



*April 18, 2014*

## ***Schedule of Events***

- 10:30 a.m. – 11:00 a.m.**      **Student Registration and Poster Setup**  
*Memorial Union - Washburn A & B Lobby*
- 11:00 a.m. – 12:50 p.m.**      **Fine Arts Presentations**  
*Carole Chapel*
- 1:00 p.m. – 2:50 p.m.**      **Oral Presentations**  
*Law School*  
*Room 100, Room 102, Room 114, and Room 119*
- 3:00 p.m. – 3:45 p.m.**      **Welcome**  
Shaun Schmidt, Chair, Apeiron Committee  
*Memorial Union - Washburn B*
- Recognition of Student Designers**  
Emily Juhnke and Carly Willis  
Regina Cassell, Apeiron Committee
- Introduction of Last Lecture**  
John Mullican, Associate Professor and Chair,  
Department of Biology
- Last Lecture**  
Mary McCoy  
Professor Emeritus of Biology  
*Memorial Union - Washburn B*
- 3:45 p.m. – 5:00 p.m.**      **Poster Presentations and Reception**  
*Memorial Union - Washburn A*

# *Last Lecture*

## "Reflections on My Life among Bugs"

presented by

Mary "Bugs" McCoy, Ph.D.

Professor Emeritus of Biology

Mary "Bugs" McCoy had a 33-year career teaching in the Biology Department at Washburn University. She retired as Professor Emerita in 2008. Her advanced degrees were a Master's and Ph.D. in Entomology from the University of Kansas. At Washburn she taught what she considered to be the fun courses in the department: zoology, entomology, parasitology, and invertebrate zoology. Her research interests included medical entomology, tropical biology, and innovative teaching techniques. McCoy studied tropical rainforest biology in Central and South America on two sabbaticals, which were life-



changing experiences. In these and other trips to the tropics, she swam with giant manta rays, saw ocelots, and was mesmerized by ants. On another sabbatical she visited West-Coast insect zoos and returned to set up Washburn's own repository of live giant charismatic bugs to use for student research, teaching, and educational outreach in the community. She was passionate about teaching, and gave many talks at many meetings on university-level biology teaching, on forensic entomology, and on protection of ecosystems. McCoy directed the Washburn Faculty Development program for four years. She was the recipient of Washburn's Ned N. Fleming Excellence in Teaching Award in 1993 and the Herrick Award for Outstanding

Service in 1999. Because of strong interests in writing and in art, she took Washburn courses in poetry writing, ceramics, fused glass and Chinese painting. In retirement she has focused on biology-based memoir writing, and her current project is *The Maligned Species: Memoirs of Multi-legged Creatures*.

Memorial Union – Washburn B

3:00 p.m.

*This lecture is made possible with support from the Washburn University Foundation. This year Dr. McCoy has generously requested this contribution be made to a Biology Department scholarship fund.*

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*Past Last Lectures presented by:*

Dr. Jorge Luis Nobo	2013	Dr. Reinhild K. Jenzen	2012
Dr. Howard Faulkner	2011	Dr. William O. Wagnon	2010
Dr. Ron Ash	2009		

## Schedule of Oral Presentations

(LA = School of Law)

<b>Time/Location</b>	<b>Presenter</b>	<b>Title</b>
<b>1:05 pm – 1:25 pm</b>		
LA 100	<b>Matthew A. Vance</b>	<i>The State of Kansas and Constitutional Funding for Education</i>
LA 102	<b>Deren Onursal</b>	<i>A Statistical Public Policy Research on Turban Ban in the Republic of Turkey</i>
LA 114	<b>Scott M. Brackey</b>	<i>Black, White, and Color: Photographing Racial Change in the Deep South</i>
LA 119	<b>Shelbie Alexandra Konkel</b>	<i>Is the Kansas SAFE Act Really Safe?</i>
<b>1:30 pm – 1:50 pm</b>		
LA 100	<b>Monica L. Schroeder</b>	<i>Melville's Maids and the Marxian Machine: Catalyst to Industrial Reform</i>
LA 102	<b>Mary-Lucia T. Darst</b>	<i>Reception and Perception: The Influence of the Mozart upon Mendelssohn, Schumann, Wagner, and Strauss</i>
LA 114	<b>Christian J. Gilbert</b>	<i>A Lion Can Run Fast But We Can Run Farther: Women's Economic Empowerment in Post-Colonial Kenya and Guinea Bissau</i>
LA 119	<b>Jessa A. Jurgens</b>	<i>The Relationship between Cherokees and Whites Leading up to Indian Removal</i>
<b>2:00 pm – 2:20 pm</b>		
LA 100	<b>Tim Brown</b>	<i>HPLC Analysis of rRNA</i>
LA 102	<b>Edith Jimenez</b>	<i>Comparative Analysis of Attitudes Towards Abortion in Latin America</i>
LA 114	<b>Cassandra E. White</b>	<i>Fifty Shades of Brown: John Brown and the Darker Side of Calvinism</i>
LA 119	<b>Shelbie Alexandra Konkel</b>	<i>A Critical Education: Washburn University's Role in Brown vs. Topeka Board of Education</i>
<b>2:25 pm – 2:45 pm</b>		
LA 102	<b>Adam Michael Teel</b>	<i>GDP per Capita and Environmentalism: Is Growth the Reason for Change?</i>



# Fine Arts Presentations

**11:00 a.m. – 12:50 p.m.**

*WTE* Denotes Washburn Transformational Experience

► **11:00 a.m.**            **Carole Chapel**            **Moderator: Dr. Chris Kelts**

*Fetter String Quartet*

**Zachary H. Cope, Samantha J. Silver, Karl S. Page, and Ryan W. Masotto**

Mentor: Diana Seitz, Music

We will be describing how different themes in Dvorak's String Quartet No. 12 in F Major Opus 96 Movement II (otherwise known as the "American Quartet"), allude to the Native American culture. Also, how his Slavik background affects the way in which he composes this quartet.

► **11:35 a.m.**            **Carole Chapel**            **Moderator: Dr. Courtney Sullivan**

*My Rights, Your Rights, Our Rights - A Journey to Understanding Race Relations*

**Mikki M. Burcher**

Mentor: Bruce Mactavish, History

This creative nonfiction piece will follow the journey of a young Midwestern woman and a small group of travelers that go on an educational journey across the deep south in an effort to better understand the civil rights movement and race relations of the past and present. It describes the author's inner thoughts and feelings as she tours places of historical significance and witnesses first hand some of the effects of slavery on African Americans in Tennessee, Mississippi, and Alabama. It also describes the conversations that occur with her peers and the group leaders as they tour the south, as well as insights and personal revelations gleaned from the tour.

► **11:55 a.m.**            **Carole Chapel**            **Moderator: Penny Weiner**

*Bros.*

**Ashley M. Vaughan**

Mentor: Penelope Weiner, Theatre

*WTE*

Throughout history gender roles have played an important part in defining society, whether positive or negative. In today's society, stereotypes of gender not only influence how others perceive us, but how we perceive ourselves. There is a constant battle between men and women and how each are classified by stereotypical characteristics that our society has engraved in us. The play, *Bros.* takes a look at what happens when two men who completely defy these stereotypes are set up by their very stereotypical wives to bond, and how they struggle to be

'manly' in front of each other. Though this play is comedic and quirky, I want to evoke in the audience a sense of how stereotypes – especially in gender – have shaped our society and caused us to lose our sense of individuality. Kevin and Mark teach us that all you have to do is be yourself, and chances are that in the end, it will be rewarding.

► **12:15 p.m.**                      **Carole Chapel**                      **Moderator: Dr. Kelly Watt**

*"Trying To Resist" - A Kinetic Commentary*

**Alex B. Olson**

Mentor: Kelly Watt, Art

This performance focuses on the idea of resisting the natural urge to move. As one gets older certain social expectations develop. How we act, move, and talk in public all have certain parameters in public. I especially notice this in movement, specifically dance. My piece centers on the struggle between carrying out natural expression in movement and trying to control the way we look in front of others. With attempt at this impression management it can create a fear of movement and expression all together. This piece is about breaking the resistance and submitting to our natural impulses.

► **12:30 p.m.**                      **Carole Chapel**                      **Moderator: Penny Weiner**

*"Choices"*

**Austin J. Swisher**

Mentor: Penelope Weiner, Theatre

*WTE*

*Choices* is a short drama about a few young people making very hard decisions in the face of some of life's most difficult situations. The majority of the content deals with societal issues such as abortion and drug use. I've been working on this piece off and on for almost a year now. I've come back to it many times to restructure the scenes and action and to further develop the characters. My current intentions are to extend it into a one-act play. My hope is that it could eventually be presented to an audience. I have experimented with writing a few different plays and though *Choices* has received the majority of my attention, I plan to continue working with the playwriting aspect of my theatre education.

# Oral Presentations

1:00 p.m. – 2:50 p.m.

*WTE* Denotes Washburn Transformational Experience



## Session $\alpha$ Moderator: Dr. Bruce Mechtly

► 1:05 p.m. Law School, Room 100

### *The State of Kansas and Constitutional Funding for Education*

**Matthew A. Vance**

Mentor: Steven Cann, Political Science - Geography

As recently as this year, multiple times in the last decade, and in a process ongoing for the last twenty years, the Kansas Judicial Branch has ruled that the amount of financial aid the State of Kansas is providing to local school districts for the suitable provision of education is unconstitutional. There is certainly a lengthy dialogue and history that explicate these findings at this and all times, but the purpose of this research project was to determine if there are any statistical indicators that the state funding of local school districts is inadequate, inequitable, and/or unconstitutional. In the end, limited statistical analysis provides empirical support for the claim that the school districts in Kansas that are the largest and the most economically disparate are the school districts that are most likely to have the poorest achievement rates. Additionally, these same school districts are almost uniformly among the school districts in Kansas that receive the least state base aid per pupil. “Constitutionality” is ultimately a matter for the courts, but this analysis underscores claims of inadequate and inequitable state funding for education.

► 1:30 p.m. Law School, Room 100

### *Melville's Maids and the Marxian Machine: Catalyst to Industrial Reform*

**Monica L. Schroeder**

Mentor: Vanessa Steinroetter, English

Writing during the rise of the industrial capitalist system, and influenced by the oppression of the workers he saw around him, the American author, Herman Melville, sought to awaken his contemporaries to the reality of the horrors and despair in the lives of the working class. His short story, “Tartarus of Maids”, especially vivifies the monstrosities present in the 19th century Industrial Revolution, and through the images of the machines and the women who work them, provides a startling critique of a society ruled and ruined by mass-produced industrialism. It is a work which called people to reform working conditions, most notably the mills and factories, and even work towards passing laws which would protect the workers from such abuse. Even today, Melville’s work causes us to question our own dependence on the machine and decline into a dehumanized society, making “Tartarus of Maids” still a very accessible and provocative piece of literature.

► 2:00 p.m.            Law School, Room 100

*HPLC Analysis of rRNA*

**Tim Brown**

Mentor: Lisa Sharpe Elles, Chemistry

WTE

DbpA is a protein that belongs to a family of proteins called DEAD-box proteins. It is an ATP-dependent RNA helicase that acts on double stranded RNA. Mutant strains of E. coli that lack DbpA have shown a slow growth phenotype. The goal of this research project is to analyze the rRNA of these mutant strains to determine any composition changes that may occur without the presence of DbpA.



**Session β            Moderator: Dr. Tony Silvestri**

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► 1:05 p.m.            Law School, Room 102

*A Statistical Public Policy Research on Turban Ban in the Republic of Turkey*

**Deren Onursal**

Mentor: Linsey Moddelmog, Political Science - Geography

In this study, the attitude of Turkish people toward lifting the headscarf (turban) ban in universities in Turkey is analyzed. The study seeks to discover what factors contribute to predicting the probability one would support lifting of the ban on turbans. 5,292 Turkish citizens are surveyed and survey showed that 4,040 respondents declared opinion that leans toward lifting the ban. Logistic regression results indicate that more religious, less educated and politically more conservative people are more likely to support lifting the ban.

► 1:30 p.m.            Law School, Room 102

*Reception and Perception: The Influence of the Mozart upon Mendelssohn, Schumann, Wagner, and Strauss*

**Mary-Lucia T. Darst**

Mentor: Tony Silvestri, History

After the death of Wolfgang Amadeus Mozart in 1791, European tastes in music changed. The Classical Era in music ended, and the Romantic Era began. Led by Ludwig von Beethoven, the new generation of composers developed styles of writing music that reflected their own individualism, creativity, emotional needs, or philosophic beliefs. Though the nationalities of the composers of the Romantic Era included all of the European countries, the United States, and Canada, the Austro-Germanic composers musically dominated the time period. These composers sought to articulate their own theories of the abstract value of music through the medium of



private letters and journal articles. As part of their discussion regarding music, they examined the musical heritage they obtained from their predecessors, specifically Josef Haydn and Mozart. Based upon their own writings, the Austro-Germanic Romantic composers viewed Mozart as the more significant of the two composers and the founder of the German musical patrimony. The music of Mozart influenced that of Felix Mendelssohn, Robert Schumann, Richard Wagner, and Richard Strauss.

► 2:00 p.m.                    **Law School, Room 102**

***Comparative Analysis of Attitudes Towards Abortion in Latin America***

**Edith Jimenez**

Mentor: Linsey Moddelmog, Political Science - Geography

Abortion is a controversial issue in Latin America as cultural and religious factors influence the way people shape their attitudes toward abortion. In Latin America, abortion is criminalized in most circumstances, yet more than 11,000 illegal abortions are carried out every day (WHO, 2008). This study seeks to understand the individual characteristics that influence one's attitude towards abortion in Latin America. World Values Survey data from 2005 for respondents from Argentina, Brazil, Colombia, Chile, Guatemala, Mexico, and Peru are included in the analysis. Logistic regression results indicate that while as a whole, support for abortion is quite low in these countries. These female individuals are less active in religious practices, have greater levels of education, are older, have fewer children, and are more likely to support the use of abortion.

► 2:25 p.m.                    **Law School, Room 102**

***GDP per Capita and Environmentalism: Is Growth the Reason for Change?***

**Adam Michael Teel**

Mentor: Linsey Moddelmog, Political Science – Geography

WTE

As nations such as China and India are industrializing and developing economically and politically, concerns over environmental quality are emerging. Calls from the international community for increased accountability and regulation are met with concern from developing nations about how costly environmental restrictions may impact their development. Some argue that developed nations, having already met basic material human needs such as food, water, and shelter, have individuals who are post-materialist in their ideological perspective, or rather their concerns vary greatly from those individuals in developing countries who care primarily about satisfying these basic material needs, no matter the cost to the environment (Inglehart 2000, 2008). This study seeks to determine if positive feelings toward environmentalism (a post-materialist ideal) tend to increase with the increase in gross domestic product per capita in a country. Logistic regression results indicate that there is not strong statistical association between GDP per capita and positive feelings toward environmentalism. The findings of the study are

limited by data availability, and future studies would do well to consider how levels of pollution and culture may impact environmentalism in a country.



## **Session γ Moderator: Dr. Ian Smith**

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► **1:05 p.m.**                      **Law School, Room 114**

***Black, White, and Color: Photographing Racial Change in the Deep South***

**Scott M. Brackey**

Mentor: Bruce Mactavish, History

*WTE*

Photographs were indispensable to immortalizing the triumphs and tragedies of the civil rights movement of the 1950s and 1960s. Moreover, the dynamic images captured in midst of the movement's struggles have been central to how subsequent generations have conceptualized the civil rights era. When compared, photographs across time can demonstrate timeless features as well as dynamic changes in society. Washburn University's Exploring Civil Rights tour of the American South placed students in the heart of many civil rights landmarks. Photographically documenting the experience helps to contextualize history as it relates to the present day. What has the work for equality overcome and what remains to be resolved? Does modern color photography symbolize a societal revolution that dismantled a black and white divide? This is an exploration of the racial changes in the South through the lens of a camera.

► **1:30 p.m.**                      **Law School, Room 114**

***A Lion Can Run Fast But We Can Run Farther: Women's Economic Empowerment in Post-Colonial Kenya and Guinea Bissau***

**Christian J. Gilbert**

Mentor: Kelly Erby, History

Colonial patriarchal politics had long oppressed African women, introducing patriarchy and destroying the relatively egalitarian gender roles that had once existed between men and women in Guinea Bissau and Kenya. In particular, the introduction of "separate sphere" ideology shattered the important economic role women had held prior to colonization and the power that stemmed from it. After independence, African men continued to demand that women remain in the private sphere. Women, however, gathered together and established organizations across the continent to advance them towards equality by restoring their economic role. These efforts encouraged Guinea Bissau and Kenyan women to increase their participation in the market economy, a key factor in equality and Africa's overall economic development.

► 2:00 p.m.                    Law School, Room 114

*Fifty Shades of Brown: John Brown and the Darker Side of Calvinism*

**Cassandra E. White**

Mentor: Kelly Erby, History

This essay explains the significance of John Brown's (1800-1859) Calvinistic faith and how his religion influenced his antislavery beliefs and ultimately led him to embrace violence as a means to end slavery. The essay will unpack the forces that shaped the Calvinism of Brown, the significance of the Second Great Awakening in American religious history, and how Calvinism, which was primarily practiced in the South, led Brown down the path of abolitionism.



**Session δ**

**Moderator: Tracie Lutz**

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► 1:05 p.m.                    Law School, Room 119

*Is the Kansas SAFE Act Really Safe?*

**Shelbie Alexandra Konkol**

Mentor: Bob Beatty, Political Science – Geography

*WTE*

In 2011 the State of Kansas passed House Bill 2067, the Secure And Fair Elections (S.A.F.E.) Act, requiring citizens to show a valid form of photo identification before voting in any election and proof of citizenship when registering to vote. Proponents of the law argue that the law prevents voter fraud, and ensures the security of elections. However, critics of the law claim that it decreases registration by making the process too confusing and that the intention of the law was to decrease participation by registered Democrats. This study will analyze the effect it has had on county level registration, and whether or not there has been a decrease in the number of registered Democrats.

► 1:30 p.m.                    Law School, Room 119

*The Relationship between Cherokees and Whites Leading up to Indian Removal*

**Jessa A. Jurgens**

Mentor: Kerry Wynn, History

*WTE*

My research investigates the increasing tensions between primarily the Cherokee Nation and the white settlers that lived in Georgia before the Trail of Tears. I am focusing on the land disputes and competition of goods between these two populations. My main argument is that the discovery of gold on Cherokee land was not the driving force behind removal but rather the long held desire of Cherokee land.

► 2:00 p.m.

Law School, Room 119

*A Critical Education: Washburn University's Role in Brown vs. Topeka Board of Education*

**Shelbie Alexandra Konkel**

Mentor: Kerry Wynn, History

*WTE*

This year marks the sixtieth anniversary of the United States Supreme Court ruling in *Brown vs. The Topeka Board of Education*; the ruling that established “Separate was in fact, not equal.” The decision, which resulted in desegregation in schools across the country, was critical in the early years of the Civil Rights Movement. Although the effects of the ruling were felt across the nation, the roots of the case were grounded in the Topeka community. Several of the judges, attorneys, and research clerks were educated at Washburn School of Law, and had strong ties to the University. Past historiographies have focused on the national implications of the Supreme Court Case, and have overlooked the significance of the individuals’ progressive Washburn Education. The research analyzes oral histories, student newspapers, year books, and other primary source documents from Washburn University’s archives to identify the Washburn's integral role in the historic decision.

# Poster Presentations

3:45 p.m. - 5:00 p.m.

*Memorial Union – Washburn A*

*WTE* Denotes Washburn Transformational Experience

1

## *Building and Calibrating the Kossel Mini 3D Printer*

**Haskell Edward McRavin**

Mentor: Bruce Mechtly, Computer Information Sciences

*WTE*

The Kossel Mini is a 3D printer engineered and programmed completely by the open-source community. The materials needed and the software required are made freely available to the community in an effort to crowd source the development of the project. I built and calibrated a Kossel Mini for the CIS department with a WTE grant in order to continue this tradition. I hope to spur interest in the emerging 3D printer market by demonstrating the operation of this equipment and teaching others to use it. I will demonstrate the operation of the Kossel and explain the kinematics of its movement with a Java application I wrote with Bruce Mechtly that simulates the process of printing.

2

## *Foil Stamping*

**Nicole J. Wilson and Drew Douglas Simons**

Mentor: Michael Hager, Art

Foil imaging is a revolutionary technique used in fine art applications that had been developed at the University of Iowa by Professor Virginia A. Myers. Hot-stamped foil is a process of applying foil or roll-leaf using a combination of heat, pressure, and dwell time to adhere the foil to a wide variety of substrates, including but not limited to: paper, metal, leather, or plastics. The foil or roll leaf is adhered to a plastic film which is then transferred to the substrate during the printing process. The foil is manufactured in a rainbow of metallics, pigments, pearlescents, tin-foils, and specialty products including holograms.

3

## *A Different Approach to Sculptural Ceramics*

**Tyler J. Quintin**

Mentor: Glenda Taylor, Art

My research is on a method of construction for large scale ceramic sculpture. The process involves first modeling the sculpture in its solid form on an armature, then systematically cutting the sculpture apart and reassembling it off the armature. The work will then be slowly dried and fired in the kiln. The project hands on and requires research into armature construction and materials, clay body, and firing methods.

4

***Animal-Assisted Activities in the Hospice Setting***

**Danielle R. Sage**

Mentor: Jane Carpenter, School of Nursing

WTE

It has long been known that animals have a positive impact on our lives. More and more research is being conducted that proves certain animals have a physiological and psychological benefit on a person. One widely accepted term to describe these animal-human interactions is called animal-assisted activities (AAA). Some benefits of AAA are to decrease pain or stress, increase range of motion, or even serve as an “ice breaker” or companion just to name a few (Browder, 2009). These animals have endless value to patients experiencing illness and suffering, especially those near end of life.

5

***The Toyota Gas Pedal Crisis, A Content Analysis of Image Restoration Strategies***

**Andrew Q. Nemmers**

Mentor: Tracy Routsong, Communication

WTE

A content analysis of the image restoration strategies used following the events Toyota Motor Company’s massive recall, beginning in 2009, on what the media termed as “sticky gas pedals.” The recall halted production and sent Toyota Motor Company scrambling to recall and fix defective vehicles. To illustrate the strategies used by Toyota, their own press release website was examined for any mention of the gas pedal recall and then categorized based on Benoit’s image restoration theory. Based on the research, Toyota Motor Company utilized good intentions, bolstering, attack the accuser, minimization, compensation, and mortification strategies in an attempt to restore the organization’s image.

6

***Comparison of Repeat Rate for Diagnostic Radiographs Obtained with Mobile Computed Radiography and Mobile Digital Radiography Systems***

**Lindsey A. Lambert**

Mentor: Barb Quaney, Allied Health

The purpose of the study is to investigate and compare the repeat rate for diagnostic imaging obtained using both mobile computed radiography and mobile digital radiography systems. This study is useful and important because the information gained from the study can be utilized to reduce patient radiation dose, decrease unnecessary medical expenditures, and determine optimal error rates for radiographers in imaging departments. The outcome will be evaluated to determine and implement the best techniques available to increase an imaging departments work flow, improve patient care, and avoid unnecessary expenses for a healthcare center.

## 7

### *Biochemical Analysis of Vegan Egg Substitutes for Baking and Cooking*

**Sheri R. Hanke**

Mentor: Lisa Sharpe Elles, Chemistry

WTE

Eggs are used for thickening, leavening, and binding in baked goods. The lipid and protein content of eggs contributes to these qualities in baked goods. Vegan egg replacers are a decent alternative; however, they do not always produce the same quality end product. The hypothesis was that if two of the vegan egg replacers were combined, an improved end result would be produced. Four different vegan egg replacers-coconut milk, silken tofu, chickpea flour, and agar powder-were tested for protein and lipid content and effectiveness as an egg substitute in a chocolate mousse recipe. Egg replacer combinations were then created to achieve a protein and lipid composition that closely matched that of an egg. Chocolate mousse made with the resulting egg replacer combinations was analyzed for texture, height, consistency, and taste and compared to mousse containing eggs. The best replacer blend could potentially be an improved alternative for eggs in other custards and baked goods.

## 8

### *The Sounds of Clay*

**Elizabeth Alice Sirois**

Mentor: Glenda Taylor, Art

The use of clay ocarinas dates back thousands of years in ancient civilizations ranging from China to Central America, where the ceramic instruments have taken a variety of forms. In this series, I have focused on the sweet-potato style of ocarina to explore how different shapes, sizes and glazing techniques affect the sound that they produce. Each ocarina is tuned to play at least a full major scale.

## 9

### *Alphabet Blocks*

**Asha Rae Slack**

Mentor: Michael Hager, Art

Alphabet Blocks is a steel sculpture that is made up of ten, 6 inch by 6 inch cubes, wrapped up in barbed wire. The cubes were discolored by being thrown into a fire pit. These objects represent repressed childhood memories. These memories could be of a short and troublesome childhood. The objects signify a sense of danger and repulsion.

## 10

### *A Trip to El Salvador: Providing Clean Water and Hygiene Education*

**Jaelyn Ann Ochsner**

Mentor: Jane Carpenter, School of Nursing

WTE

Even in a world with expanding technology and advancements in medicine, there are unfortunately many areas in the world today where people live without access to clean water. This problem is being addressed by an organization called Living Water International (LWI). According to LWI, 783 million people do not have access to an improved source of collecting water for drinking and other purposes. Water sanitary levels have massive implications on health in these communities. The purpose of this project is to focus on one small community and implement a change there. I will be volunteering a week of my time at a community in El Salvador through LWI. There, two different teams will be working on providing sustainable access to clean water located right in their community. A drilling team will provide all the labor to drill a fresh water well and the team I am on will be focusing on hygiene education to assist the community in using this water resource efficiently to decrease the spread of disease. The end goal is to help the community have access to clean water and for the education to assist in improving the health status of the community.

## 11

### *Tim Hortons: Making A True Difference*

**Amanda Kennedy, Kristen Nicole Onions, and Mary M. Ralston**

Mentor: Marsha Carrasco Cooper, Leadership Institute

WTE

As a group, we traveled this past semester to the International Leadership Association Conference in Montreal, Canada and competed in the student case study competition. We created a research paper in response to the case-study prompt provided and then presented our research in an oral presentation in Montreal. The study is as follows: Tim Hortons is a successful Quick Service Industry (QSR) that is extremely well-known and respected in Canada. This QSR has been successful in obtaining customer loyalty and adequate revenue in Canada, but is struggling to gain the same loyalty and success when attempting to expand to different countries. We hypothesized that the success of the legendary Tim Hortons can be evaluated through the key leadership concepts of adaptive leadership, systems thinking, and social responsibility.

## 12

### *Using Astym to Reduce Healthcare Costs Associated with Plantar Fasciitis*

**Jessica Peschel**

Mentor: Zach Frank, Allied Health

WTE

Plantar fasciitis is prevalent amongst individuals in the United States, with over two million acquiring the condition every year (Tong & Furia, 2010). Many of these individuals seek medical help to receive medication and physical therapy to reduce their pain and speed up the recovery process. The influx of patients seeking healthcare has created a great financial stress on third-party payers costing them an average of \$284 million a year (Tong & Furia, 2010). The lack of a



standardized treatment protocol can cause the recovery from plantar fasciitis to be a prolonged experience. The use of Astym, a soft tissue mobilization technique, along with eccentric exercises in the treatment of achilles tendinopathy was found to heal the condition in less time than normally observed (DiGiovanni, Nawoczenski, Malay, Graci, et al., 2006; What is Astym?, 2012). It can be speculated that a decrease in rehabilitation time and healthcare costs for treating plantar fasciitis could be accomplished with a standardized treatment protocol using Astym. Additionally, standardization of treatment protocols for other soft tissue injuries could also prove beneficial.

## 13

### *Nutrition Education for Seniors Receiving Commodity Supplemental Foods*

**Kathryn H. Nasse**

Mentor: Annie Collins, School of Nursing

WTE

There is a high rate of malnourishment within the population of those over the age of 65 who are living independently with an income that is currently at or below the federal poverty level. The United States Census Bureau in 2012 examined the health and nutritional status of seniors found that food-insecure seniors had significantly lower intakes of vital nutrients in their diets when compared to their food-secure counterparts. The goal for the project is to provide materials that will serve to increase the overall nutritional status of those who qualify for senior commodity food supplementation in Douglas County, Kansas. The current program that is administered through Harvesters Inc. does not provide a concise means of educating the program recipients about healthy recipes that can be made with commodity program foods for breakfast, lunch, and dinner in one resource. This educational project will provide sample booklets with simple recipes and nutritional information for the food items that they receive as monthly commodities. The purpose of the project is to provide educational materials that will assist in improving the overall nutritional status of these identified clients who participate in the senior commodity supplemental food program.

## 14

### *Mechanisms of Solvent-Free Reactions*

**Jalen L. Dickson**

Mentor: Stephen Angel, Chemistry

Organic reactions historically have been studied in solution. In recent years mechanically induced solvent-free reactions have been developed to synthesize organic molecules, including pharmaceuticals. Current research focuses on understanding the mechanism behind solvent-free reactions so that conditions can be optimized for new developments. High energy ball mill solvent-free ylide synthesis and the Wittig reaction were studied as a function of atmospheric moisture and the melting point/relative reactivity of the aldehyde. Percent completion of the reactions was determined using quantitative proton nuclear magnetic resonance spectroscopy ( $^1\text{H-NMR}$ ), and comparisons were made to solution phase reactions. It was found that the solvent-free reaction using reactants with higher atmospheric moisture content had the highest percent completion in an open environment. When using the higher melting point/more reactive

aldehydes, the percent completion decreased for the solvent-free reaction and increased for the traditional solution reaction. In summary, in the solvent-free reactions studied, the formation of the melt phase was more influential on reaction progress than the reactivity of the molecules.

## 15

### *Interoperability Between Python and C++ Libraries*

**Tyler W. Wade**

Mentor: Cecil Schmidt, Computer Information Sciences

WTE

Providing access for Python programs to C++ libraries, a process known as binding, is a difficult and tedious task when performed manually by a programmer. For example, the wxWidgets library, a popular GUI toolkit library, contains over 1000 classes that would have to be handled individually. This project seeks to create a tool with which bindings can be automatically generated from a description of the library's API, or application programming interface. Although similar tools already exist - such as SIP and SWIG - they rely upon internal details of the CPython reference implementation. This project does not depend on the specifics of CPython, rather it implements most of the binding code in Python. This allows it to support alternative implementations of Python, in particular PyPy, which is an improvement to the existing tool set.

## 16

### *Coleman Care Transition Intervention: Piloted Inter-rater Reliability*

**Brittany Rygaard**

Mentor: Debbie Isaacson, School of Nursing

WTE

A model based on the Coleman Care Transition Intervention is being implemented in the Topeka area. This project collaboration is between Brewster Place, Stormont-Vail, St. Francis, and Washburn University School of Nursing. The goal of implementing this model is to decrease hospital readmission rates by using "transition coaches" to assist the patients or caregivers in managing and taking responsibility for self-care. The problem is that we don't know how effective or consistent these coaches are being from coach to coach or patient to patient. By piloting a method to assess inter-rater reliability, I will be using a created tool to determine the consistency of the coaches and how effective or similar they are being in their work. I will then follow six different coaches, two visits each, to evaluate them by using this standard tool. The information I gather will be reported back to the main team to determine the consistency of their "transition coaches" and will provide them with information on qualities to look for when hiring new coaches.

## 17

### *Depression in the Elderly: Prevalence, Diagnosis, and Treatment*

**Leanna M. Streit**

Mentor: Marilyn Masterson, School of Nursing

WTE

Depression is a prevalent psychiatric disorder that often presents in late adulthood. The psychosocial stages of development in the older adult may contribute to the prevalence of this diagnosis. Joan Erikson's 9th stage of psychosocial development and Tornstam's theory of gerotranscendence relate specifically to the diagnosis in the older adult population and will be reviewed for further analysis. Because of the complexity of the diagnosis, depression may be misdiagnosed, go undetected, or be overlooked. Antidepressants are commonly prescribed to manage depression, but may not always be the most effective treatment, particularly for the elderly population. This review of literature explores why this is so and recommendations for more accurate treatment. Correct diagnosis of depression and effectively managing its signs and symptoms are important in relation to nursing in that many people with depression have other medical problems. It is essential that depression is managed effectively so it does not hinder recoveries or alter disease processes.

## 18

### *Physical and Psychological Effects of Sleep Deprivation on ICU Patients*

**Sarah N. Hayden**

Mentor: Crystal Stevens, School of Nursing

WTE

Sleep deprivation in the ICU setting is a common concern for critically-ill patients. However, healthcare professionals tend to become desensitized to the critical care environment and merely see sleep deprivation as secondary to needing intensive care. Although there is a large body of research on the negative physical and psychological effects of sleep disturbances, few clinical changes have been implemented. This educational development literature review was performed to promote evidence-based practice in regards to sleep-promoting nursing interventions. The findings from my research will be presented to critical care nursing staff at a local hospital to enhance patient care quality in clinical practice.

## 19

### *Atmospheric Effects on Incoming Solar Electromagnetic Radiation*

**Sean Dalton**

Mentor: Brian Thomas, Physics & Astronomy

I have been using an atmospheric modeling program (TUV) that models the effects of aerosols in the atmosphere as well as physical changes on the Earth. I have been researching these factors and how they affect incoming solar electromagnetic radiation in relative intensity by wavelength. I have been modeling from 280 nm to 700 nm. In the research, I am looking to see how changes in other factors in the program relate to changes in the altitude on the Earth. In my scope, I am limited to the parameters in TUV, but it still provides a good idea of how the atmosphere will

affect UV radiation and other incoming solar emissions. This is an ongoing research project, so not all of my information is available here.

## 20

### *Do Carbonated Beverages Affect Plasma Lactate Levels and Athletic Performance?*

**Bonnie K. McKee, Jessica E. Kopp, and Leah R. Talley**

Mentor: Tracy Wagner, Biology

WTE

Coaches frequently state that athletes should avoid drinking carbonated beverages as they may affect performance. Certainly the effects of drinking soda right before an event (increased stomach pressure, possible nausea) would be uncomfortable and could affect performance, but what about effects at the cellular level? The Wagner lab has studied the effect of increased carbon dioxide on lactate levels in the blood, as well as different measures of athletic performance. In the past, these studies were done by increasing the volume of dead space. This study was done to determine if similar results were seen when subjects were asked to perform endurance type exercises to volitional fatigue after consuming carbonated beverages. Each subject was given the opportunity to ride a bike with increasing resistance levels over time. (50 watts for the baseline resistance, increased by 30 watts every 5 minutes.) Subjects were asked to continue pedaling at a minimum of 60 RPM until they could no longer do so. In analysis, there does not appear to be any significant difference in Rated Perceived Exertion (RPE) values, time to fatigue, and maximum resistance. However, the lactate curve was shifted such that the rise in blood lactate levels is delayed when subjects consumed carbonated beverages.

## 21

### *Studying Interactions of the Herpes Simplex Virus-1 UL34 Protein*

**Samvid S. Desai and Sarah Brdecka**

Mentor: Susan Bjerke, Biology

Herpes Simplex Virus (HSV-1) is a double stranded DNA virus that causes cold sores in and around the mouth of humans. The HSV-1 UL34 protein is necessary for the virus to escape the nucleus during the infection, but the exact function of the protein is still unknown. The UL34 protein was expressed and purified in bacteria and the ability of the GST-tagged UL34 to interact with glutathione-agarose beads was verified. To help determine the role of UL34, we took purified UL34 protein and combined it with cellular proteins. Because the UL34 protein was “tagged”, we were able to pull out UL34 protein and any protein that it had interacted with from the solution. In future, we hope to identify the interaction partners of UL34 and determine their role in helping the virus escape from the cell.

22

***Cancer Survivorship Clinic: A Case Study of Social Support***

**Alexander J. Dinkel**

Mentor: Tracy Routsong, Communication

WTE

I wish to understand how professionals at a cancer survivorship clinics, like the one that I will ask questions to, offer services of social support that will benefit their previous patients, and help them along the long road of a successful survivorship. This will be studied using the theory of social support, as well as the Double ABCX theory on stress and how stress is dealt with and to what degree depending on the patient's level of stress and support needed. This is important to understand because it is believed that no further treatment is needed when patients finish treatment, but in reality there is still much more treatment to be given to patients to help them fully recover from what has happened to them during cancer.

23

***Cloning and Analysis of a Naegleria gruberi Potassium Two-Pore Channel cDNA***

**Michael J. Benfer**

Mentor: John Mullican, Biology

*Naegleria gruberi* is a free-living ameboflagellate that is ubiquitous in freshwater and wet soil. The genus *Naegleria* is well known for its ability to transform between amoeboid, flagellate, and cyst forms depending upon environmental conditions. Analysis of the *N. gruberi* genome indicates the presence of a potassium two-pore channel (K2P) gene. Due to similarities in the stimuli that activate K2P channels and environmental cues that cause *N. gruberi* to transform, this gene was chosen for further analysis. Our hypothesis is that the K2P channel, which is known to respond to change in pH, voltage, and membrane stretch, may play a role in the signaling cascade(s) that contribute to the different amebae transformations. Using the JGI genome sequence information, we designed primers to clone the cDNA of the K2P mRNA into a mammalian expression vector. Sequence analysis of the K2P cDNA reveals a discrepancy with the predicted exon intron borders of the JGI sequence, which might suggest a novel splicing mechanism. Further analysis of the cDNA clone reveals a complete ORF with highly conserved peptide motifs characteristic of K2P channels. Based on protein alignment of known K2P channels, we will present a model of the *N. gruberi* K2P protein and its putative function in *Naegleria*. The cloned sequence will then be used to transfect mammalian cell lines lacking K<sup>+</sup> channels to determine the pH sensitivity of the *N. gruberi* channel via electrophysiology studies.

24

***High Performance Computing Linux Cluster***

**Gregory Yabsley**

Mentor: David Bainum, Computer Information Sciences

Equipment donated to Washburn has been brought together to create a small cluster. The cluster is using a Linux operating system to allow the system to achieve its fullest capabilities. The cluster will be used by the Physics and Computer Information Science departments as a teaching

tool. The physics department will use the system to perform calculations on neutron star densities.

**25**

***Detosylation and Hydrogenation of Cyclic Tosylamines to Form Azamacrocycles***

**Aaron Stadler**

Mentor: Shaun Schmidt, Chemistry

The goals of this research were to detosylate and hydrogenate a library of azamacrocycles with complete characterization of the products of each synthetic step. Tosylated dien, a precursor to the detosylation, was synthesized through tosylation of an amine, allylation, and then ring closing metathesis. The detosylation method used was reduction using sodium amalgam. Detosylation was unsuccessful using this method and it was suspected that the anhydrous reagents used were wet, needing to be replaced. All anhydrous reagents except for the lab created sodium amalgam were replaced; it was then thought that the method of making the amalgam and its storage was ineffective. Future plans are to reattempt detosylation using amalgam made and stored in a manner that is less likely to oxidize.

**26**

***Progress Toward the Synthesis of a Dipyrrolyl- $\alpha,\beta$ -Unsaturated Ketone***

**Hai Ping Sun**

Mentor: Sam Leung, Chemistry

*WTE*

Based on the successful use of porphyrin compounds as photosensitizers in photodynamic therapy (PDT), an expanded oxophlorin is targeted to be synthesized and tested as a photosensitizer. The key precursor to the expanded oxophlorin is a dipyrrolyl- $\alpha,\beta$ -unsaturated ketone. Several approaches (e.g. aldol condensation) have been taken to synthesize this key precursor but without success. Here we report the progress of our current approach using reactions involving a pyrrole enamine and a pyrrole aldehyde. In a test reaction, a pyrrole aldehyde successfully reacted with a simple, nonpyrrole enamine, but the difficulty lies with the synthesis of an enamine from a pyrrole ketone. Further effort goes towards synthesizing this enamine, which will then be used to synthesize the dipyrrolyl- $\alpha,\beta$ -unsaturated ketone.

**27**

***How Large Is Our Government?***

**Salvador Lopez Jr.**

Mentor: Cecil Schmidt, Computer Information Sciences

The size of government legislation has grown since its establishment in 1779. Over time, each bill, act, or law has seen a gradual increase in size as measured in terms of word count or page count. Most recently the Affordable Health Care Act contains over 2000 pages. With an interest to measure the size of government we are developing a software product code named "Cypher". This product scans government websites and law libraries in order to read published bills, acts,

and laws calculating the size of the legislation using word count as the metric. Other features of Cypher include tracking the growth of bills across time. Ultimately we hope that this tool might shed light on the cost of our governmental bureaucracy.

28

***Preferential Grazing of Goats in Prairies Containing *Lespedeza cuneata*.***

**Thomas F. Henderson**

Mentor: Jason Emry, Biology

WTE

Sericea (*Lespedeza cuneata*) is a warm-season, perennial legume with erect, herbaceous to somewhat woody stems and many leafy branches. It is a native of Asia but was brought to the U.S. to control erosion, improve soil, and to provide forage and hay. Sericea has served this purpose but at the cost of native species. Sericea's ability to survive in various native habitats combined with the ability to produce thousands of seeds that can remain viable for up to 20 years in the seed-bank make it an invasive species in this area. Burning, grazing, and herbicides have all been used to remove or stop the spread of this species. This study examined the potential of using goats to curb or destroy the sericea in a replanted prairie. A herd of 120 goats was allowed to freely graze the area from late-June to late September. Preferential grazing was observed ( $\chi^2 = 2, p < 0.0001$ ), with forb species experiencing the greatest amount of damage ( $p < 0.001$ ). The damage between of sericea and grasses were indistinguishable ( $p > 0.8$ ). Taken together, data indicate that goats will not negatively affect sericea in areas with high diversity in which they can choose to graze on native plants. Preliminary data suggest that the presence of other plant species may affect the feeding behavior of goats towards sericea. Further surveys are planned to explore this possibility and to determine if last year's grazing impacts future emergence, growth, and composition of the plant community.

29

***The El Centro Community Health Project: The Impact of Education***

**Dawna K. Leck, Amanda Keeler, Adrienne Paige Hearrell, and Mary Ann Root**

Mentor: Kathy Ure, School of Nursing

WTE

The purpose of this study was to bring to light the importance of education in a medically underserved area such as El Centro. The research was conducted using the COACH Mobile Health Clinic from Washburn University in a central location in the community. A total of twenty-nine participants took part in the study. Based on the findings, it was determined that the majority of the participants were Hispanic, had a genuine concern for their health, and were eager to become more informed about their health concerns. The study concludes that education alone can have a positive impact on health.

30

***Racism: Then and Now***

**Natalie Kay Montney and Abigail Clark**

Mentor: Bruce Mactavish, History

WTE

This project will analyze a broad range of psychological, cultural and historic factors in order to understand racial change over a sixty-year period.

31

***Assessment of Potential Pathogenic Bacteria on Public-Use Computer Keyboards***

**Lynn M. Nguyen**

Mentor: Andrew Herbig, Biology

WTE

Computer usage has increasingly become an important aspect. Public computer labs have become popular, with some computers being used by several people on a daily basis. We hypothesized that computer equipment, especially keyboards, may serve as a reservoir for the transmission of pathogenic microorganisms. To evaluate the presence of potential pathogenic bacteria on public-use computers, a total of thirteen keyboards were sampled from computer labs on the Washburn University campus. Specifically, two keys from each keyboard were sampled based on usage: the 'space' bar (frequent usage) and the 'F12' key (seldom usage). A variety of microbial techniques were used to identify the isolates. Antibiotic sensitivity tests were performed to determine if any of the isolates were drug-resistant. Across all keyboards, the 'space' bar was more likely to harbor bacteria than the 'F12' key, consistent with frequency of use. Among the 38 isolates characterized, we identified vancomycin-resistant *Enterococcus faecalis*, the gram negative enteric *Klebsiella pneumoniae*, *Staphylococcus aureus*, and *Streptococcus salivarius*. This study demonstrates that public-use keyboards can harbor a variety of microbes including some important human pathogens. Routine disinfection of keyboards will prevent the spread of these pathogens among patrons of public computer labs.

32

***Influence of Host Selection Behavior on the Spread of the Cowpea Weevil, Callosobruchus maculatus***

**Cheyenne Bartz**

Mentor: Rodrigo Mercader, Biology

Models predicting the spread of invasive species generally consider the spread of the invasive in terms of local demography and dispersal, and how those two interact. However, the influence of differing foraging behaviors is not well understood even though they can significantly impact dispersal. Predicting the spread of newly founded populations requires the ability to assess the organismal traits influencing dispersal. Because the larvae of many plant feeding insect species are sessile, adult host-plant preference defines the larval habitat and strongly affect dispersal. For this reason host plant preference is expected to be under high selective pressure and likely to shift as populations encounter new environments. Here we use populations of the bean beetle, *Callosobruchus maculatus*, raised for over 40 generations on the preferred host of the ancestral



population (mung beans) or a marginal host of the ancestral population (chick peas) to test for differences in host-preference and dispersal. Specifically, we tested the ovipositional behavior and dispersal of each population. Ovipositional behavior was tested using four choice and no choice assays including two marginal hosts (lentils and chick peas) and two high quality hosts (mung beans and black eyed peas) of the original population. Dispersal was tested in interconnected arenas containing one of three different hosts: mung beans (preferred host), black eyed peas (secondary host), and chick peas (marginal host).

### 33

#### *Music and the Movement*

**Paige Elizabeth Miller**

Mentor: Mark Peterson, Political Science – Geography

WTE

During the civil rights movement, many political advocates came in the form of musical artists. Songs held hidden political slogans that promoted blacks to exercise their human rights. I will examine the different songs and songwriters whose music gave many people the drive to push for equality.

### 34

#### *Reported Calorie Expenditures Recorded from the Wii Fit and Oxycon Mobile: A Comparative Study*

**Levi Keller**

Mentor: Paul Wagner, Biology

WTE

The Wii Fit<sup>®</sup> is an active game platform produced by the Nintendo<sup>®</sup> Corporation. During preliminary use of the game, we observed that the reported caloric expenditure from the gaming platform did not vary during various stepping rates in the aerobic free step program. We sought out to collect data comparing the reported caloric expenditure from the Wii Fit<sup>®</sup> to the data calculated by oxygen consumption measured by the Oxycon<sup>®</sup> Mobile from CareFusion for twenty minutes at slow and fast step rates. Additional data was collected regarding the subject's heart rate, weight, height, and relative perceived exertion. Analysis of our results indicated that the Wii Fit<sup>®</sup> over estimated the subject's caloric expenditure, and the program uses weight of the participant to determine an approximate caloric expenditure. Smaller subjects had less variation from the data reported by the Wii Fit<sup>®</sup>, whereas larger individuals had greater variation from the reported data. Additionally, caloric expenditure reported over the twenty minute stepping period was constant for the Wii Fit<sup>®</sup>, and varied significantly for the Oxycon<sup>®</sup>. Faster rates resulted in slightly increased heart rates from the slow data, but resulted in an increase caloric expenditure that brought the Oxycon<sup>®</sup> data near, but not identical, to the Wii Fit<sup>®</sup> data.

35

***Creating Transgenic Flies for Understanding the Function of the Various Domains of Moleskin in Muscle Attachment and Maintenance***

**Jacob F. May**

Mentor: Takrima Sadikot, Biology

Motility in *Drosophila melanogaster* is reliant on the exact and highly regulated formation of the myotendinous junction (MTJ) which is a complex process that requires inter-cellular signaling and myofiber migration. Moleskin (msk) is an important protein expressed at the site of the muscle and tendon attachment and is crucial for the formation and function of the MTJ. It has been shown that mutations or deletions in msk affect MTJ formation and can lead to failed muscle attachments. The goal of this project was to produce transgenic flies in order to determine which domains in msk are necessary for the proper formation and upkeep of MTJ. This will be accomplished through a series of crosses using balancer stocks to incorporate msk mutations in *Drosophila melanogaster* that do not express endogenous msk. The larvae and embryos from the msk mutants will then be analyzed for muscular defects.

36

***Colorimetric Detection of Lead (II), Nickel (II), and Copper (II) Ions Using Gold Nanoparticles***

**Teresa Chui**

Mentor: Seid Adem, Chemistry

WTE

Heavy metals are a part of the ecosystem. They are found in the Earth's crust. Heavy metals enter the environment as a waste produced by industrial manufacturing processes. These heavy metals are non-biodegradable and they bio-accumulate which is a problem for the biological system in humans. In high concentrations many of these are carcinogenic and toxic and in lower concentrations they typically cause organ failure or developmental problems. The severity that heavy metals cause has led to the development of different analytical techniques such as atomic absorption spectroscopy, atomic fluorescence spectrometry, inductively coupled plasma mass spectrometry, and electrochemical sensing platforms for their detection. Although accurate in the detection of heavy metals, these techniques are costly, time consuming, and require specific instrumentations. The current method we are exploring is a simple colorimetric analysis using gold nanoparticles. Label free gold nanoparticles were synthesized using an established method. Nanoparticles were tested for their stability in various pHs. Furthermore, the gold nanoparticles have been used as colorimetric probes to detect heavy metals such as lead (II), nickel (II), and copper (II) in aqueous solution.

37

***Synthesis, Characterization and Application of Gold Nanoparticles as Colorimetric Probe for Melamine Detection in Milk and Milk Powder***

**Keith Wagers**

Mentor: Seid Adem, Chemistry

WTE

A simple and sensitive colorimetric gold nanoparticle probe for detection of melamine in milk products was developed by the reduction of Au(III) salt with sodium citrate. This method is simple and does not involve any surface modification of the nanoparticles or the milk samples used in this study. This cost-effective technique allows for rapid and sensitive on-site detection of milk samples tainted with melamine. This technique is based on the fact that the optical properties of gold nanoparticles depend on distance between particles. Gold nanoparticles are aggregated in a neutral media in the presence of melamine in milk sample; this causes an easily measurable change in the absorption spectrum of the particles, which can be monitored with the naked eye or UV-Vis spectrometer. Here, the color of gold nanoparticles changed from wine red to blue in the presence of melamine and no color change was observed before melamine was introduced into the milk sample. The observed color change is the result of the coupling of the surface plasmon resonance (SPR) between particles in close proximity. This method is also sensitive and so far preliminary data has shown detection limits of 0.46 ppm in powdered infant formula can be achieved. This detection limit is below the current safety limit of 1 ppm set by the World Health Organization. Similar results were found in whole milk and skim milk with suggestions that even lower detections limits are possible for all.

38

***Development of Quantitative PCR Techniques to Assess Expression of Metal Uptake and Ribosome Biogenesis Genes in Bacillus subtilis***

**Mollyanne Gibson**

Mentor: Andrew Herbig, Biology

WTE

MgtE is a magnesium transport protein in *Bacillus subtilis*. DeaD is a ATP-dependent RNA helicase that is a putative ribosome assembly protein in *B. subtilis*. The ability to quantify expression levels of DeaD and MgtE in different growth conditions is desirable to understand the function of these proteins. We developed a procedure to extract total RNA from wild type *B. subtilis*, reverse transcribe the RNA, and use the cDNA in qPCR for the quantification of mgtE and deaD expression levels. This technique was used to study expression levels of mgtE at high and low magnesium growth concentrations. The mgtE gene was highly expressed when *B. subtilis* was grown in low magnesium conditions compared to expression in high magnesium conditions. The methodology will allow us to further investigate the role of these genes in *B. subtilis* physiology.

39

*Photolithography on Ceramics*

**Mavis G. Meyer**

Mentor: Glenda Taylor, Art

This collection of pieces is the latest in a series of works that explore the relationship between classic and modern. Modern arts like photography are blended with more antiquated arts like ceramics. Classicism humanizes modernism while contemporary techniques add expression to antiquity. The use of a nude model for the photographic imagery is a nod to the idealistic nudes of antiquity. However, the use of a pregnant female, the poses and angles at which the photographs were taken suggest a more modern perspective. This series of work was born of the same researched photolithography technique used on two-dimensional tile from a previous series. With this collection more thought was put into the ceramic surface. Larger prints were used as well as a whiter clay body, along with curving the two-dimensional slab to give the image a more sculptural appearance. The same glaze was used in both series because of its sepia toned appearance, which adds a more modern element the ceramic surface.

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