been on the rise among college students. These students' peers may play an environmental role in terms of exposure. Genetically, the GABRA2 gene in humans has been found to be associated with alcohol and drug dependence and may increase the likelihood of dependence if students are exposed to these substances over a period of time. VCU freshmen over the age of 18 were invited to participate in a survey in the Fall of 2011 and each subsequent Spring which collected information on their past deviant behavior, their drug use before and during attendance at college, and a survey of what types of drugs they may have tried. A sum score was compiled based on whether or not they had tried drugs in any 5 categories (cannabis, cocaine, opioids, sedatives, and stimulants), giving a potential score between 0 and 5. Students could also provide a saliva sample. Genotypic data was linked with survey responses and GABRA2 alleles were examined for a relationship with use of illicit drugs. A linear regression was run in order to map the relationship between GABRA2 variation, illicit drug use and peer deviance. Overall, the importance of this study is for preventative measures between incoming and returning college students and drug use. In order to improve the quality of help for students who may be recovering from illicit drug abuse, or for colleges to develop programs with better preventative strategies, it is important to understand the environment in which GABRA2 is exposed to.

46. Synthesis of cisplatin & biological testing of the complex, compared to triplatin (BBR3464)

Heba Dawood, HSURP Award Recipient, Dept. of Biology, with Dr. Nicholas Farrell, Dept. of Chemistry

Two chemotherapy drugs were studied; one of them is cisplatin that is currently used to fight cancer and the other is triplatin (BBR3464) that was developed by Dr. Farrell. The chemotherapy drug, cisplatin, was synthesized and many different experiments were conducted such as: Recrystallization, Infrared Spectroscopy, UV-VIS, Melting Point, and Fluorescence experiment. After synthesizing the drug, it was tested in biology lab; we tested the effects of the drug on ovary cancer cells and its ability to kill cancer cells. A cisplatin MTT ASSAY experiment was done and another MTT for Triplatin was done. Results from both of the experiments were compared and it was concluded that triplatin is able to kill cancer cells more effectively and at lower concentrations than cisplatin.

47. Alternative Spinal Fusion Fixation Rod Materials: Polyetheretherketone, Nitinol and Silicon Nitride

Erik Dekelbaum, Dept. of Biomedical Engineering, with Prof. Mary Boyes, VCU Honors College

Titanium and its alloys are the most commonly used spinal fixation rod materials because of their biocompatibility, stability, and endurance. However, the stiffness, or elastic modulus, of titanium is much higher than that of cortical bone. When the spine is supported by titanium rods, most of the loading force is transferred from the anterior spinal column to the instrumentation. This can cause adjacent segment degeneration (ASD), in which the spinal segments adjacent to the instrumented segment or segments experience increased force loading and begin to deteriorate. Through analysis of various studies, polyetheretherketone (PEEK), nitinol, and silicon nitride were found to be possible alternative spinal fusion fixation rod materials to titanium. To determine which of these materials is most suited for use as a spinal rod material, the osteointegration, current commercial availability, stiffness, reinforcing material, corrosion resistance, and clinical efficacy of each material was analyzed. Although silicon nitride had strong osteointegrative properties, no testing could be found evaluating the material as a spinal fusion rod, indicating its current commercial unavailability. Even though nitinol was determined to have better osteointegrative properties than PEEK, PEEK has an elastic modulus close to bone, a reinforcing material, carbon, that allows for customization of the elastic modulus, no risk of corrosion, and strong clinical results. By implementing PEEK fixation rods in spinal fusion surgeries instead of titanium rods, the incidence of ASD may decrease as well as the risk of rod corrosion.

48. Indigenous Rights and the Guatemalan State

Dylan DeWitt, Dept. of Political Science, with Dr. Jason Levy, Dept. of Homeland Security and Emergency Preparedness

The Maya of Guatemala have managed to maintain socio-political institutions of their own despite constant outside pressure aiming to destroy their way of life. Following a civil war that engulfed the nation for thirty-six years, the Guatemalan state signed a number of international treaties that were meant to institutionalize the rights of their indigenous peoples. These treaties are meant to promote the political inclusion of the Maya, but they have remained powerless nonetheless. To explain why these treaties and the resulting political inclusion have failed to promote the political autonomy of the Maya, I have surveyed vast amounts of political and anthropological research. I also traveled to the Western Highlands region of Guatemala with Highland Support Project and VCU in December 2013 to gain greater insight. I have concluded that the failure of the treaties to promote the political power of the indigenous political institutions stems from the nature of the Guatemalan state itself. Attempts to promote political inclusion of Mayan individuals have undermined the political authority of indigenous institutions because the state has institutionalized private property rights, which directly conflicts with the communal nature of property that partly legitimizes the Mayan institutions. This conclusion can lead us to question or refine any understanding of a proper balance between political inclusion and autonomy when discussing indigenous rights.

49. Do egg size and parental care influence nestling personality in PROW?

Jenna Dodson, UROP Summer Fellow, Dept. of Environmental Studies, with Dr. Lesley Bulluck, Dept. of Biology

Animal personality is defined as consistent expressions of an individual's behavior when exposed to stressful conditions. Avian nestling personality traits can be determined through simple stress handling tests that measure breath rate and docility. Individuals with lower measures tend to be more bold and aggressive adults, traits that are correlated with increased fitness. Other developmental factors that correlate with increased fitness include egg size, parental provisioning rates, and body condition. The objective of this project was to determine

if there is a relationship between handling stress and: egg size and parental provisioning in the migratory songbird, Prothonotary warbler (PROW). This research focused on a long-term study of a prothonotary warbler population nesting in boxes along the Lower James River. Detailed morphometric data were collected for the eggs and nestlings throughout the breeding season with regular nest checks. Nestlings were weighed and banded when they were 5-6 days old. Just prior to banding, simple docility and breathing rate stress tests were conducted. Video recordings of parental provisioning were completed and used to determine the feeding rate of each nest. No relationship was found between egg mass and the breath rate or docility stress measures. There was also no relationship between rate of provisioning and stress measures. However, there was a relationship between nestling body condition (nestling mass adjusted for age) and breath rate. It is known that larger nestlings have higher survival probabilities, and our results suggest that this relationship may not only be the result of higher body condition, but also of underlying personality differences.

50. The relationship between Facebook, other social networking sites, and the rising level of narcissism seen in the Millennial generation in America

Savannah Drake, Dept. of Chemistry, with Prof. Faye Prichard, VCU Honors College

Social Networking Sites (SNS) have become increasingly popular in America with roughly 120 million Americans accessing Facebook at some point during each day. Though SNS are popular with many demographics, they are most popular with the current generation, the Millennials. The Millennial generation is composed of all people born in the period right before the new Millennium and afterward. Anyone who was of college age in the 2000's is a Millennial, and it is in that time period, from 2000 to 2009, in which samples of college age cohorts in the United States saw a very obvious drop in their dispositional empathy. Since 2000, there has been a sharp decline in two types of empathy, empathetic concern and perspective taking, in college age samples. These two types of empathy negatively correlate with narcissism, meaning that a rise in narcissism would be an effect of this decline in empathy. The type in sharpest decline, empathetic concern, most negatively correlates with exploitative and entitlement narcissism. Could this drop in empathy and subsequent rise in narcissism seen in the Millennial generation be caused by social networking sites? In order to answer my question, I analyzed several studies involving the relationship between social networking sites and human behavior. Many of these studies point to a definite presence of narcissism in the Millennial population of America today. These studies surveyed a variety of people and correlated their frequency and type of SNS use with their level of narcissism. One of these studies in human behavior examined which types of narcissists among college students use SNS and found that exhibitionism, exploitative, entitlement, and superiority narcissists are the most prevalent types found using SNS sites. Many psychologists believe the decline in empathy and subsequent rise in narcissism can be attributed to SNS, as these sites include very inwardly focused activities in a superficial environment that encourages narcissism. Exploitative and entitlement narcissists are the same types of narcissists that negatively correlate with the main type of empathy in decline, showing that the same types of narcissists that are attracted to and use SNS are the very types that are present in such a decline of empathy. SNS could very well be fostering these types of narcissistic individuals, causing the trend of declining empathy in today's Millennial generation. However, since SNS first appeared during the decline in empathy (2000-2009) rather than beforehand, many psychologists studying the relationship

between narcissism and SNS did not believe any relationship would exist between their findings and the decline in empathy. Much research now exists, though separately, that suggests there is a connection between the two. More research involving the specific types of narcissism that correlate with empathetic concern declination is needed.

51. Metastable Vapor in Janus Nanoconfinement

Driskill, Joshua; Vanzo, Davide; Bratko, Dusan; Luzar, Alenka

Department of Chemistry, Virginia Commonwealth University, Richmond VA

We study the fluctuation between liquid and vapor states of water confined between different surfaces, where one is hydrophilic and the other hydrophobic (Janus Interface). A mean field approximation and Molecular Dynamics simulations (MD) was used to show that vapor bubbles can persist in a metastable state. The metastable confined vapor has not been anticipated, due to the well-known metastability of liquid in confined evaporation, when entrance doesn't involve the formation of liquid-vapor interfaces. In the Janus Interface, we show that the liquid-vapor interface's area passes through a maximum upon entrance of the pore. We present results for a prototypical nanopore made of a pair of disk-like plates with a diameter of 84 Å, with the hydrophilic plate having a contact angles between 45-75°, and a superhydrophobic plate near ~150° due to its nanoscale corrugation pattern. At 15 Å separation distance, metastable vapor survives all simulation times when the hydrophilic plate contact angle is greater than or equal to 70°. The calculations of the energy barrier position are still under way. The new attractive mechanism could be important by enabling adhesion between polar and non-polar particles in biophysical and heterogeneous nanomaterials.

52. Yoshitoshi Tsukioka's New Forms of Thirty Six-Ghosts--Folklore in Art as a Cultural Critique on Japan's Modernization

Kate Duggan, Dept. of Art Foundation, with Prof. Mary Boyes, VCU Honors College

During the Meiji period, 1869-1912, Japan underwent rapid political and cultural changes as a result of modernization. Yoshitoshi Tsukioka's 1888-1892 *ukiyo-e*, traditional woodblock prints, in the series *New Forms of Thirty Six-Ghosts* expresses a subtle cultural critique on the Meiji State's scientific ideology through a use of traditional folklore. This series displays a connection between *yōkai*, supernatural spirits, and the identity of rural Japanese populations. The Meiji State's attempts at cultural homogenization were a threat to traditional Japanese folk beliefs. Although the Meiji State was interested in preserving visual Japanese tradition, the government worked to remove beliefs that contradicted Western science and rationality. Through the examination of peer-reviewed scholarly journals and academic books, the hypothesis may be made that folklore is more prevalent among rural lower-class populations in times of political strife and cultural change because folklore offers a platform for anonymous social and political critique and represents unique cultural identities.

53. Examining the relationship between GABRA2 and alcohol use

Diana Duong, Dept. of Biology, with Dr. Danielle Dick and Amy Adkins, Virginia Institute for Psychiatric and Behavioral Genetics

Spit for Science is a study of how genetics and environmental factors come together to influence substance use and emotional health. This research is examining the relationship between genetic variation in *GABRA2* and alcohol use in the Spit for Science dataset. The sample (n=1004) was comprised of VCU students, 18 years of age or older, who enrolled at Virginia Commonwealth University in the fall of 2011. Students had the opportunity to complete a survey and then provide a saliva sample. In the spring of their first year at VCU, participants were asked "How often do you have a drink containing alcohol" with possible answer choices "never", "monthly or less", "2 to 4 times a month", "2 to 3 times a week", and "4 or more times a week." Nine single nucleotide polymorphisms (SNPs) were examined in the *GABRA2* gene. Regression analyses will be used to examine the relationship between frequency of alcohol use, variation in *GABRA2*, and the possible moderating effects of peer deviance. The hypothesis is peer deviance will impact the frequency of alcohol use in correlation with *GABRA2* variation. This research can lead to further research with different cohorts in different geographical locations.

54. Laissez Faire and Crime in America: Why one of the premier capitalist societies also has some of the highest rates of serial and mass murder

Kaitlyn Dykes, Dept. of Criminal Justice, with Prof. Jeff Lodge, University College

Between 1880 and 1990 approximately 25 serial killings occurred in England and Wales combined. Approximately 600-700 serial killings occurred in the United States during that same period (Jenkins, 213). This remarkable difference between the rate of serial killings in the United States and those in other developed nations may be explained through an understanding of capitalism and the social atmosphere that this economic model perpetuates. This paper hopes to illustrate this concept through an understanding that serial killings and mass killings are not a-cultural, but are influenced by society and that the inherent selfishness existent in American capitalism may be creating a society wherein serial killers and mass murderers are more numerous.

55. Establishing Realities of Independent Animation

Elise Neuscheler, UROP Summer Fellow, Dept. of Communication Arts, with Prof. Ying-Fang Shen, Dept. of Communication Arts

For the summer of 2013, I received a UROP fellowship that allowed me to explore the initial stages of conceptualization for animation. I was to take the recent young adult book, "The Evolution of Calpurnia Tate," to find out what comes between having a story and making an animated movie out of that story. The project took many unexpected turns, and ultimately revealed far more than I had initially hoped about the processes and requirements of animated storytelling. A major aspect of the development of an animated film is the study of the passage of time. This pertains to the physics of movement and the physics of storytelling; in many

thousands of frames (there are usually 24 frames per second in traditional animation), an animator must deliver a story, from the ripples of water to the building of punchlines. In the example of *The Evolution of Calpurnia Tate*, the challenge was to condense a meandering tale that takes place over months, that one might read over the course of weeks, into a story that could be presented in less than two hours. I once read, "animation is about killing your darlings," and I found that it was true. Condensing this story felt like squeezing all of the juice out of an orange until all it had left to show for itself was pulp and rind. Contributing to the "Pulp and Rind Animation Industry" has never been my intention, but during this project I began to see the intense difficulty that comes with the creation of a true quality product. The constant question was "what are the most important messages of this story?" Because of budgeting of an animated film, a large concern is what would and would not, literally, "make the cut." I have never had the opportunity to use that phrase literally, before, and it is less fun in reality than I'd imagined; EOCT is full of wonderful detail, a variety of characters and anecdotal moments, an unfortunately large amount of which would not "make the cut." Potential solutions, like creating a show instead of a movie, arose and were examined. (See LEGALITIES -Foot in the door- section) As these struggles went on, it became clear that my project would be focusing on the development of a theoretical product, that getting to the production of an animation, aside from some early pre-visualization, would not be possible. There was a lot to be learned about the field; the design that goes into kinetic/visual storytelling, and making one's way in the industry.

56. Behavioral Inhibition and Anxiety in Juveniles

Alexis Exum, Dept. of Psychology, with Dr. Roxann Roberson-Nay, Psychology and Dr. John Hettema, Dept. of Psychiatry

Behavioral inhibition is the relationship between the tendency to experience distress, and the level of withdrawal from unfamiliar situations, people, or environments (Fox et al., 2004). The Behavioral Inhibition System (BIS) measures one of the underlying systems of behavior. The goal is to gauge one's reactions to aversive motive, or the movement away from something unpleasant. Previous studies have examined the relationship between inhibition levels and anxiety or nervousness. Results have shown that adults who suffer from higher levels of anxiety or nervousness as measured by self-reports of nervousness (Carver et al., 1994) and the State-Trait Anxiety Inventory (STAI) (Newman et al., 1997) also report higher scores on the BIS. In the current study, juvenile twins aged 9-13 were asked to complete a variety of self-report surveys about their personality, interests, thoughts, feelings, and behaviors. At this time they completed the Screen for Childhood Anxiety Related Disorders (SCARED), which assesses various anxiety-related cognitions, emotions, and behaviors. They also completed the Behavioral Inhibition System/Behavioral Activation System (BIS/BAS) questionnaire, which measures behaviors/thoughts away from something unpleasant (inhibition) and behaviors/thoughts toward something desired (activation)(Carver et al., 1994). We will examine the relationship between scores on the SCARED and on the BIS portion of the BIS/BAS measure. We hypothesize that higher levels of anxiety or nervousness on the SCARED will positively correlate with higher scores on the BIS. This implies that children who have higher levels of inhibition are like to be more anxious overall. This has implications for further adjusting treatment and education when interacting with children who have higher levels of anxiety and inhibition, as opposed to those with lower levels of anxiety and inhibition.

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57. Investigating the relationship between genetic variation in GABRA2 and illicit drug use

Pascaline Ezouah, Dept. of Biology, with Dr. Danielle Dick and Amy Adkins, Virginia Institute for Psychiatric and Behavioral Genetics

Spit for Science: the VCU Student Survey aims to understand how genetics and the environment come together to influence substance use and emotional health of VCU students. The purpose of this study is to investigate the relationship between genetic variation in *GABRA2* and illicit drug use in the Spit for Science sample of Virginia Commonwealth University's Fall 2011 Cohort. Students were able to complete a survey and provide a DNA sample. For this study, it is hypothesized that there will be a relationship between *GABRA2* genetic variation and illicit drug use; with peer deviance as a moderator. To investigate this hypothesis, 9 single polymorphisms in the *GABRA2* gene will be analyzed in 1523 individuals in the cohort. In the survey, the students were asked about their use of five different drug categories: cannabis, sedatives, stimulants, cocaine and opioids. From the survey, a sum score was created, with a sum score of 5 indicating that the individual has used a drug in each category. Once the sum scores have been determined, a regression will be used to test this relationship. The results from this experiment can be used to introduce new programs at the University and also bring about a sense of awareness to the University and the student body, about the role the environment and genetic predisposition has on illicit drug use.

58. The Health Ramifications of Poorly Ventilated Cooking Areas in the Indigenous Populations of Guatemala

Bushra Ferdous and Elizabeth Keenan, Dept. of Biology, with Dr. Jason Levy, Dept. of Homeland Security and Emergency Preparedness

Guatemala is a Latin American country with a high level of social and economic inequality, which makes it problematic for people living in rural areas to receive standard health care. 40% of the population is composed of indigenous groups, which adds a cultural and linguistic dimension to systemic inequality. The majority of indigenous people in rural Guatemala currently cook in unventilated brick lodgings that prevent thick smoke from being released. Consequently, indigenous people suffer from severe respiratory health complications compounded by their lack of access to minimum health care facilities. The isolation and impoverishment of the region contributes to infrequent medical expeditions and makes it

difficult for indigenous people to travel to facilities for primary health care. Previous attempts at addressing cultural barriers and primary health care issues through reformative legislation have been ineffective. Indigenous people are in need of a cumulative approach that includes both Western and Mayan health remedies. In conclusion, mitigating the negative effects of smoke and systemic healthcare crisis in the highlands of Guatemala would require overcoming cultural, linguistic, economic, and geographical obstacles.

59. Creativity & Spirituality

Bobbi Finkelstein, Kaazim Hasan, Dept. of Psychology, with Dr. Richard Bargdill, Dept. of Psychology

As a class project at Virginia Commonwealth University, 8 undergraduate psychology students conducted a variety of qualitative research methods that investigated multiple dimensions of spirituality. Topics such as spirituality and callings, creativity, major life changes, near death experiences, solitude, surreal experiences, survivorship, and yoga were examined through collecting qualitative data. Student researchers focused on examining how different life experiences can be spiritual and used interviews, ethnography, unobtrusive measures, focus groups and historiography to collect data. Utilizing phenomenological and content analyses, themes such as reflection and psychological growth consistently appeared throughout the investigation and were considered fundamental to a spiritual experience. After conducting qualitative research, SR were able to confirm findings of previous research and uncovered new constituents to phenomenological knowledge of spirituality.

60. The Personality Traits of Cyber Terrorists

Amanda Floyd, Dept. of Homeland Security and Emergency Preparedness, with Dr. Jason Levy, Dept. of Homeland Security and Emergency Preparedness

According to the Federal Bureau of Investigations, “The CSIS has defined it (cyber terror) as the use of computer network tools to shutdown critical national infrastructures or to coerce or intimidate a government or civilian population”. Cyber terrorism is on the rise and costs the government and large corporations millions and millions of dollars in both manpower and technology. The United States has seen both their military programs be hacked along with the most trusted systems of our defense contractors. The risk of another large scale cyber-attack is imminent and there’s only a question of when, where and how much sensitive information will be compromised. The ways of carrying out these terrorist attacks are as diverse as the reasoning behind carrying them out. Who are these people behind this new age form of terrorism and what are their motivations for causing such technological destruction? This research will delve further into this question by exploring the varying personality types of known hackers and virus writers. Are there certain characteristics that are commonly displayed by these criminals? Is there a criminal profile that can be looked at in seeking out these criminals for prosecution? It is essential for our nation’s economy and security that the United States’ government keeps ahead of these criminals and their ever-evolving tactics. It is also increasingly more and more important to learn about these cyber terrorists and to learn from our past security breaches.

61. Prothonotary Warbler Feather Reflectance and Sexual Selection

Miranda Foster, Dept. of Environmental Studies, with Dr. Lesley Bulluck, Dept. of Biology

In many avian species, both females and males display colorful feather ornaments that in males are known to often signal individual quality and serve as the basis for mate choice. We do not know however, if the same applies for female birds. In this study, we investigated whether carotenoid content in female Prothonotary Warblers (*Prothonotaria Citrea*) feathers, a measure of feather quality, was correlated with annual reproductive success. Feathers from 130 female individuals over a period of four breeding seasons were collected and their reflectance was measured, along with data on annual reproductive success. We found a significant positive relationship between carotenoid content and number of young fledged, after accounting for the effect of nest initiation date, which is known to significantly influence annual reproductive success. We found that earlier and older females tend to fledge more young, but that all early arriving females are not the same. Among early breeders, the ones that go on to produce the greatest number of young have higher carotenoid content in their feathers. This same relationship was not found in later breeding females. This could indicate that males use female plumage as a signal to select higher quality females during the early portion of the breeding season when selection pressure is highest to choose a high quality mate.

62. After-School Programming for Youth: Adolescent Perceptions of Participation and Future Aspirations

Vanessa Fuentes, UROP Summer Fellow, Dept. of Psychology, with Dr. Elizabeth Goncy, Dept of Psychology, and Dr. Kevin Sutherland, School of Education

Introduction: Peer victimization and bullying are growing concerns in schools and surrounding communities. They are prevalent and disconcerting realities for many adolescents. Researchers who examine bullying and victimization have called for increased attention to the racial/ethnic composition of a school or community when examining the prevalence of these acts. Finding ways to promote inter-ethnic relationships may help maintain the safety of communities and schools. Youth Empowerment Solutions for Peaceful Communities (YES) is a community-level youth violence prevention program designed to engage youth and adults in carrying out community change projects created by youth. YES is grounded in empowerment theory, which states that youth violence prevention is most successful when youth are involved in the process (Zimmerman, 2000). While the literature supports that implementation of evidence-based programs combined with evidence-based instructional practices such as YES have resulted in positive effects for adolescents in school and community settings, addressing specific needs of schools and surrounding communities (e.g., cross-cultural bullying, ethnic discrimination from peers) and the sustainability of these EBP's has been of concern for preventative researchers and practitioners working to address these issues. This poster will represent the findings of a pilot study in which components of the YES program were used in the implementation of an after-school program for adolescents in a diverse, urban middle school that is part of a larger study examining the effects of a comprehensive, community-based intervention targeting reductions in youth violence exposure.

METHODS: In a pilot study 18 middle-school students, who demonstrated strong leadership skills, were nominated by teachers to participate in an after-school program directed towards building on these leadership skills and community empowerment skills. Building off of the success of the pilot study, the intention is to interview students (N = 14) participating in this year's after-school groups held this spring. Each interview will focus on understanding themes concerning cross-cultural bullying (e.g., personal experiences, personal perspective on the issue), future aspirations and goals, and leadership.

RESULTS: Responses will be coded into respective themes. Our intent is to examine students' self-reported ethnic or racial identity and its relation to personal goals and/or leadership expectations. The implications of our findings could suggest the importance of ethnic identity in prevention and intervention methods addressing bullying.

63. How Does Culture Affect Latino College Students' Mental Health?

Vanessa Fuentes, UROP Summer Fellow, with Jonathan Brooks and Adriana Rodriguez, Dept. of Psychology, with Dr. Rosalie Corona, Dept. of Psychology

Background: The rise in mental health problems among college-age students is a national concern. In a national survey of college students, over 50% reported symptoms of anxiety, while 31% reported difficulties with daily functioning as a result of depressive-like symptoms (ACHA-NCHA, 2011). Increased demands and responsibilities, living away from home, and lowered social support contribute to college students' mental health problems (Cleary et al., 2011). Cultural experiences such as acculturative stress (Katsiaficas et al., 2013) and discrimination (Huynh, 2012) may heighten mental health problems for racial/ethnic minority students. In this project, we explore whether cultural factors (i.e., ethnic identity; *familismo*) buffer the relation between acculturative stress, discrimination, and mental health outcomes in a sample of Latino college students.

Method: Participants consisted of 198 Latino young adults (18-25 years of age), with a mean age of 20.59 years (SD 1.77), 70% female, 78% born in the U.S., and 43% reported being first in their family to attend college. Participants completed the Multigroup Ethnic Identity Measure (Phinney, 1992); Mexican American Cultural Values Scale (*familismo* subscale; Knight et al., 2010); Riverside Acculturative Stress Inventory (Miller et al., 2011); Brief Perceived Ethnic Discrimination Questionnaire – Community Version (Brandolo et al., 2005); Patient Health Questionnaire (PHQ; *measures depressive symptoms*; Kroenke et al., 2001); and the Depression, Anxiety and Stress Scale (Lovibond, & Lovibond, 1995).

Results: On the PHQ, 70% of participants reported minimal to mild symptoms of depression and 15% reported moderate to severe depressive symptoms. Bivariate analyses revealed that age was not significantly related to any study variables; however, cultural factors (both risk and protective) were related to mental health outcomes. Specifically, *familismo* was negatively associated with mental health problems, whereas acculturative stress and discrimination were positively associated with mental health problems. Multiple regressions revealed that *familismo* moderates the relation between acculturative stress and mental health problems, with higher levels of *familismo* serving as a protective factor against the effect of acculturative stress on depression, anxiety, and stress symptoms.

Conclusion: Our findings highlight the importance of helping Latino college students remain connected to their family values as a way of promoting mental health. The implications of these findings can inform the development of more culturally competent prevention programs.

64. Simulation as an Assessment of Core Critical Skills for First Year Medical Interns

Charlene Gaw, Dept. of Chemistry, with Dr. Moshe Feldman, Center for Human Simulation & Patient Safety, School of Medicine

Introduction: The transition from undergraduate medical education to graduate medical education is one that new interns are often underprepared for. Simulation scenarios offer a novel tool to develop and assess core critical skill areas that are imperative towards maximizing patient safety and patient care. This study evaluates an intern conference to develop and assess teamwork, consultation, escalation, informed consent, and handoffs using simulation.

Methods: The “Walk the Walk” intern conference to establish a common culture of patient safety by training and evaluating intern skills in core critical skill areas. Interns were assessed on their performance in the aforementioned critical areas, and then provided with individualized feedback. Previous experience with patient safety and teamwork was reported on a scale of 0 to 3, with 3 being very experienced. In addition, pre-conference and post-conference self-efficacy in the areas of interest was recorded. Interns returned six months later, and were evaluated on the same fundamental competencies during a simulation performance.

Results: Data was collected from 133 interns participating in the “Walk the Walk” conference. Previous experience of working on a team for a non-clinical job had a mean value of 2.31 (median = 2), working on a team in a clinical setting had a mean of 2.50 (median = 3), participating in a healthcare related course that addressed patient safety had a mean of 1.89 (median = 2), and participating in a non-healthcare related course that addressed patient safety had a mean of 1.21 (median = 1). There was a significant increase in self-efficacy in the areas of consultation ($P<.01$), escalation ($P<.05$), informed consent ($P<.01$), handoffs ($P<.05$), and total mean self-efficacy ($P<.05$). **Conclusion:** Results suggest that interns have considerable experience working in teams, but not as much experience with formal education to guide them on how to best work as a team. Self-reported ability in 4 out of the 5 core skill areas support the conference training was effective. Although there was no significant improvement in teamwork, interns reported feeling very confident in teamwork skills on average. Future work will evaluate performance in the simulation scenarios and during the 6 month followup.

65. Validation and Use of the Novel Object Recognition (NOR) Paradigm to Model Effects of Ketamine on Memory and Learning

Merit George, Dept. of Biology, with Dr. Katherine Nicholson, Department of Pharmacology and Toxicology

Among the drugs of abuse that have been extensively studied for the past several decades, “club drugs” have been one of the most far-reaching groups under investigation. This group encompasses a variety of psychoactive drugs with particular effects, including Gamma hydroxybutyrate (GHB), Rohypnol, ketamine, MDMA (ecstasy) and methamphetamine. The emphasis on the study of these agents largely stems from the significant misuse of these drugs, in addition to the notable physiological, psychological, and social consequences that use of these strongly addicting substances holds for the individual. Perhaps the most concerning information regarding use of club drugs deals with the prevalence of misuse and abuse in the adolescent and young adult population (12-20 years of age). Because of ethical and procedural issues associated with human club drug studies, researchers are now turning to rodent animal models to develop a sound representation of club drug use that can mimic the multiple effects of the drug on several of the aforementioned biological and behavioral factors. One specific example of these rising models is the behavioral task called Novel Object Recognition (NOR). In this paradigm, the rat is habituated to a specific environmental chamber or field, followed by habituation to the presence of two identical objects in the chamber. After a delay period in

which the rat is placed back into its home cage, the rodent is returned to the chamber that holds one of the previous objects and one novel object. Based on the natural tendency of rodents to spend more time exploring a novel object than a familiar one, it is inferred that the choice to explore the novel object reflects a defined type of recognition-related memory. The purpose of the current study is to further validate the NOR behavioral paradigm as a reliable and consistent assessment of memory and learning, and to subsequently use the model to examine the effects of acute ketamine administration on short-term memory in both adult and adolescent Sprague Dawley rats. By focusing on a club drug that is underrepresented in the drug abuse literature and on a model that has not been extensively applied in previous research, this project also aims to suggest potential avenues of further research using this versatile paradigm. Furthermore, by considering both adolescent and adult populations, this study will provide a basis for comparing the effects of ketamine administration on different age groups.

66. Kangaroo Care in Babies and Women with Postpartum Depression: Physical and Psychological Benefits

Simone Gregor, Dept. of Biomedical Engineering, with Prof. Mary Boyes, VCU Honors College

Postpartum depression affects 10-15% of women and 10% of women develop anxiety disorders after delivery. Postpartum depression is caused by a physiological predisposition where the symptoms develop after hormonal changes caused by pregnancy, including spikes and drops of estradiol, progesterone, cortisol and oxytocin. Skin-to-skin contact, also known as Kangaroo Care, is a proven treatment for premature babies and implemented in the Neonatal Intensive Care Unit that helps to increase their emotional and physical well-being, including reducing stress hormones, helping with their respiration and oxygenation, regulating blood pressure, increasing oxytocin levels and mother-infant bonds. Current hospital procedures do not allow for Kangaroo Care and mother-infant bonding immediately after birth because of routine procedures that include vitamin K injection, eye prophylaxis antibiotic ointment, foot and hand printing, weighing, measurements and bathing. Kangaroo care for all infants immediately after birth and during the weeks and months following birth will allow for increased levels of oxytocin in both mothers and babies, increasing mother-infant bonds and decreasing the potential for the development of postpartum depression.

67. The Effect of Low Care/High Protection Parenting Styles on Subjective Anxiety in Juveniles

Casey Guerra, Dept. of Psychology, with Dr. Roxann Roberson-Nay, Psychology and Dr. John Hettema, Dept. of Psychiatry

According to previous research, the Parental Bonding Instrument (PBI) has been used to measure perceived parental characteristics. It specifically measures care and overprotection by asking the parents of the juvenile participants a series of retrospective questions about their children. Participant results are categorized into one of four quadrants based on their scores: High care/low protection, high care/ high protection, low care/high protection, and low care/low protection. For the current study the PBI is completed by both parents separately about their children. Previous research proposes the idea that those who were raised in low care and high protection environments reported higher anxiety as adults. The purpose of this study is to determine if there is a correlation between the parents that returned low care and high protection scores on the PBI with those who reported high subjective anxiety in juvenile's between the ages 9 and 13 years old. During the carbon dioxide challenge the participants are

hooked up to a carbon dioxide mask and asked to breathe room air with the normal amount of carbon dioxide (3-5%) for 11 minutes, and air that contains 7.5% carbon dioxide for 8 minutes. Data collection for the current study is ongoing. To test this hypothesis, we will compare data collected from the Parent Bonding Instrument with the subjective units of distress (SUDS) taken during the Carbon Dioxide Challenge.

68. Crime and Corruption in Guatemala

Erick Gwaltney, Dept. of Homeland Security and Emergency Preparedness, with Dr. Jason Levy, Dept. of Homeland Security and Emergency Preparedness

Guatemala currently has a population of over 14 million and more than half of the people live in severe poverty. The very poor living conditions are strong contributing factors to the high level of crime throughout the country. Criminal organizations use violence and intimidation to strengthen their control over the people and law enforcement (World Report, 2013). Mexican drug cartels have significantly added to the violence throughout the country (World Report, 2013). Groups such as the Zetas and Mara Salvatrucha have been carrying out lethal attacks against rivals and those who defy their control, especially those who refuse to pay extortion money (World Report, 2013). This kind of violence strongly affects the tourism revenue for the country. Drug trafficking cartels have the ability to operate almost freely throughout the country. Corruption within the National Civil Police (PNC) is a major problem and is contributing directly to the cartels being able to operate in Guatemala. In a country so poor it is easy to motivate individuals with money. Many PNC officers accept payment from cartels that exceed the amount of their paycheck from the government. The PNC is on the front lines of Guatemala's battle against crime with a force 25,000 officers (ICG, 2012). The PNC are often viewed as inefficient, corrupt, and abusive resulting in the citizen's distrust and fear of the police (ICG, 2012). In a country that is strafed with poverty it is no surprise that the police force is severely underfunded. Having no money restricts the PNC access to resources needed to gain the public trust and build a state based on rule of law (ICG, 2012). The inability to combat drug traffickers, including Mexican cartels, allows them the opportunity to move at will across borders. In the past several years, Guatemalan citizens' frustration with crime has led to violent incidents of vigilantism, including stoning and lynching, especially in isolated rural areas (Crime Report, 2013). In response to the ineffectiveness of law enforcement agencies, the Perez Molina administration has begun to rely on the military to assist in efforts to combat organized crime (World Report, 2013). Progress has been made but the achievements are very small when looking at the big picture. The justice system in Guatemala has done a very poor job of being an effective tool in the fight against crime and violence. According to the World Report 2013, 98% of crimes in Guatemala do not result in prosecutions. A large amount of violence in Guatemala has been attributed to gangs, organized crime, and narcotics-trafficking organizations; however corruption and inadequate investigation of such crimes made factual attribution for crimes difficult (Human Rights Report, 2013). Corruption is one of the main factors contributing to the ineffectiveness of the justice system. In order to be successful in taking down powerful criminal organizations and reducing violence, the government must concentrate on police reform and work to strengthen the justice system in Guatemala (ICG, 2012).

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69. Child Anxiety Sensitivity in Juvenile Adolescent Twins

Laura Hazlett, Dept. of Psychology with, Dr. John Hettema, Dept. of Psychiatry and Dr. Roxann Roberson-Nay, Dept. of Psychology.

Anxiety sensitivity (AS) is a dispositional trait where one is fearful of anxiety symptoms, and is distinguishable from the trait of anxiety itself. (Eke & McNally, 1996). These fears of anxiety-related sensations are an important factor in predicting the emergence and severity of panic symptoms (McNally, 2002). The Child Anxiety Sensitivity Index (CASI) is the child version of an 18-item self-report questionnaire commonly used to measure anxiety sensitivity. Zinbarg et al. (1997) demonstrated that the ASI has three first-order factors: Physical Concerns (i.e. “It scares me when my heart beats fast”), Mental Incapacitation Concerns (i.e. “When I am afraid, I worry that I might be crazy”), and Social Concerns (i.e. “Other kids can tell when I feel shaky”). The aim of the current study is to examine the relationship between scores on the CASI and responses during a low-dose carbon dioxide breathing task designed to induce panic-related sensations. The participants in our study were monozygotic and dizygotic twin pairs ranging from ages nine to thirteen. Twins’ responses throughout the task were measured using the Subjective Units of Distress Scale (SUDS) and the Diagnostic Symptom Questionnaire (DSQ), which measures cognitive and physical panic symptoms. We hypothesize that there is a positive relationship between the CASI and anxious responding during the carbon dioxide breathing task, such that as CASI scores increase, so do scores on the DSQ and SUDS. The results support the hypothesis and show significant evidence of a relationship between the CASI and subjectively experienced distress and panic symptoms. So, the more fearful an individual is of panic symptoms, the more severely they experience those symptoms, which in turn causes greater subjective distress. This study contributes to identifying the overall relationship between the CASI, DSQ, and SUDS scores when looking at physical, mental, and social concerns that contribute to the fear of experiencing subjective anxious symptoms.

70. A Look at Tuberculosis and Drug Resistant TB in China and the United States

Megan Healy, Dept. of Anthropology, with Dr. Noel Boaz, Dept. of Anthropology

There are many things plaguing the world today, one of them is *Mycobacterium tuberculosis* otherwise known as Tuberculosis (TB). Since it's origin TB has become more virulent against antibiotics and became multi-drug resistant (MDR-TB). Two countries come to mind for comparison, China and the United States. China is having severe problems with the disease while the United States is managing it a bit better. Each country has unique circumstances

and the statistics show that both may be doing better with just TB but MDR-TB is sticking around and gradually becoming more and more of a threat.

71. A Synthesis of Epigenetic Factors Caused by Maternal Obesity: Predisposition for Development of Childhood Obesity

Jordan Hiegel, Dept. of Biology, with Prof. Mary Boyes, VCU Honors College

Obesity is an immense epidemic taking the globe by storm with more than one-third of American adults coping with the disease and childhood obesity rates across the world having doubled in children and tripled in adolescence within the past 30 years. There is such a great need to study the source of what causes obesity so that it can be prevented rather than treated after the disease has taken hold. Maternal obesity has recently been discovered to affect a number of epigenetic factors that influence the fetus. Exposure to the placental environment of overweight or obese mothers is believed to increase the likelihood of the fetus developing obesity. Epigenetic factors that are affected by maternal obesity and in turn cause gene expression in the fetus are increased leptin levels affecting hunger control, insulin resistance and increased cortisol levels, evolutionary factors such as mismatch theory, developmental plasticity, maternal malnutrition, mental and cognitive disorders, and adipose tissue development. These epigenetic factors form pathways that amplify the effect maternal obesity has on a fetus and that fetus' chances of developing obesity. This study analyzed these pathways and synthesized the role of epigenetic factors caused by maternal obesity and their ability to interact with each other to increase the likelihood of a child to develop obesity in their lifetime. The most influential epigenetic factor that influences a child's probability of developing obesity was concluded to be maternal nutrition, which is amplified by all other epigenetic factors and increases the effect of these factors on the fetus' genome. Although it is established that smoking and drinking during pregnancy is a major taboo, less attention is spent on the nutrition intake of the mother. Cravings of fatty foods and over eating are over looked because they are thought of as 'normal' behavior for a pregnant mother, but as it turns out, what you eat during pregnancy can have a huge impact on the fetus' gene expression and may lead to a development of obesity in the child.

72. Printing the Past to Engage the Public

Vivian Hite, Dept. of Anthropology, with Dr. Bernard Means, Dept. of Anthropology

I plan on exploring public involvement and engagement at George Washington's Boyhood Home at Ferry Farm in Fredericksburg, Virginia. Ferry Farm is a public archaeology site that allows volunteers and the public to participate in the actual field research. Three dimensional printed artifacts provided through a partnership with the Virtual Curation Lab at VCU help non-archaeologists understand the kind of artifacts found previously at the site. The ability for physical models to be used in the field allows the public to connect with the past inhabitants of the landscape. Creating this connection and involving the public in the history of their community helps raise people's awareness of the importance of cultural heritage locations such as George Washington's Boyhood Home.

73. Modern Voluntary Cannibalism Using Social Media Networks

Jessica Hodges, Dept. of Education

In this research the occurrence of voluntary cannibalism - one person offering themselves up willingly for consumption either pre- or postmortem to one or more persons - using internet social networking sites (Specifically Twitter and message boards) is discussed. The Meriam-Webster Dictionary defines social media as: "forms of electronic communication (as Web sites for social networking and microblogging) through which users create online communities to share information, ideas, personal messages, and other content (as videos)". While message boards predate the coining of the term, they certainly fit into all the attributes listed above with more popular social media networks like Twitter. The only two modern instances of voluntary cannibalism have used social media networking to connect the consenting parties: the case of chef Mao Sugiyama having his genitals surgically removed and cooked for paying consenting customers and the case of Armin Meiwes using the online message board "Cannibal Cafe" to find Bernard Brandes, a willing victim. Both of these cases will be discussed in detail as well as detailing the use of these social media sites for such a taboo purpose.

74. Secrets to Success: The Relationship between GPA and Academic Involvement in Extracurricular Activities

Michael Hoehner, Dept. of Psychology

This study examined the potential relationship between extracurricular involvement on a college campus and student grade point average (GPA), which is often used as a benchmark for academic success. The researchers performed a Pearson correlation analysis on the number of hours spent on a college campus by students in one week and a scale developed to gauge the depth and level at which students were involved with clubs and societies at their respective college. The researchers handed out an anonymous survey, distributed in a simple random and convenience pattern, and also asked professors to distribute the survey to one of their classes, resulting in a sample of $n=55$ individuals, with 3 surveys being discarded due to inadequate information. There was a positive correlation between GPA and level of involvement on campus ($r=0.401$, $p<0.005$, $n=52$).

75. The "BEST" Control Scheme to Suppress Arrhythmia using Optimal Control Theory

Min Im, UROP Summer Fellow, Dept. of Applied Mathematics, with Dr. Norma Ortiz-Robinson, Dept. of Mathematics and Applied Mathematics

Our project was based on published article of Berger, Cain, Socolar, and Gauthier in Physical Review Journal (2007), *Control of electrical alternans in simulations of paced myocardium using extended time-delay autosynchronization*. The main goal was to study the controlled behavior of alternans, the abnormal beat to beat alternation of cardiac action potential duration, in simulations of paced myocardium by use of the optimal control theory. Optimal control provides conditions to determine a control law for a given system such that a certain optimality or "cost" criterion is achieved. An optimal control problem includes a cost functional that may depend on both the state and control variables and a differential equation, which models the evolution of a particular system in question. In the article, *A structurally optimal control for predicting and analyzing human postural coordination*, the authors proposed an optimal control model that computes joint feedback responses by minimizing the quadratic sum of the joint torques. Their main goal was to restore the joint angle to zero position (vertical position of the body). Our study focuses on the behavior of electrical alternans and whether they can be

improved or stabilized in some optimal way. In the article, *Control of electrical alternans in simulations of paced myocardium using extended time-delay autosynchronization*, their results present the use of extended time-delay autosynchronization (ETDAS) to control alternation of action potential duration to the genesis of cardiac arrhythmias. These results suggested successful control domains, however, they did not identify whether a particular value within

76. Are Latino Adolescents' Possible Selves Related to Educational Beliefs and Sexual Health Outcomes?

Efren Velazquez, B. A., Neha Jadhav, Carla M. Shaffer, Ph. D., Raquel Halfond, Ph.D., Rosalie Corona, Ph. D.

Background: Identifying whether Latino adolescents' future goals are related to their educational and health behaviors is important as Latino youth are disproportionately affected by unplanned teenage pregnancy and school dropout. Possible selves theory suggests that adolescents' hopes and fears for their future motivate their behavior (Markus & Nurius, 1986; Oyserman, Terry, & Bybee, 2002). Yet, few studies have examined the association between possible selves and educational and health outcomes among Latino youth.

Method: 133 Latino adolescents (13-18 years) completed surveys that assessed demographics, educational beliefs, pregnancy beliefs, sexual behaviors and intentions, and possible/fearful selves. Thirty-five adolescents answered the questionnaire in Spanish and 98 in English, and most adolescents had a foreign born parent. Adolescents were asked, "What do you hope to be like in the next five years?" and "What are some things you are concerned about or things you want to avoid being like in the future?" Responses were coded using Oysermans (2004) Possible Selves coding scheme, with the inclusion of cultural values as a category.

Results: Most adolescents reported Achievement (70.7%) or Physical/Health (16.5%) possible selves. There was more variability among feared selves: Achievement (25.6%), Risky Behavior (30.1%), and Physical/Health (11.3%). Balance occurred primarily for Achievement; 24% of adolescents had an Achievement possible self paired with a Risky Behavior feared self. We conducted 2X2 ANOVAS (Achievement PS X Immigrant Status) to examine the association between Achievement possible selves and outcomes. For educational beliefs, a significant main effect was found for Achievement possible selves, $F(1, 114) = 6.032, p = .016$. There was no main effect for immigration status or a significant interaction. Adolescents that had an Achievement possible self ($M = 4.61, SD = .73$) showed more favorable educational beliefs compared to those with non-Achievement possible selves ($M = 4.22, SD = 1.03$). With respect to pregnancy beliefs, there was a significant interaction, $F(1, 104) = 15.415, p = .000$. Specifically, immigrant youth with an Achievement possible self and non-immigrant adolescents with a non-Achievement possible self reported riskier pregnancy beliefs (see Figure 1). Finally, Chi-square analyses were conducted to examine intention to have sex and Achievement vs. Non-achievement possible selves. No significant differences were found, however, 27.6% of adolescents who reported an Achievement possible self were sexually active, 36.2% did not plan to engage in sex and 7.8% planned to engage in sex soon. (See Table 1)

Discussion: Although few adolescents reported balance in their possible and feared selves, nearly a quarter reported an Achievement possible self and a Risky Behavior feared self highlighting the relevance of risky behaviors to Latino adolescents' educational goals. Results

suggest that prevention programs may want to focus on educational goals/outcomes and risk behaviors.

77. Integrating Phage Therapy into Western Medicine

Jacob Jaminet, Dept. of Biomedical Engineering, with Prof. Faye Prichard, VCU Honors College

The World Health Organization has described the rise of antibiotic use as a “global health security emergency” (who.int). With the growing concern about antibiotic resistant bacteria, there has been an increased interest in bacteriophages. Bacteriophages are high-specific viruses that only infect bacteria. The use of bacteriophages medicinally to treat bacteria is called phage therapy. Research in phage therapy gained momentum until the introduction of antibiotics. While the USA and other Western countries accepted antibiotics, the Soviet Union and their satellite nations still continued to research phages. Since the funding for research was supplied by the Soviet military, the results of their studies were deemed top secret. With the fall of the Soviet Union, data that were previously unavailable to the USA and other nations became available to the larger research community. Articles were reviewed from the discovery of phages to current clinical trials that have been done. The papers about the history of phages explored why phage therapy did not gain the popularity in the USA they have today in Eastern Europe. As phage therapy was a standard of care during their study, the studies done were not double-blind, placebo controlled and are not applicable to the standards set out by the Food and Drug Administration (FDA) and European Medicines Agency (EMA). Current clinical trials are being conducted under the purview of the FDA and EMA. While phage therapy has the advantages of being highly specific, there is concern that phages could potentially exchange DNA between bacteria and actually cause bacteria to become more virulent. Although there are concerns with phage therapy such as DNA exchange and possible viral mutations, phage therapy should be investigated through clinical trials under the purview of federal regulatory agencies because while the large body of research is not the standard double-blind placebo controlled study as required by the FDA, they do show promise as novel form of treatment of bacterial infections.

78. Diagnostics of Brain Injury Rehabilitation

Nathalie Spita, UROP Summer Fellow, Dept. of Biology, with Dr. Andrew Ottens, Department of Anatomy and Neurobiology

Traumatic brain injury (TBI) is a leading cause of long-term morbidity among the young resulting in significant societal impacts. Yet advances in TBI therapeutic care have been largely limited by the complexity of the pathobiology, heterogeneity among patients, and imprecise endpoint assessments with which to evaluate efficacy. Thus, there remains a significant need for improved diagnostics, particularly for guiding novel therapeutic use and outcomes. So called theragnostic assays are of particular interest in the new area of TBI rehabilitation, which ideally would target a window of heightened brain plasticity during which circuit remodeling would support recapitulation of lost function. The biochemical processes associated with brain plasticity following TBI produce metabolized components that are small enough in size to passively diffuse into peripheral fluid and by natural means are excreted into urine. We employ high performance mass spectrometry to quantify these byproducts, comprising a “TBI urinary signature” of some 2,500 TBI selective molecules. In this study we hypothesized that the urinary signature would evolve with the advent of a plasticity window during the course of inpatient rehabilitation and that the signature would reflect patient functional improvement at

discharge. Urine samples from eight TBI patients were collected at admission and discharge from the Brain Injury Rehabilitation Unit who were also assessed using neurocognitive rating assessments. Application of non-supervised dimensional reduction analysis demonstrates that the TBI urinary signature is highly effective at classifying TBI patients from non-traumatized age / sex matched individuals, whether evaluated at rehabilitation admission or discharge (approximately one month from the injury). Further, our data demonstrate that the TBI urinary signature evolves distinctively during inpatient rehabilitation, clearly differentiating the point in recovery for each individual. Results further suggest individualized features grouping subjects into recovery classes that are being evaluated for functional correlates. Further research with these results will further evaluate the prognostic capacity of the TBI urinary signature as subjects are followed out one year from their injury.

79. CPEB2 Splice Variants CPEB2A and CPEB2B Affect the Hypoxic Stress Response and Breast Cancer Metastasis

Ryan Johnson, Dept. of Biology, with Dr. Margaret A. Park – Department of Biochemistry, Cell and Molecular Biology; The Massey Cancer Center

Triple-negative breast cancers (TNBCs) are tumors that lack the estrogen-receptor (ER), the progesterone-receptor (PR), and the epithelial growth factor receptor 2 (HER2) and are responsible for 15-20% of all breast cancer. TNBCs provide poor prognoses and higher rates for metastases compared to other breast cancers. We have found that cytoplasmic polyadenylation element binding protein 2 (CPEB2) mRNA splicing is dysregulated in cells that display resistance to anoikis (attachment-dependent cell death). Importantly, CPEB2A:B ratio decreases in patient-matched tumor tissue when compared to normal control tissue. Furthermore, downregulation of each isoform produced opposing effects on both AnR and HIF1alpha and TWIST1 levels (molecules that are downstream of CPEB2). Taken together, our results indicate that CPEB2 is involved in the development of anoikis-resistance in cancer cells and may be heavily involved in TNBC cancer progression. Additional studies of alternative splicing in TNBC may lead to both understanding of the molecular pathways leading to TNBC metastasis and the development of rationally designed treatments for TNBC.

80. The influence of GABRA2 and Peer Deviance on Illicit Drug Use in College-Aged Students

Justin Joseph, Dept. of Chemistry, with Dr. Danielle Dick and Amy Adkins, Virginia Institute for Psychiatric and Behavioral Genetics

Recent studies have shown that single nucleotide polymorphisms (SNPs) in the *GABRA2* gene may influence one's susceptibility to illicit drug use. In order to determine whether an association is present in young adults, we will be performing a study within the Spit for Science research project at Virginia Commonwealth University in Richmond, Virginia. The Spit for Science project aims to understand how genetic and environmental factors come together to influence substance use and emotional health. A cohort of 1523 incoming freshman donated a saliva sample in the fall of 2011 and answered surveys regarding their use of the following categories of drugs: cannabis, sedatives, stimulants, cocaine, or opioids. Follow-up surveys were given during the spring of their freshman year and the spring of their sophomore year. Data on drug abuse was converted to a numerical score between zero and five, depending on how many of the five categories of drugs the respondent had ever tried. We will also be using survey responses to measure the moderating variable of peer deviance. The saliva samples were

processed and genotyped for 8 SNPs in the *GABRA2* gene. Specific associations will be determined through use of regression analysis. It is hypothesized that the study will show an association between *GABRA2* SNPs, illicit drug use, and the additional influence of peer deviance. These findings can be used to improve strategies that aim to decrease drug use among college students and allow them to successfully recover.

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82. The Effect of the GABRA2 Genotype and Peer Deviance on Alcohol Use within College Students

Jessica Joseph, Dept. of Chemistry, with Dr. Danielle Dick and Amy Adkins, Virginia Institute for Psychiatric and Behavioral Genetics

Past research has shown that an individual's level of alcohol use may depend on various factors, both genetic and environmental, along with the interaction between them. Several studies have found that certain *GABRA2* genotypes may be associated with elevated levels of alcohol use. This issue is of particular concern in college campuses, where social pressure becomes an important environmental factor. To better understand how genetic and environmental factors come together to influence substance use and emotional health, a group of students attending Virginia Commonwealth University in Richmond, VA submitted DNA samples and answered survey questions as part of the Spit for Science research project. The cohort entered college in the fall of 2011 and took follow-up surveys during the spring of their freshman and sophomore years. A total of one thousand and four participants who reported that they have previously drunk alcohol were asked about the frequency of their alcohol use. Regression analysis will be used to determine the presence of any associations between *GABRA2* genotype, peer deviance, and alcohol consumption. We hypothesize that high levels of

peer deviance and specific variants of *GABRA2* SNPs will be shown to correspond to increased levels of alcohol use. The conclusions of this study can be used to create specific techniques for decreasing alcohol abuse among college students and lead to better understanding of how to create effective treatment and prevention strategies.

83. Nutrition Education and the Development of Risk Factors for Eating Disorders in Elementary Age Children

Reva Joshi, Dept. of Biochemistry, with Prof. Mary Boyes, VCU Honors College

Over the past few decades, the development of an 'ideal' body type, perpetuated by the media and fashion industries, that has led to widespread self-esteem and body image issues among young girls. These issues can develop into a number of serious problems in adolescence including eating disorders and other mental illnesses. After analyzing sixteen peer reviewed journals, I have found that the education system in America can be utilized to facilitate change in nutritional trends in our country. Current nutrition education in schools is either ineffective or nonexistent. Therefore, specific changes need to be made to this system to produce an efficient method of primary prevention of eating disorders, as well as a health conscious and nutrition literate society. These changes will reconstruct the administration, curriculum, and perception of nutrition education in schools.

84. Heteronormative Stereotypes in Animated Children's Television

Nora Kavaldjian, Dept. of Art Foundations, with Prof. Faye Prichard, VCU Honors College

The socializing effect that television has on child viewers is incredibly important to childhood development – research shows that children can model roles and behaviors that they observe on television – and this power to condition children's minds to a television-based view of reality can influence children's conceptions of gender, stereotype, and diversity. Children exposed to television media will base their conceptions of the world on what they've seen, usually animated cartoon shows with highly stereotyped characters in fairly set roles (Barcus 1983, Bandura, 2002). The purpose of this paper is to review research on the subject of gender roles in animated children's media and, using this research, to gauge whether or not animated children's television programming consistently portrays heteronormative gender stereotypes as "normal" as well as whether or not children may mimic or model the stereotypical behavior (in regards to gender roles and expression) that they have observed. I have examined eight sources so far; two examine the nature of the television industry and the modern animation industry, two are analyses of previous research done on the subject of TV affecting socialization, three are original research articles which survey the content of animated children's TV shows (with one describing adult reactions to the show being researched), and one article which surveys the history of a more educational animated show and its influence. The results so far indicate that animated TV shows definitely show gender stereotypes and stereotypical behavior (Bresnahan et al., 2003); coupled with the years of research that show how children react to television at different ages (Kirkorian et al., 2008), there is an obvious place for a link between the two which will show how children actually react to said gender stereotypes and work. More research will be needed, but I am sure that there are articles available that specifically track children's reactions to gender stereotypes in animated media – and will likely indicate that children will end up mimicking and modeling the behavior they've seen on TV. With this research in mind, the heads of the television industry could thus initiate changes – either in regulation or in choices made in hiring/etc. – to change what may be harmful stereotypes present in their products, to make cartoon shows more applicable to real life and more well-rounded so that the children influenced by them will not end up with harmful misconceptions about gender and gender representation.

85. Depictions of Strong Women in Positions of Leadership as Portrayed in Film

Zechera Kernizan, Dept. of Anthropology, with Prof. Bonnie Boaz, University College

Scholars have studied the depictions of what it means to be a strong women in a high position of leadership and have stumbled on a list of obstacles that challenge women seeking success in their professional life. These obstacles have consolidated into four main categories: the strife that is faced between domestic responsibilities and career oriented goals which is referred to as the “Juggling Act”, the universal characterization of a successful women, the constant comparison between women and men in the workplace, and lastly various limitation on the level of successes that can be obtained by a woman known as the “Glass Phenomenon.” In this paper, the research mentioned above is used to delineate film depictions of women in power as a socialization of what is accepted by popular culture, while exploring the obstacles that women in leadership roles face. This research in progress is important because of the implications stereotypes and assumption of popular culture has on the accessibility and determination young women have toward positions of leadership and power in the workforce.

86. Commercial Dietary Regimen as an Alternative Treatment for Acne

Maheen Khan, Dept. of Biology, with Prof. Mary Boyes, VCU Honors College

Current treatments for acne include topical retinoids, benzoyl peroxide, topical and systematic antibiotics, azelaic acid, and systematic isotretinoin. Isotretinoin (Accutane) is the most effective form of acne treatment, but also poses severe and dangerous side effects. Accutane’s side effects include mental pressure, inflammatory bowel disease, depression, and, for pregnant women, fetal malformations. Just like any other organ of the body, the skin must be given a nutritious diet in order to stay healthy. Dermatologists are not required to take the patient’s diet into consideration, which could be crucial in treatment of the patient’s acne. Developing an alternative regimen based on a patient’s diet can reduce the invasive risks that females face while taking Accutane. A commercially structured dietary regimen (such as one based on the “Weight Watchers” model), which target low intake of sugar and high intake of vitamin A, can be beneficial as opposed to a self-help method.

87. Variation in GABRA2 and Illicit Substance Use

Hassan Khuram, Dept. of Psychology, with Dr. Danielle Dick and Amy Adkins, Virginia Institute for Psychiatric and Behavioral Genetics

Spit for Science: the VCU Student Survey aims to understand how genetic and environmental factors come together to influence substance use and emotional health. Previous studies in the literature have shown a relationship between variation in *GABRA2* and substance use. It is of great interest to find out whether or not variations in the *GABRA2* gene are associated with illicit drug use in this sample. It is hypothesized that polymorphisms in *GABRA2* will have an association with increased use of illicit substances. In the fall of 2011, incoming VCU freshman had a chance to take the Spit for Science survey and provide a saliva sample. Survey responses regarding substance used were combined into a sum score based on how many categories of illicit drugs the student reported trying at least once. We will specifically look at nine single nucleotide polymorphisms in *GABRA2*. Linear regression will be used to determine

an outcome. Other environment conditions such as peer deviance may also be potential moderation variables and will also be examined. Results from this study can greatly help people in the VCU community identify risk factors for illicit drug use.

88. Improving Preparedness of the Medical Community for Weaponized Smallpox: Identification, Vaccination, and Changes in Protocol

Krishna Kinariwala, Dept. of Biology, with Prof. Mary Boyes, VCU Honors College

Smallpox was once a prominent global disease with well-known and grave complications. Though smallpox has been declared an eradicated disease by the World Health Organization, the threat of an outbreak through a bioterrorist attack still remains. The threat of a bioterrorist attack which utilizes smallpox is a present and pressing danger, for which the United States is unprepared. Due to the eradication of smallpox vaccination programs which provide immunity to the civilian and military populations, a smallpox outbreak would certainly be catastrophic. Therefore, in order for the medical community to be prepared for such an event, several aspects must be taken into account. Various protocols and guidelines for biopreparedness were evaluated in order to determine a succinct methodology for readiness. These recommendations were also compared with the response to the 2001 anthrax bioterrorist attack in order to determine how preparedness could be improved. Finally, recommendations for preparedness for a smallpox attack were given. For smallpox, identification, vaccination, and protocol need to be at the forefront of preparedness. Due to the similarities between smallpox and chickenpox, physicians must be familiar with distinguishing between the two. Plans for production and transportation of vaccines and vaccination supplies must be accounted for. Finally, hospitals must develop and be familiar with plans regarding biopreparedness.

89. Juvenile Recidivism Rates and Social Service Pathways

Sarah King, Dept. of International Studies, with Prof. Mary Boyes, VCU Honors College

Recidivism rates amongst juveniles who have committed drug offenses are higher than any other offense type, and overwhelmingly occur in urban settings amongst minority youth. This paper aims to determine what types and volume of social services might best be employed to reduce juvenile drug-related incarceration and recidivism rates in Richmond, VA. Although many factors (including general strain and social disorganization theory, socioeconomic status, parenting practices, peer contagion, and perceived disadvantage) contribute to incarceration and recidivism rates amongst youth, prior research has indicated that the presence of adequate and available social services can diminish these effects. This paper explores the relationship between each of these intersecting components through synthesis and analysis of peer-reviewed scholarly articles to narrow the scope and apply the findings specifically to Richmond. Census data as well as personal exploration of the different social services offered to youth in the local area is utilized to compliment the pre-existing research on patterns and factors of juvenile drug crime. The significance of this research includes identifying the shortcomings of available social services to youth in the Richmond area as well as suggestions for implementing new methods or programs to better assuage the onset of juvenile delinquency and recidivism.

90. Trait mindful attention and awareness: Preliminary findings on empathy and compassionate behavior outcomes

Kirby, Z. M., Berry, D. R., Hensel, A. K., Green, J. D., & Brown, K. W., Dept. of Psychology

Mindfulness is a quality of consciousness characterized by receptive attention to and awareness of present moments and experiences (Brown & Ryan, 2003). Increasing evidence suggests that the empirical stance on reality afforded by mindful states of awareness may promote more positive other-oriented functioning, such as increased empathy for others (Beitel, Ferrer & Cecero, 2005), improved moral reasoning and decision-making (Shapiro, Jazaieri & Goldin, 2012) and greater altruistic tendencies (Condon, Desbourdes, Miller & DeSteno, 2013). However, the findings relating mindfulness to empathy have been mixed, with some finding trained mindfulness promoting cognitive empathy (Birnie, Speca & Carlson, 2010) and others finding mindfulness related to both emotional and cognitive empathy (Beitel et al., 2005). This study sought to clarify the relationship between dispositional mindfulness and indices of compassion and empathy in response to a fellow student's ostracism during an online ball-tossing game, including trait cognitive and emotional empathy, state empathic concern or distress responses, and prosocial gameplay and messages toward the rejected player. Initial findings suggest that trait mindfulness is negatively associated with trait personal distress, and positively associated with trait perspective-taking.

91. BENTHIC MACROINVERTEBRATE ASSEMBLAGE STRUCTURE AND BIOMASS IN PRISTINE STREAMS OF SOUTHERN WEST VIRGINIA

Andrew Kirk^{1,2}, Daniel McGarvey², and Matt Rouch²

Department of Biology¹ and Center for Environmental Studies², Virginia Commonwealth University, Richmond, Virginia, USA.

A paucity of least-impacted streams in southern West Virginia due to the prevalence of large-scale disturbances such as mountaintop mining operations makes development of reference conditions a priority for headwater streams. Benthic invertebrates are reliable indicators of stream conditions due to their sensitivity to environmental stressors. This study provided new empirical information on reference stream conditions in southern West Virginia, including invertebrate biomass estimates. Seasonal macroinvertebrate samples were collected via Hess sampler for three streams and identified to genus-level (except for Chironomidae). Published length-mass regressions were used, including head capsule widths and body length measurements, to estimate biomass. Biomass data were then compared with scores from three bioassessment indices/protocols (WVSCI, MAHA, GLIMPSS) to assess the validity of biomass data in stream condition assessments. Season biomass trends were also examined.

92. A review of aggression prevention and intervention programs for elementary school students: Examination of gender differences

M. Floyd, I. Hernandez, A. Hood, L. A. Mensah-Etsi, R. H. Myer, C. Norris, L. Oglesby, with Dr. E.A. Goncy, Department of Psychology

In a study conducted by Crick and Grotpeter (1995), results indicated that boys and girls differed significantly in aggression. Girls who showed significantly more relational aggression were suspected to not only have serious trouble adjusting, but were also more likely to be rejected by peers. Although there is extensive research on these types of gender differences in aggression, many early elementary school violence prevention programs, such as Promoting Alternative Thinking Strategies (Crean et al., 2013), have yet to address gender-specific issues and differences. Previous research suggests that gender impacts not only the likelihood that an individual will be involved in violence, but also the intensity and type of violence the individual experiences (Storch, Masia-Warner, Crisp, & Klein, 2005). We propose to compile a literature review using the VCU libraries database, PsycInfo, PsycNet, and ScienceDirect, that will examine gender-specific differences in aggression and also examine how violence prevention programs account for gender differences during elementary school. Teaching about aggression and violence as early as elementary school can build a positive, healthy foundation for future adolescent and adult relationships. We argue that for maximum, long-term benefits, interventions should not only be tailored to a child's developmental stage, but should also be gender-specific. Customizing these programs to each gender can raise awareness regarding the harmful effects of various types of aggression (e.g., physical aggression and relational aggression). For the purpose of this review, we plan to review violence prevention and intervention programs for males and females living in the United States and attending kindergarten through the sixth grade.

93. Synergistic Interaction of Chemotherapy Drugs in Chronic Myelogenous Leukemia (CML) Cells

Akhil Kolluri, Dept. of Biomedical Engineering, with Dr. Steven Grant, Hematology-Oncology, Internal Medicine, VCU School of Medicine

Chronic myelogenous leukemia (CML) cells are harvested and injected into mice through a process known as xenotransplantation. After tumor development, the tumors are extracted and the cells within the tumor are analyzed. A cell line used in this project was BAF3/T315I. These tumor cells were incubated in RPMI culture media in various conditions including the control condition, various doses of the cell-cycle inhibitor drug PF477736, various doses of bosutinib (the chemotherapy drug for CML), and each combination of the doses of the two drugs. The survival and protein content of the cells in each condition were analyzed by flow cytometry and western blot analysis respectively. The data was analyzed to see if there was a synergistic effect of the combination of the two drugs on the cancer cell death.

94. Evaluation of Behavioral Distress Tolerance Task Stability across Settings

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Distress tolerance (DT) is characterized as an individual's ability, behavioral and/or perceived, to withstand negative affective states (Simons & Gaher, 2005). Current research indicates that low levels of DT may be a risk factor for certain types of psychopathology; for

instance, much focus has been placed on anxiety disorders, whereby the primary traits that constitute the disorder lie in levels of heightened and distressing emotions (Keough, Riccardi, Timpano, Mitchell, & Schmidt, 2010; Vujanovic, Bonn-Miller, Potter, Marshall, & Zvolensky, 2011). Various means of examining DT currently exist, including self-report and behavioral measures, which assess perceived ability to tolerate distress and performance-based demonstration of DT, respectively (Leyro, Bernstein, Vujanovic, McLeish, & Zvolensky, 2011; MacPherson, Stipelman, Duplinsky, Brown, & Lejuez, 2008). Although these methods are believed to examine the same construct, previous studies have had mixed results (Hofmann, Gawronski, Gschwendner, Le, & Schmitt, 2005; Kline, Sulsky, & Rever-Moriyama, 2000; Podsakoff et al., 2003). Self-report methodologies are prone to a number of sources of error, including individuals whose responses result from transient emotional states, as well as response-biasing (e.g., the need to self-report in a socially acceptable manner; Podsakoff, MacKenzie, Lee, & Podsakoff, 2003). In contrast, behavioral measures have allowed for a quantitative measure of one's willingness to escape or avoid distressing conditions (MacPherson, Stipelman, Duplinsky, Brown, & Lejuez, 2008) thus potentially reducing the above-mentioned sources of error. For this reason, the proposed study aims to assess the relationship between the self-report DT Scale (DTS; Simons & Gaher, 2005) and the Paced Auditory Serial Addition Task (PASAT; Lejuez et al., 2003), which is a laboratory based task that induces distress through fast-paced computation coupled with "explosion" noises for incorrect responses. It is hypothesized that perception of ability to withstand distress measured by the DTS will differ from the behavioral demonstration of DT assessed via the PASAT in that individuals will self-report higher levels of DT than exhibited behaviorally. The proposed poster will present preliminary results from an ongoing study examining the reliability of DT behavioral tasks, and we expect to have a minimum of 50 participants completed for inclusion in the analyses. The data will contribute to the growing literature regarding the measurement of DT, which may better aid researchers in examining the relationship between inability to tolerate distressing emotions and psychopathology.

95. Mindfulness Buffers Exclusion-Related Social Distress

Ami Kumar, Dept. of Psychology, with Jordan Quaglia and Daniel Berry, Dept. of Social Psychology

Social rejection is one of the more "painful" experiences humans can endure, affecting long term physical and emotional health (Eisenberger, 2012). Perceiving social rejection can create psychological and social distress (Leary, 2004). A number of studies have sought to understand for whom and under what conditions social rejection would be more, or less impactful. Building on this research, the present study targeted mindfulness—a psychological state that entails receptive attention to one's present experience (Brown & Ryan, 2003)—as a potential buffer to rejection-induced social distress. Consistent with this, mindfulness is associated with reduced psychological, neuroendocrine and electrophysiological indices of social distress in evocative social situations (see Brown, Ryan, Creswell, & Niemiec, 2008 for review). Study one was a correlational study examining the effects of trait mindfulness on social distress induced by Cyberball (V4.0 Williams, Chung & Choi, 2000). Cyberball is a software-based ball-tossing game, wherein ostensible players are programmed to exclude the participant. Measures of social distress were taken immediately after the exclusion, and two measures of trait mindfulness were associated with decreased social distress following exclusion (P s < .01). In study two we manipulated mindfulness by randomly assigning participants to listen to a brief mindfulness audio induction (MI) or a control induction (CI). As in study 1, participants were excluded via Cyberball and then filled out self-report measures of

social distress. MI participants experienced less social distress, relative to controls, $t = 4.632$, $p < .001$. This study speaks to the potential for mindfulness to buffer distress during social rejection.

96. Diversity Program Reform: Secondary School Students and Critical Race Theory

Shannon Laribo, Dept. of Cinema, with Dr. Susan Gonzalez Baker, Dept. of Sociology

There was a turning point in my own academic career when I took an anthropology course called “The Origins and Idea of Race.” After that class, I felt that I was beginning to really understand and comprehend this complex historical and present issue of racial inequity. This shift incited a research question of whether an informed, academic discussion of race could really change students' perceptions of race as an issue and their perceptions of people of other races. This research project employs a pretest/post-test system through which I measure whether students who I present the basic tenets of critical race theory to, gain a more objective view of race issues and feel more positively about those of different racial groups or not. I administer two questionnaires in order to measure this change. One is presented before the race discourse, and another afterward. I have done research into diversity programs and race classes in order to create a discussion that focuses on the main points of critical race theory and the sociology of race. I facilitated this race discourse to three different groups of secondary school students and measured for change in their perceptions. The purpose of this research project is to add to current research that evaluates the benefits of diversity programs for students, but to extend this research into secondary education.

97. Novel Discovery of Therapy for Prostate Cancer

Jung Lee, Dept. of Biology, with Dr. Yan Zhang, Dept. of Medicinal Chemistry, VCU School of Pharmacy

It has been shown that prostate cancer cell lines upregulate CCR. CCR5, chemokine receptor type 5, is a family A type G protein-coupled receptor (GPCR). Consequently, the antagonism of this receptor is thought to be correlated with producing an anti-proliferative effect on prostate cancer. Unlike all the other drugs, anibamine possesses a structural skeleton that is remarkably different from all previous lead compounds. It is a natural product that contains a pyridine ring and two 10-carbon side chains, which has shown to have a binding affinity of 1 μ M for CCR5. However according to Lipinski's rule of five (e.g., it has a molecular mass of more than 500 daltons and an octanol-water partition coefficient of >6), it is un-druglike because of anibamine's two hydrophobic side chains. Therefore, the structure should be modified by primarily eliminating the two hydrophobic side chains, which will improve the molecule's solubility and drug-like properties.

98. The Subconscious Bookshelf: The Printed Book's Function as a Status Symbol

Rachel Lee, Dept. of Graphic Design, with Prof. Mary Boyes, VCU Honors College

Books are inherent parts of our life, and understanding their expansive and unexpected power can help us to understand the subconscious functions that they serve. This power has a

long historical precedent but also is beginning to shift in the modern digital age. Books have the power to function as mirrors of the reader's identity, as symbols of social distinction and mobility, as aesthetic objects of decoration, as trophies for intellectuals, or as luxury, material objects. The aim of this paper is to examine the middle-class consumption, accumulation and display of books, in order to explore an integral function of the printed book—as a status symbol. This research considers what the printed book conveys about the reader and how it manages to do so. This role may depend on the book as object, on the book as text, or on the book as symbol—wholly made up of the connotations surrounding it. All of these functions are indissolubly tied to the book as a status symbol.

99. Taxonomic Characterization and Forensic Attribution of *Bacillus* Threat Agents Using Extracellular Lipid Profiles.

Donald Jessup, UROP Summer Fellow, Dept. of Forensic Science, with Dr. Christopher Ehrhardt, Dept. of Forensic Science

Biochemical signatures that provide information on both the taxonomy of an unknown threat agent and the conditions used to cultivate it in the laboratory have considerable implications for biodefense. The goal of this study was to examine extracellular lipid variation in *Bacillus* spores across different species and/or strains as well as different growth conditions and to construct forensic attribution signatures based on these profiles. Two different strains of *Bacillus cereus* and *Bacillus thuringiensis* and one strain of *Bacillus anthracis* were cultured with three medium formulations, each containing a different source of complex carbon/nitrogen compounds. Lipid composition from each spore sample was analyzed with DART-MS and Gas Chromatography (GC). DART-MS results showed that spore surfaces contained complex assemblages of both fatty acids and hydrophobic amino acids. The relative ratios of fatty acid structures were indicative of both the species/strain and the culturing medium recipe. *Bc*14579 spores were enriched in 17:0 iso fatty acids whereas *BcT* spores were enriched in 13:0 iso and 15:0 iso fatty acids. Sporulation in each of the three medium recipes also produced characteristic shifts in 15:0 iso, 14:0 iso, and 16:0 iso fatty acid biomarkers. GC-FID profiles were consistent with these results. All three *Bacillus* species (*Ba*, *Bc*, *Bt*) could be easily differentiated using multivariate visualization techniques, and each strain showed diagnostic changes in individual FAMES. Specifically, variation in the relative proportion of 17:1 iso ω 5c and 17:0 iso allowed for discrimination of each growth condition within the respective species/strain groups. These results suggest that lipid signatures may be a powerful tool for biodefense agencies to characterize the taxonomy of unidentified pathogens and determine other forensically relevant aspects of their cultivation.

100. Relationship between high school antisocial behavior and the GABRA2 gene as moderated by peer deviance

Sydney Levan, General Sciences, with Dr. Danielle Dick and Amy Adkins, Virginia Institute for Psychiatric and Behavioral Genetics

Spit for Science: the VCU Student Survey is a university-wide project that aims to understand how genetic and environmental factors come together to influence substance use and emotional health. We were interested in studying both the association between *GABRA2* and high school antisocial behavior as well as if the association is moderated by peer deviance. 1,474 individuals from the 2011 Spit for Science cohort, which consisted of VCU undergraduate students, filled out a survey their freshman year at VCU and provided a saliva

sample. Each individual was given a summed score for high school anti-social behavior determined from his or her answers on six questions in the survey. Each saliva sample was genotyped at 8 single nucleotide polymorphisms (SNPs) in the *GABRA2* gene. We hypothesized that individuals with more copies of the minor allele at these SNPs would have higher summed scores of antisocial behavior. A linear regression analysis will be used to investigate the relationship between genotype at the tested *GABRA2* SNPs and high school antisocial behavior. Peer deviance will be examined as a potential moderating variable in this relationship. This study could strengthen known association findings with related variables and *GABRA2* in the literature.

101. The Consensual Validity of Ephebophilic Relationships

Jacob Levin, Dept. of Biomedical Engineering, with Prof. Bonnie Boaz, University College

An issue in statutory rape cases is the matter of ephebophilia, a sexual preference for individuals in later pubescence. Societal values aside, there has not been sufficient evidence that a sexual attraction to adolescents is abnormal. 45% of adult males are ephebophiles and prison studies have shown ephebophilic sex offenders to have a normal mental status. Age of consent laws were enacted to protect African American males and have frequently been exploited since. Response inhibition matures gradually over adolescence and differs in early, middle and late pubescence. Some studies of adolescent decision-making group individuals in early and late adolescent together which may have led to skewed results. A distinction between early and late pubescence should be made in future research.

102. Breast Cancer Screening Strategies: A Review of Mammography Screening

Musa Mahmood, Dept. of Biomedical Engineering, with Prof. Mary Boyes, VCU Honors College

Mammography is currently the most widespread method of screening women for early breast cancer. The diagnostic accuracy of both widely used mammography procedures (full-field digital and film-screen mammography) are the subject of much debate due to high rates of false-positives, false-negatives and over-diagnosis. New studies also question the process's efficacy in reducing mortality, which conflicts with prior evidence that shows some benefit. Studies highlighting increased survival due to mammography may be subjected to lead-time bias errors. The aim of this paper is to identify the most effective method of early breast cancer screening. This is done by analyzing research related to mortality reduction and survival as well as increases in life-expectancy. Different types of mammography screenings are considered including alternative possibilities such as magnetic resonance imaging (MRI), digital breast tomosynthesis (DBT), and positron-emission mammography (PEM). Screening strategies in high-risk subjects with a familial history and genetic predisposition are also considered. Due to the heterogeneous and unpredictable nature of cancer progression, lead-time bias, and cancer treatment, the available trial evidence is challenging to interpret. In addition, there are vast inconsistencies between studies regarding the effects of mammography screening on mortality and survival over long time periods. Evidence regarding survival rates is doubtful due to lead-time bias. Lead-time bias is a bias in perceived survival length that appears due to early detection. Breast cancer screening requires a comprehensive screening strategy: a solution that will narrow screening to the highest risk subjects, and a screening method that will eliminate unnecessary harmful treatments.

103. PETA and the Practice of Sexualized Advertising

Abir Malik, Dept. of Biology, with Prof. Bonnie Boaz, University College

Over the last few decades, advertisements have been objectifying and sexualizing women as a tactic to attract men into supporting various causes. This paper deals with how the advertisements created by the animal rights movement of PETA, People for the Ethical Treatment of Animals, exploit women in an attempt to gain more supporters. It will also analyze the psychological and emotional affects that sexualized advertisements have on the women who are forced to view them. Through these controversial advertisements, women's rights and the way that women are treated are put at risk. Women display their entire bodies placing themselves in a vulnerable and dangerous situation. Advertisements of this nature represent women as equals of animals challenging the difference between animals and humans. The results are very negative with increasing aggression, such as rape, towards women from the viewers. Sexualized and objectified images take away from the purpose of the cause making the audience reluctant to support it.

104. Effects of Glucose Concentration on Fibrillogenesis in Breast Epithelial Cells

Brittany A. Martinez¹, Lauren Griggs¹, Min Zhao², Lynne Elmore, Ph.D.², and Christopher A. Lemmon, Ph.D.¹

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Fibronectin is a soluble glycoprotein that is assembled by cells into insoluble fibrils that make up a major component of the extracellular matrix in developing tissues. Studies have shown its importance in cell adhesion, growth, migration, and differentiation. In the adult human, fibronectin expression is low in most tissues, with the exception of hepatocytes. However, in several disease states, including many cancers, fibronectin expression is dramatically increased in cells within the diseased tissue. Studies from rat mesangial kidney cells have shown a linkage between high glucose concentration and increased fibronectin expression. A common hallmark of many cancers is increased glucose transport into the cell as well as increased glucose metabolism within the cell. We thus hypothesize that increased glucose metabolism may be a driving factor in increased fibronectin assembly in tumors. To investigate this, healthy mammary epithelial cells (MCF10A), premalignant epithelial cells (MCF10AT1), and malignant epithelial cells (MCF10CA1) are cultured using glucose concentrations in the media ranging from 8.5 mM to 33.5 mM. Cells are labeled using immunofluorescence techniques to quantify fibronectin assembly; fibronectin expression within the cells is determined using quantitative PCR. Immunofluorescence and PCR are also being used to determine the degree of Epithelial to Mesenchymal Transition (EMT) in these cells; previous studies have shown that glucose concentration can drive EMT, which has been implicated in cancer. These studies may provide a mechanism by which altered glucose metabolism in cancer cells drives an increase in extracellular matrix assembly by changing fibronectin assembly.

105. African Americans, the Tuskegee Syphilis Study, and AIDS Clinical Trials

Madeleine Mashon, Dept. of Art History, with Prof. Faye Prichard, VCU Honors College

Despite African Americans composing 13% of the US population, they account for 51% of all reported AIDS cases between 1985 and 2002. Yet, due to a variety of sociocultural, structural and economic factors, many African Americans are uneducated about or distrustful of HIV/AIDS research methods and research-related procedures and terms in general. Researchers are struggling to find African Americans for screening and enrollment in AIDS Clinical Trials, which is critical to the development of new antiretroviral medications. “Without adequate representation of racial and ethnic minorities it is difficult to assess the ramifications, if any, of race and gender on HIV treatment regimens” (Cargill and Stone 906). Understanding these barriers to enrollment and developing strategies to combat them are essential to forming more successful minority recruitment methods in HIV/AIDS research. To establish this link, I examined numerous focus group studies, surveys and questionnaires that evaluated the willingness of African American populations to participate in health research and the obstacles impeding their enrollment, as well outlined methods to increase their participation. The studies revealed distrust rooted in the Tuskegee Syphilis Study and other historical events, poor or inadequate knowledge of healthcare procedures and terminology, and other various structural issues as major barriers to minority enrollment. However, although the Tuskegee Syphilis Study has discouraged some African Americans from participating in health, specifically HIV/AIDS-related, research, a combination of other sociocultural factors has played a greater role in their decisions to participate. It is crucial for healthcare professionals to educate minority populations about the benefits and drawbacks of health research, form trusting patient-provider relationships, and provide culturally sensitive recruitment strategies such as peer-driven intervention. Increasing African American participation in AIDS Clinical Trials is the only way to treat these issues, and it is imperative that health professionals take the necessary steps to do so.

106. From the Fields of Ferry Farm

Ashley McCuiston, Dept. of Anthropology, with Dr. Bernard Means, Dept. of Anthropology

The soil at Ferry Farm holds an immensely rich cultural history, and has moved and transformed under the feet of countless figures throughout history. Located along the Rappahannock River in Stafford County, Virginia, this site has acted as a camp to early American Indians, a home for the Father of Our Country George Washington, an encampment for Union Soldiers during the Civil War, and a fascinating archaeological site for over a decade of researchers. This poster will exhibit the dynamic history of Ferry Farm, as well as the archaeological research that has been done there, particularly in cooperation with the students and faculty at Virginia Commonwealth University. Such collaborative projects have included field schools, work with the Virtual Curation Laboratory, and my own thesis work which examines in depth the prehistoric component of this intriguing site.

107. Associations between Cultural Beliefs and Asthma Self-Efficacy in Pediatric Asthma

Crystal McNair, Dept. of Psychology, with Dr. Robin Everhart, Dept. of Psychology

Background: Cultural beliefs about medication effectiveness have been shown to differ by racial and ethnic backgrounds and can contribute to pediatric asthma disparities. Given that

child asthma is managed within the family system, caregiver beliefs about asthma medications may impact a child's efficacy to manage their asthma.

Objective: The purpose of this study was to examine associations between caregiver beliefs about asthma medications and child asthma self-efficacy.

Methods: Participants consisted of 102 caregivers and their children with persistent asthma (children aged 6-15 years). Forty-four percent of caregivers were Caucasian, 33% of caregivers were African American, and 23% were Latino. Children completed an asthma self-efficacy questionnaire and caregivers completed a questionnaire about their beliefs related to child asthma medications.

Results: Controlling for race/ethnicity and family income, caregivers who more strongly agreed that "my child's medications are a mystery to me" were more likely to have a child who reported lower efficacy to prevent an asthma attack ($\beta = -.23$, $\Delta R^2 = .05$, $p < .05$). Stronger caregiver beliefs that their child's health depends on asthma medications were more likely to have a child with greater efficacy to manage an asthma attack ($\beta = .28$, $\Delta R^2 = .08$, $p < .01$).

Conclusion: Findings suggest that caregiver beliefs about asthma medications may impact children's efficacy to both prevent and manage an asthma attack. Caregivers that believe strongly in the importance of medications may pass these positive beliefs along to the child, which may influence a child's confidence in managing their asthma. Future research on this topic should use a larger sample and examine specific caregiver beliefs that may affect a child's self-efficacy in managing their asthma.

108. Digital Skeletons: Zooarchaeology in the 21st Century

Mariana Zechini, Dept. of Anthropology, with Dr. Bernard Means, Dept. of Anthropology

Zooarchaeology is the study of animal remains (including bone, hair, shell, etc) recovered from archaeological sites. The Virtual Curation Laboratory (VCL), housed in the School of World Studies at Virginia Commonwealth University and directed by Dr. Bernard K. Means, has received faunal remains from various archaeological sites and modern type collections. These remains are being scanned using a NextEngine Desktop three-dimensional (3D) scanner in order to study the advantages and disadvantages of using three-dimensional technology on zooarchaeological data. The VCL has scanned specimens such as raccoon, passenger pigeon, groundhog, turkey and deer in order to understand how 3D scanning can solve problems related to preserving archaeofaunal data.

109. Is Ketamine An Antidepressant?

Cristina R. Merritt, Mary A. Friar, Todd M. Hillhouse, Kevin A. Webster, with Dr. Joseph H. Porter, Department of Psychology

Major depressive disorder (MDD) is the most common mood disorder in the United States affecting approximately 14.4% of Americans. Unfortunately, approximately 36% of MDD patients are treatment-resistant (i.e. they fail to respond to treatment with current antidepressant medications) and for the patients that do respond to current antidepressant drugs, there is a delayed onset of 4-12 weeks before adequate symptom remission is achieved. Recently, several studies have demonstrated that ketamine can produce a rapid and prolonged reduction in symptoms in MDD patients (Berman et al., 2000) and in patients who are treatment-resistant (Zarate et al., 2006). Ketamine is a noncompetitive antagonist at NMDA

glutamatergic receptors and is used as a dissociative anesthetic in both humans and animals, but it also has abuse liability in humans. These clinical results with ketamine have generated a great deal of interest in novel mechanisms for the treatment of MDD and glutamatergic systems have emerged as one potential target. The present study was designed to test the possible antidepressant-like properties of ketamine in a preclinical behavioral assay with mice and to compare it to the antidepressants, imipramine (a tricyclic antidepressant) and fluoxetine (a selective serotonin reuptake inhibitor [SSRI] antidepressant). The differential-reinforcement-of-low-rate (DRL) 72 sec operant procedure, which was established in the 1980's to selectively screen antidepressant drugs, has primarily been used in rats. In the DRL procedure animals are required to wait 72 sec between operant responses in order to receive a reinforcer. A drug demonstrates an antidepressant profile if the number of reinforcers are increased and the number of responses are decreased. Interestingly, only one published study has evaluated the effects of antidepressant drugs in mice under the DRL 72 sec operant schedule. The aim of the current study was: 1) to establish the DRL 72 sec procedure in mice using two different operanda (nose-poke and lever-press) and 2) to compare ketamine with imipramine and fluoxetine. Mice in both nose-poke and lever-press groups were successfully trained to respond under the DRL 72 sec operant schedule. The response operandum was clearly an important determinant of drug effects in the DRL 72 assay. Imipramine (32.0 mg/kg), fluoxetine (32.0 mg/kg), and ketamine (32.0 mg/kg) significantly increased reinforcers and decreased responses in the mouse lever-press group. In contrast, imipramine (32.0 mg/kg) and fluoxetine (32.0 mg/kg) significantly increased reinforcers, but failed to alter the number of responses emitted for the mouse nose-poke group. Finally, ketamine (0.32-32.0 mg/kg) produced no significant changes in DRL performance in the mouse nose-poke group. These results provide evidence that the DRL 72 sec assay is a valid procedure for assessing the antidepressant-like effects of drugs in mice and that ketamine produced an antidepressant-like profile that was similar to imipramine and to fluoxetine. However, the operandum available for responding was an important determinant of drug effects on DRL responding in that the lever-press results for mice more closely resembled the antidepressant-like effects of these drugs in previous studies that tested rats, than did the nose poke results.

110. Rhythm Therapy as a Novel Treatment Option: Alleviating Verbal Memory Damage in Temporal Lobe Epilepsy Patients

Ryan Meshkin, Dept. of Biology, with Prof. Mary Boyes, VCU Honors College

In addition to its fundamental importance to the production of music, rhythm offers potential therapeutic effects. Individuals suffering from temporal lobe epilepsy (TLE) experience a selective pattern of verbal memory damage that is most significantly afflicted within the left temporal lobe. Magnetic resonance imaging has shown that the left planum temporale region of the brain is larger in musicians than in non-musicians. Such a finding implies that certain elements of musical experience lead to this enhanced left temporale region. It has also been found that rhythm can play a role in modulating certain left temporal lobe processes by increasing attention to syllabic stress and reversing timing deficits in dyslexic patients. Findings that demonstrate significant rhythm training-induced improvements in the language skills of dyslexic patients can be extended to TLE patients. In order to bridge knowledge from the disciplines of biology, medicine, music therapy, and education that engage in discussions on rhythm and TLE, I conducted a cross-disciplinary analysis of literature in the field to determine whether or not reversing temporal processing deficits with rhythm training can alleviate verbal memory damage for TLE patients. My findings indicate that reversing temporal processing deficits with rhythm training can alleviate verbal memory damage, a fundamental impairment associated with TLE. Furthermore, rhythm therapy, delivered through musical training, offers many advantages over current treatment options. The versatility and potency of rhythm therapy is such that it can be used in conjunction with medication post-operatively or alone as an independent therapeutic technique.

111. Cycling Infrastructure: Place, Mobility, and Economic Development in the Urban US

Michael Rogers, Dept. of Urban and Regional Studies-Planning and Policy, with Dr. Damian Pitt, Wilder School of Government and Public Affairs

This project examines the economic development effects of bicycle infrastructure in low-income communities of the urban United States. The essay begins by reviewing literature that is focused on the Spatial Mismatch Hypothesis (SMH). This review is used to conceptualize the economic stagnation in low-income communities that is caused by a lack of access to transportation. From there, the essay reviews several policies that have been suggested or implemented as a means of thwarting the effects of SMH. The review of such policies evidences the importance of mobility in economic development. After reviewing associated policies, the paper moves to discover the economic development benefits of cycling infrastructure. Two case studies (Washington, DC and Portland, OR) are then provided in order to analyze if, and how American cities are using cycling infrastructure as a method to increase mobility in spatially isolated communities. The essay then applies the findings of the case studies to analyze the direction of cycling infrastructure in Richmond, VA. The paper concludes by evaluating the effectiveness of the three cities' approaches in relation to spatial isolation, and offers suggestions for improvement.

112. AhR and Autoimmune Disease

Erica Miller, Dept. of Anthropology, with Prof. Faye Prichard, VCU Honors College

Autoimmune disease affects millions and has been a large area of study for decades. Despite the intense research, there are still no known prevention measures/cures for these chronic conditions. There was much excitement upon the discovery of the aryl hydrocarbon receptor some years ago as a pathway to immunoregulation, possibly providing the answer to our research. AhR is activated by ligands which then activate certain genes to effectively suppress and regulate the immune system. AhR activation has even been shown to prevent the onset of type I diabetes in mice (Kerkvliet 2012). However, studies done on AhR have been performed mainly on mouse models and, due to differing ligand binding affinities, may react differently. My research on this issue has not yet been completed but I suspect to find that there is a large likelihood that the treatments that work in mice may not work in humans. I've since used studies from peer reviewed journals investigating the relationship of AhR and autoimmune disease, mostly involving activation by TCDD. More recently I've started researching other ligands such as ITE shown below. Data from the human genome project has also proved useful in considering concerns for future implementation of treatments that activate AhR, as they could differentiate in results due to a number of polymorphisms of AhR that have been uncovered. A recent study on TCDD shows that genomic expression is species-specific (Forgacs 2013). One could argue that this is only one type of ligand and that even so TCDD is too toxic to be used on humans. Another type of ligand, ITE, was shown to suppress EAU and T-cell mediated immunity in mice without the toxic effects of TCDD (Nugent 2013). However, I would challenge this idea because previous experiments have suggested that low doses of TCDD have no noticeable toxic effects on mice, but it has since been shown that even low doses do, in fact, have toxic effects such as hepatic steatosis (Forgacs 2013). I will further investigate the possibility of these varied results being due to misexperimentation or genetic

differences between the groups of mice which may resemble polymorphisms found in human AhR.

113. The Effective Use of Web 2.0 Technologies in the Political Realm

Kirby Miller, School of Business, with Prof. Faye Prichard, VCU Honors College

The influence of Web 2.0 technologies has infiltrated the political realm, not only being used by members of each political party, but also in each level of civic engagement. The primary problem this paper assesses is the extent to which American presidential candidates have used Web 2.0 technologies as a political tool and how these technologies will affect the future of political activity. While Web 2.0 technologies have been widely used by candidates in the two recent presidential races, and while they will see an increased use as the millennial generation emerges in the political arena, the effective use of Web 2.0 technologies will be through supplemental use with traditional political tools and specified use among each form of Web 2.0 technology. The study looked at one article that analyzed data from the 2000 National Annenberg Election Survey, four articles that had a qualitative analysis of the Web 2.0 technologies used by presidential candidates in the 2008 election, an article was included that summarized the findings in a controlled lab experiment that studied young adults' political use of Web 2.0 technologies, another article was an empirical study of candidate use of Twitter and its effect on candidate salience, and the last article used content analysis and survey research to find a correlation between online political groups and offline political participation. The primary belief is that Web 2.0 technology will be supplemental to traditional political tools. The extent to which they will be used and how they are used is contested among scholars. While some believe that universal, undifferentiated use of Web 2.0 technologies can be an effective political tool, each form of technology must be used differently to maximize political efficiency because each form of Web 2.0 technology melds effectively with a different traditional political tool. Candidate websites and Facebook have been found to enrich fundraising efforts while Twitter has been found as a means to mimic a town hall meeting. Candidate YouTube channels have been found to act as a testing point for television advertising before running on mainstream channels. These findings show that future political candidates will need to adopt Web 2.0 technologies as a way to enrich their traditional political activities. Campaigns will need to use each Web 2.0 technology differently in the way that will most effectively aid their campaign. Many of these tools will be adopted and controlled by social media directors.

114. Caffeine and Alzheimer's Disease

Emily Miller, Dept. of Chemical and Life Sciences Engineering, with Prof. Faye Prichard, VCU Honors College

Ninety percent of Americans consume caffeine daily in some form or another. Most caffeine users value it for its stimulant effects, but recent knowledge about this molecule suggests that it could provide protection against degenerative cognitive disorders and keep the brain functioning at full capacity throughout the aging process. In my research, I am examining the impact of daily caffeine consumption on the progression of Alzheimer's Disease in senior citizens. I am also investigating some of the more harmful effects of caffeine consumption such as hypertension and anxiety to determine if these outweigh any possible benefits to the elderly. The data collected for this research was found mostly in formal lab reports and journal articles representing research performed at universities from across the globe. I looked at studies that investigated the effects of caffeine on both human subjects and animals. Caffeine acts as a non-selective antagonist to two major adenosine receptors (A_1 and A_{2A}). Manipulation of the A_{2A} adenosine receptor in the early stages of Alzheimer's Disease has been shown to slow or stop neurodegenerative damage before it becomes irreversible. Adenosine levels impact sleep, arousal, neuronal health, cognition, and memory. Caffeine has

also been proven to control levels of amyloid- β proteins in the brain. Elevated cerebral amyloid- β protein levels are a main indicator of Alzheimer's Disease. The cognitive protection offered by caffeine is most beneficial when the caffeine is consumed over a large span of time, prior to the Alzheimer's diagnosis. Simply put, an elderly person who has been drinking three cups of coffee per day for the past 30 years of his or her life is more likely to experience the cognitive protection than an elderly person who begins drinking three cups per day when he or she is diagnosed. Side effects associated with caffeine are highly personal to the individual consuming it. For this reason, it is difficult to come to a black-and-white conclusion about whether or not the benefits of caffeine consumption outweigh the risks. I was, however, able to come to the conclusion that caffeine protects against cognitive impairment in the elderly. If an Alzheimer's Disease patient has no underlying conditions that caffeine could exacerbate, it could be beneficial. Caffeine is in the xanthine class of organic compounds. By understanding the way caffeine, and consequently other compounds in this classification effect brain chemistry, those in the medical and pharmaceutical community can better understand how to treat Alzheimer's Disease.

115. Cybersecurity in K-12

Ryan Mogadam, Dept. of Homeland Security and Emergency Preparedness, with Dr. Jason Levy, Dept. of Homeland Security and Emergency Preparedness

There is no greater national security threat than cyberattacks. Although conventional military force will always exist, cyberthreats present an all-new challenge for countries to defend against. In a world powered by technology, the public is increasingly more susceptible to the dangers of cyberattacks. Technology has made the world function more fluidly but it has also left people with a great vulnerability. Everything from phones to nuclear power plants are vulnerable to cyberattacks. These threats are not simply a threat of the future; instead, attacks like Stuxnet have illustrated the potential for military use of cyber attacks. (Langer, 2011) Unfortunately the battle for cybersecurity is a losing one at this point. This is due to the fact that it is difficult to defend against sophisticated coding, and very few people are proficient in coding. Cybersecurity is one of the most important fields of study anyone can learn. In America cybersecurity education is something that is borderline non-existent at the grade school level. While subjects like music, art, and history are important; America needs to realize that in order to assure the safety of its citizens and poise its youth for success, time must be taken to teach cybersecurity and coding. Schools need to evaluate their curriculum and remove some of the art, music, and history classes, and insert programming, and cybersecurity lessons. Although this may be drastic, it is critical in ensuring the safety and success of the country.

Ralph, L. (2011, May 23). Stuxnet: Dissecting a cyberwarfare weapon. *Security & Privacy, IEEE* ,9(3), 49-51.

116. Cyberstalking: A Dangerous Cybercrime

Safoorah Mughal, Dept. of Homeland Security and Emergency Preparedness, with Dr. Jason Levy, Dept. of Homeland Security and Emergency Preparedness

This research offers an overview of cybercrime and the principal objective is to examine cyberstalking. Cybercrime is increasing because cyber criminals are rapidly taking advantage of growing technology. These criminal actions include attacks against computer software and hardware, identity theft and circulations of underage sexual media, hacking online financial applications, and, in addition, the use of viruses, Botnets, and various email scams known as phishing. Cybercrime is any illegal action which uses electronic communication or devices or

information systems containing the Internet. The principal objective of the research is to demonstrate cyberstalking as a serious crime which has vigorous effects on victims' lives. General population and college students may have basic or little to no knowledge of how cyberstalking can be harmful and even life-changing. Cyberstalking is the patterns of threatening or aggressive behaviors that utilizes of the Internet, email or other electronic correspondence to stalk. This research provides general information about cybercrime but mainly focuses on the deliberation of cyberstalking in particular and provides useful guidelines for online users to avoid falling into victimhood.

117. Exposure of Preadolescent Children to Nonnative Accents and the Trajectory of Linguistic Flexibility

Gretchen Mull, Dept. of Art Education, with Prof. Mary Boyes, VCU Honors College

The purpose of this study is to examine how exposure of children to nonnative accents during their linguistic development increases their linguistic flexibility in adulthood. By reviewing articles and primary sources that examine the processes of speech intake, the stages of linguistic development, and the role of experience versus perception, the study also clarifies what elements most significantly alter a listener's ability to interpret unfamiliar speech and during what periods a person is most conceptually available to development a streamline understanding of nonnative speech. This study challenges the argument that exposure is the only way to understand nonnative accents and the argument that all adults have the ability to decipher unfamiliar speech just because it is the same language as the listener. Through exposure which leads to familiarity and the development of mechanisms to isolate essential and nonessential linguistic information, listeners increase their ability and flexibility for future interactions with nonnative-accented speech.

118. Systems Biology of the Glial Response to Traumatic Brain Injury

Hiyab G. Yohannes, Dept. of Forensic Science, with Dr. Andrew K. Ottens; Department of Anatomy and Neurobiology

It has been widely acknowledged that cellular and synaptic reorganization occurs after traumatic brain injury (TBI). Early pathobiology entails synaptic degradation, cell loss, and excitation of astroglia and microglia in areas peripheral to the site of focal injury (perilesion). Subsequently, neurons are stabilized with glial trophic support followed by synaptic reorganization. Yet, the nature and timing of signaling and guidance cues underlying these morphological dynamics remain largely unknown. Our lab applies systems biology to further our understanding of molecular-cellular dynamics following TBI. We hypothesized that the temporal pattern of morphometric cellular change following TBI can provide a template to resolve corresponding cell specific proteomic dynamics. A controlled cortical impact focal injury model in male rats was employed. GFAP and OX42 glial specific markers and fluorescence microscopy were used to profile morphometric change across the first two weeks post TBI. Glial markers were co-probed with the cell differentiation marker nestin to differentiate reactive and differentiating states within the peri-lesion cortex adjacent to the focal injury center. Peri-lesion tissue was also analyzed with a high-capacity, label-free quantitative proteomics platform. Informatic analysis revealed over 13,000 peptide responses across time following TBI, purporting protein dynamics of over 1,700 proteins. This TBI neuroproteome reflected temporal patterns of shifting biochemical processes between acute and subacute phases; however, the dynamics were complicated by the overlap of different cell-type responses within the bulk tissue. Template correlation analysis allowed selection of proteome dynamics in correlation

with glial morphometric change resolving protein network relevant to glial dynamics and a systems understanding of the pathobiological response to brain injury.

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119. A collaborative national-scale analysis of land use and frog diversity across spatial scales

Chelsea Althouse, Michelle Arnold, Myles Denardo, Miranda (MJ) Foster, Joseph Green, Kathleen (Kat) Lau, Philip Loudon, Joseph Neale, Nathaniel Stearrett, Alexandra Stylianou, Alexander Welch, Julie Charbonnier, with Dr. James Vonesh, Dept. of Biology

Amphibians are sensitive to changes in land use because they require both upland terrestrial habitat and aquatic wetland habitat to complete their life cycle. Our previous work demonstrates that land-use change including road density, development, and wetland area impact amphibian diversity. We build upon this previous work to examine the relative influences of these factors across different landscape scales. Incorporating scale within our model allows us to explore by which mechanism different factors impact amphibians (e.g. do roads increase roadkill in the immediate surrounding area or do they isolate populations at the larger scale?). North American amphibian monitoring program (NAAMP) compiles data from standardized roadside surveys of calling frogs and toads across the majority of the contiguous United States to examine the impacts of human activity on amphibian populations over time. In this study we used NAAMP call data from 18 eastern U.S. states and National Land Cover Data to address the following research questions 1) How is the impact of road length and landscape change mediated by distance from the habitat and 2) how do species differ in the relative influence of these effects over the landscape? We quantified landscape features (e.g., habitat types, wetland –forest connectivity, road density and arrangement) using a GIS program and calculated amphibian diversity estimates of each survey at six locations ranging from 300 meters (local scale, the core terrestrial habitat) to 10, 000 meters (associations should decline at this distance). This approach allows us to explore the relative influence of factors at the regional level to build a predictive model to answer our research questions. This project is supported by the National Science Foundation, Transforming Undergraduate Education in Science program coordinated by David Marsh and the National Center for Ecological Analysis and Synthesis.

120. Comparisons and Contrasts Between Marketing Techniques Used by the Tobacco Industry and Public Health Figures

Dorothy Yen, Depts. of French and Biology, with Prof. Mary Boyes, VCU Honors College

The tobacco industry has long been known for its aggressive advertising techniques to promote its product to the general public; conversely the public health field has long been regarded as the main opposing force to the tobacco industry's efforts. The public health field's techniques of manipulating and presenting information has not been examined to the degree that the tobacco industry's techniques have been due to public health's mostly-accurate message regarding tobacco smoke. This review was performed by analyzing a variety of articles and academic sources focused on this subject. This review was conducted to examine as well as compare and

contrast the methods used by both the industry and accredited public health officials and institutions. Neither the tobacco industry nor public health professionals can deny scientific findings or empirical evidence regarding tobacco smoke and its harmful qualities but that does not deter them from manipulating evidence or even producing their own contradictory studies. The tobacco industry's public relation efforts to promote its product have long been a part of the industry's history. It has also been shown that accredited health professionals (such as the Surgeon General) use manipulative methods to promote their bias on the issue of tobacco and smoking. Accredited health professionals display conflicts of interest when definitively shutting down any opposing opinions regarding the health risks involved with tobacco smoke. Because of the utmost importance of maintaining credibility in the public eye, both institutions must remain careful and tactful in their marketing techniques. The public, however, does not internalize the PR from the tobacco industry in the same way that it does the governmental institutions. While the government is rightfully protecting the public against the damages and harms of tobacco smoke, it is suppressing some of the potential research that can and should be conducted in order to further the public's knowledge on the issue of tobacco smoke and its byproducts.

121. Propagation of Human Embryonic Stem Cells on Fibronectin Substrates

Tiffany Wong¹, Venkat Gadepalli², Raj Rao², PhD, and Christopher Lemmon³, PhD

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Human embryonic stem cells (hESC) have the potential to treat tissue and muscle damage as well as certain diseases because of their ability for self-renewal and formation of specialized cell types. Currently, mouse embryo fibroblasts are used as a feeder layer to grow the cells *in vitro*. However, many problems arise from this method because of contamination of cells from another species and because the cells do not fully represent the cell environment in humans. Thus, it is important to find a platform from human materials to maintain their self-renewal and differentiation abilities. Fibronectin, a protein commonly found in humans, has previously been identified by the Rao lab as a candidate for supporting hESC self-renewal. We measured the proliferation of these cells on three different fibronectin fragments: III-7-10, which contains the integrin binding site, III-12-14, which contains the growth factor binding site, and the combined III-7-14. The proteins were expressed in *E. coli* and adsorbed onto tissue culture plastic. We also compared the proliferation of hESC when incubated with FUD, an inhibitor that prevents fibronectin matrix assembly, to test the role of fibronectin assembly in colony formation and survival. We evaluated the hESC state of differentiation by using an alkaline phosphatase stain. This project is ongoing, but we have found that a specific site of fibronectin has increased proliferation and survival of hESC without differentiation and may have the potential of creating a cost effective human derived solution for human embryonic stem cells to grow on.

122. Discovery and Characterization of Phages infecting Bacillus

Ayad Alawdi, Wassal Alhammad, Mohammad Alkhulaifi, Ali Alsubaie, Irene Arora, Micaiah Cheeks, Justin Clary, Sklyer Dache, Mayowa Folorunso, Joshua Fung, Beatriz Galindez, Akhil Garg, Malika Gill, Neel Gohil, Jacob Jaminet, Shivani Kanungo, Ellen Korcovelos, Kireet

Kundavaram, Liam Lewis, Megan Mair, Haley Mitchell, Kaylee Newcomb, Parantap Patel, Joseph Pond, Luis Reyes, Navpreet Saini, Rachel Siefring, Natasha Smith, Ali Zamani, Allison Johnson¹

Students in BNFO 252 Phage Discovery Laboratory, ¹Center for the Study of Biological Complexity, VCU

Bacteriophages are bacterial infecting viruses that work by seizing host machinery to replicate within the microorganism. Students at Virginia Commonwealth University, in the SEA PHAGES program sponsored by Howard Hughes Medical Institute, isolated novel phages from soil samples collected along the eastern seaboard. *Bacillus*, the host bacterium, can cause food poisoning, treat for crop pesticides, and may even result in death for species *B. cereus*, *B. thuringiensis*, and *B. anthracis*, respectively. Phages infecting these bacteria are potentially useful for studying their evolution and pathogenicity. Nine phages infecting *B. thuringiensis* subspecies *kurstaki* and four phages infecting *B. cereus* 14579 were isolated and characterized in Fall 2013. During the course of purification, a novel technique called “plaque enrichment” was developed to increase the concentration of phages and the multiplicity of infection (MOI). After uniform plaque morphology was obtained through multiple rounds of purification, electron microscopy was used to determine phage morphology. DNA was purified and phages were also plated to test host range. The genomic DNA of four phages infecting *B. thuringiensis* was sequenced: Nigalana, NotTheCreek, SageFayge, and Vinny. The genes in Nigalana were identified using bioinformatics tools which determined that the genome encodes all of the pieces required to construct a phage. The genome sequences of NotTheCreek and SageFayge were quite similar to Nigalana, while Vinny appears to be unique. For example, Vinny contains seven tRNA genes while the other phages contain zero. Progress on characterization of genome features, including analysis of promoter and shine dalgarno sequences, and comparison between phage genomes will be discussed. Annotation and analysis of the above phages contribute to the advancement of viral microbiology knowledge and may offer future applications.

123. Using Classical Music to Increase Focus and Productivity in Elementary School Students with ADHD

Andrea Nguyen, Dept. of Biomedical Engineering, with Prof. Mary Boyes, VCU Honors College

Currently, physicians use prescription medications to treat attention deficit hyperactivity disorder (ADHD) in children known to have low levels of the neurotransmitter dopamine. ADHD children commonly have low adherence to medications used to treat their condition because there is no known dosage to produce the optimal attention span for motivation and focus. The safest method of dopamine production is through natural techniques, which could reduce medication intake and thus side effects. Listening to classical music dominant in consonant sounds has been shown to increase dopamine levels in children with ADHD through the dopamine “reward” pathway in the brain. Because all children exhibit some increase in dopamine while listening to consonance-dominated classical music, educators can introduce this music into the classroom to improve overall academic performance and help treat ADHD children simultaneously. Instructors could rotate music playlists weekly to avoid memorization and monotony. Music could be played in quiet environments when focus is key—not during playtimes or group work. Music treatment is a cost-effective method that—with extant classroom technology—can increase overall focus and work production, proving a worthwhile investment. Physicians should turn to incorporating music in ADHD treatments rather than

solely prescribing medications in order to expand the possibilities of discovering more efficient treatment plans. Though consonance dominated classical music is known to increase dopamine, further research should be conducted in order to better define appropriate ADHD treatment plans in the classroom.

124. Phosphoinositide control of Kv2.1 channel activity

Thaison Nguyen, Dept. of Biology, with Dr. Diomedes Logothetis, Dept. of Physiology, VCU School of Medicine

Voltage gated potassium (Kv) channels are essential for repolarizing action potentials in neurons and other excitatory cells. Recently, it has been appreciated that a minor but critical secondary messenger of the plasma membrane, phosphatidyl 4, 5 – biphosphate (PI (4, 5) P₂), regulates channel gating in many channel types, including the non-voltage sensitive inward rectifying potassium (Kir) and the weakly voltage-dependent KCNQ channels. It has been suggested that in general strongly voltage-dependent Kv channels are not PIP₂ sensitive, unlike most other channels. To test this hypothesis, *Xenopus laevis* oocytes are co-injected with the Kv2.1 wildtype RNA and a G protein – coupled receptor (M1R) or a voltage sensitive lipid 5 – phosphatase (Ci-VSP). Oocytes are also incubated in a phosphatidyl – 4 (PI4) kinase inhibitor (wortmannin) for several hours. These experimental procedures deplete PIP₂ through different means, namely PIP₂ hydrolysis through activation of a Gq – coupled muscarinic receptor; dephosphorylation of PIP₂ through activation of a lipid phosphatase; or PI4 kinase inhibition to prevent PI (4, 5) P₂ synthesis. The two – electrode voltage clamp (TEVC) technique is used to record PIP₂ depletion in each experiment. Preliminary results suggest that in each scenario, PIP₂ depletion decreases the overall amount of current, offering support for the channel's sensitivity to PIP₂. Some of these PIP₂ – depletion conditions may allow the channel to open earlier, as observed in a left shift of the I-V curve, a finding consistent with behavior reported for Kv1.2. Consequently, our preliminary results suggest that Kv2.1 is PIP₂ sensitive, in contrast to what was claimed previously.

125. Relationships Taught By Disney Princesses

Alena Nolder, Dept. of Graphic Design, with Prof. Bonnie Boaz, University College

The Disney princess film franchise has become a very popular topic within the last decade where parents and researchers argue that the females and their lives in the films are portrayed in an idealized manor that teach children incorrect standards about life. This paper focuses on how the princess industry, which was created and expanded by Disney princess films, is an exponentially growing business that more and more children are being raised on during their prime developmental years. The Disney princess films consist of similar story lines: the princess and evil stepmother having a conflict, the prince sweeping the princess away, and everything ending with a happily ever after. Through this repetition, children pick up concepts, such as waiting for their prince charming or needing to be a perfect, loving princess for a boy, that may work as a reality in the films, but create false ideals in the real world. This paper analyzes scholarly articles and personal observations done while working at a preschool to deliberate the affects that Disney princess films have on young girl's relationships. Specifically, the article will focus on how the films teach girls wrong ideals about relationships with boys and women, and how these films affect the way girls treat each other.

126. The Forgotten Culture of the Enslaved

Israa Nour, Dept. of Anthropology, with Dr. Bernard Means, Dept. of Anthropology

Hundreds of thousands of enslaved people from Africa were brought to the eastern United States against their will from 1619 to 1865. They played an enormous role in the history of this country, but often times their existence is only viewed as the “institution of slavery.” Processual archeologists study and teach slavery from an economic and political standpoint with some attention to the inequality, inhumanity and abuse of those enslaved. Recently, post-processual archeologists have encompassed the culture, traditions, folklore, religion, behavior and rituals of those enslaved in the United States. After hundreds of years of neglected aspects of African American culture, their material culture has been preserved in a way that processual archeologists have failed to do. Post-processual archeologists have been able to emphasize the subjectivity of archeological interpretations in slave settlements and burial grounds.

127. The Burial Practices of the Berawan

Dorothy O’Boyle, Dept. of Anthropology, with Dr. Bernard Means, Dept. of Anthropology

This research poster is about the small tribe of Berawan people, a subgroup of Kenyah, of Borneo, Indonesia. The Berawans live in an egalitarian and agricultural society in the rainforest very similar to the tribes they are derived from. These people have a distinct way of treating their dead that generations of people around the world have been intrigued by. Their treatment of the dead consists of "secondary treatment" or secondary burial of the body where the body is first placed in a clay jar on the corner of their slash-and-burn gardens to decompose into the earth; the second part of the burial occurs when the bones are dry and put into a decorative box/coffin for permanent burial with the ancestors. This poster will discuss the Berawan culture and their burial practices.

128. Paleohistopathological and Taphonomic Studies of Naturally Mummified Spleens

KELSEY D. O’NEILL¹, JAMES SCOTT BANNING^{1,2}, and ENRIQUE GERSZTEN³. ¹School of World Studies, Virginia Commonwealth University, ²Forensic Science Department, Virginia Commonwealth University, ³Department of Pathology, Medical College of Virginia campus, Virginia Commonwealth University.

Spleens rapidly undergo post-mortem autolytic changes making preservation in mummified specimens rare. To date, there have been no previous studies of mummified splenic tissue. The current study addresses this gap through analysis of 19 naturally mummified individuals excavated from 5 separate valleys within in the desert regions of southern Peru and northern Chile dated between 1700 B.C. and A.D. 600. This study seeks to identify normal and abnormal structures in mummified spleen tissue as well as to examine the differential preservation of splenic tissue between individuals. Twenty samples of spleen tissues were rehydrated in Ruffer’s solution and placed in a 95% ethanol solution. Each sample was then stained with hematoxylin and eosin, as well as Masson’s trichrome in order to visualize the architecture of the organ tissue. After microscopic examination, the most well preserved slides were stained for the presence of iron and calcium. Microscopic examination in conjunction with staining techniques verified the presence of splenic tissue containing blood remnants interposed with fibrous tissue. Our results suggest that while fibrous tissues were well preserved, the parenchyma was markedly shrunken. Blood elements and calcium were

identified in the spleen tissue with no evidence of disease . We hypothesize that the natural mummification process that preserved these individuals prevented normal splenic post-mortem autolytic changes. The identified blood remnants will allow molecular techniques, such as miRNA, to facilitate a more comprehensive understanding of the mummified individual's genetic makeup and life history.

129. Impacts of Urbanization on Dogwood Population Fitness

Kaitlyn Parkman, Dept. of Biology, with Dr. Rodney Dyer, Dept. of Biology

The phenomenon of urbanization occurs all over the world. In an attempt to find jobs and financial stability, people move to cities for more opportunities. As a result, about half of the global population lives within cities, and that number continues to rise ("Urban Threats"). Some threats associated with urbanization include pollution and physical barriers to root growth of trees ("Urban Threats"). These threats can lead to habitat fragmentation and the loss of biodiversity; species can die and cease to exist in a habitat where they once flourished (Newman *et al.* 2013). The effects of habitat fragmentation on the relationship between the plant and the pollinator also remain unknown (Newman *et al.* 2013). It is very important to study the populations of species in the city, because they are a vital part of the ecosystem. In this research project, I will study the fitness of dogwood trees located in an urban neighborhood of Richmond, Virginia known as "the Fan." The fitness of the trees will be based on the reproductive output. After locating, mapping, and sampling the individuals in the fan, I will use statistical analysis to see if there is a correlation between the reproductive output based on seed production of the trees and the location of the tree within the urban environment. This information will raise questions about the effects of the location of the tree in relation to pollinator populations as well. This study will allow us to measure a component of fitness that may be influenced by urban location, and to differentiate possible good and bad conditions for dogwoods within the city. Ultimately, we will gain a better understanding of how to manage our dogwood species, and how to maintain connectivity across the landscape so the dogwood population can flourish.

130. Using Nanoporous Gold as an Electrochemical Sensor in Biologic Solutions

Jay Patel, UROP Summer Fellow, Dept. of Biology, with Dr. Maryanne Collinson, Dept. of Chemistry

Nanoporous gold (NPG) serves as a useful material for applying electrochemical measurements to biomedical applications. NPG, which have pores that range from 10-50 nanometers, are made through exposure of a 50%-50% gold/silver alloy to nitric acid. UV light treatment and electrode preparation follow, which ultimately result in a functional NPG electrode. A method used to determine the properties of NPG is cyclic voltammetry (CV) which is usually performed over a period of time in bovine serum albumin (BSA), plasma, and blood, to determine the extent of biofouling (the decrease in the rate of exchange of electrons between the electrode and the surrounding solution) of these electrodes. Minimized biofouling is necessary for a functional NPG electrode. CVs for NPG electrodes exposed to biological fluids display minor deviation from the CVs of electrodes not exposed to the biological fluids, showing that NPG effectively resists biofouling and allows electrochemical measurements to be made in such complex solutions. Because NPG is effective in biologic solutions, experiments involving the

measurement of redox potential is possible. Ideally, a baseline redox potential value in the blood of various animals and humans will be obtained, so any deviation from the baseline value can be projected as an altered physical condition. Recent studies include studying the effect of blood species (i.e. ascorbic acid) on redox potential in order to correlate concentration of these species with rest potential. The purpose of this project is to develop a sensor that effectively measures redox potential in a sample of blood as a means to gauge patient condition.

131. Carbon Dioxide Hypersensitivity in Nicotine-Dependent Young Adults

Divya Patel, Dept. of Biology, with Dr. Roxann Roberson-Nay, Dept. of Psychology

Smokers frequently smoke because of anxiety (Hughes et al. 1990) and smoking produces symptoms congruent with anxiety-related disorders (Benowitz 1996). Carbon dioxide hypersensitivity is a relatively new technique used to measure anxiety in patients, who potentially may suffer from panic disorder. Typically, humans breathe less than one percent of carbon dioxide in the air. For the CO₂ task, individuals are asked to breathe air that has been enriched with a higher concentration of carbon dioxide. Previous studies have indicated that smokers exhibited higher anxiety reactivity when inhaling 20% carbon dioxide enriched-air (Zvolensky et al. 2001). The purpose of the current study is to determine if nicotine-dependent individuals exhibit higher hypersensitivity to 7.5% carbon dioxide-enriched air. From ~390 young adults (female= 56%, M_{age}=19.75, σ =2.67), a total of 22 smokers were identified, with which 22 non-smokers were randomly paired. Similarities in age, gender, and baseline anxiety were accounted for. Physiological response, symptomatic ratings, and subjective self-report ratings were obtained before, during, and after the CO₂ task. Paired t-tests will be used to compare the physiological, symptomatic and subjective responses between the groups of non-smokers and smokers. Repeated measures analysis of variance will be conducted to determine the changes in physiological, symptomatic and subjective responses through the duration of the task. Preliminary findings show that smokers subjectively reported higher anxiety levels than did non-smokers.

132. Efficacy of Curcumin as Treatment for Alzheimer's

Parantap Patel, Dept. of Biochemistry, with Prof. Faye Prichard, VCU Honors College

Curcumin is the primary curcuminoid found in the rhizome of the turmeric plant (*Curcuma longa*), responsible for the spice's distinctive yellow color. Research conducted within the past two decades suggests that the compound may be an effective treatment for Alzheimer's disease, the most prevalent form of dementia affecting nearly 5.2 million Americans. My paper investigates the efficacy of curcumin as treatment for the pathogenesis and symptoms of Alzheimer's. I examined research pertaining to the pathogenesis of Alzheimer's, the symptoms of Alzheimer's, the chemical properties of curcumin, and the clinical applications of curcumin in Alzheimer's, using both *in vitro* and *in vivo* studies. The pathogenesis of Alzheimer's is defined by the aggregation of amyloid-beta plaques, formation of tau protein, and propagation of oxidative oxygen and nitrogen species. The chemical nature of curcumin enables it to interact with multiple biochemical pathways in the central nervous system, inhibiting the pathogenesis of the disease. *In vitro* applications of curcumin show much promise to this end. Alzheimer's is also characterized by the symptoms of cognitive decline and memory loss. *In vivo* studies of curcumin on living subjects provide mixed results for the substance's efficacy on

symptoms and pathogenesis. Curcumin shows much promise in inhibiting the pathogenesis of Alzheimer's, according to *in vitro* studies. However, the lack of definitive conclusions from *in vivo* applications shows that the substance cannot yet be designated as an effective treatment for the disease.

133. EXAMINING TREATMENT FIDELITY IN MOTIVATIONAL INTERVIEWING

Akanksha Patel, Taylor Ihsane-Thomas, Alexandra Sova, Amy Jeffers, with Dr. Melanie K. Bean, PhD

Children's Hospital of Richmond at Virginia Commonwealth University, Department of Pediatrics

Objective: Childhood obesity is a significant health concern, especially in lower income African Americans within the United States. Previous research suggests that programs developed to promote healthy eating and exercise habits have been effective in reducing childhood obesity. One strategy that has been impactful in facilitating those changes is Motivational Interviewing (MI), a brief, patient-centered counseling style used to explore and resolve ambivalence about behavior change. Recent studies have shown that MI has its advantages, such as increasing patients' sense of control when making healthy choices and promoting overall wellness; however, less research examines treatment fidelity and its impact on program adherence which may limit the interpretation of the results. Treatment fidelity is defined as the methodological strategies used to monitor and enhance the reliability and validity of behavioral intervention. NOURISH+ is a parent-focused intervention for overweight children ages 5-11 years (Nourishing Our Understanding of Role-Modeling to Increase Support and Health: PI: Mazzeo). We are currently implementing an adjunctive, MI-based treatment to investigate if MI can improve treatment adherence and effectiveness of NOURISH+ (NOURISH+MI; PI: Bean). We describe treatment fidelity methods and preliminary feasibility data in the NOURISH+MI trial. **Methods:** Prior to study onset, raters were trained extensively on use of the MITI 3.1 (Motivational Interviewing Treatment Integrity Code), a validated coding system designed to measure adherence to MI. Satisfactory interrater reliabilities (determined using intraclass correlations; [ICC]) were established prior to study onset. Raters also used the MITI 3.1 to examine MI competency of study interventionists, to indicate readiness to begin treatment. Participants who consent to NOURISH+MI complete two MI sessions prior to the onset of the group-based treatment. Session 1 (T1) occurs over the telephone and Session 2 (T2) is in-person. All sessions are audio recorded and independently coded by two raters. ICCs are continually assessed throughout the study duration to identify rater drift and indicate areas in need of retraining. MITI ratings also determine interventionists' competence and adherence to MI. Raters and interventionists attend bi-weekly to address. **Results:** To date, 80 MI sessions (T1=46, T2=34) have been conducted and coded using the MITI for MI adherence. Interventionists met or exceeded competency with a M of 100% MI adherence, 1.8 reflection to question ratio, and 4.8 Global spirit. Rater ICC's ranged from 0.6 to 1.0 across MI global scores and behavior counts. **Discussion:** Interventionists met or exceeded competency thresholds, demonstrating excellent treatment fidelity. While overall ICCs were adequate, the limited response ranges for the global scores contributed to lower ICCs in those domains. Overall reliabilities were adequate suggesting high fidelity to the MITI 3.1 and reliable ratings among independent raters. Data suggest that the NOURISH+MI trial is being implemented with high

treatment integrity. Thus, if study results suggest that MI is deemed effective, this intense protocol for establishing and maintaining treatment fidelity enhances confidence in treatment effects and furthers scientific research examining MI and pediatric obesity treatments.

134. Disaster Mitigation in Guatemala

Christopher Patterson, Dept. of Homeland Security and Emergency Preparedness, with Dr. Jason Levy, Dept. of Homeland Security and Emergency Preparedness

Guatemala is an area that is highly susceptible to Hurricanes, with the primary issue being flooding. Localities in Guatemala vary in their levels of preparedness. Hurricane Stan in particular caused a large amount of damage in the Guatemalan highlands and southern coast. Torrential downpours caused significant flooding, and several mudslides throughout the country. As of October 21, 2005, the death toll was at 664 individuals, with 844 still missing. The President of Guatemala declared a state of emergency on October 5, 2005. A total of fifteen departments were affected in Guatemala. This research will focus on the rebuilding of the critical infrastructure of the Guatemalan highlands, specifically on the roads and living structures. The research will focus on plans to improve the current main road in Chuicatama II. This road is primarily dirt and gravel, and portions of it are concrete. During rain events, especially hurricanes with their torrential downpours this road becomes virtually impassable. After a major event such as a hurricane, this road is the only access to the city. If this road is washed out and impassable it delays essential resources and aid to the city post major event. Research will focus on materials and methods that can be used to build this road up and maintain its stability, and longevity. This will allow aid and resources to reach the city in a timely manner and assist its residents in times of need. This research will also look into the possibility of placing a second or replacement road in a better location with a reduced risk of washout.

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135. Expressions of Grief and Change in the Poetry Projects of Bereaved VCU Students

Michael Pease, Sarah Gilbert, Amber Halloway, Lubna Zia-Uddin, Dept. of Psychology, with Dr. Sandra Gramling, Dept. of Psychology

A large proportion of college students, (40%) have experienced the death of someone close to them (Holland, Currier, & Neimeyer, 2006), but little is known about how college students experience and cope with loss. Expressive writing has been posited as a method for dealing with traumatic experiences (Pennebaker, 1997), but its use with the bereaved has been called into question (Stroebe, Schut, & Stroebe, 2006). A stress management course at VCU allows students to complete loss-focused writing exercises, including acrostic "alphabet poems" for course credit. The current study aims to test the hypothesis that stages of grief (based on

Rando's (1993) popular "six R's" theory) are expressed by college students in these writing exercises. A further hypothesis was that student would show progress through the stages from the beginning of their exercises to the end. Eighty undergraduate students completed a writing assignment. Students were allowed to focus their writing efforts on any type of loss experience, not just a loss due to the death of a loved one. Of these, 56 students (mean age: 21.9 years; 80% female; 33.9% African American, 32.1% Caucasian, 12.5% Asian and Latino, respectively) completed an end-of-semester feedback survey regarding the usefulness of these exercises (a 70% return rate), and 48 produced code-able alphabet poem writing projects. Two teams of two undergraduate students are independently coding the alphabet poems using a coding scheme based on Rando's "six R's" theory of grief. Rando's theory suggests that the bereaved complete six processes while grieving: Recognizing the loss, reacting to it, recollecting/reexperiencing it, and finally relinquishing it, readjusting to the outside world, and reinvesting in new relationships. As we read through each poem, we analyze each line or set of lines and decide whether or not it represents one of the stages. We then compare our codes with our teammate for agreement, and have a graduate student supervisor act as tie-breaker. So far, we have found many examples emotions and of Rando's six stages in each of the poems we have coded. Recognizing the loss, reacting to it (with negative and positive emotions) and recollecting the loss are the most common stages expressed in the poems coded so far. Most of the poems show some kind of a change in stage expression by the end of the poem. The last two stages showed up in several of the poems analyzed. We have also noted that poems tend to progress from showing the first few stages in the first half, and the last three stages in the second half of each poem. These findings suggest that qualitative analysis of expressive and creative writing processes can be a useful window into the college student grieving process. Future studies should examine how poems that progress through all or most of the stages differ from those that do not on outcomes such as grief severity.

136. Resiliency after Natural Disasters

Christopher Peck, Dept. of Homeland Security and Emergency Preparedness, with Dr. Jason Levy, Dept. of Homeland Security and Emergency Preparedness

The ability for a place to recover after natural disasters, the resiliency of a location, is almost as important as how protected the people are. Because make no mistake, there will be another hurricane, typhoon, earthquake, drought, landslide, etc. Mother Nature is not a fun person to taunt, or a fun person to play games with. And when these natural disasters happen, as they have continued to happen, and will continue to happen long after we are all gone from this earth. We need to be prepared to recover from them. We as a nation have struggled with this topic for a long time, and the most recent glaring example was the aftermath of hurricane Katrina. Our resilience in mobilizing was admirable; the U.S. Coast guard alone rescues more than 4,000 people within the first few days off of rooftops in the flood waters (USCG, 2005). But, the overall impact was not prepared for, even two weeks after hurricane Katrina hit landfall (on Sept 17, 2005) water and sewage were still not working, and all told 2.4 million people were out of water at that time (NRDC). This is something that needs to be severely worked on, because we can't have people without access to water. We have made wonderful strides, in our organizational system, with the implementation of NIMS (National Incident Management System), which the main goal of it is "a secure and resilient nation with the capabilities required across the whole community to prevent, protect against, mitigate, respond to and recover from the threats and hazards that pose the greatest risk." (FEMA, 2013)

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137. Disappearing Synesthesia and Adult Creativity

Katie Pelikan, Dept. of Graphic Design, with Prof. Mary Boyes, VCU Honors College

After conquering years of dismissal and disbelief, synesthesia has been classified as a legitimate and extremely rare disorder that elicits a crossing of senses across modalities. The most common type of synesthesia is called grapheme-color, where a person perceives or associates a color in a specific hue for each letter of the alphabet and every digit. Because this condition is only assumed to effect a mere six percent of the adult population, research and studies on the neurological capabilities of synesthesia have been as infrequent as the disorder itself—until recently. The Neonatal Theory of synesthesia, first proposed by Maurer in 1988, predicts that all humans are born with certain cortical sensory connections that cause synesthetic experiences, which are pruned before adulthood. According to this theory, the entire population is synesthetic at one point in their life. The purpose of this paper is to examine the possible explanation for the development and dissipation of synesthesia in people from infancy to adulthood. By analyzing both anatomical evidence and the pressures of enculturation on synesthetic individuals, I have found that many synesthetic children lose their access to primary process modes of thought by adulthood. This primary process thinking is attributed to physiognomic perception, increased metaphor usage, higher creativity level, and advanced neurological functioning. The prevalence of synesthetic qualities and higher levels of creativity in children is rarely evident in adults, and this may be attributed to synesthetes being unconscious of their different perceptions. Furthermore, the failure to use the synaptic connections that elicit synesthetic experiences could result in the pruning of those cortices in early childhood. In the rare case that an individual maintains strong automatic correspondences that trigger secondary modalities, this person will have access to both primary and secondary modes of thought, and in most cases, a much higher level of creativity. In order to preserve higher neurological function in adulthood and expand the amount of informational stimuli received from the senses, young individuals with synesthetic tendencies should be encouraged and not suppressed in their creativity or incongruous associations.

138. Making a Point!

Sarah Perdue, Dept. of Anthropology, with Dr. Bernard Means, Dept. of Anthropology

There are a great number of chipped stone artifacts in the archaeological record and the Virtual Curation Laboratory (VCL) at Virginia Commonwealth University is one place that stores and categorizes them through digital means. As an Intern with the VCL, I help add to the existing data collection of chipped stone artifacts along with the virtual curation of these artifacts. The VCL uses the NextEngine Desktop 3D scanner for digitally archiving each of the chipped stone artifacts. Besides providing a digital archive, the VCL also prints out plastic replicas of the artifacts by using a Makerbot Replicator. This digital way of archiving allows for further analysis and conservation that one might not have been able to achieve because of a lack of funds. Another benefit is that the archaeological record can be made more accessible to the public as many artifacts cannot be handled personally.

139. Using Metabolic Engineering to Make Biofuel Production Cheaper

Pooja Nanjannavar, Dept. of Chemical and Life Sciences Engineering, with Prof. Faye Prichard, VCU Honors College

Biofuels are one of the most promising sources of alternative energy because they are easily transported and they can be more fuel efficient than traditional petroleum fuels, thus releasing fewer greenhouse gases. It is especially important to invest in biofuels because our supply of crude oil is quickly dwindling and is expected to run out within the next 100 years. However, the most commonly used biofuels today are usually derived from corn, which is both energy inefficient and a threat to the global food economy. Therefore, it is more promising to use grasses, which are more energy efficient and do not jeopardize food economy. However, this process is expensive because grass is dense in lignocellulosic material and lignin, which require high cost pretreatments to break down in order to access energy rich cellulose. Metabolic engineering of biosynthetic pathways has the potential to reduce costs significantly, and thus make biofuels more appealing to industry as an energy source. This paper attempts to find if metabolic engineering can be applied to more than one aspect of the biofuel production process and significantly reduce costs enough to make biofuels a viable replacement for petroleum. To explore this possibility, this paper analyzed three meta-analysis reviews on lignocellulosic biomass pretreatments and changing plant metabolism, one meta-analysis on the prospects of changing metabolism of the bacteria used in lignin processing, three experimental papers on the potential of changing bacterial processing metabolism, and one experimental paper relating lignin mass to biomass yields. Based on these analyses, metabolic engineering can make biofuel production most cost effective by changing the biosynthetic pathways of the actual biomass to make it less lignin dense, to have more biomass, or to change the structure lignin to make it more easily broken down. It can also be achieved by altering the metabolic pathways of yeasts that convert cellulose in biomass to ethanol and other fuel sources. These findings show that it is possible to make lignocellulosic biofuel production less costly, but reveal that the extent of this cost reduction is largely unquantified and must be further researched to identify the viability of implementing these findings.

140. CHARACTERS IN ADVERTISING AND BRANDING IN ADVERTISEMENTS OVERCOME CHILDREN'S LOW COGNITIVE DEFENSES AND INCREASE THE OBESITY EPIDEMIC

Sarah Peters, Dept. of Mechanical Engineering, with Prof. Mary Boyes, VCU Honors College

Junk food advertisers spend billions of dollars every year on advertising aimed at children. These foods are known to be major contributors to the obesity epidemic, a growing problem around the world. Food advertising should be regulated to exclude advertisements that appeal to those under twelve as these children do not have fully developed cognitive defenses. This paper investigates the effects of cartoon characters, packaging, and branding in television advertisements on childhood obesity by analyzing various pieces of literature related to obesity, cognitive defenses, home environments, and advertisements. Advertising and branding overcome children's cognitive defenses and thus negatively influence childhood obesity and the adiposity levels of children. There are many factors that determine the cognitive defense level of the children including the food environment created by the family, family

situation, and modeled behavior. Children respond to advertisements differently than adults and are more susceptible to food branding and advertisements due to their low level of cognitive defense. Children's cognitive defenses are not fully developed, even at the ages of seven or eight, and thus they cannot evaluate advertisements like adults can. Children create food brand bonds at incredibly early ages and are drawn in for life, creating a cycle of bonding that is hard to break. Various factors influence children's defenses and response to advertisements including the effects of food environments created by parents on food behaviors. Overweight children may also have lower cognitive defenses than children at a healthy weight level and are thus more vulnerable to the advertising and branding targeted at them. Parents may not be aware of the effects their behaviors have on their children's eating habits and often do not discuss critical thinking with their children. Advertisements aimed at children take advantage of these low levels of cognitive defense and the factors that lead to these low levels of cognitive defenses and should thus be regulated.

141. Spit For Science

Marcus-David Peters, Dept. of Biology, with Dr. Danielle Dick and Amy Adkins, Virginia Institute for Psychiatric and Behavioral Genetics

Spit for Science: the VCU Student Survey aims to understand how genes and the environment come together to influence substance use and emotional health. Many studies have investigated the potential relationship between *GABRA2* allele variants and an individual's subjective responses to alcohol. The results of many of these studies consistently show that individuals with specific *GABRA2* variants have lower subjective responses to alcohol thus causing them to drink more which in turn increases their risk for becoming alcohol dependent. In this study, we wanted to see if specific *GABRA2* variants were associated with a related variable, alcohol drinking frequency, in a sample of college students. VCU freshman in the fall of 2011 were given the opportunity to take the Spit for Science survey and provide a DNA sample. A linear regression will be used to test for the relationship between alcohol use and *GABRA2* variation. We also wanted to investigate whether peer deviance could have a moderating effect on this relationship. The proposed questions and answers of this study are highly important today because they could provide us with the necessary information on how we can help young individuals from potentially developing into alcohol dependent adults.

142. The Feasibility Fetal Gene Therapy in the Treatment of Cystic Fibrosis

Elizabeth Pham, Dept. of Chemistry, with Prof. Faye Prichard, VCU Honors College

Cystic fibrosis is a genetic disease that ultimately leads to death in many of the patients it affects. Currently, there are no known treatments that cure cystic fibrosis and it is currently one of the largest genetic killers. Gene therapies are being investigated both somatically and embryonically as a potential treatment or cure for the genetic disease, cystic fibrosis. However, there are many risks associated with gene therapy. Here, the benefits, risks, and current knowledge of cystic fibrosis were all assessed to determine whether fetal gene therapy is currently a viable option in comparison to post-natal gene therapy and current treatments for cystic fibrosis. Two meta-analyses on experimental data of both fetal gene therapy and postnatal gene therapy as well as several research papers on the feasibility of different gene therapy methods were used to compare treatments. Although multiple researchers have shown in experiments using animals or models that fetal gene therapy is possible, none have addressed the potential risks involved to the fetus and the mother. Post-natal gene therapy has shown some promise in clinical trials but there are still risks associated. Until further

experimentation is done, fetal therapy cannot be considered a viable option for treatment of cystic fibrosis. Since fetal therapy has shown positive results, more attention must now be shifted to the affects of fetal gene therapy to the fetus and the mother before it can be considered in humans.

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144. Analysis of Ancient Ritual Sacrifice Using Michael Winkleman's Method of Standard Cross-Culture Sample

Alexandra Price, Dept. of Fine Arts, with Prof. Mary Boyes, VCU Honors College

I am studying ritual human and animal sacrifice using Winkleman's 1998 Standard Cross Cultural Sample method because I want to analyze similarities between cultures with sacrifice in order to help my reader understand why ritual sacrifice developed in civilization's that had little to no contact with each other. This analysis will use Michael Winkleman's method of analyzing cultures with the Standard Cross-Cultural Sample (SCCS) to identify similarities between sacrificial civilizations. Throughout ancient polytheistic cultures, sacrifice was used as a ritual to connect with holy deities. This analysis will focus on animal and human sacrifice in different polytheistic cultures, particularly the Aztec Empire, the ancient Mediterranean, and ancient India. The analysis will examine the variables of population density, food resources, political stability, political structure, and social structure.

145. Language and Anorexia Nervosa: How Diagnostic Terms may Catalyze or Extend the Duration of Anorexia Nervosa in Adolescent Females

Leslie Pyo, Dept. of Painting and Printmaking, with Prof. Mary Boyes, VCU Honors College

Anorexia nervosa (AN) has the highest rate of mortality among psychiatric disorders. It is categorized as an Axis 1 Clinical Disorder in the DSM-IV and a Mental/Behavioral Disorder in the ICD-10. No research, however, has been conducted on how linguistic categorization may psychologically and neurobiologically contribute to the etiology or duration of AN. Medical terminology loses its original context when used in non-medical society, transforming into an identity-oriented label rather than a diagnosis. Body image disturbance (BID), one of AN's four diagnostic criteria, is dynamic: individuals with AN cannot create a stable body image, which results in a self-image that fluctuates with external stimuli (i.e. the categorization applied to them). They demonstrate hypersensitivity to AN-related words, indicating an information processing bias that further increases susceptibility to fluctuating BID. Individuals with AN also demonstrate hyper reactive amygdala function. This area of the brain coordinates and initiates responses to perceived threats. In individuals with AN, the hyper reactive amygdala catalyzes AN tendencies in response to the perceived threat of negative evaluation by others, a fear that is perpetuated by labels like "disordered" and "diseased." Early diagnoses, then, could establish AN where it did not previously exist. The amygdala has also been implicated in early language development and processing, a fact that further supports the proposed impact of diagnostic language on the etiology and trajectory of AN in an individual. Many scientists are calling for a completely new spectrum model for the description and treatment of AN, making more research on the language of diagnosis imperative.

146. Replacing Amniocentesis with Cell Free Fetal DNA Extracted from Maternal Plasma and Amniotic Fluid

Danarubini Ramanan, Dept. of Chemistry, with Prof. Mary Boyes, VCU Honors College

The Centers for Disease Control and prevention report that in the United States, over twenty percent of infant deaths are caused by congenital birth defects. Prenatal screening and diagnostic tests were developed in order to identify cases of birth disorders in the first and second trimesters of pregnancies. The most common prenatal invasive diagnostic procedure is amniocentesis, which involves harvesting and culturing intact fetal cells from amniotic fluid extracted from the amniotic sac. However, as this procedure is invasive, it has a .6% procedural related fetal loss rate in addition to the natural fetal loss rate of 1.08%. Fifteen research articles were analyzed to study whether non-invasive maternal plasma cell-free fetal deoxyribonucleic acids (cffDNA) testing can replace amniocentesis and help avoid the risk of fetal loss in prenatal diagnosis or if current invasive practices can be amended to be more accurate and efficient through invasive amniotic fluid cffDNA analysis. Maternal plasma cffDNA is found to have false positive detection rates of .5% and best serves as a prenatal screener. A metaphase karyotype analysis of amniotic fluid cffDNA was found to be as accurate as metaphase karyotype analysis of cultured intact fetal cell DNA. However, more Randomized Control Trial (RCT) parallel group superiority trial should be conducted to compare the diagnostic sensitivity and detection rates of aneuploidy between intact fetal cell DNA analysis and amniotic fluid cffDNA analysis. Similar studies should be conducted assessing sensitivity and specificity of a combined maternal plasma cffDNA and quadruple serum-screening test. Determining the clinical practicality of incorporating cffDNA analysis into prenatal screening diagnostic procedures could result in faster and more accurate detection of fetal aneuploidy. In addition, further exploration of the use of maternal plasma cffmRNA to assess fetal allelic ratios as non-invasive prenatal diagnosis should be conducted to avoid fetal loss rates associated with amniocentesis.

147. The Effect of Intelligence on Early Termination of the Carbon Dioxide Challenge

Lakshmi Ravindra, Dept. of Biology, with Dr. Roberson-Nay, Dept. of Psychiatry

The goal of the study was to investigate the relationship between intelligence of the juvenile participants and their early termination of the carbon dioxide challenge. Research has shown that high levels of intelligence correlate with anxiety (Nauret). Based on this research, it was hypothesized that if juvenile participants were subjected to the carbon dioxide challenge, then the participants with higher levels of intelligence would terminate the carbon dioxide challenge more often than participants with lower levels of intelligence. In order to measure intelligence, the WASI-II IQ test was administered to juvenile participants between ages 9-13. During preliminary analysis, the sample size was ~200, but is subject to change. The challenge consisted of the participants wearing a facemask that would allow them to breathe both room air (minimal carbon dioxide) and air with ~7.5% carbon dioxide. The participants were to breathe 11 total minutes of room air and 8 minutes of air with ~7.5% carbon dioxide; the participant had no knowledge about when they would receive room air vs. ~7.5% carbon dioxide. Participants were allowed to terminate the challenge at any point. The termination times for all the participants, their subjective units of distress (SUDS) before and after termination, and the participants' WASI-II scores will all be compared in order to reach a conclusion about the hypothesized results.

148. Titanium Surface Characteristics Alter Macrophage Activation

Gireesh Reddy, Dept. of Biomedical Engineering, with Dr. Rene Olivarras-Navarrate, Dept. of Biomedical Engineering

Biomaterial surface properties such as chemistry, topography, and energy regulate cell response. Previous studies have shown that increasing surface roughness of orthopedic and dental implants improved bone formation around the implant from the differentiation of stem cells. Yet, the effect of the implant surface properties on immune cells is not known. Immune cells including macrophages are among the first cells to interact with the biomaterial and therefore condition the microenvironment for further cell recruitment and differentiation. In this study, we examined the effect of surface modifications on macrophage activation and cytokine production. Primary cells were isolated from wild-type male mice bone marrow and cultured with RPMI 1640 supplemented with macrophage colony stimulating factor (M-CSF) for seven days. Upon confluence, cells were plated onto four substrates: TCPS, PT, SLA, and modSLA. Two time points were observed at 1 and 3 days. Protein and DNA quantification of IL-1B, IL-4, IL-6, IL-10, and IL-13 was performed with ELISA and Pico Green Assay respectively. Increases in protein levels of pro-inflammatory IL-1B and IL-6 from day 1 to day 3 were found in all substrates and a decrease was found in the high energy, hydrophilic surface (modSLA). Anti-inflammatory IL-10 was increased on the modSLA substrate. We found that the surface energy of the material plays a role in the cytokine expression profiles of macrophages. Future studies will examine the further characterization of activated macrophages and whether activated macrophages respond in a comparable manner to non-activated macrophages.

149. Thai and Iranian Policy on Sexual Reassignment: Who Benefits, Who Loses, and Who Can Help?

Summer Rezeli, Dept. of Art Foundations, with Prof. Mary Boyes, VCU Honors College

Sexual reassignment surgery is legalized and subsidized by the Iranian government; the nation performs the second-most sexual reassignment surgeries in the world, just behind Thailand. Homosexuality and transgenderism are banned in Iran, and both are punishable by the death penalty. The Iranian government defends its stance on both homosexuality and transsexuality with religious texts, as does Thailand, which takes a much more fluid approach to gender and sex due to a tri-gendered origin story. Through the close examination of scholarly articles on Iran and Thailand, it becomes clear that those who benefit from sexual reassignment are primarily not those who elect to undergo sexual reassignment. Foreigners and the media both largely reap the benefits of these policies in both Iran and Thailand. In Iran, the government achieves its agenda on eliminating gender nonconformity and homosexuality in the country by heteronormalizing the nation either through direct force or coercion to receive SRS. In Thailand the sex-industry gains a lot from sexual reassignment; meanwhile, The United Nations as a whole and the United States individually are both trying to alleviate the issues in Iran through international human rights laws and human rights organizations, but these entities are actually perpetuating the problems due to misinformation and misunderstanding about gender politics in the country. Furthermore, such Western nations as the U.S. still have a long way to go to eradicate discrimination both legally and socially at home before they can hope to intervene in LGBT rights abroad.

150. Male Infertility and Sperm Viability Due to Folate Deficiency: An Analysis of Causation, Detriments, and Preventative Measures

Sarah Roberts, Depts. of Business and Mathematics, with Prof. Mary Boyes, VCU Honors College

This dissertation aims to link folic acid to sperm viability in order to see how the essential nutrient affects male fertility levels. Since the 1990s, it has been found that at least 20% of infertile couples are due solely to trouble with the male's reproductive health, with another 30-40% having the male as a contributing factor. In relations to findings that the average American male does not receive the daily recommended intake of dietary folate, it is shown that folate deficiencies are becoming a rapidly increasing problem. After analyzing over twelve scientific research studies and multiple blogs and websites, it was concluded that a folate deficiency, even in the healthiest of men, can lead to reproductive health troubles, such as infertility. Better known as a B-vitamin, the daily U.S. Recommended Dietary Allowance for an adult male is 400 micrograms of folate. This recommended intake can be met through a healthy diet, focusing primarily on leafy greens. Proper cooking techniques must be followed, as processing of foods can cause a decrease of folate retention. If the recommended intake is still unable to be met by diet alone, external supplements and antioxidants may be used to increase the amount of folate being consumed. Due to folic acid's important role in DNA synthesis and reparation, a deficiency may lead to DNA fragmentation, and insufficient ability to produce healthy sperm. In addition, reactive oxygen species, apoptosis, and methylation may be negatively affected by a lack of sufficient amounts of folic acid in the seminal plasma and serum. Sperm viability, measured through morphology, motility, count, and volume, has been proven to have a strong correlation with folic acid. However, by successfully adjusting to the recommended intake, through a dietary or supplementary manner, the deficiencies can be aided and fertility can be healthfully resumed in a relatively short amount of time.

151. America's Fastest-Growing, Serious Developmental Disability and its Relationship to Maternal Depression

Natalie Robles, Dept. of Psychology, with Prof. Faye Prichard, VCU Honors College

Autism is among the fastest-growing, severe developmental disabilities in the United States and it has become an increasingly prevalent diagnosis among infants and toddlers. According to the Centers for Disease Control and Prevention in 2014 1 in every 68 children are diagnosed with the disorder. Autism Spectrum Disorders (ASD) are complex neurodevelopmental disorders evident in early childhood that are characterized by difficulties in social interactions and communication as well as restrictive and repetitive behaviors. ASD is caused by a complex and variable combination of genetic risk and environmental factors that influence early brain development. Results of previous studies have shown maternal depression may begin to affect brain development in the fetus prenatally. The primary objective of this paper is to review the most recent research on the link between maternal depression and ASD. I looked at several studies that review the effects of antidepressants, serotonin, and parental psychiatric disorders and their influence on the offspring's risk of ASD. The risk of ASD was increased in mothers with affective disorders, such as depression, although the association cannot be directly linked to maternal depression without considering other factors such as variation in serotonin levels and the use of antidepressants, specifically SSRIs during pregnancy that may contribute to adverse effects in the offspring's neurodevelopment. The existing literature on the association of ASD and serotonin and its subsequent effect on the fetal neurodevelopment advocates for additional research on the biological mechanisms between the two. Further research on the effects of maternal depression on ASD, independent from other sources such as antidepressants, SSRIs, and other maternal psychiatric disorders are necessary to directly correlate maternal depression and the increase risk of ASD in the offspring.

152. What source of natural gas will meet future European demand

Conrad Roos, Dept. of Chemical and Life Sciences Engineering, with Prof. Faye Prichard, VCU Honors College

Natural gas is a major source of energy in Europe and influences the political and economic wellbeing of the continent. The problem facing Europe is that demand will continue increasing while domestic production is declining, leaving a gap between the current supply and future demand. Liquefied natural gas (LNG), pipeline gas, and domestic unconventional gas were the three options that I researched to see which has the most potential to meet future European demand. I looked at predictions of natural gas reserves in Europe, Russia, and other key producing areas worldwide, analyses of the global LNG trade, along with the political obstacles to each option, to identify which is likely to take the lead in supplying Europe. My research concludes that pipeline gas is unlikely to meet growth in future European demand because of uncertainty over the ability to replace declining reserves in producing nations along with political concerns about dependence on a few suppliers. LNG is best positioned to meet future demand as more supplies of LNG become available for Europe as less is shipped to North America due to rising production there, along with the growing investment in LNG infrastructure. Further research is necessary to evaluate the potential of unconventional gas reserves in Europe to contribute to future supply. This means European nations should consider investing in LNG terminals along with distribution infrastructure to help route future imports through their nation, while also evaluating the potential of their domestic reserves.

153. A Performance Effectiveness Model for the Assessment of Anxiety's Effect on Muscle Activation in Trumpet Players

Hannah Rumsey, Sahil Aggarwal, Erin Hobson, Jeeyun Park, with Dr. Ross Walter, Dept. of Music

The purpose of this research study is to analyze the relationship between anxiety and muscle activation in undergraduate trumpet players. The three following muscles will be measured: masseter, sternocleidomastoid, and upper trapezius. Muscle activation will be measured by surface electromyography (sEMG), while the trumpet players play two short excerpts. Anxiety will be induced to one group of trumpet players by instructing them to focus on accuracy and not miss any notes, while the control group will be instructed to simply play to the best of their ability.

The data will be analyzed along with anxiety reports of each subject with the State-Trait Anxiety Inventory, and with VAS data of perceived anxiety after the repeated playing trials. Through covariate data obtained from the anxiety reports and an anxiety-induction experimental protocol, we hope to discover what effect anxiety will have on general muscle activation and fatigue in trumpet players. We hypothesize that subjects with higher anxiety levels will display higher levels of muscle activation and fatigue over the course of playing the trumpet as compared to subjects with lower anxiety levels. We hope to provide a foundation for future studies in music and medicine as well as for studies related to psychological well-being and performance effectiveness, not just in instrument playing but in other tasks as well.

154. VIGS

Cameron Winn, Dept. of Biology, with Dr. Wenheng Zhang, Dept. of Biology

VIGS (*virus induced gene silencing*) is a relatively efficient new technique for insertion of plasmid vectors into plants through administration of agrobacterium via inoculation. Through study and experimentation with VIGS various methods of transmission for gene silencing have been found. The method commonly used and also the one used in our laboratory exercise was the leaf inoculation method by syringe. This method is direct in its approach where the agrobacterium with the plasmid vector holding the gene of interest is inserted into a leaf of the plant in multiple areas. The method of inoculation of leaf through syringe is used to administer agrobacterium with *PDS/CYC2* gene vector of Ti plasmid to manipulate coloration of the leaves of the plant species *N. Obtusifolia*. This method is one of many methods used to study VIGS. Vacuum infiltration provides a more efficient way of administering agrobacterium by soaking the whole plant in bacterium and then filtering out unwanted moisture through a filtration system. Agrodrench method introduces agrobacterium through the root and soil. Biolistic transformation or “gene gun” method yields immediate results on the molecular level however this method deals with plant cells not whole organism of a plant. Also DNA abrasion method is useful in direct contact through the tissues of the plant to also yield relatively quick results.

VIGS, *PDS/CYC2*, plasmid, agrobacterium, inoculation, vector, transmission

155. The Role of Television on Early Onset Puberty

Salman Salman, Dept. of Biomedical Engineering, with Prof. Mary Boyes, VCU Honors College

The recent trend of early onset puberty has been increasing in recent years. As several studies have shown, a strong link between diet and puberty has been made including studies

done on animals as well as humans. However, not much attention has been paid to the cultural influences that have emerged recently such as television, computers, and gaming devices. In this report, I analyzed several different studies that dealt with television and diet habits, children with early puberty, hormonal changes in children with early onset puberty, as well as the methodology of administering treatment. I hoped to link television to early onset puberty by analyzing the effects television has on dietary changes and in turn hormonal changes that cause children to have early onset puberty. By doing this, I can aid pediatricians in reconsidering treatment options for children maturing at a faster-than-normal rate and be sure that the harmful effects of early puberty (i.e. increased risk for breast/testicular cancer, insulin rejection, etc.) can be averted. After careful analysis of reports from a wide range of persons all over the world, television turned out to have a negative effect on children's diet preferences that predisposed them to earlier puberty. Foods that were high in sugar and fat were more appealing to children who watched more television leading to increased leptin levels. These increased leptin levels were vastly shown to cause early puberty in both rodents and humans. Also, detailed administration of treatment showed that patients were more likely to follow doctor recommendations. To conclude, increased television viewing time was shown to be associated with a higher intake of fatty foods and in turn higher leptin levels. These high leptin levels strongly predisposed the child to early puberty and the most effective way to treat this is for pediatricians to specifically tell the patient how to cut down on television and poor food habits in order to maintain healthy growth.

156. Text, Pictograms, and the Systems they Govern: An Argument for Clarity in Metro System Signage

Stephanie Schapowal, Dept. of Graphic Design, with Prof. Mary Boyes, VCU Honors College

This paper examines the components of signage in underground transit systems worldwide that facilitate easy use of the system by the rider. Two of the most important components of a sign are the text and the pictograms, and this paper will explore the roles of both of these elements in relation to the rider, the advantages and disadvantages of one over the other, and the perceptual area where these two elements combine. The relationship of text and pictograms to the sign's location in space is an extension of the sign's information that has the potential to ground or confuse the rider. Effectiveness is judged on both a sign's ability to successfully direct a rider to their destination, and its ability to keep order in the physical environment. By focusing on three systems—the New York Subway, the Paris Metro, and the Seoul Metro—as well as sign theory, the research blends what is theoretically effective and what has happened by chance—the results of the historical combination of lines and the day-to-day improvisation that has been assimilated into the network. The paper concludes that the ideal metro system is universally clear, and simple enough to internalize, yet detailed enough as to avoid confusion. The results of this study can be used to make suggestions to systems worldwide as they look to make improvements to their wayfinding systems in the 21st century.

157. Le Corbusier's Urban Planning and its Lasting Effects on City Design in Imperialist Countries and Abroad

Davis Scherer, Dept. of Graphic Design, with Prof. Mary Boyes, VCU Honors College

In the both the periods between and after the World Wars, the French government expressed an increased interest in redeveloping Paris and the surrounding suburbs. It was during this push to renovate the wreckage and to improve the living situation of the impoverished that modernist sentiment first flourished in the country. This paper examines not only the effects of modernism's rise in France, as well as Le Corbusier's urban planning efforts

therein, but also the diffusion of modernist principles into colonial holdings of major European powers touched by modernism. Using both analyses of Le Corbusier's work and case studies of modernism in countries such as India, Brazil, Mexico, and China, and iterations both in and outside of France, I have come to the conclusion that as modernism was absorbed into the architectural vernacular of countries such as this, it took on new ideologies based on cultural values. This adaption, often necessary growths in order to promote the acceptance thereof in each country, created distinct forms of architecture and urban planning unique to the cultural context they promulgated in.

158. Biological Feasibility of Interstellar Travel

Matthew Schneck, Dept. of Biomedical Engineering, with Prof. Faye Prichard, VCU Honors College

Exposure to the space environment has resulted in numerous alterations to homeostatic mechanisms within the human body. Immune suppression, musculoskeletal degradation, decreased cardiac output and fluid redistribution have all been reported throughout short and long term space flight. The goal of this review is to discover if long term interstellar travel is biologically possible for humans. The relative influence of cosmic radiation, microgravity, and high velocity travel on homeostasis has not been previously established for interstellar space travel. Real-time space flight data and ground-based studies were compiled from other researchers. This data was analyzed with the goal of establishing the relationship between the aforementioned environmental pressures and the corresponding homeostatic consequences. Meta-analysis revealed that the predicted homeostatic consequences of interstellar space flight do not significantly inhibit the body's ability to function in the space environment. Although interstellar travel is mechanically restricted, it is biologically possible provided proper defense mechanisms are applied. Further research must be directed towards eliminating mechanical restrictions including propulsion mechanisms, circular sustainment systems, environmental protection and interstellar communication.

159. Police, Military Security, and the Cartels in Guatemala

Jake Schroeder, Dept. of Homeland Security and Emergency Preparedness, with Dr. Jason Levy, Dept. of Homeland Security and Emergency Preparedness

Guatemala is currently the most populous country in central numbering at just over 14 million. With such a large population, security is currently one of the country's largest concerns. The largest of which (most recently) has been the trafficking of narcotics and meteoric rise of organized crime, most notably the "Zetas" cartel heralding from southern Mexico. Historically these particular issues have not always been the norm. Up until this point, Guatemala has mostly seen civil violence such as revolution and civil resistance. Now, the country faces an unprecedented drug trafficking problem only solidified by its geographical location. The Guatemalan local police forces and its state security institutions are notoriously weak and inefficient; with officials saying that at up to 60% of the country is under the control of drug traffickers. Although some progress has been made, the country's institutions and political system are all far too weak to address these concerns head on and many radical changes will have to be made in order to see any long term (or for that matter short term) progress. Like the situation in Mexico, many police forces are asking for temporary military assistance in combating the organized crime in the region and clauses of the Guatemalan constitution allow for this to happen unhindered. The devastating poverty of the country also allows for many regions to become incredibly more vulnerable to the already very widespread organized crime.

160. New Media: A Web Series

Paislee Winkler and Jerid Prater, Dept. of Broadcast Journalism, with Prof. Wesley Broulik

VCUarts New Media Project is a class that connects students in a variety of school departments together to make a web series. This web series is similar to a television show as we create five short episodes, that add up to a thirty minute pilot show. This class is the only one at VCU that addresses television and web show creation. Optimally, this course will prepare future television content creators. Participating students come from the Theater Department, Kinetic Imaging, Film and Photography, and Richard T. Robertson school of Media and Culture. We are making content that is original work, we are writers, editors, film crew and actors. We come in early before class and stay late to create original work that has gone through the process of copyrighting and in the Writers Guild of America. This cross culture class is researching the process of a viral video. Watching and doing work similar to a web series on the Internet today. We encompass social media, engaging in local businesses, as we partner up for locations and promotions. Currently we have worked with the Lair and Sugar Shack Donuts. We read works of successful television writers and creators we hope to build work that reflects and challenges the way people watch video content. In our current work, the series we are creating is "Imagerapy," a group of people "breathers" meet in a therapy group to discuss having a life with a imagery friend "figment". The imagery befriended fall in love and realize who they truly are. As a producer and script supervisor in the class, I see and learn every aspect of the program. Leading in planning a shooting schedule, connecting with businesses, and playing the extra. The professors of the program work as the network do review the finish product before it airs. The web series will be online by April this year, and from this present we will be able to find out how a web series gets a buzz, how to we engage with viewers and what people like to see when watching online content. The product we are making in this class provides research in the future of visual content.

161. Fighters or Fanatics?

Dhruv Sethi, Dept. of Psychology, with Prof. Mary Boyes, VCU Honors College

The correlation between competitive traits and aggression amongst sports spectators is a paramount area of study in order to show society the ill effects that may be achieved through extended exposure to competitive sports viewership environments. Increased exposure to highly competitive sports viewing environments will result in fans to commit acts of aggression and violence just as video games have indicated in the past. Evidence from peer-reviewed journals linking aggression and traits of competitiveness from athletes to fans with similar mindsets supports the conclusion that athletes and fans may behave similarly resulting in violent acts such as homicide, rape, or domestic violence. The general population does not believe that sports can provide to be a seriously detrimental pastime, whereas violent video games have been viewed as unacceptable. Research in this area can help the general population prevent being subject to unnecessary criminal records and rates of delinquency as a result of increased crime rates. If behavior changes in the general population results in changes in incidences of violent and aggressive behavior in competitive atmospheres, then society can benefit from the decreased number of criminals which thereby can benefit not only governments from prison or judicial costs but also humanity as a whole.

162. The Correlation of the Order Effect and Anxiety in Relation to the Carbon Dioxide Challenge and Screaming Lady Task

Tulsi Shah, Dept. of Biology, with Dr. John Hettema, Dept. of Psychiatry

In the current study, juvenile twins aged 9-13 were asked to perform two psychophysiological tasks, referred to as the carbon dioxide (CO₂) challenge and the Screaming Lady task. In the CO₂ challenge, participants were asked to breathe enriched air for eight minutes that contained 7.5% CO₂. Subjective anxiety was assessed every two minutes during a baseline, CO₂ inhalation, and recovery period using the subjective units of distress scale (SUDS). The Screaming Lady task was designed to assess a fear-potentiated startle response. Participants were exposed to a classical conditioning paradigm in which loud screams were paired with images of a woman's face. Air puffs delivered to the forehead were used to induce a startle response, and participants were unaware of when either stimulus (scream or air puff) would be administered. A SUDS rating was taken before the Screaming Lady task began, after the acquisition period, and after the extinction period (*need citation here—see Britton paper*). Based on previous research, it has been shown that sustained inhalation of CO₂ can trigger physical symptoms similar to those experienced during a panic attack (Blue, 2014). In the current study, the CO₂ and Screaming Lady tasks were also administered one after the other though the order of what came first was randomized. It is hypothesized that the anxiety generated by the CO₂ task could lead to greater distress and anxiety during the Screaming Lady task. This would be demonstrated by higher SUDS ratings during the Screaming Lady task by those who did the CO₂ task first. The data was divided in two parts: one in which the carbon dioxide task was performed before the screaming lady task and one in which the screaming lady task was performed first. The SUDS ratings will be used to examine if indeed such an order effect exists for these tasks, and these analyses will be used to inform study procedures in the future.

163. Gene Therapy Evolution: How Gene Therapy has Evolved Preventive Medicine

Kayuri Shah, Dept. of Biomedical Engineering, with Prof. Faye Prichard, VCU Honors College

Gene therapy technologies offers a prospect for preventive medicine; before the trait can harm the recipient, genetically engineered transgenes will either alter the genetic disorder beforehand, or allow for regeneration of the tissue. The basic goal in bone formation and regeneration is to find a quick, easy, and cost-effective method to help bone growth, formation, and regeneration where surgery may be impossible or too risky. Gene therapy provides that, whether as a technology or product. Cells have the ability to be engineered, or manipulated, within the recipient's body, or by removal and reimplantation. While treatments such as surgery are available, sometimes it is extremely difficult for those methods to reach certain areas of the body. Not only that, preventive medicine has advanced to the stage where genetic bone disorders can be eliminated before it is passed down to offspring. By comparing scholarly sources regarding the different *in vivo* and *ex vivo* methods, researchers have shown how bone formation and regeneration can be done easily through gene therapy. Between the two methods, both viral and non-viral methods have been tested. Results show that *in vivo* methods have many safety implications, however, it is the less expensive method. Regardless, *ex vivo* has been tested and could be taken to clinical trial level, unlike the others that have yet to be taken beyond pre-clinical trial and animal testing. Currently, legislation only supports the use of gene therapy on somatic cells, but in the long run, gene therapy could solve the problem of chronic hereditary genetic disorders if the alterations could be made in gamete cells. Not only that, but there has been no final definition of gene therapy, and therefore there is no stopping someone from altering an unlikeable physical trait in comparison to an actual physical challenge. The only thing stopping gene therapy and therapeutic products from hitting the market is the red light on clinical trials. Several methods have yet to pass the pre-clinical trial stage, and be tested on large animal models. Until then, there will not be an actual advancement to the human stages of clinical trials, helping no one, let alone the role in preventive medicine advancement.

164. THE EFFECT OF THIRD-WAVE FEMINISM IDEOLOGY ON SOCIETY'S PERCEPTION OF WOMEN

Kelly Sheaff, School of Business, with Professor Bonnie Boaz, University College

Third-wave feminists argue in favor of women's sexual freedom and pleasure as signs of independence and power, as well as various takes on individualism and dissenting from the traditional norms that have been set for women in past generations. This paper focuses on how third-wave feminism ideology is being expressed politically, socially, and especially in the media. Analyzing scholarly articles ranging from the rise of feminist groups, such as female punk bands and politically active groups like the Pussy Riot girls in Russia, to our society's perception of female celebrities in the media who portray a "girl power" platform in music, film, and television. There is backlash women in the media receive for overplaying sexuality, emotional rage, and displaying gender undertones in anything they do. Third-wave feminist efforts are being given a negative connotation by the media that causes society to perceive women to be vindictive, vengeful, and unstable. I argue that third-wave feminism has received an overall positive reception by society, despite how media is apt to juxtapose women's expressed efforts. Through research studies and observation third-wave feminism is unlike any feminist ideology before its time. The third-wave primarily promotes entitlement of individualism and to define feminism for one's self, giving young girls and women the ability to accept themselves for who they are and the women they are and have the right to be.

165. How do coping mechanisms affect the quality of life in adolescents who have experienced trauma?

Anne Simmons, Brianna Epps, Jason Schuitmann, Tess Davis, Dept. of Psychology, with Dr. Wendy Kliewer, Dept. of Psychology

The objective of this secondary analysis was to examine whether positive reframing moderates life satisfaction in children who have experienced victimization in the past year. Previous studies found that children who are frequent targets of peers' bullying are at risk for a variety of adjustment problems including depression, loneliness, and anxiety (Boulton & Underwood, 1992; Graham & Juvonen, 1998; Hawker & Boulton, 2000). Moreover, coping plays a direct role on the adjustment of children and may be used as a moderator in the effect of a stressor on the life satisfaction of an individual (MacCann, Lipnevich, Burrus, & Roberts, 2012). Following this research, the experimenters conducted a secondary analysis on Dr. Wendy Kliewer's Project CARE data. The results indicate that, although victimization is a significant predictor of life satisfaction, positive reframing does not effectively moderate the relationship between victimization and life satisfaction. The lack of self-report victimization and life satisfaction heavily contributes to the statistical insignificance of this test. However, with a more robust sample size, the data will aid in establishing effective coping mechanisms.

166. Schoolwide Implication of Graphic Novels in Secondary Education

Aprille Singson, School of Nursing, with Prof. Faye Prichard, VCU Honors College

Educators are often divided on the use of graphic novels in school curriculum because of the rising recognition and increasing interest. The school wide incorporation could influence how the future generations perceive and function in everyday life. The problem explored in this paper is the extent to which the school wide implication of graphic novels can be beneficial to students. The paper seeks to find out that although graphic novels are sometimes overlooked and deemed as merely stepping-stones for students, they can be significantly beneficial to students. This exploration encompassed two articles focused on the specific uses of graphic novels in academically challenged students such as English Language Learners and deaf students, two case studies of the use and results of graphic novels in classrooms, two articles concerned with the potential for an increase in multiple literacies in the classroom as a result of specific literary devices, and two articles that discussed the ideal implication of school wide graphic novels. It also involved two articles that argued against the school wide implication of graphic novels in the curriculum and argued for specific uses with specific students. Some scholars argue against the school wide implication of graphic novels because many students disregard the learning possibilities, so they would not benefit from the implication. However, I found that many more argued for the school wide implication because they can be used for a variety of things such as historical perception, multiple literacies which is increasingly important in today's visual world, social and cultural conventions, an introduction for traditional texts, and more. As a result, the school wide implication of graphic novels should be done for the benefit of the next generation, but because of the still present stigma of against graphic novels, they should be implemented slowly so students are willing to accept then and gain all the knowledge possible. Suggestions for further investigation include a study on the affect of graphic novels on test scores and an investigation as to why students are more likely to disregard graphic novels.

167. Implications of Patrilineal Surnames

Raymond Smalara, Dept. of Pre-Health Sciences, with Prof. Mary Sheldon, University College

Current Western tradition unofficially dictates that a woman, upon marriage, is to take her husband's surname and pass it along to her children. In order to explore the reasons behind today's relatively unchanging adherence to the trend of patrilineal surnames, surveys on marital name choices as well as publications on historical origins of the family and of family names were consulted. Some view this patrilineal trend as sexist, citing societal pressure and the patriarchy as forces compelling women to adhere to the tradition. While these factors do affect surname trends, the oppressive roots of the patrilineal surname run deeper than sexism. Further research revealed that sexism is not a main motivator or cause of patrilineal naming; the establishment of the permanent, patrilineal surname is linked to imperialist oppression, forced assimilation, and racism. Today, women don't often consider the history of the surname, or politics, in their surname choices. Individual last name choices are not directly dictated by oppression, but the implications of overall surname trends reveal racist, heteronormative, and otherwise unjust undertones. Research suggests that surnames as a whole represent suppressive imperialist practices; only on an individual level do surnames represent the innocuous labels of heritage and ancestry. Ideally, we as a society would cease to continue supporting the oppression-based trend of patrilineal last names. In fact, realistic, viable alternatives to that surname tradition exist, including hyphenation and the creation of entirely new surnames. Under current circumstances, however, many women do not have the realistic option of choosing a nontraditional name, or must focus on more pressing issues of oppression

than that of their surname, and following patrilineal naming trends should not automatically be read as ignorance or complacency.

168. Is There a Correlation Between the presence of TSNA's in E-liquid Aerosol and High Wattages?

Nathaniel Smith, Dept. of Chemical Sciences, with Dr. Joseph Turner, Dept. of Chemistry

Previous electronic cigarette studies like one conducted in Greece in 2013 aimed at identifying, quantifying and comparing Tobacco Specific Nitrosamines (TSNA's) present in E-cigarette aerosol to those present in tobacco products all cited a presence of toxins in e-cigarette aerosol significantly lower than that of tobacco based goods (2,3). A study at Drexel University conducted by Dr. Igor Burnstyn postulates that there may be a direct correlation between the temperature of the heating element and the amount of formaldehyde present in e-liquid vapor (2). In the paper it was shown that a sample generated by an atomizer that had been burned black was analyzed and showed a high concentration of carbonyls. Glycerin burns at 288 °C and can produce carcinogens via a dehydration reaction (6). One of the products of this reaction is acrolein, a toxin of particular interest to researchers (2). An unpublished study cited that in their analyses acrolein and glyoxal content approached threshold limit values thought to be a result of the liquid being overheated(2). It is also assumed that e-cigarette liquid containing nicotine or flavorings extracted from tobacco leaves have a higher likelihood of containing TSNA's. Burnstyn's study analyzed vapor produced by a device with a much lower power output than most vaping devices available to consumers presently. Similarly, a Greek study published by the International Journal of Environmental Science produced e-cigarette aerosol using a device with an output of 6 watts, still lower than products available now (1,2). E-cigarette power devices' (batteries) output limits are not standardized and output can range from 5-60 watts depending on the device used. A dry atomizer begins to exceed 288 degrees Celsius at a power output of about 13 watts (7). This point is predicted to be the danger threshold for TSNA production. As wattage output increases there should be an exponential increase in the quantity of TSNA present. For this summer study we are looking at a set of five samples of prepared e-liquid solutions that will be vaporized in 10 watt increments from 10-50 watts. The vapor samples will then be analyzed individually looking for increasing levels of possible formaldehydes. It is essential to ensure all solutions contain the same type of nicotine and remain unflavored. Previous tobacco and nicotine studies lead me to assume that TSNA production will vary between synthetic and extracted natural nicotine. Natural nicotine extract contains contaminants that may cause an increase in TSNA's present in the aerosol. Storage temperature, humidity and UV light exposure are also variables that must be kept consistent and minimized. High temperatures and UV light cause nicotine to oxidize. It was found in a tobacco study that TSNA production increased if the nicotine extract came from tobacco leaves exposed to temperatures in excess of 27 °C or were sun cured for several hours. This study will aim to investigate whether or not a correlation between high power output and TSNA content in E-cigarette aerosols exists.

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- 7). Nathaniel Smith, "Temperature Calculations for Dry .30 ga Kanthal Wire Heating Elements for Use In Electronic Cigarette Atomizers"

169. Media Representation of Severe Mental Illness

Shelby Smout, Dept. of Psychology, with Dr. Elizabeth Kreydatus, University College

The topic of mental illness has been present in visual media for decades. In recent years, representation regarding illnesses such as depression, anxiety, and OCD has improved in accuracy and has become more widely addressed. However, representation regarding severe mental illnesses, which include but are not limited to, schizophrenia, bipolar disorder, and dissociative identity disorder have remained stagnant over the years and continue to perpetuate the stigma surrounding people with a severe mental illness. Research has shown that negative depictions of mental illness in movies and on television promote negative feelings about mental illness in viewers which is ultimately detrimental to those with severe mental illness. Although there have been some initiatives to improve representation of mental illness in visual media they are fairly recent and have yet to make an impact regarding all types of mental illness. The types of media covered in this study include movies, television shows, and televised news. The focus on this study was to compare the representation of severe mental illness in media between past media and current media. Based on the consulted research and experiments along with the observations made regarding primary sources of current media, it is concluded that media representation of severe mental illness has remained largely negative over the years.

170. Polyamory and Identity

Briana Spangler, Dept. of Psychology, with Dr. Elizabeth Kreydatus, University College

Polyamory is a relationship orientation that involves the consensual participation of multiple sexual and emotional relationships with various people. Polyamory allows people to construct their relationships based on the personal needs and desires of both the individual and the individual's partners. This relationship orientation, like gender and sexual orientation, contribute to a person's identity and how they express themselves in the world. My goal with this research was to figure out how the polyamorous lifestyle contributes to an individual's personal identity. I examined peer-reviewed journals on the specific topic correlating polyamory and identity to begin my research. These journals touched on the classification of polyamory within identity. Because there is little research on this particular topic of polyamory, I decided to collect my own qualitative research through a small case study of people in the local polyamorous community; each person interviewed has their own unique relationship dynamic, and is currently or was at one point in a polyamorous relationship. The results of these interviews reflected the integration of their relationship orientation to their personal identity.

This small case study does not speak for the entire polyamorous community, but my goal in doing these interviews was to compare the research I had found to conducted fieldwork.

171. Modulations in redox state alter DNA repair mechanisms in cancer cells

Aaron Wilson, Dept. of Chemistry, with Dr. Vasily Yakovlev, Dept. of Molecular Biology

It has been shown that elevated levels of reactive oxygen (ROS) and reactive nitrogen species (RNS) not only directly damage DNA, but at physiological relevant doses, downregulate genes necessary for high fidelity homologous recombination repair (HRR) DNA repair (Yakovlev 2013). This leads to mutagenesis by two pathways: Directly damaging DNA by oxidative and nitrosative stress, but also by allowing the damage to accumulate. ρ^0 cells are cells that lack the necessary genes required for the electron transport chain (ETC) and have significant decreases in superoxide O_2^- production, thus decreasing the redox state of the cell. These cells have been used in a number of studies relating ROS generated by the ETC to a number of different mechanism. However none have addressed the link between decreased ROS/RNS to increases in DNA repair. We hypothesized that if exogenous ROS/RNS introduced to the cell caused a decrease in DNA repair, then a permanent decrease in ROS/RNS should lead to an increase in DNA repair. By using a DR-GFP reporter based assay that gives the percent of cells that used HRR, we found that ρ^0 have an increase in HRR.

172. Effects of Nest Box Temperature Manipulation on Aspects of Reproductive Success for Prothonotary Warblers

Michael Stueland, Dept. of Biology, with Dr. Jonathan Moore, Dept. of Biology

Since 1995 the average clutch size of a nest box population of the Prothonotary warbler (*Protonotaria citrea*) in Richmond, VA has shown a marked decrease. Many potential causes of this decrease have been explored such as predation and food availability. However, one unexplored cause is that of the gradual increase in average ambient temperature occurring in the region. While many studies have looked at the effects of variable climate on reproductive success, few have looked at how experimental alterations in ambient temperatures in the field affect the reproductive success of birds. We manipulated temperatures of nest boxes of Prothonotary warblers located along the James River at Deep Bottom Park. We used black paint and white paint to respectively increase and decrease nest box temperatures while no paint was used for control boxes. We verified nest box temperature manipulations using iButtons. We compared clutch size and nestling residual mass between manipulated boxes (black, white, control). Nest box temperatures were significantly different between groups as predicted. Nestling residual masses were not affected by temperature manipulations over the entire season. However, we detected marginal effects of nest box temperatures on nestling residual mass during the late clutch (clutches initiated after May 20). Adults in warmer boxes also tended to lay smaller clutches, which is a valid strategy from a thermodynamic perspective. While no significant differences could be found, we believe that larger samples sizes will elucidate our predicted relationships.

173. In what ways is gender inequality a predominant factor in the home in regards to household chores?

Prutha Talati, Dept. of Accounting, with Prof. Bonnie Boaz, University College

Household chores have been regulated based on gender for numerous decades. Although many individuals may feel that the housework is divided evenly between both female and males, there are numerous factors that have to be taken into consideration such as the type of work, time spent on the task, and which gender does more of a specific task in order to determine if equal amounts of work are actually being done. This paper focuses on the way that gender is a prominent factor in the house and how it is become an major factor in terms of the chores that are completed by the house. Scholarly articles dealing with male and female chores around the house and the amount of time that each gender spends completing total housework are analyzed in order to understand which gender does more housework. Through the research, it was seen that women do twice as much work around the house as men, and when the tasks are split, the split is based on masculine and feminine tasks. Furthermore, when children observe this gendered split between their parents, they tend to follow the example of the same-sex parent and learn to only do the chores that they see.

174. Survey of the blow flies (Calliphoridae: Diptera) in and around Richmond, Virginia

Akia Talbert, Dept. of Forensic Science, with Dr. Baneshwar Singh, Dept. of Forensic Science

Blow flies are a diverse group of organisms of forensic, medical, and veterinary importance. Most importantly for forensic purposes, these organisms assist in estimation of minimum post-mortem interval (PMI_{min}), or locating the original location a decaying corpse was placed. For both applications geographical distributions of species in question is very important. To minimize error in PMI_{min} estimation using insects as evidence, it is important to have developmental data from a strain of species from that particular area, because the same species from different areas may have a different developmental rate. Information on geographical distribution of many species is either outdated or unavailable for many parts of continental USA. The main purpose of the study is surveying blow flies that are distributed in and around Richmond areas, and to identify any species that are new to this region. Second purpose of this study is to optimize blow fly colony maintenance protocol at VCU. By surveying the general Richmond area, the data will benefit investigators whom employ forensic entomology a more approximate time range that biological tissue evidence has been left at significant areas in a crime scene, or PMI for victims based on the average life cycle of a particular Calliphoridae species found in proximity.

175. New Findings on Self-Forgiveness and Religious Commitment

Kirsten Talbott, Dept. of Psychology, with Brandon J. Griffin and Dr. Everett L. Worthington, Department of Psychology

Empirical evidence supports the connection between forgiveness of others and religion; however, few studies examine the connection between self-forgiveness and religion. In the present study, university students ($N = 117$) completed online assessments of self-forgiving beliefs, religious commitment, perceived transgression severity, and demographics. Findings indicated that religious commitment negatively predicted self-forgiving beliefs over and beyond offense-related variables and demographics. The present study offers a new perspective into the relationship between religious commitment and self-forgiveness, suggesting that people who are highly committed to their religion are less likely to believe that they should forgive themselves.

176. Effects of dissolved and dietary Microcystin on clearance rates of Wedge Clams (*Rangia cuneata*) in the tidal fresh James River

Spencer Tassone, Dept. of Environmental Studies, with Dr. Paul Bukaveckas, Dept. of Biology

Benthic filter feeders are important organisms in estuaries due to their ability to remove algal and non-algal particulate matter from the water column. Microcystin (MC) is a cyanotoxin that is known to have adverse effects on diverse consumers, though its effects on benthic filter-feeders are not well-studied. In this study, we examine the effects of microcystin on the filtering activities of *Rangia cuneata*, a common and often dominant filter-feeder in tidal freshwaters. Clams and seston obtained from the James River were used along with commercially-available microcystin to measure clearance rates of *Rangia* across a gradient of dissolved microcystin concentrations. We also compared clearance rates of James River clams to natural food sources in the presence and absence of microcystin. Our results show that dissolved microcystin inhibited *Rangia* clearance rates. Even at the lowest concentration tested ($0.40 \mu\text{g L}^{-1}$) clearance rates were significantly lower than controls. Dietary experiments showed that when elevated microcystin was present in the James (September), clearance rates were lower for clams fed James River seston relative to clams fed seston from another source. Our results suggest that the presence of microcystin may diminish ecosystem service provided by benthic filter feeders.

177. Comparing Practical Effectiveness of Traditional Chinese Medicine to Western Medicine in Treating Anorexia and Bulimia Nervosa in the West

August Thomas, Dept. of Biomedical Engineering, with Prof. Faye Prichard, VCU Honors College

The purpose of this investigation was to discover how Traditional Chinese Medicine (TCM) practices, such as acupuncture and herbal remedies, might work more or less effectively than Western vectors of treatment, such as cognitive behavioral therapy (CBT) and pill based medicine in treating the eating and mental disorders anorexia nervosa (AN) and bulimia nervosa (BN) in Westernized countries. I answered this question in three ways: by comparing results from research on clinical effectiveness of TCM versus Western medicine for eating disorders, analyzing socioeconomic data to see if the population suffering from these disorders was unable to receive care for financial, cultural, or personal reasons, and evaluating the logistical effectiveness of medicinal systems for treating eating disorders. After reviewing these topics, I subjectively decided which treatment vector was more practically effective. Neither treatment vector was superior in every category – both had strengths and weaknesses. For example, non-white ethnic groups in the US, nearly all of which have greater prevalence of anorexia nervosa and bulimia nervosa than whites, tended to avoid seeking Westernized treatment for mental and eating disorders due to mental stigma; otherwise, CBT would prove the most clinically effective treatment. Additionally, clinical studies testing TCM indicated that acupuncture significantly increases the quality of life and decreases anxiety levels of AN patients, but the data failed to include information on primary eating disorder outcomes, like body mass index (BMI); eating disorders are a new concept to the TCM paradigm. Overall, the results from this study suggested that Western based methods of treatment are currently more

practical and effective than TCM for treating AN and BN in Western countries. More research will be required to solidify these findings – an almost total lack of financial data for treating AN and BN, coupled with an additional lack of clinical studies quantitatively measuring primary outcome variables for eating disorders, especially those involving TCM, made a conclusion difficult. Financial and cultural differences across various factions in the Western world may have skewed the final judgment. Further research on this topic should focus on the clinical effectiveness of TCM versus Western medicine.

178. After Care Programs and Re-trafficked Victims

Kayla Vernon, Dept. of Psychology, with Prof. Faye Prichard, VCU Honors College

Today there are 27 million people trapped in modern-day slavery worldwide, largely through human sex trafficking. There are many programs and policies put in place to prevent this corruption and to care for those who have been victimized. What many do not realize, however, is there is a portion of those victimized who are re-trafficked even after care has been provided. After care programs focus on multiple needs, including shelter, mental and health necessities, repatriation processes, and vocational training. This research is aimed towards analyzing those policies and programs to evaluate any links between them and re-trafficking. I reviewed scholarly articles that discuss these programs and their effectiveness as well as articles that made suggestions as to what would be the best answer to this issue. My research showed there are multiple factors that contribute to the process of re-trafficking, not just the after-care provided to victims. Some of these factors include the root socioeconomic causes as well as poor follow up with the victims whether they return to their home country or choose to stay in America. Other factors include the lack of education provided to health care professionals regarding the treatment of victims, which leads to improper care. Also, there are two main frames trafficking has been viewed through, human rights and criminal justice. Research has shown that a criminal justice frame solely focuses on using the victims as tools to prosecute the traffickers, while a human rights frame focuses on treating the victims as victims and concentrating on their individual needs instead. These frames have a large influence on the policies put in place to combat this issue, which is why some articles suggest a focusing on the human rights frame may help enforce stronger policies and create more effective programs.

179. Virtually Scanning Jamestown 1607-1610

Lauren Volkers, with Dr. Bernard Means, Dept. of Anthropology

The Virtual Curation Laboratory, located at Virginia Commonwealth University, has been 3D scanning artifacts in collaboration with Jamestown Rediscovery from a very narrow period of time, from 1607 to 1610. This short time period includes the founding of the Jamestown colony and the Starving time, where colonists consumed dogs, their seven horses, and at least one young woman. The intersection of Native Americans and Europeans can also be seen with native-made artifacts found in European contexts or altered by European contact. This poster will feature a butchered dog mandible and a butchered horse tibia from the starving time, native-made and European-made pipes and ceramics, and a jeweler's mold.

180. The role of KLF1 and KLF2 in regulation of cell cycle transitions during erythropoiesis

Kristen Wade, CSBC Summer Fellow, Dept. of Bioinformatics, with Divya S. Vinjamur, Safa F. Mohamad Dr. Joyce A. Lloyd

Kruppel-Like Factors 1 and 2 (KLF1 and KLF2) are transcription factors that are responsible for regulating key genes involved in beta globin expression and red blood cell development, or erythropoiesis. The absence of either single gene during mouse embryonic development has been shown to cause anemia, reduced beta - globin expression and lower erythrocyte count. The combined removal of both KLF1 and KLF2, as seen in the double-knockout (DKO) mouse model, results in an embryonic lethal phenotype by day 10.5 of embryonic development. KLF1 has been implicated in direct regulation of the key, cell cycle control genes E2f2 and p18 (CDKN2C). Both of these genes have known roles in promoting transition from G1 to S phase. In light of this relationship, one of the potential molecular causes of this decrease in cell count could be due to a dysregulation of cell cycle progression. In order to investigate the relationship between KLF1 $-/-$, KLF2 $-/-$ and KLF1 $-/-$ KLF2 $-/-$ in regulating cell cycle within erythroblasts, cell cycle profiles of single knockout, double knock and wild type day 9.5 mouse embryos were compared. Results showed that KLF2 $-/-$ embryos displayed a similar profile to the wild type embryos. This indicates that KLF2 alone is not responsible for causing the observed phenotypic changes. However, both KLF1 $-/-$ and KLF1 $-/-$ KLF2 $-/-$ erythroblasts had 20% fewer cells in S phase as compared to wild type. In addition to this, these cells also exhibited a 2 fold increase in the number of cells found in G0/G1 phase. These results suggest that KLF1 occupies an essential role in promoting the transition to S-phase during the cell cycle, a role that is not shared by KLF2. This conclusion is supported by the direct, positive regulatory effect that KLF1 exerts on E2f2 and p18. In its absence, these genes cannot be expressed properly and so the G0/G1 to S phase transition is inhibited. Further elucidating the relationships between these two KLFs will help lead to a better understanding of the molecular mechanisms behind the roles of these transcription factors that are so crucial to erythrocyte development.

181. A Multiplication Toy for Children: The Color Cross Cube

Michael David Walker, Dept. of Graphic Design, with Dr. Ramana Pidaparti, Dept. of Mechanical and Nuclear Engineering

For very young children, learning multiplication might be a challenge that could discourage them from pursuing STEM fields later in school. Introducing complex concepts in multiplication through a toy might facilitate understanding and stimulate interest in STEM fields. This study examined the possibility of teaching multiplication to children seven and younger through the creation of a toy that explains the multiplication process kinesthetically. Existing educational toys were examined based on ability to merge pedagogical and entertaining elements. Research was carried out on devices used to teach multiplication including flashcards and number charts. Diagrams were made of a three-dimensional device that would convey the same concepts as traditional two-dimensional models. A design concept was developed and refined following a systematic process. Scaled drawings were produced and a preliminary model was constructed. A digital rendering of the toy was created and a final model was made of cut Plexiglas. The result, called the Color Cross Cube, is composed of a hollow tower and twenty colored pegs representing the numbers one through ten. Pegs are inserted into slots on two sides of the tower and are viewed from above. A light illuminates the translucent pegs and allows users to count the product of numbers being multiplied. When light passes through the pegs, it emphasizes areas where they overlap and change color. These color changes are also projected above the toy by the base light. The toy may be used in the classroom, as an aid for homework completion, or for entertainment purposes.

182. The down regulation of CYC2-like genes should produce phenotypic defects on floral development in *N.obtusifolia*.

Melissa Walker, Dept. of Biology, with Dr. Dr. Wenheng Zhang, Dept. of Biology

The floral bilateral symmetry in angiosperms has evolved independently many times from the radially symmetrical ancestors. This floral trait is often associated with some of the largest groups of angiosperms, such as Orchidaceae, Lamiales, and Fabaceae. It was thought bilateral symmetry associated with the precise pollination system that could promote speciation. In order to understand the evolutionary transition from radial to bilateral symmetry it is essential to identify the genes responsible and their specific role in the floral evolution. The TCP gene family is transcription regulators that aid in cell division and growth in plants. In snapdragon (*Antirrhinum*), the CYCLOIDIEA 2-like (CYC2-like) genes of the TCP gene family regulate the dorsal floral identity, including the expanded dorsal petals and aborted dorsal stamen. When the gene is down regulated the dorsal identity is lost and flowers become radial. The CYC-like gene is also present in radially symmetrical flowers but the exact function and contribution to plant development is unknown. *Nicotiana obtusifolia*, aka desert tobacco, has radially symmetrical flowers. In this study, the CYC-like genes will be down regulated in *Nicotiana obtusifolia* plants to determine the specific role of the gene. Virus-Induced Gene Silencing (VIGS) method will be applied. The tobacco retrieval virus carrying the CYC2-like gene sequence will produce double strand RNA sequence of CYC2-like gene, which will trigger an anti viral response that ultimately leads to the down regulation of the CYC2-like gene. We propose that the results from the down regulation of CYC2-like genes should produce phenotypic defect(s) on floral development in *N.obtusifolia*. The real time PCR will also be applied to show the extent of the down regulation of the gene. For future analysis the down regulation of the CYC2-like transcription factor will allow the investigation of the downstream target genes that contribute to bilateral symmetry.

Contributors: Dr. Wenheng Zhang, Jingbo Zhang (Graduate student)

183. Evaluating Human Drives and Needs for a Safe Motivational System

Morgan Waser, Dept. of Computer Science, VCU School of Engineering

The human motivational system can be viewed as either being composed of drives or of needs. Our actions can be explained as being based upon reflexes, desires and goals evolved from pressures to maintain or fulfill instrumental sub-goals. Or we can use Maslow's hierarchy of needs as another lens to provide a different view. Both correlate well with the ways we look at decisions when we are making them as well as how they interact over time and build upon one another to better meet our needs and fulfill our goals. We also focus on two drives in particular that seemingly drive the factionalism in machine intelligence safety.

184. Decreasing the Infant and Neonatal Mortality Rates: An Anthropological Approach

Parker Webster, Dept. of Psychology, with Dr. Bernard Means and Dr. Richard Harrington, Dept. of Anthropology

One of the major incidences looked at by public health officials in the assessment of the public health in a particular country is the infant mortality rate. This index is one of the only indices that can not only indicate the general health of the country, but also speak to the economy, culture, and societal structure. This poster presentation will seek to discuss the relevance of this particular index, the factors influencing it, and the possible methods of reducing infant mortality. Furthermore, it will seek to accomplish these goals through a holistic lens, incorporating current medical knowledge, the biological foundations of disease, cultural practices that influence infant mortality, and the psychological factors underlying these relevant issues.

185. The Undermining of Females in Video Games

Samuel West, Dept. of Biology, with Prof. Bonnie Boaz, University College

Video games as a form of entertainment have been rapidly evolving over the past few decades. Female presence in video games has grown exponentially alongside this evolution. This paper focuses on how women are presented in games, the roles that they play within the games and their physicality while performing leadership roles. Scholarly articles have been analyzed on topics including the design of cover art used to sell games, the part that women play in the storyline, the physical nature of women in video games, and the effects sexualized women can have on the gamers. Women have matured from the simple “damsel in distress” character into influential leaders in recent games, but at a cost. While they may be the leaders in a game, they are seen in exiguous outfits that emphasize their perfectly shaped bodies. They are hypersexualized and are often seen as objects and rewards, rather than leaders, because of their body. I argue that while women are starting to take on more leadership roles in video games; their physical portrayal completely undermines any leadership ability the character has. Many scholarly authors agree that these images of women have far more detrimental effects on players rather than promoting women as strong capable leaders.

186. Student Leadership Through Peer Advising

Holly Whitt, Dept. of Liberal Studies for Early and Elementary Education, with Lisa Fleming, College of Humanities and Sciences

As an undergraduate student at Virginia Commonwealth University I have seen both the positive and negative impacts peer advising can have on students. My research and experience will show the benefits of peer advising from a student perspective. Understanding the benefits of this method of advising to both the peer advisor and the student is critical in measuring its impact. Peer Advisors in the Liberal Studies for Early and Elementary Education (LSEE) program at VCU are students who have completed the majority of their program requirements and have met the required GPA and testing benchmarks. Furthermore, these students have also demonstrated a keen interest in mentoring their fellow students. Peer advisors gain invaluable leadership skills through their experience and are an invaluable asset to the LSEE program at Virginia Commonwealth University.

187. An Ontological Approach for User- Centric Data Mining Model Management

David Williams, UROP Summer Fellow, Dept. of Information Systems, with Dr. Manoj Thomas, Dept. of Information Systems

The application created assess effectiveness of developing an ontology driven solution for automated data mining model selection and reuse by developing an ontology based infrastructure to bridge the semantic gap between the business user and the knowledge engineer during knowledge discovery and data mining with big data. The application offers two key functionalities. First, the application provides the capability to update DM repository with candidate models each of which will be registered using the standardized Predictive Modeling Markup Language (PMML) industry format. Second, the application provides a web interface that captures the specific data mining objectives of the business user using the Goal Question Metrics (GQM) approach for goal elicitation. The application makes inferences based on the asserted facts classified in the ontology and make model recommendations that meets the stated business objective. To determine the applicability and feasibility of the solution, independent raters familiar with the DM domain will be solicited to offer a thorough and explicit assessment of the ontology design and application capabilities.

188. My friends made me do it: peer deviance, alcohol, and GABRA2

Kenyada Williams, Dept. of Biology, with Dr. Danielle Dick and Amy Adkins, Virginia Institute for Psychiatric and Behavioral Genetics

The Spit for Science research study aims to understand how genetic and environmental factors unite to influence substance use and environmental health. This research was done in order to determine the relationship between the *GABRA2* gene and alcohol use along with the effects of peer deviance and amount of consumption. To determine these results, the Spit for Science research team has collected survey questions and DNA samples from voluntary first year participants at Virginia Commonwealth University in spring 2011. We are examining the amount and frequency of average alcohol consumption in conjunction with the amount of deviancy shown in the majority of one's peers. We also examined 8 single nucleotide polymorphisms (SNPS) in the *GABRA2* gene for significance in increased alcohol consumption among students who drink. The regression results showed zero correlation between peer deviance and the frequency of alcohol consumption. In addition, we were also unable to identify a moderating effect of peer deviance on the relationship between alcohol use and *GABRA2* variation. Since *GABRA2* is most commonly associated with more severe alcohol-related outcomes, such as Alcohol Dependence, further analyses must be done in order to determine the genes relationship with simple or limited alcohol use.

189. Success of Drug Decriminalization in Portugal

Emily Sexton, Dept. of Craft and Material Studies, with Prof. Faye Prichard, VCU Honors College

During the 1990's, Portugal, as well as the rest of the European Union was suffering from increasing rates of problematic drug usage, especially heroin use, causing overcrowding of prisons and the spread of HIV and AIDS. In 2001, in an attempt to improve these conditions, Portugal decriminalized all drugs, eliminating use and consumption from the penal system and creating an entirely new process. Some officials worried that the policy would cause an increase in drug usage and "drug tourism" in Portugal. This research paper analyzes drug statistics collected and published by Portuguese government organizations, independent organizations and drug policy groups since the new policy was adopted, and examines current

conditions in the country. I also gathered research from a variety of other sources, referencing journals and studies published by researchers in the field and first person testimonies and documentaries. Interviews of expert drug policy makers and officials in and outside of Portugal as well as of other key experts and reports were analyzed as well. These findings show that Portugal has experienced decreases in problematic drug use of all types of drugs. Some more of the results include a decrease in incarceration over drug crimes, an increase in those receiving treatment and help for drug use, and a greater number of drug trafficking arrests, as the police force has been able to re-focus its attention and resources on more serious crimes. The research and analysis presented implicates that after 13 years of implementation, the decriminalization policy has been a success for Portugal. This policy takes a very different, modern approach to drugs unlike any other country. Those that were against the implementation of the policy predicted catastrophes as a result, none of which happened. Overall, decriminalization is a progressive drug policy that is having a positive effect on the country, and the next step is to use this research paper in addition to further analysis to decide if the policy could be implemented effectively in other countries as well.

190. Inkjet Printing and Gene Therapy for the Treatment of Glaucoma

Shirley Yu, Dept. of Chemistry, with Prof. Faye Prichard, VCU Honors College

The neurodegenerative disease glaucoma is one of the leading causes of blindness and accounts for over ten million visits to physicians for treatment. Unfortunately, there is yet to be a concrete accepted approach to alleviating the effects of glaucoma. This dissertation examines recent studies and reports on the specifics of viral vectors, non-viral vectors, piezoelectric inkjet printing, heat inkjet printing, and glaucoma. A few of the studies involve the progression of an experiment while others combine and discuss the results of multiple experiments. Using these articles I compared the effectiveness of gene therapy to the use of inkjet printing to create retinal cells. By replacing, adding, or deleting a specific sequence in the human body, the gene expression of the eye can be altered. There are two different types of injections for gene therapy, viral vectors and non-viral vectors. Both methods typically target the trabecular meshwork and neuroretina to regulate the aqueous humor outflow and lower the intraocular pressure. In the case of glaucoma, the treatment solely provides neuroprotection instead of curing the disease, thus patients must undergo repeated injections in order to keep the disease from deteriorating. Inkjet printing of retinal cells have shown to produce three dimensional tissue grafts that may replace defective tissues. The printed cells have been tested for survivability and regeneration properties, since it has been suggested that the printing process can cause defects. Both heat inkjet printing and piezoelectric printing have been used to create neural cells. By evaluating the advantages and disadvantages of gene therapy as well as printing, I can evaluate whether or not inkjet printing can overtake gene therapy to become a conventional treatment for glaucoma in the near future. There have not been many clinical trials done on either of these methods for glaucoma, thus it is difficult to obtain a certain answer to the question at hand. At this point advancements in the area of three-dimensional printing neural sheets may provide a more promising cure. However, more research must be done on how each of these treatments affect glaucoma in humans.

191. The Application of Stent Technology on Artificial Venous Grafts

Alexander Whitehead, Dept. of Biomedical Engineering, with Prof. Faye Prichard, VCU Honors College

Current artificial vein grafts for long-term dialysis and bypass surgeries suffer from atherosclerosis and restenosis, and they tend to thrombose after initial patient recovery. The alternative materials, coatings, and polymer interfaces being explored in stents may be useful in graft applications, increasing both the quantity and quality of the patient's life. To better comprehend the clinical standards and developing alternatives, I collected previously identified physical and chemical venous properties, as well as the corresponding synthetic materials that would support them. I compiled studies of primary and secondary endpoints (such as death, myocardial infarction, thrombosis, and target-lesion revascularization) in various graft materials, polymer coatings, and drugs to gauge efficacy. Based on my findings, I suggest that everolimus coatings linked to polytetrafluoroethylene (PTFE) grafts by poly(n-butyl methacrylate) (PBM) should be subjected to further clinical research and *in-vivo* trials.

192. Hip Hop and Stereotypes about African American Physical Beauty

Isabel Lee, Dept. of Art Foundations, with Prof. Mary Boyes, VCU Honors College

The illicit-erotic, converging economies of hip-hop and the hypersexualized imagery of women present a complex paradox of both self-fashioning and misogynistic marginalization for African American women. By studying the objectification and marginalization of women as a political, social, and commercial tool I aim to create more understanding about the social and historical contributors to this projected identity of African American women. I explore the questions of race, gender, and sexuality in the context of hip hop and how these are challenged by dynamic, unconventional artists that have recontextualized the role of minority groups represented by the music industry. The portrayal of African American women's image through the history of oppression in slavery, the misogyny of popular media, the widely accepted social culture of the youthful generation, and the role of African American women within their own society of men and women have a direct correlation to how the women are portrayed in the modern hip hop industry. The introduction of hip-hop incorporating "booty videos" as a genre raises questions about the historically entrenched, misogynistic view of repulsive black sexuality, and that within the illicit erotic economy of the modern strip club and music video set, the marginalized group of black women seek legibility and independence through pleasure and fetishized desire. In my research I seek to explore the perspective of the women portrayed in the industry, and what factors – social or cultural – contribute to the continuation of such marginalization.

193. Anti-Americanism Linked to Cultural Framing and Vaccinations

Forum Sanghavi, Dept. of Biology, with Prof. Mary Boyes, VCU Honors College

In 2003, two years after the terrorist attack on the United States and the reelection of General Olusegun Obasanjo to his second term of presidency, an anti-vaccination campaign was launched against the polio vaccine in the Northern Nigerian states of Kano, Kaduna, and Zamfara. This anti-vaccination campaign stemmed from rumors circulating in the Northern Muslim states that said that the vaccinations were laced with anti-fertility agents, HIV/AIDS, or cancer causing chemicals. The paranoia and fears that caused these rumors to begin were linked to the Muslim distrust of the Baptist president who had close ties with the Western nations of the world, including the United States of America. In the Koran and in Nigerian culture as a whole, women are revered for their ability to give birth, thus causing the fear and panic to be widespread in Northern Nigeria. It was thought that as a result of tensions between

the Western and the Muslim world, President Obasanjo was allowing vaccinations in the country to sterilize the children in order to inhibit the growth of the Muslim Nigerian population. The anti-vaccination campaign allowed polio to spread to over 20 countries across Africa, the Middle East, and Southeast Asia. As a result of the rapid spread of this disease that had originally only been endemic to Nigeria, Afghanistan, and Pakistan, the World Health Organization (WHO) officials tried to appeal to the northern Nigerian public using methods that had been developed and successful in Western countries. This caused a communication barrier between the WHO and this region of the world because the campaign was not framed according to their cultural norms and as a result, the poliovirus is still prevalent in that area. Cultural framing is incredibly influential in terms of attempting to change the cultural norms or gain the trust of a group of people.

194. Music and The Subjective Image

London Perry, Dept. of Cinema, with Prof. Mary Beth Reed, Dept. of Film and Photography

Music has accompanied film since the medium's birth over a century ago. Over time, the relationship between music and the moving image has developed into an essential piece of narrative storytelling, whether it is to set an emotional tone or help to tell the story itself. As a filmmaker and music appreciator, I explore the relationship between music and film through my own creation and manipulation. My particular interest is in how to create a subjective image through the use of music alone to express a character's emotional state, rather than relying on dialogue to convey the character's internal experience. I juxtapose the objective image from a third person perspective with music and lyrics that speak as the protagonist from a first person perspective. The result is a blend of omniscient commentary that is understood through highly subjective emotional expression.

195. Music therapy improvisation and its effects on depression

Andrew Phung, Dept. of Biology, with Prof. Faye Prichard, VCU Honors College

Depression is a growing endemic in the western world. It arises from multitudes of environments and affects a wide array of people from high school teenagers to successful celebrities. Because of the rise of this condition, many fields of psychiatry are being researched to formulate better methods for depression treatment. One of these fields is music therapy. Music therapy is a recent area of therapy that is scarce in dedicated literature, but current research shows promising progress that pertains to the treatment of depression. Although there are no definitive conclusions on how musical methods and mechanisms work, music therapy improvisation (MT improvisation) has unique therapeutic qualities that demonstrate its capability as a promising area of depression therapy. For this reason, four areas of research were reviewed: improvisation techniques, therapeutic-client relationships, the psychology of depression, and promising areas of future MT improvisation research. Currently, MT improvisation research is developing, but is becoming more specific as more complex experiments are expanding. The information that therapists and researchers have now is indicative of potential improvisational therapy models, and some research is beginning to demonstrate how MT improvisation alleviates depression symptoms. While no conclusions can be made on the driving mechanisms of MT improvisation, current research demonstrates

promise and has convincing elements that voice a need for further research in brain function during treatment and methods of quantitatively analyzing improvisation.

196. Different Indicators of Status Exchange Theory in the United States between African-American Men and Caucasian Women

Camille Brenke, School of Nursing, with Prof. Faye Prichard, VCU Honors College

There have been numerous studies in recent years that have supported status exchange theory in the United States. Status exchange theory is defined as the exchange of minority's resources, whether education, income or other tangible resource, with the intangible rewards of being wed with a majority individual, to include a higher placement in the social hierarchy. However, few studies have differentiated the nuances in status exchange—whether it is more commonly expressed as an exchange of income, education or job prestige. The purpose of this research is to discover if African-American men in the US are more likely to engage in status exchange if they achieve higher levels of income or higher levels of education or job prestige. While it has been argued that interracial relationships are an indicator of improving relations among racial groups in the United States, it is also argued that the existence of status exchange only exacerbates the stratification between minorities and the majority. I investigated multiple primary sources from scholarly, peer-reviewed journals. These articles focused on status exchange between African-American men and Caucasian women. They tested different indicators of status exchange, some testing the three aforementioned, others focusing solely on education. Evidence of status exchange theory has been found in nearly all of the studies investigated, especially in terms of education. I found that status exchange theory is exemplified where African-American men are of a higher education status than their Caucasian wives; this occurs more often than in relationships between African-American men of higher income levels than their Caucasian wives. These results imply a socially constructed ideology that exists within the United States that an African-American man of high education or job prestige can complete his authority once engaged in a relationship with a Caucasian woman. An African-American man of a higher income than his wife, in turn, feels little obligation to prove his worth by way of matrimony with a Caucasian woman. Even though it was possible to surmise these conclusions, further research should be conducted in this field that looks at the differences in status exchange. With changing social ideologies pulsing in the United States, new research in this field is always in demand.

197. 19th Century France and 21st Century Korea: Studying Long Period Fashion Cycles

Kevin Tan, School of Business, with Prof. Faye Prichard, VCU Honors College

Fashion, in 2013, was a \$1.2 trillion industry and predicated changes in fashion trends or people's tastes could easily make the difference between success and failure in the industry. In the 20th and 21st centuries, there exist easily observable cyclical trends in fashion. For example, in 2014, the skinny jeans that are so popular amongst men first appeared in the 1970's. There are countless observations of these short period cyclical trends, but there exist larger trends in fashion that are not as easily observed. Long period trends can span centuries and geographic separation with ease. Looking at fashion from 19th century France and 21st century Korea through numerous case studies, a relationship between the two vastly different eras of clothing can be found. Drawing from three articles from reputable scholarly journals and one primary source dealing with Korean fashion, one extensive case study on the nature of cyclical fashion trends, and three sources on Impressionist French Fashion, I have compiled

the information required to define the relationship between the two eras. Similar political trends, a leftward swing in their policies and a rising middle class, served to create very comparable changes in their fashion. Traditional clothing was modified, little by little, in a lead off the extremely rapid changes that occurred in both eras. Studying larger trends in fashion would allow for a competitive advantage for both marketers and designers in the field, allowing them to preempt coming fashion fads and capitalize on them.

198. Colorblind policies in U.S. secondary education and their contribution to the school-to-prison pipeline

Valentina Lopez, Dept. of English, with Prof. Faye Prichard, VCU Honors College

Colorblind school policies contribute to the phenomenon known as the school-to-prison-pipeline affecting non-white youth in the United States. My research exposes the flaws of post-racial attitudes and approaches towards education, and how grassroots alternatives engaging and embracing diverse communities can decrease the rate in which teenagers are funneled into the criminal justice system. Schools with colorblind policies foster standardization of whiteness in an attempt to eliminate inequality and discriminatory policies, which promotes a greater sense of alienation and poorer academic performance in non-white youth. This approach to education, paired with zero-tolerance school policies, creates an environment that ultimately criminalizes disenfranchised youth and leads them to fail out of school, as opposed to being inclusive. I studied peer-reviewed scholarly articles that examine racial attitudes permeating school environments, colorblind policies and the standardization of whiteness, and emerging alternatives that embrace diversity as opposed to suppressing and ignoring it. The sources came from a variety of research journals specifically dedicated to education, race relations, and reform; other sources included studies of different grassroots efforts to push for multicultural curricula in schools. The authors who executed these studies and articles are all experts in their fields, be it in regards to racial policies in academic institutions, race relations, or education reform. They perform extensive research in these fields of study, are Ph.D. holders in such fields, and are professors at a variety of different American universities. The research suggests that colorblind policies are ineffective in fostering an inclusive environment and succeed in alienating minority youth. Colorblind policies assume whiteness as the standard, and employ rhetoric that effectively erases race and its many complex qualities in an attempt to eradicate racism. This isolates non-white youth by rendering their own racial and ethnic identities as null and void, and further pushes out students from the public school system. The alienation of children from schools leads many teens to either drop out or perform poorly in school, which in turn can lead to an increased tendency to become involved in criminal activity, and reinforce the school-to-prison pipeline. The research points to a more inclusive approach to education that embraces multiracial identities and adopts school curricula that incorporates the arts, humanities, and sciences from different racial perspectives. These methods have proved effective in reducing dropout rates and improving academic performance in minorities in the schools that have adopted them. The inclusion of such a curriculum helps students learn to embrace differences and celebrate them, teaches them to cohabitate harmoniously, builds stronger communities, and keeps teenagers in schools as opposed to prison.

199. Modernization and Changing Marriage Trends in India

Devanshi Patel, Dept. of Mathematical Sciences, with Prof. Faye Prichard, VCU Honors College

Since the 21st century, the religious conditions of India have been wavering. People are becoming increasingly unaware of the important religious traditions, rituals, and scriptures, particularly of Hinduism. This could be as a result of many factors, but one common factor is modernization. Specifically, one of the largest social institutions in India is of marriage. Despite India's race towards modernity, some ancient customs during the process of marriage are still very common today. However, the way of practice of Marriage has gone through much modification since ancient times. Therefore, this research studies Hindu marriages throughout the years in order to figure out if modernization is a significant factor towards the changing marriage trends of Hindu marriages in India. In order to do this, the research utilizes specific interviews from both married and non-married people in India and surveys about peoples' opinions on marriage. It also uses specific articles about the changes in different steps in the marriage process such as the selection process, the engagement, the dowry system, and the actual marriage itself. I have concluded that modernization is one of the most important factors towards the changes in the Hindu marriage process. As a result of the findings from this research, people in India can be more aware of the deterioration of culture and religion in India. This can lead concerned individuals to do more research and find out if other institutions are being affected due to modernization and if so, how.

200. To what extent should phage therapy be used instead of antibiotics?

Malika Gill, Dept. of Biology, with Prof. Faye Prichard, VCU Honors College

Resistance to antibiotics is a growing problem in the world today. This is leading to the rise of superbugs, infections that have resistance genes to most drugs. Another treatment option, phage therapy, has risen to popularity in the past few years. It is a way to treat bacterial infections by having bacteriophages inject their DNA into bacteria and lyse the bacterial cells. Phages have certain host ranges, meaning they have a certain number of bacteria that they can infect and kill. Researchers have developed phage cocktails, mixtures of phages that can treat multiple infections at once. There are many factors to consider when looking at both options such as cost, research time, effectiveness, and side effects. The goal of this research paper was to learn whether phage therapy is the better option to treat infections. Phages are one of the most abundant organisms in the world. According to the many studies that characterize novel bacteriophages, finding and isolating them is generally easy. From looking at two articles about phage therapy, the cost is higher because it is a newer process and needs to be researched more to treat the many bacterial infections in the world today. However, antibiotics also take many years to develop. When they do get created, they only have a short amount of time before bacteria gain resistance genes to them. I looked at two studies that discuss how easy it is for antibiotics to become ineffective. Bacteria have mutations that can make their genes resistant, and they also have horizontal gene transfer. Antibiotics are effective, but only until the bacteria gain resistance. Phage therapy is usually always effective if the bacteriophage used can infect the bacterial host it is trying to kill. With the creation of phage cocktails, it makes it easier to kill bacteria, because many phages are added to one mixture. This also lowers the cost, because individual phages don't have to be found and manufactured separately. From the current research, it seems unlikely that bacteria will gain resistance to bacteriophages. There have not been side effects found from phage therapy, which is why research is being continued on them. I consulted many sources related to both phage therapy and antibiotics to make an informed decision about what is the better method of treatment. All of the above findings lead to the implication that phage therapy is the better option to treat bacterial infections. I think that we need to put more money into phage therapy research and work on getting FDA approval for most concoctions. Antibiotics are not going to be cut out completely, so we should use them until more phage cocktails have been made to treat all the infections out there.



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