**Abstracts**

**The 1st Annual Student Scholars Symposium**

**April 13, 2012**

1. Paper Presentation – Art

**From Elvis to Barbra: A Feminist, Jewish, Lesbian Response to Andy Warhol’s Work through Deborah Kass’s “The Warhol Project.”** Ale’ Daton and Rocky Horton.

This paper analyzes Andy Warhol’s female celebrity portraits through feminist art. Specifically, Deborah Kass’s The Warhol Project, an exhibit that began on March 1999 at Tulane University’s Newcomb Art Gallery. The project continued to be exhibited at various galleries, spanning until 2001. It contains some of Kass’s most seminal works, such as The Jewish Jackies and Self-Portrait series. The works are appropriations of Warhol’s work, in which Kass substitutes Warhol’s ‘celebrities’ with Jewish, lesbian, and female subjects, intending to redefine beauty and celebrity status; each of Kass’s portraits being the antithesis of a well-known Warhol portrait. Kass’s response to Warhol’s work is based on her personal experience as a feminist, Jewish lesbian.

1. Paper Presentation – Biology

**Endothelin Converting Enzyme-1 Expression is Up-Regulated in Invasive Human Breast Cancer.** Reem Sidani and Beth Conway.

The Endothelin-1 Pathway has been implicated in the invasiveness of cancer cells. Endothelin Converting Enzyme-1 (ECE-1) cleaves Big Endothelin-1 into Endothelin-1, binding to receptors. These receptors activate signaling pathways leading to various functions including, in some cell types, invasion. ECE-1 has been found to be a link in the invasiveness of certain cancer cells, such as prostate, ovarian carcinoma, and neuroblastoma cells. Four ECE-1 isoforms have been identified, with certain isoforms up-regulated in the previously described cancer cells. The contribution of these individual isoforms to invasion has not been studied in breast cancer cells. We tested these isoforms in the invasive MB-MDA-231 cell line and the less invasive MCF-7 cell line to determine isoform expression patterns. We hypothesized that ECE-1 would be up-regulated in highly invasive breast cancer cells. We found that the MB-MDA-231 cell line had increased levels of ECE-1B and ECE-1D compared to the MCF-7 cells.

1. Paper Presentation – Biology

**Expression of Brain Derived Neurotrophic Factor and BDNF Receptors in T Cells Indicates the presence of an Autocrine Loop.**  Chelsi Cassilly and Jon Lowrance.

*Abstract:* Brain Derived Neurotrophic Factor, BDNF, is a nerve growth factor involved in various cellular processes including cell growth, differentiation, and survival. Although the majority of studies on BDNF have been in terms of neuronal development and growth, this study focuses on T cells. Specifically, the expression of BDNF and BDNF Receptors in CCL-119, a T Lymphoblast line, was analyzed. Using RT-PCR, SDS-PAGE, and Western Blots, presence of BDNF in CCL-119 was confirmed. Analysis of RT-PCR resulted in the positive expression of TrKB and TrkC receptors and no expression of TrkA and P75. These data indicates the presence of a BDNF autocrine loop within CCL-119 T cells.

1. Paper Presentation – Biology

**Prostate-Specific Membrane Antigen and its Role in Angiogenesis.** David Bourgeois and Beth Conway.

Angiogenesis is necessary for tumor growth and disease progression in solid tumor cancers. Prostate-Specific Membrane Antigen (PSMA) is a transmembrane peptidase expressed on tumor-associated endothelial cells that positively regulates angiogenesis in a laminin-dependent manner. Previous research conducted in our lab has demonstrated that PSMA acts upon laminin peptides that have been digested upstream by matrix metalloproteases (MMPs) and activates endothelial cells. We hypothesize that these PSMA-derived laminin peptides activate integrin beta-1 resulting in increased endothelial cell adhesion and activation. Laminin was digested with recombinant MMP-2 and then digested further with recombinant PSMA to generate peptides to be used in our experiments. Laminin digested only by MMP-2 was used as a control. As previously observed, we found that laminin peptides digested by MMP-2 and PSMA increased HUVEC cell adhesion, a common indicator of endothelial cell activation. To determine if this activation was dependent on integrin beta-1, we inhibited integrin beta-1 using a neutralizing antibody. HUVEC cells exposed to our peptide with neutralized integrin beta-1 demonstrated a decrease in cell activation and adhesion. This result suggests that PSMA-generated laminin peptides activate endothelial cells in an integrin beta-1 dependent manner. Additionally, the laminin peptides generated by sequential digestion with MMP-2 and PSMA significantly increased microvessel density and hemoglobin content in Matrigel plugs implanted into C57/Bl6 mice compared to laminin peptides generated by MMP-2 alone. Together, our findings suggest a novel mechanism for PSMA promoting angiogenesis by generating integrin beta-1-activating laminin peptides.

1. Paper Presentation – Biology

**Use of the norovirus P particle as a novel vaccine platform.**  Kyle Brawner Beth Conway.

The norovirus P particle is formed by 24 copies of the protrusion (P) domain of the norovirus capsid protein. The P particle is easily produced in Escherichia coli, extremely stable, and highly immunogenic. There are three surface loops per P domain, making a total of 72 loops per particle, and these loops are potential sites for exogenous antigen insertion for immune enhancement. To prove this concept, the rotavirus VP8 antigen was inserted into one of the loops. Insertion did not affect P particle formation, and the immune-enhancing effect of the P particle was demonstrated by significantly higher antibody titers induced by P particle-presented VP8 compared to free VP8 in vaccinated mice. Additionally, mice immunized with the P particle-VP8 chimera shed less live rotavirus than mice immunized with free VP8, indicating enhanced immune clearance of rotavirus in a mouse model of active infection. These data suggest the P particle can be used as a novel vaccine platform, and the availability of up to 72 loops suggests the potential for versatile vaccine designs incorporating a variety of exogenous antigens.

1. Paper Presentation – Biology

**Expression Patterns of Renal Rhabdoid Tumor Cells Suggest Existence of Neurotrophin Signaling Pathways.**Austin Ray and Jon Lowrance.

Brain-derived neurotrophic factor (BDNF) and Nerve Growth Factor (NGF) are neurotrophins that play crucial roles in survival, growth, and differentiation of neural and non-neural cells. Neurotrophin signaling pathways are implicated in aggressive cancers of kidney and bladder. In this study we examined the possibility of BDNF and NGF signaling pathways in renal rhabdoid tumors, an invasive pediatric malignancy whose biology is not yet understood. Reverse transcription polymerase chain reaction (RT-PCR) is used to elucidate expression patterns of the G-401 renal rhabdoid tumor cell line. RT-PCR results suggest that neurotrophin signaling pathways exist, as BDNF, NGF and respective high and low-affinity receptors (TrkA, TrkB, p75) are expressed. This data establishes a baseline of knowledge for future study of the aggressive nature of renal rhabdoid tumors and neurotrophin expression.

1. Poster Presentation – Biology

**C. elegans: A Morphogenic Study.** Zen and Bonny Millimaki.

The objective of our study is to perform a mutagenesis screen in *Caenorhabditis elegans* to further our understanding of the genes involved in morphogenesis, migration, and spicules formation of the male. *C. elegans* is a great model for this study because it has a very short life cycle, clear cuticle, known cell lineages and sequenced genome. Additionally, large scale mutagenesis screens performed in *C. elegans* have been successful in furthering our knowledge of cell signaling through studies of the vulva, neural development, uncoordinated animals, behavior, and studies on mating behavior. The predominant sex form of this species is hermaphrodite, and males are very few in the total population. Moreover, there are no female *C. elegans*, only hermaphrodites. The hermaphrodites can self-reproduce without the males, thus many are more interested in studying the hermaphrodites than the males. The spicule is required for mating to probe the vulva opening and to hold the vulva open during ejaculation. In the process of the development of the spicules, the cells must migrate to their location and harden, changing the morphology. However, the molecules involved in the process are not known. We will use EMS to mutagenize C. elegans and will screen for non-functional spicules.

1. Poster Presentation – Biology

**Exon Expression of Brain-Derived Neurotrophic Factor in Cancer Cell Lines, Hb-8501 And Pc-3.** Anna Hanna and Jon Lowrance.

Brain-derived neurotrophic factor (BDNF) is a member of the neurotrophin growth factor family necessary for survival, growth and differentiation of neurons. In addition to neurons, BDNF has been reported in other tissues such as liver, heart, spleen, prostate, placenta, lungs, muscle, stomach, thymus, salivary glands, kidney, trachea, and the small intestine. BDNF is encoded by a complex series of 9 exons, which are located on chromosome 11 in humans. Exon 9 is the only coding exon for the BDNF protein while the other 8 exons are noncoding 5’ portions of the mRNA transcript. The expression of BDNF exons I through VIII is minimal in normal human tissue. The differential exon usage between normal primary cells and cancer cell may indicate a role for specific exon expression within certain cell types and may aid in defining BDNF function within those same cells. In this study, we examined BDNF exon expression in two different human cancer cell lines, PC-3 (prostate adenocarcinoma cells) and HB-8501(B-lymphocyte myeloma).

1. Poster Presentation – Biology

**Genetic Diversity of *Dalea Foliosa* Using ISSR Markers.** Botros Aiyad, Tien Ngo and Mary Sledge.

*Abstract:* *Dalea foliosa* is a federally endangered plant species. The goal of this project is to assess genetic diversity among three populations of *D. foliosa* held by the National Plant Germplasm System (NPGS): PI 648967, PI 648968, and PI 648969. Previous results showed that two of the populations studied were closely related while a third population showed greater genetic diversity. Seeds from each population were nicked in their seed coat to allow penetrance of water, placed in a 1.5 ml PCR tube filled with water, and incubated in the dark at 5°C for 96 hours to break their dormancy. The seeds from each population were taken out and sandwiched between wet paper towels, wrapped in foil and transferred to a 26.7 °C incubator to germinate. Genomic DNA was isolated using the QIAGEN DNeasy Plant Mini Kit and analyzed with 857 and 881 ISSR markers producing distinct bands indicating genetic variability.

1. Poster Presentation – Biology

**Neprilysin Negatively Regulates Human Breast Cancer Cell Invasion.** Marina Salama and Beth Conway.

Neprilysin/CD-10 is a membrane bound protein that catalyzes the cleavage of active endothelin (ET-1) to inactive protein fragments, thus inhibiting the ET-1 signaling pathways that lead to cell proliferation, motility, and invasion. We hypothesized that Neprilysin will negatively regulate breast cancer cell invasion and will therefore be unregulated in low invasive breast cancer cells. Using invasion assays we treated low invading MCF-7 cells with Thiorphan, a Neprilysin inhibitor, and we observed an increase in cell invasion. Similarly, neprilysin mRNA was consistently detected in low invading, but not highly invasive breast cancer cells. These results suggest that Neprilysin down-regulation may be an important step in breast cancer cells becoming highly invasive, therefore Neprilysin may be an effective target for breast cancer therapy.

1. Paper Presentation – Chemistry

**Computational Chemistry and UV/Vis Spectra of 2,2' Cyanines.** Jonathan Clinger,William Hedges and William Tallon.

The cyanine dyes are used as stains for microbiological analysis of proteins due to their strong binding capabilities. Improved models of these molecules could be useful in more accurately predicting their properties. This study evaluates several mathematical models using the programs Spartan and Gaussian to determine which model best predicts some of the properties of these molecules. This report focuses on the UV/Vis spectra of the molecules since this property is highly dependent on electronic structure. Spectra obtained in our laboratories and those previously reported in the literature are used in the comparisons. Computational chemistry results obtained in our laboratories and those reported in the literature are compared to each other and to the experimental spectra. It is assumed that the model that best predicts the spectra of the molecules would also best predict other properties such as binding strength.

1. Paper Presentation – Chemistry

**Computational Chemistry and UV/Vis Spectra of 4,4' Cyanines.** Geoffrey Musick, Hong Tran and William Tallon.

The cyanine dyes are used as stains for microbiological analysis of proteins due to their strong binding capabilities. Improved models of these molecules could be useful in more accurately predicting their properties. This study evaluates several mathematical models using the programs Spartan and Gaussian to determine which model best predicts some of the properties of these molecules. This report focuses on the UV/Vis spectra of the molecules since this property is highly dependent on electronic structure. Spectra obtained in our laboratories and those previously reported in the literature are used in the comparisons. Computational chemistry results obtained in our laboratories and those reported in the literature are compared to each other and to the experimental spectra. It is assumed that the model that best predicts the spectra of the molecules would also best predict other properties such as binding strength.

1. Paper Presentation – Chemistry

**The Development of an Enzymatic Assay for Tyrosine Decarboxylase by Capillary Electrophoresis.** Brendon Burke and Kent Clinger.

Tyrosine Decarboxylase (TDC) is the enzyme responsible for the decarboxylation of tyrosine to form tyramine. Enzyme assays for TDC now include manometric determinations, the counting of radioactive 14 CO2, and carbon dioxide sensitive electrodes. Manometric determinations require expensive and specialized manometers, the counting of radioactive 14 CO2 uses a long-lived beta-particle emitter, electrodes tend to be insensitive. Consequently, a TDC determination by capillary electrophoresis is being developed. Capillary electrophoretic conditions have been found that separate tyrosine from tyramine, allowing for the successful determination of their concentrations. The application of this method in the determination of TDC will be discussed.

1. Poster Presentation – Chemistry

**In Silico Analysis and Synthesis of Anticancer Metal-Based Drug-Linker Building Blocks.** Brittany Duerk and John Dominic Smith.

Cisplatin is among the most widely used anticancer drugs in history. The success of cisplatin in treating various types of cancer has led, through the years, to the search for and development of other metal-based anticancer drugs. Numerous compounds with centers varying from platinum and ruthenium to gallium, titanium, and other metals have been synthesized and tested. However, dangerous side effects resulting from the biological activity of the metal are often associated with these metal-based compounds. Previous studies have shown that metal-based imaging agents can be selectively delivered to tissues of interest using a drug-linker-peptide targeting system. We have extended this targeting system to the delivery of therapeutic agents, including cisplatin and Rapta-C, using suitable linker molecules and peptides that target receptors over-expressed by tumors against which these drugs are active. In silico analyses of the binding of the metal-based drugs to the linkers 6-aminohexanoic acid (6-aha), 11-aminoundecanoic acid (11-aua), and phenylvaleric acid (pva) were performed using Density Functional Theory (DFT) methods with the B3LYP functionals and LANL2DZ basis set. Preliminary results indicate successful preparation of drug-linker complexes, the first step in forming the drug-linker-peptide therapeutic agent. Selective delivery of active metal-based anticancer drugs could mean lower dosages, reduced side effects, and more effective treatment for cancer patients.

1. Poster Presentation – Chemistry and Biochemistry

**Micronutrient Content of Herbal Teas.** Annecie Benatrehina and Kent Clinger.

Herbal teas are widely consumed mainly for their claimed health values, but rarely has their mineral content been determined. In this study, infusions of twelve herbal teas were prepared similarly to commercial directions and the mineral content of the teas was analyzed by inductively couple plasma emission spectroscopy. The tea samples include blueberry leaf, dandelion root, Echinacea herb and root, eleuthero root, ginger root, golden seal, hawthorn berry, lemon balm, peppermint leaf, red clover seed, and raspberry leaf. The results show that none of these infusions contain a significant source of Mn, S, Fe, Nas, or Al. However, higher amounts of P, K, Ca, and Mg were observed in several of these infusions, especially in Echinacea herb, ginger root, and golden seal.

1. Paper Presentation – Chemistry and Biochemistry

**AWater Quality Analysis of Radnor Lake State Natural Area.** Latoya Clark and Kent Clinger.

Radnor Lake is a state park located in Nashville, TN. In the fall of 2005 the Radnor Lake Watershed Initiative was established in order to collect data to be able to research and protect the lake from harm. In the Fall of 2011 the Instrumental Methods of Analysis class at Lipscomb University became a part of the water quality study. The task at hand was to gather water quality data and compare the results to the U.S. Environmental Protection Agency (EPA) drinking water standards to get a better understanding of the quality of the water, which impacts both the wildlife and natural preservation of Radnor. Inductively Coupled Plasma Emission Spectroscopy (ICP-ES) was used to determine metal ions and common ions were analyzed by Ion Chromatography (IC). Most of the water samples were found to be in the normal range for stream and lake samples.

1. Paper Presentation – Education

**Examining the Effectiveness of the Oasis College Connection.** Sherica Clark, Douglas Stewart, and Ronald Woodard and Reva Buckley.

Students from first generation, low income households need increased access to post-secondary educational opportunities. These students face many potential barriers to college and career success including: Being at a disadvantage in terms of college knowledge, personal commitment and familial support; being at greater risk with respect to persistence and degree attainment; having lower degree aspirations; and expecting to take longer to complete their degree programs (Doyle & Filkins, 2002). Research shows that special student services targeted to this audience can result in improved academic outcomes and improved retention rates (Purnell & Blank, 2004). The Oasis Center College Connection provides intensive pre college services, such as admissions and financial aid counseling to students ages 14-23 traditionally underrepresented on college and university campuses. The purpose of this research is to analyze the effectiveness of the Oasis College Connection in increasing access to post-secondary opportunities for low-income, first generation high school students. Researchers will explore the following research questions: 1) Is there a relationship between the number of contacts with Oasis College Connection and post-secondary placement in college or career opportunities? 2) How do students perceive the effectiveness of the services provided by Oasis College Connection? 3) Does the Oasis College Connection program significantly increase the number of students from high poverty schools in Nashville choosing to apply and enroll in college? 4) Do students receiving pre-college services feel more supported in the pursuit of postsecondary opportunities? The impact of the intervention will be discussed.

1. Paper Presentation – English

**Design to Write.** Anna Uselton and Stacia Watkins.

Whether or not we are cognizant of the subliminal effect of aesthetics on our psyches, design has the ability to either abolish or nourish our creativity. As increasingly creative environments, writing studios are canvases with which we can either stultify or, we hope, stimulate students’ creativity—the better to write every kind of piece, from essays to reports to songs. The Lipscomb University Writing Studio is uniquely concerned with preparing an environment which stimulates the incarnate creativity of our students. Using ideas gleaned from *The Architecture of Happiness*, by Alain de Botton, “An Ideal Writing Center: Re-Imagining Space and Design,” by Leslie Hadfield, et al, and “Ethos of Space in Next-Gen Writing Centers,” a panel at the Southeastern Writing Center Association 2012 Conference, I explore ethical writing studio aesthetics and examples of innovative writing studio.

1. Performance – English

**A Cleaving Open.** Daniella Burke and Matthew Hearn.

We sat before a Vishnu shrine listening to museum-like quiet, looking for godly peace in a pagan ritual. Breathing, exhaling the whispered pain of broken hearts upward, outward, somewhere-ward, hoping for an answer, or at least relief. Sometimes what used to be easy is hard, but as long as you are happy, I will be too. I hope this time this man, this avatar bent on renewal remembers how much he should love you, you and the elephants and trees and ideas that come out of your mind. We sat on a warm, dark curb, feeling the lighter rip, smoking Old Hillsboro, our lives monkey-gripped. I forget to tell you how much your attention means to me; and would it be alright if I refused to let you leave me? I’m sorry that I couldn’t tell you why I cried, sorry I settled for an untruth instead of telling you I felt like I was losing something and didn’t know how to stop it. That I know what it feels like to be a desert.

1. Performance – English

**Gunpowder and Candy.** Lindsey Durham & Kim Reed.

In order for a writer to speak truth, one must write what one knows and imagine the rest, and memory is the most powerful tool in the writer’s arsenal. In my poetry collection, titled “Gunpowder and Candy,” I have attempted to reconstruct three instances of memory, each drawing on a different element of my character as a child. “Taxidermy” draws on my childlike attempts to understand the world as it is. “Akimbo” centers on my reluctant realization of growing up. “The Lark” explores my fear of loss and death. The manner in which I write adopts the free indirect style of each situation, developing my unique brand of syntax and contributing to the overall polish of the three pieces. This collection was accepted and presented at the 2012 Sigma Tau Delta (English Honors Society) Conference in New Orleans, LA.

1. Paper Presentation – English

**Beyond Plot-Spinning: The Role of Frederick Hale in *North and South.*** Sarah King & Matthew Hearn.

Most critics classify *North and South*, a novel by Elizabeth Gaskell, as an exclusively industrial novel examining social issues of the Victorian Era in Great Britain. However, this paper pushes accepted criticism of the novel one step further, examining *North and South* from a character-based perspective. This analysis centers on the often overlooked character of Frederick Hale, the brother of protagonist Margaret Hale. Frederick is forced to live in exile because of his involvement in a mutiny onboard a Royal Navy ship. Though critics have dismissed Frederick as a cheap plot-spinning device, Frederick’s presence and subsequent disappearance in the novel actually affect each member of his family in a profound way and exacerbate their individual spiritual crises. His tragic disappearance from the family circle mirrors the disappearance of Gaskell’s own brother. Additionally, Frederick serves a symbolic purpose in the novel; he stands as a symbol of insubordination, class struggle, and the conflicts which accompanied the Industrial Revolution. His presence in the novel lends validity and credibility not only to the plot, but to each character in the Hale family and to the novel’s greater themes.

1. Paper Presentation – Institute of Conflict Management

**Conflict Resolution Strategies for Inmates.** Dawn Bell Fears & Phyllis Hildreth.

The research looks at the benefits of circle facilitation and negotiation strategies during incarceration. The goal is to encourage inmates to effectively manage stress, relationships, and make better decisions. We utilize research of female offenders coupled with data captured from parenting classes and life skills courses to design a peer-based program for use behind bars and in the free world. It also examines the role of faith-based curricula to facilitate a change before release.

1. Paper Presentation – Mathematics

**The Hardest Pitch to Hit.** Hunter Bates, Lauren Morris & Gary Hall.

Hitting a baseball is believed by many to be the hardest thing to do in sports. Anyone could find hitting a round ball with a round bat at any speed to be difficult, let alone a pitch at 90 miles per hour. While many people choose to believe that the game of baseball has evolved in favor of the hitter, individual pitchers continue to bring their own speed, control, and spin that keeps hitters guessing. Which pitch is the hardest to base hit? This of course depends on who is pitching and who is up to bat, but what is the hardest pitch? The hardest pitch is believed to be an outside pitch, but why and how? We will answer these questions with research and statistical data using the Lipscomb baseball team during their 2010 season.

1. Paper Presentation – Mathematics

**Theoretical Studies of Classification and Regression Problem.** Andrianarimanana Harinando Gary Hall.

Mathematics has myriads of application in other sciences, especially in machine learning. In this paper, we will demonstrate how machine learning ties statistics, linear algebra, calculus and numerical analysis together to implement simple algorithm such as linear regression and logistic regression. In supervised learning, a hypothesis needs to be supplied in order to solve regression and classification problems. We present a statistical approach to meticulously choose a hypothesis for general classification and regression problems. We also utilize the different techniques in linear algebra to perform the different operations in supervised learning. Our studies will emphasize the theoretical aspects of the subject; empirical studies will be performed on a later date.

1. Paper Presentation – Music

**The Spirituality of Johannes Brahms and “Ein deutches Requiem.”** Kirk Averitt and Gary Wilson.

Before its debut in 1868, Brahms’s “Ein deutches Requiem” was subject to skepticism. The work was to be performed in collaboration with the Good Friday service that year at Bremen Cathedral. Upon reviewing the work, the cathedral’s director of music was alarmed by the absence of fundamental Christological doctrine. There was no mention of salvation through Christ or the redeeming death of the Lord, both of which are central to the liturgical celebration of Good Friday. Despite the director’s concerns, Brahms refused to modify the text he had chosen. While Brahms was a man of faith, his views reflected both Universalist and humanistic ideas. It is certain that particular biblical ideals were omitted from his requiem as a reflection of his own spirituality. This presentation will take a look into various aspects of Brahms’s life in relation to the German Enlightenment, and the roots of the faith tradition in which Brahms was reared. These events in the composer’s life influenced the formation of his faith, the choice of text for his “Requiem” and the creation of what has become his most celebrated work.

1. Performance – Music

**Dance for Two Flutes with Banjo Continuo.** Zac Swann, Mackenzie Carter, Carly Bergthold, Bailey Werner and Sally Reid.

Dance for Two Flutes with Banjo Continuo is modeled upon the chamber music of the Baroque era, which often included a number of soloists and an accompanying group called the basso continuo. Basso continuo would commonly consist of a cello to play the bass line and a harpsichord or lute, to fill in chordal harmonies. The soloists would perform acrobatic, flourishing melodies together, exchanging the melodies and counter melodies in a playful duet style. The basso continuo would accompany the soloists with harmonic support and a contrapuntal bass line. Taking stylistic influence from modern folk traditions, and exchanging the Baroque harpsichord with the more idiomatic banjo, I have composed three dances that offer a contemporary representation of the traditional arrangement between soloists and their basso continuo accompaniment.

1. Performance – Music

**Molliphony.** Christon Carney & Sally Reid.

The first movement begins with a flowing motif accompanied by a rhythmic waltz. The piece continues to develop through the use of 20th century tertian harmonies. The first movement ends with a false ending, but then resolves to a beautiful rich jazz chord. The second movement is subtitled "Snowy Night Drifts," which accurately describes the beautiful rich billowing accompaniment that seems to transport the mind to a tranquil and peaceful place. The movement then takes a drastic turn in an epic middle section that reflects the confusion of the heart. The movement then ends with the same pulsating accompanying theme but a cadence seems to signify a question. The last movement is the most prominent, and reflects the essence of the passionate musician in an array of melodic motive that run, turn, morph, and move together until you come back to the original theme. Although the theme maintains its harmonic integrity, it still maintains elements of the other sections of this rondo form. The movement ends with a triumphant recapitulation of the theme in the V/V.

1. Paper Presentation – Pharmaceutical Sciences

**Synthesis of Sterically Hindered Meperidine Analogs: Continued Opioid SAR Development.** Rachel Saylor and Susan Mercer.

Opioids are the standard drug class used in the treatment of chronic severe pain, providing analgesia and euphoria. Despite clinical usefulness, chronic opioid treatment leads to side effects including tolerance, dependence, respiratory depression, nausea, and constipation. Efflux transporters and drug metabolism have been shown to contribute to central tolerance development through a systems level approach. The efflux transporter P-glycoprotein (P-gp) is present at the BBB and is critical to opioid bioavailability. P-gp substrates are generally lipophilic compounds containing a basic nitrogen with a molecular weight less than 500, multiple H-bond donors, and a correlation with CYP3A4 substrate activity. Most clinically used opioids have these characteristics, accounting for their P-gp and CYP3A4 activity. An exception is meperidine, a CYP3A4 substrate with no P-gp substrate activity. Meperidine is not optimal for chronic pain treatment due to low potency and toxic metabolite formation. CYP3A4 demethylates meperidine into normeperidine, a toxic metabolite, leading to convulsions and potential death in accumulation. We hypothesize that introducing steric hindrance to the piperidine ring at the 2- and 6-positions will optimize meperidine by eliminating CYP3A4 activity and therefore toxic metabolite formation. These novel analogs have potential for chronic opioid administration lacking tolerance development. The synthesis of the 2,6-dimethyl and 2,2,6,6-tetramethyl analogs will be presented, along with the chemical and biological analyses. Additions to the piperidine ring of the opioid drug class have not previously been studied due to synthetic difficulty. These results provide additional SAR for the opioids while correlating results to P-gp and CYP3A4 activity.

1. Poster Presentation – Pharmaceutical Sciences

**Generation and Characterization of Etoposide-Resistant Mutants of Topoisomerase IIa.** Elizabeth G. Gibson and Joseph E. Deweese.

Topoisomerases are abundant nuclear enzymes that regulate the DNA topology and remove knots and tangles in the genetic material. In order to perform these functions, topoisomerase II cuts both strands of the double helix and passes an intact double helix through the break. While the anticancer agent etoposide is highly effective at disrupting topoisomerase II function, etoposide is also metabolized into a catechol and a quinone in the body. In order to more thoroughly study etoposide and its metabolites, we are developing etoposide-resistant mutants of topoisomerase IIa. Using X-ray crystallography data, we identified several candidate positions that could confer resistance to etoposide. We individually mutated Gly462 to Ala, Asp463 to Glu, Arg487 to Lys, and Glu572 to Lys using a PCR-based mutagenesis process. We are using an established protocol for purifying His-tagged, human topoisomerase IIa from Saccharomyces cerevisiae. Yeast cells are transformed with a galactose-inducible vector containing the mutated topoisomerase IIa gene. Two to six liters of yeast cultures are grown, induced, and harvested for preparation. Yeast cells are disrupted via bead beating before centrifugation and filtration to remove debris. Cleared cell lysates are incubated with Ni2+ beads before loading into a column. Following imidazole-gradient elution, column fractions are assayed using SDS-PAGE for the presence of enzyme. Topoisomerase II-containing fractions are concentrated using a molecular weight cut-off filter before being frozen at -80? C for storage. These enzymes are currently being grown and purified for characterization.

1. Paper Presentation – Physics

**Correlation of Noninvasive Magnetic and Electric Measurement of the Gastric Slow Wave.** Nicole Muszynski and Alan Bradshaw.

A variety of gastrointestinal diseases affect the electrical activity of the smooth muscle, but relatively few diagnostic methods for these diseases exist. This need, coupled with recent findings that elucidate physiological control mechanisms of the gastric electrical syncytium, has encouraged research into the electrogastrogram (EGG) and magnetogastrogram (MGG) as noninvasive methods for assessing gastric pathophysiology. We measured the gastric slow wave in the smooth muscle of the stomach using mucosal (EMG) and cutaneous (EGG) electrodes and the Superconducting Quantum Interference Device (SQUID; MGG) simultaneously. The waveform correlation between the electromyogram (EMG) and the multichannel SQUID magnetogastrogram (MGG) was 0.35 ± 0.01 which was higher than the correlation of 0.29 ± 0.01 between the mucosal EMG and the cutaneous electrogastrogram (EGG). However, the correlation improved after we processed the EMG/EGG signals with SOBI blind-source separation techniques to 0.41± 0.02 for EMG/MGG and 0.36 ± 0.02 for EMG/EGG. Although the difference in correlation was statistically significant before the use of SOBI (p < 0.001), we did not observe a difference after using SOBI (p = 0.18). We concluded that the SQUID magnetometer could noninvasively record the gastric slow wave better than the electromyogram/electrogastrogram due to the distortion and attenuation from alternating low- and high- conductivity layers in the abdominal volume conductor.

1. Paper Presentation – Psychology

**Mirroring Mirrors.** Jonathan Paul Gillette and Dale Alden.

Mirrors are among the most common of objects in everyday life, yet they surely rank among the most curious. For example, one mirror can capture the same image as another only by taking its place. A mirror is, furthermore, a thing whose properties and capacities, though constant, can only be seen or experienced by giving it something to do, something to reflect. Mirrors, then, also have strange relationships with the objects they reflect, recording and forgetting those objects with the speed at which they pass through the scope of their specular field. Even more peculiar than the relations between mirrors, or even between mirrors and objects, is the relationship that human beings maintain with mirrors. The human obsession with mirrors is one characterized by deep entrenchment. Mirrors play a vital yet often overlooked role in one’s daily routine. They grant the first acknowledgment of one’s self in the day, and consequently are often credited as an object that provides a sense of self. This study is interested neither in the history nor in the study of mirrors as objects in themselves. Here, we are primarily concerned with the possibilities that arise from gazing into, or rather within, them. More specifically, we wish to investigate how the implementation of a “conversational” mirror, into which the patient and therapist may peer together, might strengthen or weaken the psychotherapeutic relationship and process.

1. Paper Presentation – Psychology

**The Relation of Personality, Biculturation Self-Efficacy and Acculturation among Chinese Americans.** Peili Lu and Shanna Ray.

Acculturation has emerged as one of the main constructs in psychology research in recent years, however, the attention is primarily paid to the effect of acculturation on the adjustment among immigrants. The personality factors that affect an individual's acculturation process and outcome remain largely unexplored. This proposed study is conducted to investigate the relations of Big Five Personality traits, Bicultural Self-Efficacy and Acculturation among Chinese community immigrants in Tennessee using a survey method. Three goals were pursued in this study: 1) To verify the association between Bicultural Self-Efficacy and Acculturation; 2) To examine the relations between Big Five Personality traits and Acculturation; 3) To explore the relation between Big Five Personality traits and Bicultural Self-Efficacy and investigate whether Bicultural Self-Efficacy functions as a mediator in the relationship between Big-Five Personality traits and Acculturation. The assessments consist of English and Chinese versions of a self-designed Demographic Questionnaire, the Vancouver Index of Acculturation, the Big Five Inventory, and the Bicultural Self-Efficacy Scale.

1. Paper Presentation – SALT

**A Waste Reduction Project.** Soambolanoro Razafimanjato, Christin Shatzer.

One billion dollars’ worth of waste is thrown out in garbage every year at school dining services around the country. And most of this waste is food especially leftovers. Why is waste reduction so important? One reason is that it cuts cost, but it also generates revenue. Waste reduction also enhances the company’s image, and mostly, it has a great impact on the environment. Lipscomb Dining has been dealing with this issue of waste for a couple of years now. That is the reason why I have decided to help them prepare a waste reduction campaign. The project started in January and will end in April. Right now, we are in the process of starting the report and the manual for Lipscomb Dining for future uses. The point of the project is to get accurate information on the process at the dining hall, then to set measurable goals for the campaign, and finally to compile a list of waste prevention possibilities for Lipscomb Dining.

1. Paper Presentation – School of Computing and Informatics

**Stock Market Trading system using Reinforcement Learning.** Andrianarimanana Harinando Toninirina, Mendrika Ramarlina, Arisoa Randrianasolo.

Computer based agents buying or selling stock is nothing new at the current time. The majority of these agents learn how to trade by trying to extract trading rules from a hand classified data provided by a human trade expert. The computer agent's goal is to mimic the thought process of the human trade expert. The computer trading agent's performance, therefore, depends on the quality of the data provided by the expert. If the human trade expert provides a low quality data, then the computer based trader will achieve a low performance. To overcome the dependence on a human trade expert, this research proposes the utilization of a computer agent that will | learn to become a trade expert. This learner agent will then produce an automatically classified data that can be used by the computer agent that is tasked with performing the real time buying and selling of stock. Our approach consists of using a reinforcement learning method to develop a computer agent that will learn by itself to determine when to buy and sell stock. The learning data produced by the reinforcement learning agent will then be generalized using a neural network. The neural network agent, called the trader, will be used as a predictor and will effectuate the real time stock trading. The two agents, learner and trader, interact with each other using a feedback method so that the learner can improve its learning and the trader can inquire more classified data to improve its trading performance.

1. Paper Presentation – Social Work and Sociology

**The Impact of Case Disposition on Domestic Violence Recidivism Rates.** Ricki Adkins and Hazel Arthur.

In conjunction with the District Attorney’s Victim Witness Services Office and based on a retrospective case review, this study compared recidivism rates of convicted misdemeanor domestic violence offenders based on case disposition. Of particular interest was whether a maximum probation sentence of 11 months and 29 days resulted in less likelihood of recidivism than did a jail sentence or retired charges. Additionally, the study produced a demographic profile of domestic violence cases in one middle Tennessee county from the year 2011. Discussion of findings will include implications for victim support services.

1. Paper Presentation – Vanderbilt Clinical Pharmacology

**N-Acylphosphatidylethanolamine Phospholipase D (NAPE-PLD) Hydrolyzes Isoketal-Modified Phosphatidylethanolamines (Isok-PE) to the Inactive Ethanolamine Product.** Stephen Gragg and Sean Davies.

Increased lipid peroxidation is associated with a number of diseases including atherosclerosis. Lipid peroxidation generates many biologically active aldehydes including isoketals. Isoketals induce inflammation and cell death, but the cellular mechanisms that underlie these effects remain unknown. Isoketals react with a variety of cellular primary amines including proteins and phosphatidylethanolamines (PE). Previous studies focused on the effects of protein modification, because elevated levels of isoketal-modified protein were found in atherosclerosis and myocardial infarction. However, recent cellular studies have shown that more modified PE than modified protein is formed when isoketal is added to cells. Isoketal-modified PE (IsoK-PE) activates the inflammatory response of endothelial cells and induces endothelial cell death which might contribute to atherosclerosis. We hypothesized that there are catabolic enzymes that protect against the inflammatory effects of IsoK-PE by rapidly degrading IsoK-PE, but that these enzymes may be impaired in person with vascular disease. We found that when low levels of IsoK-PE are added to endothelial cells, they are able to degrade IsoK-PE. We hypothesized that NAPE-PLD, the enzyme that hydrolyzes N-acyl PEs, might also be responsible for degrading IsoK-PE. We found that IsoK-PE competitively inhibited NAPE hydrolysis by recombinant NAPE-PLD and that IsoK-PE itself was a substrate for NAPE-PLD (Km 2.2 uM). Using mass spectrometry, we confirmed that the product of NAPE-PLD hydrolysis was isoketal-modified ethanolamine. These findings suggest that NAPE-PLD could play a role in protecting cells from oxidative stress by neutralizing IsoK-PE adducts and that NAPE-PLD could potentially be utilized as a form of anti-inflammatory therapy.

**Key Note Presentation:**

 **Research: The Art of Discovery**

**Tim Johnson: Professor & Chair of History, Politics & Philosophy,**

**Lipscomb University**

To students who have presented the results of your research today, you are to be commended. What a great accomplishment today represents for you in your respective fields of work. And what a great program this is, to give students an opportunity to showcase their work. We look forward to this inaugural Student Scholars Symposium becoming an annual event, and I personally wish that we had started this earlier.

Just to promote my own department a bit, if we had had this symposium last year, we could have heard from one of our history students **Michael McRay** whose research on Jewish & Palestinian relations resulted in him reading a paper last spring at the Phi Alpha Theta Regional Conference (nat’l history honorary). Michael not only won the best paper award, but he then went on to read his paper at the Alpha Chi National Honor Society’s annual meeting in San Diego and won best paper nationally. And if we had had this symposium two years ago, we could have heard from one of our history (American Studies) students **Rebecca Robinson**, whose research into the McGavock family in Franklin led her to write a short book and to digitally preserve the McGavock family records. Rebecca’s work won her both state and national historic preservation awards.

But we are here this year to honor what you have done as young scholars in your various disciplines. And I’ve been asked to speak for a few minutes on research. No matter the field, research is largely about the same thing. It is a quest for knowledge, it is a search for answers, it is the art of discovery. Research begins with questions that beg for answers, and it is the research that answers those questions or perhaps answers some questions and raises others. And there is so much that we know so little about; outer space, the depths of the ocean, the capabilities of the human brain, the mysteries of DNA, and on and on.

Most of you do your research with microscopes, spectrometers, centrifuges, and a host of other pieces of lab equipment that I know nothing about. And your methodology of research involves empirical observations and experimentation. Think of all the disciplines that are represented in this room, and the various ways that research is conducted in different fields. Sometimes those differences are slight and nuanced, sometimes different research techniques are significant. The other day, I looked up synonyms for the word research to see how many variations I could find: investigate, discover, bring to light, search, probe, sift, uncover, unearth, examine, inspect, inquire, study, question, analyze, dissect, explore, reflect. But **no matter** the methodology, or the word one chooses to describe the action, research always seeks to quench that thirst for knowledge.

I can’t speak to the kind of research that is done in biology, chemistry, or psychology, but I’d like to **share my thoughts on historical research** and what I have learned about the art of discovery over the past 25 years. First of all, let me dispel this myth about historical research. A few years ago I heard someone on this campus say that historical research is comprised of going to the library and reading books. That, of course, is a gross oversimplification. Of course historians don’t require the kind of expensive equipment that some of you have to have to conduct your research, but historians have to go wherever the manuscript collections are located; that is to say, the personal papers, diaries, and other eyewitness unpublished accounts of whatever historical event one is researching. As for me, almost none of the primary research that I have done over the past 25 years has been done in the state of Tennessee.

So here are some of the things I’ve learned about doing research in my discipline & I suspect some of this will be applicable to your discipline as well. Research begins with curiosity and imagination. These are characteristics that even the non-academically trained person possesses, but it’s the academic training and knowledge that informs the person how to use that curiosity and imagination. Curiosity causes us to ask questions, and imagination helps us devise ways to get at the answers to those questions. Sometimes that means finding connections and relationships between separate parts that no one has ever thought to look at before. Let me give you an example. One of my colleagues, a fellow historian, drew a line from Nashville to Abilene, TX, and then he plotted along that line (varying 100 miles north or south) every country music star that happened to be a member of, or was raised in the Church of Christ. And if you plot along that line using those two common characteristics, you’d be surprised how many Church of Christ / country music stars you would find, and the question is why? What is the relationship? Is there a relationship? What does that tell us about religion (specifically the religious body that many of us belong to) and its affinity to that particular music genre? What causes that intersection of those two characteristics? Well, we know that country music **lyrics** are permeated with references to honky tonks, love affairs, your cheating heart, and the like. So my colleague theorized that this connection has to do with the relationship between one’s behavior on Saturday night and the forgiveness one then feels compelled to seek on Sunday morning. Well, I won’t try to go any deeper into his hypothesis. The point here is that it requires imagination to even think to look at that connection, and then try to answer the questions that it raises.

To embark upon a research project, **the first step for the historian is the search**. I don’t mean the search to answer questions about the past. I mean the search for the material needed to conduct serious research. Where are the manuscript collections located? How many are there? When can I get to them? And do I really need to look at all of those collections in Virginia, Connecticut, and Texas? Or how many collections do I have to look at before I know that I have an accurate picture of this historical event? I remember a fellow graduate student 30 years ago in a seminar once asking this question, “When do I know I’m finished with my research and ready to start writing?” To which our professor responded, “You know you are finished with your research when you’ve read everything that has ever been written on your topic.” A little bit of an exaggeration, but the lesson he was trying to teach us young aspiring historians was that you have to dig deep; good research means being thorough. The search for material does not always take the historian to distant places. I have wised up and am currently beginning a research project that involves Tennesseans who fought in the war with Mexico in the 1840s. One of the main characters in the story I want to recreate is **William B. Campbell** who was born in Gallatin, was a colonel in the Mexican War, and later governor of Tennessee. From the major Campbell collection at Duke University, I have learned within the past 2 weeks that Campbell family descendants still live in middle TN and still have a large collection of his personal papers. According to my sources they are not inclined to let anyone see the materials. So, I’ll be trying to set up a meeting with family members soon.

I’ve learned that integrity plays an important role in historical research and that historians have to **be honest**. One can, if one wishes, choose to use only the sources that supports a preconceived idea. To do so, you get the history that you want but not necessarily the history that was. To pick and choose only the material that supports one’s thesis while ignoring all others is dishonest and results in a dishonest account of the past. And that goes for making up sources and fabricating research. In 2000 Michael Bellesiles, a historian at Emory University published a book entitled *Arming America: The Origins of a National Gun Culture*. In it, he argued that widespread gun ownership in the colonial and early national period was a myth. He contended that gun ownership was not common in America until the industrial revolution of the late 19th century brought the mass production of firearms. Bellesiles’ book was a major reinterpretation of early American history, and it touched a **nerve** by wading into that politically charged arena of 2nd Amendment gun rights. The book was highly praised and it won the prestigious Bancroft Prize, second only to a Pulitzer Prize in prestige. And then it was learned that his research had been “faulty, fraudulent and unethical.” Bellesiles fabricated records, misstated statistics, and erroneously cited a host of sources. For example, he had numerous footnotes to **California probate records** that, as it turns out, were destroyed in the San Francisco fire in 1906. And dishonest research has consequences. Not only did Bellesiles lose all credibility in the profession, but his Bancroft Prize was rescinded (unprecedented) and he resigned his professorship at Emory. **Be honest.** Don’t fudge the numbers, don’t falsify the data.

The next thing I’ve learned is that you have to **go where your research leads**. Your hypothesis might be that the primary cause of the War of 1812 was to defend American merchant interests & trade rights, but when you see that most of the congressmen from mercantile states voted against going to war, you have to rethink your position. You thought one thing but your research leads to another conclusion. Your hypothesis might be that the southern diet is unique to this little corner of the world and that it originated and was developed here. However, if your research indicates, as it does, that influences from other regions, like Africa, have had a significant impact on the way Southerners eat, once again you have to revise your conclusions accordingly. If you set out to tell the story of a person’s life or to recreate a historical event, you’ll likely begin your research with an idea of where it will lead and what the story will include. But your research might take you in a direction that you never contemplated. As you learn more about your subject, new avenues of research open in front of you and sometimes you end up searching for answers by going down paths that you did not anticipate. In the process of researching for a couple of my books, I’ve found answers to questions in some of the most unusual places, I’ve been forced to rethink and revise my conclusions about my subject because my research told me that what I previously thought, was not true. Like peeling an onion, there are many layers to a story, and the deeper you go the more you uncover. It’s a search for truth. Your research may lead you to places you didn’t anticipate, and you may discover unflattering or disappointing things about your topic. But you have to tell them. Honesty demands it & your discipline will be better for it. **Go where your research leads** you; scrutinize sources with an unbiased eye, and then just watch as the story naturally unfolds before you. This concept is true for individual research projects (like an experiment, an article, a book), but it can also be true on a grand scale in terms of taking your career in an entirely different path.

Something else I’ve learned about historical research. **Be objective**. Can we ever be completely objective? Probably not, because we all look at events, actions, and motivations through the lenses of our own place, time, and peculiar circumstances. Different people look at things differently; we have inside us our own preconceptions, beliefs and biases. But it is incumbent upon the researcher to be as objective as is humanly possible when trying to unlock the mysteries of the past, or the mysteries of science, or the motivations of a novelist. Having a preconceived idea can cloud judgment and result in the wrong conclusions. This reminds me of a humorous story about an elderly married couple reflecting on 60 years together. War, heart attack, laid off, retire - Sarah you’re bad luck! Sometimes when we try to evaluate evidence through the lense of our own personal experiences, we fail to see things as they really should be. Frankly, a lack of objectivity is one of the most common mistakes historians make. One of the most famous examples of a historian being influenced by time and place and personal feelings is **Charles Beard who in 1913 published Economic Origins of the Constitution.** He argued that at the Constitutional Convention in 1787 the money interest seized control of the process from “the people” and created a political system that benefitted them financially. Their interest was in protecting their own wealth and the wealth of the upper classes. It was in effect, said Beard, a counterrevolution in which the financial class took power from the real revolutionaries who had fought and won the Revolutionary War a few years earlier. It was an unflattering account that portrayed the FF as self-serving.

Many Americans were shocked at the picture that Beard had painted. It was a significant reinterpretation of the Constitution, and Progressive historians of the early 20th century heralded it as a brave, new, path-breaking study. Within 10 years Beard’s version of the **motives behind the Constitution** had become the standard interpretation. However, in the mid-20th century several historians began to take a closer look at Beard’s research and his conclusions. Kathryn Brown, Richard McCormick, Robert Brown, and above all Forrest McDonald began to dismantle Beard’s argument. What we now know is that Beard’s methodology was overly simplistic and his conclusions were badly flawed. In short, to use McDonald’s words, his “interpretation was incompatible with the facts.” Indeed, some of the Founding Fathers, in supporting the new Constitutional framework, were actually acting to the detriment to their personal economic interests. How could Beard have been so wrong? Well, he came of age at a time of class warfare wherein financial empires and big businesses that had come about as a result of the industrial revolution were demonized as exploitative. The wealthy had somehow gotten where they were unfairly. We call it the **Progressive Era** and Charles Beard was a product of that period. He allowed the time in which he lived, the lense through which he saw life, to unduly influence the way he interpreted the past, even if that meant reading into his sources things that were not there. It’s an all too common mistake when historians project present day ideology into the past. **Be objective** in your research. Despite being disproved 60 years ago, Beard’s interpretation is still often found in textbooks.

Another thing I’ve learned about research . . . it requires sacrifice. Be prepared to invest time & depending on circumstances, money. **Schola** is the Latin for free time; and schola is the root from which is derived the words scholar and scholarship. Producing scholarship requires time. And the hours can be long and solitary – they will be long and solitary. I remember my first extended research trip was in 1987 as a graduate student. - Washington DC, **boarding house** on East Capital Street for **$85** a week (quality of amenities), stayed for a month and had enough money to budget myself **$5** a day for food. I lost $10. (Oh, I’ve learned that many universities will rent empty dorm rooms in summer.) Research requires sacrifice. I’ve stayed in some flea-bitten, rickety old rat traps, and on numerous occasions, after days or weeks in an isolated reading room in some distant archive, I’ve asked myself, what am I doing here? Is it really worth it? Let me assure you, when you hold the results of your research in your hands, the finished product–it’s worth it.

Finally, I think I should comment on the role of technology in historical research. I want to give you one positive example and one negative. Recently, the findings of new Civil War (CW) research have made a great splash in the historical profession. For over 100 years the accepted number of Americans who died in the Civil War has been about 620,000. I’ve repeated that figure many, many times. Recently, demographic historian **David Hacker** from Binghamton University in NY utilizing software and newly digitized census records released his findings that the old 620,000 figure was way off the mark. The more accurate estimate of Civil War dead (and his research seems to be valid and accurate) is at least 752,000. That’s a 20% increase - major new piece of knowledge - it’s all CW historians have been talking about, and it was made possible by technology. Let me say something about technology and the future of historical research. Here is one example that I’m afraid causes me to be **pessimistic**. Personal letters are among the historians’ richest resources. One of the greatest calamities is to discover that the personal papers of the individual you are researching were lost or were destroyed in a fire - did you know there are no surviving letters between George and Martha Washington? She burned all of their correspondence after his death–what a loss. Today, people no longer write letters. First it was the telephone now **email, texting & tweeting** have rendered letter writing a thing of the past. Think of all the information about the daily lives of ordinary people that is being lost because there will be no paper collections for future historians detailing their daily routine, their opinions about current events, their feelings about another person. I predict that 100 years from now your great grandchildren will be able to know more about the Civil War generation than they know about you.

So, those are my reflections on doing research in my discipline. But regardless the discipline, research is the way we answer the questions that we bring to the scholar’s table. Research expands and **creates new knowledge**, and in that way pushes forward the horizon and opens new possibilities. Reporting the findings of your research like you have done today is how academics contribute to the debate, it’s the way scholars talk to each other, and participate in the creation of new knowledge. So be honest, go where your research leads, approach your work with creativity, objectivity & integrity, and go out there and make your mark. Today you have been engaged in that scholarly debate. Congratulations and keep it up.