

20th Annual

**Mid-Atlantic Regional Conference
of Undergraduate Scholarship**

MARCUS

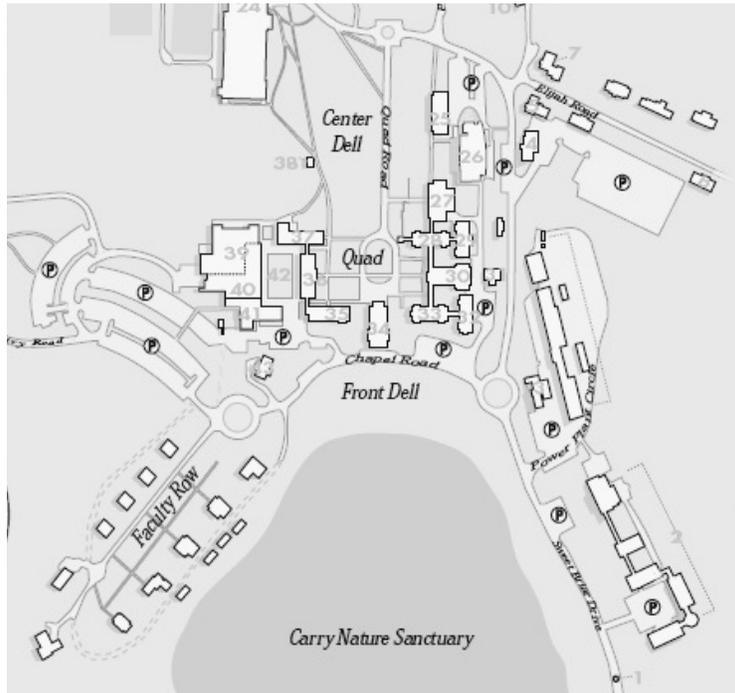
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Saturday, October 6, 2018

Sweet Briar College

A message from the organizer: **Welcome to MARCUS!**

Whether you are here as a presenter or co-author, a faculty sponsor, or a guest/auditor, we are delighted that you are joining us on the campus of Sweet Briar College today.



(you entered *here*)

Please take the opportunity to venture out beyond the conference center and explore the rest of our beautiful campus!

Schedule at a Glance (all events are on the lower level unless otherwise noted)

- 9:00 AM - 9:50 AM Registration & refreshments
- 9:50 AM - 11:00 AM Panels 1-3
- 11:10 AM - 12:20 PM Panels 4-6
- 12:30 PM - 1:30 PM Lunch upstairs (Wailes Room)
- 1:40 PM - 2:50 PM Panels 7-9
- 3:00 PM - 4:00 PM Poster session & refreshments upstairs
(Boxwood Room)

PANEL 1 (in Room A)

George Washington and the Whiskey Rebellion

Travis Valle (James Madison University)

In 1791, Alexander Hamilton convinced Congress to impose a tax on whiskey which angered Pennsylvania frontiersmen. By 1794, some Pennsylvanians became violent and riotous, believing the government was overreaching its authority. President George Washington had to decide how the federal government should address an open, armed “rebellion” of disgruntled farmers. Personal correspondence from Washington and Hamilton, along with secondary sources will be used to analyze the factors that contributed to Washington’s decision to lead a 13,000-man militia to suppress a disorganized insurrection in western Pennsylvania. This paper will examine the rioters’ unwillingness to cede to government authority after multiple warnings, growing anti-federalist sentiment, Hamilton’s instigation, and Washington’s obligation as the executive of a new nation to enforce rule of law.

An Invitation to Satan: Puritan Culture and the Salem Witch Trials

Alia Stone (James Madison University)

Fits, outbursts, bizarre behaviors. All extraordinarily unusual displays for Puritan girls to exhibit, yet, several girls living in Salem, Massachusetts began experiencing these odd symptoms in the late winter of 1692. Clearly something was wrong. The diagnosis? Bewitchment. Convinced that the children were possessed, the town’s religious leaders began a crusade, using the girls to weed out Satan’s influence in the community. This presentation examines how the town’s stringent Puritan culture provided the necessary conditions that enabled the girls to exploit their newfound attention and provoke hysteria in their neighbors, ultimately instigating the deadly consequences of the Salem Witch Trials.

Ahead of the Game: A Look at the History of Athletics, Field Hockey, and Lacrosse at Sweet Briar College from 1900-1930

Theresa Carriveau (Sweet Briar College)

In this paper I uncovered the role Sweet Briar College played in creating opportunities for female athletes in U.S. institutions of higher education from 1900 – 1930, specifically field hockey and lacrosse. I looked through several thousand uncatalogued original archival documents and reviewed secondary sources to create an understanding of the beliefs surrounding early collegiate female athletics. The materials revealed that SBC athletics, both intramural and intercollegiate, were strongly supported on campus at a time that was otherwise rare. During that period, the idea of women participating in intercollegiate sports was widely discouraged, but Sweet Briar did not listen. It pushed for more intercollegiate events each year, thus proving that Sweet Briar was truly “ahead of the game.”

The Fight for Southern Memory: Diverging Southern Civil Religions Compete for Public Space

John Budd (James Madison University)

In today’s American communities, controversy surrounds the public display of Confederate symbols. Although many were placed over a century ago, they are still very powerful objects. This paper applies the concept of civil religion to the Lost Cause ideology that is responsible for the surge of Confederate memorialization in the late nineteenth and early twentieth centuries. It also uses civil religion to understand another group’s efforts to publicly memorialize the leaders of the Civil Rights movement. The

purpose of this paper is to understand how both groups formed, how they embody civil religion, and how their material artifacts shape the public American landscape. Furthermore, it observes the meaning of their sacred objects in a modern context.

PANEL 2 (in Room C)

Measuring Water Quality and Working Toward Automating the Process of Sampling Water

Rosa Bello (Sweet Briar College)

Testing water quality is necessary to ensure the safety of people and aquatic life, and automatic water sampling makes this task easier and more convenient for users in many ways as it can eventually save time and money. Therefore, this summer the water quality was tested and compared at Lower Lake at Sweet Briar College and Otter Lake at George Washington National Forest. The water quality parameters that were measured was the dissolved oxygen, temperature, pH, conductivity, turbidity, and flow. An automatic water sampler designed by a former Sweet Briar student was re-evaluated and adjusted as needed to make the device safer and more compact. This water sampler requires further adjustments and testing.

Automated Process for Fabricating Patterned Layer-by-Layer Structures

Rylee Runyon & Lacey Tucker (Sweet Briar College)

The layer by layer fabrication technique is a well known and flexible approach to make polymer thin films for a wide range of applications. While flexible, the layer by layer approach is not well suited for constructing patterned structures. Developing a process for fabricating patterned layer by layer structures may increase the potential applications for the technique. We present our approach for fabricating patterned layer by layer structures, including the use of a novel dipping robot. The use of multiphysics simulations will be discussed as a strategy to understand our novel approach.

Simulation of TOA Residuals for Pulsars in a Planetary System

Joe Vazquez (Randolph College & Cornell University)

Jim Cordes & Shami Chatterjee (Randolph College)

A pulsar is a neutron star that emits radio pulses at a predictable and stable interval. A time of arrival (TOA) is the time in the measuring period at which the pulse is measured. A TOA residual is the phase shift in TOAs from their expected value. For a pulsar in a planetary system, this TOA residual is time-dependent, meaning we can use it to detect planets from the pulsar's orbit around the barycenter of the planetary system. Using this and multiple other methods, one can predict the position of a pulsar to a high degree of accuracy, which may help in the search for gravitational waves.

PANEL 3 (in Room D)

The Nazi Gestapo: How Legal Loopholes Assisted in the Evolution of Hitler's Closest Terror Organization

Christine Swartz (James Madison University)

From its rise to power in 1933 to its dissolution in 1945, the Gestapo carried out the task of murdering millions of victims under Hitler's Nazi regime. This paper utilizes books, letters, diaries, newspapers, and images preserved by the Smithsonian to highlight the path of legality that prominent members of the Gestapo followed in order to legitimize the organization's horrific actions. By examining the rise to power and role of the Gestapo, historians and citizens begin to understand the legal loopholes that allow such organizations to easily rise to power and grant a clearer lens into the functioning of totalitarian regimes.

From Imperialism to Indignation: How British Expansion During World War II Contributed to Iranian and Iraqi Nationalisms

Lauren Palmieri (James Madison University)

Throughout World War II, though certainly not beginning and ending with, Britain viewed the Middle East as an operational theatre. With particular attention to Iraq and Iran, Britain pursued its own oil interests, justified by orientalist ideologies and the threat of fascist expansion. The combination of attempted British alliances with Middle Eastern countries, the exploitation of Iranian and Iraqi geographies, and British neglect towards Palestine created a unique situation that fueled the nationalization of oil industries and anti-British sentiment. Through maps, photography, British policies, and nationalist speeches, this paper explores how British expansion into the Middle East during World War II contributed to the rise of Iranian and Iraqi nationalisms.

A War Won in the Skies: Air Superiority in the Second World War

Chandler Dugal (James Madison University)

Through an analysis of both primary sources and contemporary scholarly work, the presenter will argue that air superiority was the deciding factor in the outcome of the Second World War. The presentation will cover both the European and Pacific theaters of war, and discuss both the tactical and strategic decisions made in the battle for the skies. In addition, the relative aircraft productive capacities of the belligerent nations will be compared. Highlighted points will include: the early war success of the Luftwaffe, the ability of the Lend-Lease program to keep the Allies in the war, airborne infantry, and Japanese air-warfare doctrine.

How Cybersecurity Affects College Football Players and Their Teams

Sophia Cary (Sweet Briar College)

The sports and entertainment industry is a fast-paced field with many adults achieving their dreams of total stardom. But what if they lost everything? I looked at how cybersecurity can affect a professional athlete's career. I will specifically address how specific types of cyber issues can take place (such as identity theft or extortion), how to solve these problems and ensure the players', teams' and coaches safety, and I will conclude with how cybersecurity can affect their reputation and career in terms of brand endorsements, social media choices, relationships with mentors, coaches, family, and even friends.

PANEL 4 (in Room A)

The Spark of Change: The Montgomery Bus Boycott

Emily Stegner (James Madison University)

On December 1, 1955, Rosa Parks was arrested for refusing to give up her seat on a public bus to a white man. Civil rights activists in Montgomery, Alabama began planning for a one-day boycott of the bus system that evolved into a yearlong protest. Using firsthand accounts and contemporary newspapers, I argue that the Montgomery Bus Boycott was the catalyst of the broader civil rights movement because the injustices of segregation were forced into the public eye, it started the careers of influential civil rights activists such as Fred Gray and Martin Luther King Jr., and this boycott proved to the oppressed everywhere that change could be made through peaceful protest and the bond of community.

The Winter War: How Three Months Impacted World War II's European Theatre

Riley Shelton (James Madison University)

A clear “underdog,” the Finns were outnumbered greatly by the Red Army in terms of men, artillery, tanks and much more. Though in terms of morale, they clearly outweighed the Soviets. While Soviet soldiers were freezing in the subzero temperatures of the harshest Finnish winter on record, the Finns were experiencing the comforts of home in their frontline saunas. This paper explores this disparity in levels of morale and how it heavily influenced the outcome of the war. The paper concludes with a further analysis of how the War as whole was impactful to the narrative of World War II and influenced the German decision to invade the USSR through Operation Barbarossa.

Oil Prices and the Macroeconomy

Sophia Dessart (Sweet Briar College)

The primary aim of this research is to explore the relationship between oil prices, economic growth, and inflation in economies from different geographical regions and income levels. The resulting research paper first provides a comprehensive literature review of influential papers on the topic and then estimates fixed effects models to further explore the oil price-macroeconomy relationship. Results indicate that oil prices have a significant relationship with economic growth and inflation for economies in North America, Latin America and the Caribbean, Europe and Central Asia, and East Asia and the Pacific, along with economies across the majority of income levels.

Measuring Firm Performance across Legal Forms of Organization (LFO)

Sean Stimpson (Hampden-Sydney College)

One of the most important decisions an entrepreneur has to make when setting up a new business is deciding its legal structure. While there is growing interest in examining factors that affect performance and survival of startups, not much research has been conducted in identifying factors that determine legal structure of the business. In this paper, we will examine the legal form of startups. The big questions that we will address in the research project are: which legal structure do entrepreneurs prefer when they first set-up their businesses? Is there a change in the legal structure when businesses grow and how do startups perform across different LFO? To answer these questions, we will use the Kauffman Firm Survey.

PANEL 5 (in Room C)

Finite Group Invariants of the Rank 2 Heisenberg Vertex Algebra

Jude Quintero (Randolph College)

Vertex Operator Algebras, or VOA's, have proven useful in string theory and conformal field theory, but are relatively difficult to find and study. One of the most famous of these VOA's is the Heisenberg Vertex Algebra. We study the orbifolds of the Rank 2 Heisenberg Vertex Algebra ($H(2)$) under operation of the cyclic and dihedral groups. We use the notion of polynomial invariants, which are then polarized and transformed into invariant elements in $H(2)$. We then use classical relations combined with the derivative structure of $H(2)$ to find the minimal generating set of these invariants.

Compositional Design of Inorganic Oxide Nanoparticles in Ionic Liquid Gel Polymer Electrolytes for Solid-State Lithium Metal Batteries, and the Future of Electronics Design

Nasar Maung (Virginia Tech)

Driven by the apparent drawbacks of the lithium ion battery, researchers are looking towards the safer and potentially viable solid state battery for use in the technology of the future. In this presentation, we will discuss the importance and viability of the gel polymer electrolyte as an alternative to the currently used liquid electrolytes. We will explore our efforts to synthesize and characterize a range of nanofiller-polymer composite electrolytes for use in solid state batteries. The composite electrolyte consists of a room-temperature ionic liquid, inorganic oxide nanoparticles, complex polymer, and lithium salt. The underlying hypothesis is that adding inorganic oxide nanoparticles can reduce the crystallinity of the polymer and alter the lithium diffusion pathways in the polymer electrolyte.

Water Treatment for Developing Countries: Concrete Filtration

Karlynn McCarthy (Sweet Briar College)

Over 840 million individuals struggle to find drinkable water. Traditional filtration methods are not an adequate solution for developing countries due to maintenance costs. The purpose of this research is to develop water treatment methods that are created by the consumer with accessible materials, including concrete. Filtration with cured concrete allows colloidal particles and bacteria to be caught through physical entrapment or absorption, resulting in cleaner water. By reducing the water percentage in an aggregate based mixture, higher permeability is achieved. Experiments evaluated local lake water turbidity, E. coli concentration, UV/VIS absorbance, and total organic carbon concentration before and after filtration. Concrete filtration with a fourteen to fifteen percent water content yielded the lowest turbidity and coliform counts.

PANEL 6 (in Room D)

Economic Consequences of Colombian Peace Agreements

Miguel Correa (Hampden-Sydney College)

Focus of the research project is to analyze the economic impact of revised peace agreement between Colombia's largest rebel group, the Revolutionary Armed Forces of Colombia (FARC), and the Colombian Government on Colombian economy. We begin by providing the background of the Colombian Civil War starting 1948, till the historic peace agreement is signed in 2016 and then discuss the establishment of the FARC and process of Peace Negotiations. We interviewed officials of the Colombian economy to get government's perspective. We further elaborate on Colombian macroeconomic data and create linkages between the peace treaty and the prices of commodities (oil, coal, and coffee), GDP, Trade, and Foreign Direct Investment (FDI).

Political Allies in Hamlet

Julia Kell (Radford University)

Throughout Hamlet, Shakespeare portrays strong homosocial bonds between men. The friendship between Hamlet and Horatio, for example, has been explored by many other scholars, including Thomas MacFaul and Robert Evans. This paper analyzes male friendships, with particular emphasis on Hamlet and Horatio. I argue that while Hamlet enjoys the company of Horatio, their relationship is one-sided, with Hamlet choosing his friends based on their loyalty and usefulness to him. Politics are on the forefront of Hamlet's mind, and he treats his friends according to how they will fit into his plan, using cunning and strategy. Focusing on Hamlet's darker side encourages readers to see him as a flawed hero who cares most about his allegiance to his kingdom.

The Raw Deal: The Triumph and Hard Knocks of the American Shipbuilders of the Second World War

J.J. Cummings (James Madison University)

In the 1,366 days the United States was at war, the shipbuilders on the home front managed to produce 5,777 ships. Their contribution was, arguably, the most critical to the war effort of all U.S. industry. Their jobs were treacherous -- the second most dangerous of all homefront industries. Shipbuilding was one of the most progressive industries of the day: hiring, promoting, and supporting its diverse workforce without discrimination, and the least mistake could spell death for their creation's inhabitants or the recipients of the supplies their machines ferried across the vast oceans. Yet, the specific contribution of these individuals is often lost among the backdrop of the effervescent homefront production effort as a whole.

From Complaisance to Collaboration: Analyzing Citizens' Motives near Concentration and Extermination Camps during the Holocaust

Jordan Green (James Madison University)

The role of local peoples near concentration camps, extermination camps, and mass shooting sites in Europe during World War II is a widely unexplored area of the Holocaust. Although locals both knew of these sites and their purposes, many chose to be complaisant while others collaborated with the Nazi regime. Therefore, non-persecuted Germans and occupied peoples near the camps played a substantial role in the atrocities committed during the Holocaust. These civilians' actions, or lack thereof, in response to the crimes against humanity before their eyes were driven by three main factors: fear, antisemitism, and economic gain. One truth exists regardless of their motives: these citizens bore witness to the Holocaust either by choice or by compulsion. They were watching.

PANEL 7 (in Room A)

Discovering Agency through Language for Female Characters in Richard III

Megan Robertson (Radford University)

This essay analyzes the eloquence of Margaret, Elizabeth, and Anne from William Shakespeare's *Richard III* to demonstrate the affinity women have for vocal power and how the utilization of rhetoric can offer mobility for women in society. Although these characters suffer acute trauma, they manipulate the plot through holy language, direct insults, and paranormal predictions. Their vocal artistry facilitates Richard's demise and their own social preservation, illustrating the progressive stance that women can be just as competent, if not more capable, than men in the employment of language. Furthermore, this paper suggests that—because these female characters model bravery and a willingness to improvise—the play can function as a powerful resource for women searching for a nonviolent outlet to their struggles.

Mary Todd Lincoln: Influence and Impact on the Civil War in the White House

Selena St. Andre (James Madison University)

Long before President Lincoln's death in 1865, his wife, Mary Lincoln, was regarded as an insane woman with a spending problem and little regard for the Civil War. Mrs. Lincoln, in fact, was essential to Lincoln's successful presidency and ability to keep the Union together. This thesis seeks to understand Mary in a different light than history has. By further understanding her unbound ambitions, love of the finer things in life, and her good works that have been overlooked, we can begin to recognize the influence that Mary amassed publicly and privately as First Lady. Without her, Lincoln may have governed the Union very differently. Their relationship, the good and the bad, was essential to a successful presidency and war.

Shakespeare versus Sophomores

Jessica Mundy (Radford University)

As early as 6th grade, students are introduced to Shakespeare culturally, linguistically, and academically. However, this frequent exposure oftentimes leads to dread and intimidation which may taint their Shakespeare experience before they begin to study it. This experience hinders student engagement, which in turn hinders the student's success. In effort to combat this, this presentation provides a review of the methodology behind teaching Shakespeare. Instructional practices that can be used to teach Shakespeare's *Much Ado about Nothing* are also broadly applicable to almost any text. *Much Ado* is an easy read and the characters' antics can be quite juvenile at various points making it appealing for high school students.

The Global Effects of U.S. Military Uniforms

Michael Carlucci (James Madison University)

This project dives into the topic of military uniforms— more specifically the textiles being used to make them. In the middle of the 20th century, both US and foreign textile industries faced a great deal of pressure by supplying the United States with textiles for military uniforms. Because of two federal regulations, the Department of Defense was restricted on where and how they can make any purchases regarding the production and manufacturing of military uniforms. By examining newspaper articles from the 1950s, 60s, and 70s, we will see firsthand how these regulations caused both fortune and misfortune for textile industries, but also paved the way for globalization.

PANEL 8 (in Room C)

Controlled Monitoring of Hydrilla in Lower Lake, Sweet Briar College VA

Alexis Culley (Sweet Briar College)

Hydrilla (*H. verticillata*) is an invasive aquatic plant that poses a threat to freshwater ecosystems across the United States. Hydrilla blocks sunlight, thereby influencing the light penetration, heat distribution, and biological processes of the lake. In order to reduce hydrilla, 45 grass carp were released into Sweet Briar College's Lower Lake in April 2018. In June 2018, a manipulated experiment was set up to exclude the existing carp from a set area. Visual surveys and biomass data suggest that in 2018, hydrilla was less abundant than in 2016 and 2017. Additionally, in enclosures where hydrilla was present, chemical changes were observed. Results confirm that releasing grass carp is an efficient method of biomangement for infested ecosystems.

Reliable Synthesis and Spectral Analysis of a Historically Notable Inorganic Phosphor

Matthew Williams (Randolph College)

This talk presents the simple laboratory synthesis of a Bologna Stone, believed to be the first known synthetic phosphor. The Bologna Stone was a scientific marvel of the seventeenth century and was actively studied by many of the leading scientists of that era, including Galileo Galilei and Robert Boyle, among others. In the time leading up to the Scientific Revolution, the Bologna Stone and its marvelous properties factored into important scientific arguments about the nature of light and matter. This talk presents a simple synthesis of the phosphorescent material and the results of characterization by modern analytical techniques.

Extraction of Betulin and Synthesis of a Betulin Analogue

Emily Wandling (Sweet Briar College)

Betulin is a natural product found in the bark of the paper birch tree (*Betula papyrifera*). It was isolated using Soxhlet extraction with chloroform in an average percent yield of 6.85%. Using the Kirby-Bauer and 96-well assays, the anti-microbial properties of betulin were tested against *Pseudomonas aeruginosa*, a bacterium that is one of the leading causes of death in cystic fibrosis patients. It was revealed that betulin possessed some inhibitory properties against *P. aeruginosa*. Efforts are underway to optimize the synthesis of a novel betulin derivative in hopes that it will exhibit greater inhibition towards *P. aeruginosa*.

PANEL 9 (in Room D)

Lone Wolves: How Nazi Ideology Hindered Germany's War on the Eastern Front

John Hanley (James Madison University)

The war on the Eastern Front during World War II was the bloodiest conflict in human history. What once began as an imminent German victory soon turned into one of the largest military failures in human history. But what caused this shift in momentum? During my presentation, I will explore the reasons behind the Nazi defeat. Ideology, I argue, was the most prominent and defining factor along with a couple of key logistical problems. These circumstances combined to cause the deaths of over 30 million people and leave a permanent scar on the face of humanity.

Feste Dances the Social Stratum

Chelsea Stowe (Radford University)

This paper's focus is on the importance of the secondary plot to the overall theme in Shakespeare's comedies. Using William Shakespeare's *Twelfth Night*, or *What You Will*, Feste, the fool, is analyzed to demonstrate the function of the tertiary characters. Feste is able to defy class-based conventions but maintain his role as a fool. Through research of Shakespearean-era pronoun usage and class-divides, it is evident that Feste defies traditions and carries himself above his social status. Because Feste, as a tertiary-plot character, challenges his status, the overall theme of distorted identity is enhanced in the Olivia-Viola-Orsino love plot.

Band of Sisters: Gendered Roles for Women Agents in the Strategic Operations Executive During World War II

Megan Schoeman (James Madison University)

For the ongoing events of World War II, Great Britain was under pressure to defeat the Nazis. In the attempts to liberate Nazi-occupied countries, they recruited brave women to join the men in the Strategic Operations Executive. British society thought war and sabotage were only suitable for men; however, Churchill proved them wrong. Despite the differences in gender, women were able to overcome society's perceptions of femininity. The women agents of the F Section proved that they were capable of guerrilla warfare, sabotage, and endure the pressures of potential of captivity and torture if they were caught by Germans. The daring women ultimately assisted and led British organizers and French resistors to victory against the Nazis, liberating France.

Women's Anticipated Reactions to Ignoring vs. Confronting Sexism

Shifti Kamal, Jessica Bell, Kiera Moyler, Emily Hudson, & Abbey Narodowy
(Sweet Briar College)

Past research focuses on misogynist comments from a man. We extended it to focus on misogynist comments from a woman. When women encounter a prejudiced comment from a person, there are two options: ignore or confront. Participants were randomly assigned to consider in scenarios where they ignore or confront the commenter. It was found, when the prejudiced comment is coming from a male and the participant ignores it, she anticipates angry reaction from the female onlookers present if they ignore the comment and from the male onlookers present if they confront. When a female comments, the participants anticipate that the present female onlookers would be angrier when ignored and male onlookers would be angrier when confronted.

POSTER SESSION

#1

A One-Pot Method of Non-C₂ Symmetric Schiff Base Synthesis and Characterization

Brahm Dean
Hampden-Sydney College

The goal was to synthesize multiple unsymmetrical Schiff-Base Ligands and then attach a metal, Nickel (II), forming a metal complex. After the metal complex had been synthesized, I planned to test its catalytic effectiveness.

#2

Effects of Whey Protein Isolate on Proliferation and Maturation of C₂C₁₂ Murine Muscle Cells *in vitro*

Blake Martin
Hampden-Sydney College

Tissue engineering is an emerging field with the potential to replace large volumetric tissue loss. Media in which cells are grown impacts the maturation of the muscle cells. Research suggests that branched-chain amino acids (BCAAs) can promote skeletal muscle cell growth. The purpose of the project was to study the effects of whey protein isolate, a supplement high in BCAAs, on proliferation and maturation of C₂C₁₂ mouse skeletal muscle cells. 0.3% and 0.6% whey (w/v) significantly increased both cell number ($p < 0.01$, $n=4$) as well as number and length of myotubes ($p < 0.0001$, $n=4$) versus the positive control (2% horse serum). These findings show that whey protein isolate increases the proliferation and maturation of myotubes over a 14-day period.

#3

Psychological First Aid

Grace Overman
Christopher Newport University

Mental health crises are steadily on the rise in the United States. Our current national strategy for intervention is unfunded resulting in a limited implementation of any assistance at the federal or state level. Given the distinct lack of emergency care for mental health crises, steps must be taken in order to improve the immediate treatment of mental health. Psychological First Aid (PFA) is a research-based module to help victims, survivors, and witnesses in the immediate aftermath of a traumatic event. The module provides training on needs assessment, providing compassion, and determining appropriate resources for the person in crisis. Additionally, PFA is not only easily implemented in conjunction with standard First Aid training but is cost effective as training is not only available to mental health workers but also employees, educators, and the general public. The purpose of this research is to outline the current approaches applied in crisis intervention and to explain how PFA can be effectively implemented to provide initial management of this crisis.

#4

Caged and Controlled: The Link between Animal Abuse and Domestic Violence

Nicolette DeFrank

Christopher Newport University

Animal abuse has been repeatedly linked to family violence, however, many institutions which seek to remedy these issues isolate them from one another. This mindset further proliferates the idea that they are separate, and subsequently results in institutions ignoring solutions which holistically address the root of interpersonal violence. Around 34% of abused women with pets delay leaving their abuser because they have no place to house their animals. Abusers often torture and kill animals in order to frighten, coerce, or punish the victims. Establishing animal friendly women's shelters would begin to alleviate this problem on a local level. However, collaborating with larger, national institutions is necessary in order to bring attention to the link between animal abuse and family violence.

#5

Integration of Novel Purification Technologies

Yoko Koyama

Washington & Lee University

My research is on integrating two novel water technologies: a biochemical coagulant, PG α 21Ca, and concrete filter, for which Dr. Bethany Brinkman (Sweet Briar College) has been a pioneer. My research shows that it is more effective to treat water with a combination of technologies rather than a single kind.

#6

Extraction, Separation, and Analysis of Pigments in Colored Rice Varieties

Valarie Osei-Akyeampong

Randolph College

According to Chinese legend, black rice was once forbidden to all but the ruling class, due to its rarity, taste, and nutritional value. Now readily available, it is well-known in Asian cuisine, and used in desserts, porridge, and the like. Recent research at Louisiana State, shows that black rice has high fiber and vitamin E content and amounts of anthocyanins that rival blueberries. Anthocyanins are potent antioxidants and in the diet may help to prevent certain cancers, high blood pressure, and heart disease, among other diseases. This project proposes to isolate the pigments in black rice and analyze their antioxidant capacity, and to compare those results to other rice varieties.

#7

The Effect of Spacer Length Variation on Novel Cationic Bipyrimidine Amphiphile Antibacterial Activity

Elizabeth Terry & Hanna Yu

James Madison University

The rising prevalence of drug resistant pathogens on medical equipment increase patients' susceptibility to acquiring drug resistant infections. Amphiphiles, compounds with a hydrophilic head and hydrophobic tail, have been studied for antimicrobial properties. Their ability to disrupt bacterial membranes makes them important disinfectants in medical communities. Novel cationic amphiphiles, containing two bipyrimidine groups, each with a hydrocarbon tail and separated by a carbon linker of varying lengths, were developed and tested for antibacterial activity. The results suggest that antibacterial ability of amphiphiles increases with the length of the carbon spacer between bipyrimidine groups. This observation was consistent for both Gram positive and Gram negative bacteria. A better understanding of structure-function relationships will contribute to the development of more effective antimicrobials.

#8

Misconceptions of School Shootings

Lindsay Cross

Christopher Newport University

#NeverAgain: this is the name of the movement started by the students of Marjory Stoneman Douglas High School in Parkland, Florida. They are just one of the many schools that have experienced the devastating effects of a school shooting. This movement has garnered a great deal of attention and has brought awareness on the topic of school shootings. School shootings encompass many debates in today's society: mental illness, political beliefs, and why perpetrators commit such violent acts. While there are many other aspects, the public views and research of these are inconsistent. The purpose of this research is to discuss common media misconceptions of school shootings. Implications and future research directions will be discussed.

#9

Social Support Among College Students: Prominent Aspects That Determine Well-Being

Dana Fulcher

Christopher Newport University

Social relationships are extremely important throughout the college years as students navigate this transitional period. Khallad and Jabr perceived social support and family demands of college students' well-being across different cultures and found that effects of unrealistic family pressures on mental health can be detrimental. Certain aspects of college students' social relationships seem to be especially beneficial. For example, Rook researched the differences of social support and companionship and studied the effects of how life stress and loneliness play a more important role in the overall well-being of an individual than previously thought. This poster examines research on the benefits of social relationships in college students. Practical implications and suggestions for future research are also discussed.

#10

An Experiment in Electron Paramagnetic Resonance Spectroscopy for Undergraduate Labs in Physical Chemistry or Physical Biochemistry

Matthew Rehak, Jefferson C. Thompson, H.J. Sipe, Jr.

Hampden-Sydney College

We propose an EPR experiment for undergraduate laboratories to introduce EPR spectroscopy and instrumentation to students of physical chemistry and biochemistry. Previously published experiments generally focus on simple, stable radicals and do not study complex spectra in which computational analysis may be required. The biochemical oxidation of DTBHA and BHT radicals by HRP/H₂O₂ produces somewhat more complex spectra of long-lived radicals using relatively small amounts of reactants and illustrates enzymatic activity that produces phenoxyl free radical species.

#11

Creativity, Intelligence, and Motivation in Gifted Students

Zachary Swanson

Christopher Newport University

The purpose of this project was to investigate Renzulli's (1986) three ring conception of giftedness among high school students in the Governor's School for the Gifted. It was expected to see higher levels of Creativity, Intelligence, and Motivation in members of the Gifted Education program compared to those who were not enrolled. The individuals were evaluated on these three measures using the Wonderlic, Divergent and Convergent Creativity tests, and the Intrinsic Motivation Inventory. This research provided support for Renzulli's (1986) three ring conception of giftedness. The results of this study can enable educators to better understand how components of giftedness manifest in traditional forms of assessment and may enable high school administrators to design curriculum for gifted programs.

#12

One-Pot Synthesis of Nonsymmetric Schiff Based Ligands

J. Jacob Justus

Hampden-Sydney College

The project set out to test a one-pot synthesis of nonsymmetric Schiff based ligands. First, a chemical salt was synthesized with 1,3 Phenylenediamine and hydrogen chloride. Next, the salt was bonded with 5-bromosalicylaldehyde. After the condensation, the chloride was stripped away and was replaced with 5-chlorosalicylaldehyde. Instrumentation was then performed on the result to ensure the synthesis of the ligand proceeded correctly to be used for metalation later.

#13

The Study of Baseball Batters' Pre-Swing Rituals' Influence on Hitting Success

Kyle Darmstead

Christopher Newport University

Few studies have studied the importance of ritual behavior and superstitions in collegiate baseball players. Our research attempted to determine if ritualistic behaviors change the performance outcomes of a baseball player's hitting ability. Specifically, we compared pre-pitch motions to (a) in-person interviews and (b) baseball measures to determine the influence of rituals. Our results indicate that ritual habits that predict baseball-hitting success are inconclusive, but such ritual habits appear correlated with a baseball player's sense of self and spirituality. Given the results future research is discussed.

#14

"Between this Lovembrace": The Ancestral Erotics of the Baroness Elsa von Freytag-Loringhoven's Poetry

Aubrey Butto

Virginia Military Institute

In my research I explore how the Baroness alters and complicates the concept of gender essentialism and develops what I have come to call ancestral erotics, aligning the filth and purity of her parentage with the embodied, erotic origins of her poetry and visual art. My essay explores the ways in which the Baroness's poetry elaborates on her complex ideas of gender and sex, ancestry, the inheritance of personality traits, and how her three poems, "Analytical Chemistry of Progeny," "Cathedral," and "Ancestry," derive from, and shape, her poetics of ancestral erotics.

#15

A Study of Nonylphenol Isomers Using ESR Spectroscopy

Nathan Houser, H.J. Sipe, Jr.
Hampden-Sydney College

We report electron spin resonance (ESR) spectroscopic studies of the phenoxyl radical of nonylphenol prepared by Ce(IV) oxidation in a fast flow apparatus. Nonylphenol has been employed commercially as a plasticizer to replace controversial bis-Phenol-A (BPA). The nonylphenol was a mixture of isomers as established by GC-MS and consequently the ESR spectrum was poorly resolved. A series of related phenols with methyl-, ethyl-, isopropyl-, and t-butyl- substituents was also studied to rationalize the spectrum observed for nonylphenol's radical. These results were compared to those observed previously for the phenoxyl radical of BPA.

#16

Three-dye DNA Switch for Detection of Restriction Enzymes

Chanel Person
Hampton University

A three-dye DNA switch was previously developed using structural DNA components to detect the presence or absence of removable and replaceable linkers. Building from this work, a DNA switch that enables sensing of restriction enzymes is developed. The DNA sensor is composed of three dye labeled arms (cyanine 3, cyanine 3.5, cyanine 5), as well as three caps, linkers, and compliments. The enzymes used are XbaI, EcoRI-HF, BamHI-HF, NcoI-HF, XhoI, and SmaI. The ability of the restriction enzyme to cleave to the targeted site and cut the linker is tested. The two-arm structure containing each linker was created to determine which three enzymes work best together. The goal is to create a DNA sensor that can detect three enzymes simultaneously.

#17

Growth of Anisotropic Silver Nanoparticles on Biological Surfaces

Ethan Boeding, Tim Pressler, Yunhua Li, Tijana Grove
Virginia Tech

Inspired by advances in nanoparticle synthesis at the liquid-substrate interface, we have integrated substrate-based techniques with colloidal chemistry for in situ growth of plasmonic nanoparticles in egg shell membranes. First, we create a substrate-bound template by immobilizing the colloidal seed onto protein fibers. The nanocrystals grow at the liquid-protein interface within the micron-sized membrane pore. Herein, we quantitatively study the effects of the pretreatment buffer pH, incubation time, and seed age on seed-immobilization efficiency. The data showed the best seed immobilization conditions were with a pH 4 pretreatment buffer, 12-hour incubation of the ESM, and seed age of 1 day old. Going forward, monitoring the nanoparticle growth on the ESM will provide more insight on how to improve this process.

#18

**Synthesis of a Family of a Non-C₂-Symmetric
Inorganic Ligands and their Metal Complexes**

Marcellus Wiggins
Hampden-Sydney College

We set out to create an unsymmetrical ligand using differing salicylaldehyde arms and a 1,2-phenyldiamine backbone. To create a ligand with two different arms, one of the amine groups of the backbone had to be protected so that the backbone could react in a 1:1 ratio with one arm without having to worry about creating backbones with two of the first arms attached with excess unreacted backbone. To fix this issue, we reacted the backbone in a 1:1 molar ratio with HCl so that one amine would protonate, making it unable to react until we deprotonated it later in the reaction. We were able to create three separate products, but we are not certain that the resulting products were pure.

#19

**Runoff Quality from Roofs and Ground-Level Surfaces:
Implications for Rainwater Harvesting**

Margaret van Beek & Thinh "Bill" Pham
Randolph College

Rainwater harvesting systems have increased in popularity. Most guidelines recommend collecting runoff from roof surfaces because the roofs are thought to be cleaner. We compared the runoff quality of both roof surfaces and ground level surfaces such as parking lots and lawns by sampling runoff from three events and measuring parameters relevant to microbial health. Biological oxygen demand and turbidity were significantly lower in runoff from roofs than in runoff from pedestrian and lawn surfaces and vehicular surfaces. However, the actual microbial quality of runoff from vehicular surfaces was similar to the microbial quality from roof surfaces. The similar water quality of runoff from vehicular and roof surfaces means rainwater from vehicular surfaces could be collected for some beneficial uses.

#20

Characterization of Recombinant Human Hair Keratin Biomaterials

Erik Akbar
Virginia Tech

Keratin biomaterials show potential for use in medical applications due to their inherent biocompatibility, self-assembly, and controllable porosity in a bulk material. However, the extraction of natural keratins from sources such as wool, feathers, or hair require extensive processing conditions which leads to the production of undesirable by-products. Recombinant keratins can bypass these issues by providing a reliable protein sequence with every expression. The goal of this project was to construct and characterize biomaterials using both keratin precursor proteins and K-31/K-81 oligomers grown recombinantly in *E. Coli*. Using recombinant proteins, keratin can be used as a reliable source of biomaterials for novel devices that facilitate cellular repair, assist in drug delivery, or provide structural support to bones and organs.

#21

**The Callousness Trait and How it Negatively Affects
General Behavior: A Literature Review**

Mary Jobe, Danielle M. Hawkins, Lauren K. Davis, Thomas Pollack, Zachary T. Wilson
Christopher Newport University

Callousness is characterized as having a lack of empathy, guilt, and/or no remorse of wrongdoing (Loona & Kamal, 2013). This raises the question of the impact this trait has on one's behavior. This literature review examines ten studies' results. Our findings indicate that those with the trait tend to bully (Munoz, Qualter, & Padgett, 2011); behave aggressively (Stickle, Kirkpatrick, Brush, 2009); and have poor relations with their mothers (Bisby, Kimonis, & Goulter, 2017) and teachers (Horan, Brown, Jones, & Aber, 2016). In addition, the trait is typically studied in children, who have behavioral problems or personality disorders. Adults are seldom the participants for such studies; therefore, further research should focus on the prevalence of callousness and its effects on adults.

#22

The Mechanism of the Cancer Stem Cell Phenotype

Alyssa Hubal, Ben Portnoy, Geraldine Ezeka, Kevin Rose
Loyola College Maryland

Cancer stem cells represent a subset of cells within a tumor that have the ability to either self-renew into more cancer stem cells or differentiate into malignant cells that contribute to the bulk tumor. However, cancer stem cells remain dormant during treatment, contributing to therapeutic resistance leading to tumor reoccurrence. Recently, researchers discovered that embryonic factors are regulators of cancer stemness, making them therapeutic targets. Research has shown that the embryonic factor, ZSCAN4, plays a role in supporting the cancer stem cell phenotype. However, the mechanism by which ZSCAN4 acts to maintain the stem cell phenotype is unknown. Our study aims to define the role of ZSCAN4 in the maintenance of the undifferentiated state and survival of cancer stem cells.

#23

**Multiscale Modeling of a Functionalized Surface Catalyst
for Hydrogen Peroxide Production**

Yuriy Snyder
Randolph College

Hydrogen peroxide (HP) is a commodity chemical with a broad range of uses. The major environmental detriment of the life cycle of HP is the current industrial process used in HP synthesis; it is otherwise a "green" chemical in its applications. Reducing the environmental impact of HP synthesis through a new process would serve as a major improvement that would save energy and money. Computational modeling allows proposed materials such as surface catalysts to be studied for viability before any synthesis or thermodynamic characterization is carried out. The goal of this project is to model a simple surface catalyst for the production of hydrogen peroxide directly from hydrogen and oxygen gases, without the need for catalytic nanoparticles or multiphase reactors.

#24

A Dying Breed: Mayo Cabell and the Demise of the “Old South”

Paige Sellars

Randolph Macon College

This project investigates the plantation economy of Antebellum Virginia and the defense of slavery that supported it. I examined the diaries of Mayo Cabell (1800–1869), a wealthy, Virginia slave owner. Cabell owned slaves that cultivated his crops; like other planters, he involved himself in business ventures, partnering with various companies and owning a shipping firm. His diaries reveal his support for the South and slavery. Cabell’s perception of his slave management reflected prevailing, pro-slavery arguments post-1832: that slavery was economically sound, in accord with Christianity, and beneficial for slaves—exposing them to civilization and offering them protection they supposedly needed. Mayo Cabell represents Old South mentality, and his diaries illustrate how he internalized and expressed the pro-slavery rhetoric of the era.

#25

CD27 Mediates Allogeneic T Cell Response

Ryan O’Donnell, Xuefang Cao, Wei Wang, Rachel McNeill

Loyola University Maryland

Allogeneic hematopoietic cell transplantation is a potentially curative therapy for hematologic malignancies, including leukemia and lymphoma. Approximately 20% of patient deaths following allogeneic hematopoietic cell transplant are due to Graft Versus Host Disease (GVHD). GVHD is caused by the immune activation of donor cells recognizing the recipient cells as foreign. T cells chiefly function in cell-mediated immunity and are primarily responsible for the beneficial graft-versus-tumor (GVT) effect, however they also cause the adverse GVHD effect. Recent studies have shown that CD27, a T cell surface protein in the tumor necrosis factor (TNF) superfamily, plays a crucial role in cellular immune response through CD27-CD70 co-stimulation. This is because CD27 is largely regulated by CD70 expression, a cell surface protein on antigen.

#26

Investigating Emotional Callousness in Youth: A Literature Review

Amanda Mathis, Kyra R. Wilbur, Grace N. Wilson, Noah T. Guion

Christopher Newport University

Current research has delved into studying antisocial and maladaptive behaviors in children, as well as the association of these behaviors with other personality traits (Decuyper, De Bolle, De Fruyt, & De Clerq, 2011). So far, high levels of emotional-callousness are associated with heightened levels of aggression (Ezpeleta, Osa, Grandero, Penelo, & Domènech, 2013) and poor academic development (Horan, Brown, Jones, & Aber, 2016). These negative behaviors and traits are so prominent, they are easily sensed by close family (Benesch, Görtz-Dorten, Breuer, & Döpfner, 2014). Additionally, one’s experiences in youth shape emotional-callousness and uncaring traits (Goulter, Kimonis, Hawes, Stepp, & Hipwell, 2017). However, future research should be conducted on how behavioral and personality traits of emotionally callous youth develop through adulthood.

#27

**From Redistribution to Deportation:
Government Tactics for Ethnic Cleansing in the Middle East**

Taylor Williams
Randolph Macon College

This paper illuminates historical and contemporary tactics of government sanctioned ethnic cleansing in the Middle East. Historically, the focus of this paper draws from the Armenian Genocide and the Greco-Turkish Population Exchange. I examined Ottoman law code, along with a treaty between Greece and Turkey, that arose from the Lausanne Conference in 1923. Contemporary tactics of ethnic cleansing are illustrated through the tactics of the al-Assad regime in Syria, this specifically includes property redistribution, chemical warfare, and starvation. This paper examines the evolution of tactics and targeted minorities of ethnic cleansing in the historical and modern Middle East.

#28

**Pro-Environmental Practices as Determined by People
Embedded in Implicit Situational Demands**

Zachary Wilson
Christopher Newport University

Ecological and experimental approaches to recycling research focus on different means of understanding pro-environmental factors. The present research offers a theoretical model for understanding those factors that contribute to people recycling under implicit situation. Implicit Situation is defined as a circumstance when people have an immediate need to throw away trash and recyclables. For instance, when people are in a hurry or rush and have recyclable materials, what determines their pro or anti-environmental choices and behaviors? This paper attempts to both outline and render the theoretical requirements for such choices and behaviors.

#29

**Segmentation and Analysis of Handwritten
Medieval Manuscripts for Automatic Indexing**

Nicole Schneider
Loyola University Maryland

Scholars studying handwritten medieval manuscripts often view images of the manuscripts in databases, alongside the transcribed versions of the text. To make the process of verifying transcriptions easier for scholars, we used image processing techniques to locate lines of text within manuscript images, so that individual lines of transcribed text could be linked to their locations within an image of an entire manuscript page. This eliminates the need for scholars to search through an entire page of text just to find a few lines that they are interested in viewing. The algorithm developed uses XY projection, connected-component analysis, 2D Fourier transform, and morphological operations to de-skew, de-noise, and ultimately segment the text into individual lines.

#30

The Development of 3D Printable Stretch Bioreactors

Andrew Howell

Hampden-Sydney College

The goal of this research was to create an affordable, fully functional, and fully 3D printable stretch bioreactor for tissue engineering (TE) applications. The initial design had three individual chambers with one well per chamber. This was later replaced with a custom two-chamber-eight-well system to improve replicability and simplify the system as only two chambers need to be sealed rather than three. A 3D printed, modular stretch bioreactor was developed. Rubber bands were clamped in place of scaffolds and uniform stretch was observed on all rubber bands when a force was applied. Unique features of this bioreactor include low entry costs, high levels of modularity, adaptive control, and increased replicability and it has the potential to promote skeletal muscle maturation.

#31

Characterization of Recombinant Cellulose-Binding Protein

Grey Fritz, Jennifer McCord

Virginia Tech

Lignocellulosic biomass is an abundant resource that has potential to be used for biofuel production. However, the conversion from lignocellulose to glucose requires pre-treatment, which creates compounds that inhibit saccharification enzymes. Researchers are therefore developing helper proteins which will protect the cellulases from the inhibiting compounds. Carbohydrate-binding modules (CBMs) are small domains in carbohydrate-active enzymes which attach the catalytic domains to the carbohydrates, typically to break down carbohydrates into glucose. Our goal is to create a recombinant CBM protein to be used as an additive to enhance the production of glucose from lignocellulose.

#32

Lynchburg Neighborhood Database Initiative: A Pilot Study

Jessica Bui, San Hoang, Leo Cohen, Dung Nguyen

Randolph College

The BNIA is an almost 20-year old alliance managed by the University of Baltimore that collects, organizes- and makes publically available- neighborhood-level data helpful in determining the well-being of communities within Baltimore. The BNIA has identified eight "Vital Signs," or categories of or neighborhood well-being, and for each, a multitude of indicators, or variables that allow for exploration of that vital sign. Desired data can then be pulled for cross-sectional, time-series, and panel analysis. The purpose of this project is to pilot the development of a similar database for Lynchburg, Virginia and to collect, analyze, and share early findings about variations in Census Block Group indicators across the city.

#33

Teaching Math and Science in a Changing World

Damien Douglas & Josh Yeast

Randolph College

We report results of a study in which teachers gain experience and access to resources for hands-on and inquiry-based science lessons. This study was conducted to increase teacher content knowledge and comfort with STEM subjects, and to eliminate students' and teachers' stereotypical perception of scientists. Participants included forty 3rd-9th grade teachers and 63 students. The teachers participated in a week-long Institute using inquiry-based lessons across the sciences that they could replicate in their classrooms. Select teachers from the Institute were then able to try teaching these lessons to students at our week-long summer science camp. Teachers and students were given various pre- and post- test surveys to gain an understanding of their comfort level with science and perception of scientists.

#34

The Effects of Amino Acids on C2C12 Cell Maturation

David Fluharty, Kristin M. Fischer, Michael J. Wolyniak

Hampden-Sydney College

Three million people in the US suffer from traumatic injuries yearly. Natural healing results in scar-tissue formation and loss of function. Injuries resulting in $\geq 50\%$ skeletal muscle loss cannot regenerate and impairs body movement. To improve myotube formation, the amino acid (aa) concentration in Dulbecco's Modified Eagle's Medium (DMEM) was increased to 0.12% (w/v) for L-glutamine, 0.01% (w/v) for L-cysteine, 0.03% (w/v) for L-lysine, and compared to a control of DMEM with 2% horse serum. The MTS assay revealed that cell numbers were higher in aa supplemented ones compared to the control. Fluorescent imaging determined that L-lysine supplemented cells produced more and longer myotubes. The data indicates cells are most responsive to L-lysine supplemented DMEM.