Metropolitan State University of Denver's 5th Annual

UNDERGRADUATE RESEARCH CONFERENCE

A Symposium of Scholarly Works and Creative Projects

April 22, 2016

8:00 am - 5:00 pm

North Classroom Atrium

UNDERGRADUATE RESEARCH CONFERENCE

A SYMPOSIUM OF SCHOLARLY WORKS AND CREATIVE PROJECTS

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A Service-Learning Experience Through Metropolitan State University of Denver

FIFTY YEARS OF TRANSFORMING LIVES 1965 2015 METROPOLITAN STATE UNIVERSITY OF DENVER

Registration and conference details at tinyurl.com/MSUDenverURC

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Undergraduate Research Program Mission

The URP at MSU Denver seeks to engage students and faculty in meaningful and rewarding research experiences and projects thereby promoting active, engaged, experience-based learning. Students participating in undergraduate research gain a deeper understanding of their field and are more prepared for jobs requiring creativity and exploration as well as graduate and professional schools.

The URP promotes, supports, and celebrates faculty and student engagement in undergraduate research activities. The URP defines undergraduate research as:
Scholarly and creative endeavors accepted within one's discipline as activities contributing to the body of knowledge in one's field. Undergraduate research seeks to examine, create, and share new knowledge or works in ways commensurate with practices in a particular discipline. Undergraduate research projects involve student-faculty collaboration in the form of either student initiated projects overseen by a faculty mentor or faculty initiated projects involving students as integral members of a research team. Undergraduate research projects include a dissemination component wherein the results and outcome of the work are shared with a broader scholarly/creative community in some form. This definition includes the four tenants of undergraduate research: mentorship, originality, acceptability, and dissemination.

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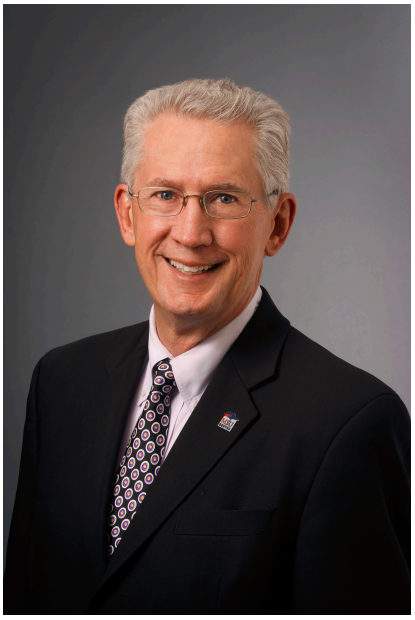
METROPOLITAN STATE UNIVERSITY℠ OF DENVER

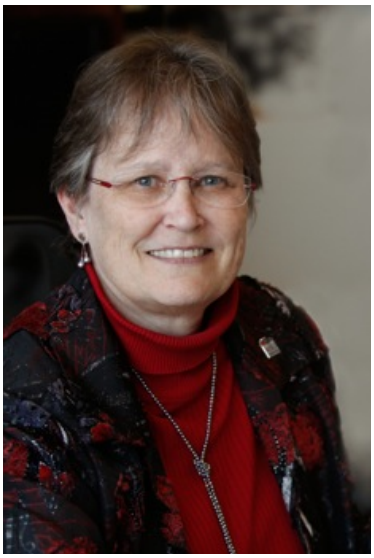


For the past 50 years, Metropolitan State University of Denver has been transforming lives. Through our quality academics, we provide diverse opportunities in the classroom, in a laboratory setting, and in our surrounding communities. We facilitate the pursuit of knowledge so that we may contribute to our fields of study and to those around us as well.

At MSU Denver's 5th Annual Undergraduate Research Conference: A Symposium of Scholarly Works and Creative Projects, this transformation is showcased on numerous levels. By engaging in undergraduate research, you are developing essential skills relevant toward the pursuit of a particular trade or graduate school program; additionally, because many of our graduates remain in Colorado, you are bolstering the livelihood of our amazing state. The work showcased at this year's Metropolitan State University of Denver's Undergraduate Research Conference: A Symposium of Scholarly Works and Creative Projects truly highlights the diversity offered at MSU Denver and the transforming experience of undergraduate research.

Congratulations to each student presenting a research project, to each faculty member who mentored students on those projects, and to everyone in attendance for engaging in discussions about the phenomenal projects conducted at MSU Denver. It, truly is, a great day to be a Roadrunner!

Stephen M. Jordan, Ph.D.
President



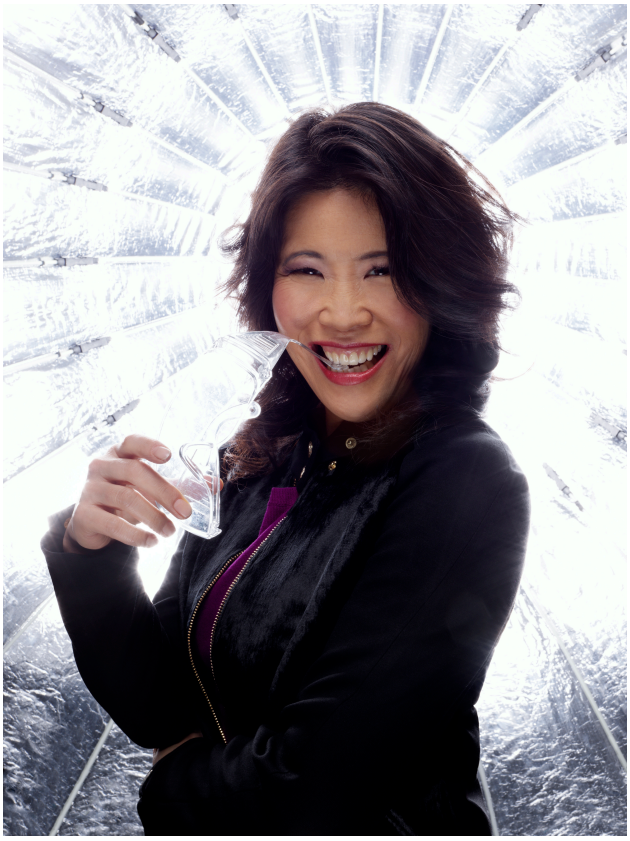
I welcome you to the 5th Annual Metropolitan State University of Denver Undergraduate Research Conference: A Symposium of Scholarly Works and Creative Projects with utmost enthusiasm! This conference showcases the innovation, dedication, and breadth of expertise of our students and faculty. MSU Denver is devoted to engaging our students in the passion of lifelong learning and the pursuit of knowledge; we are committed to providing inspiration through opportunities in the classroom, laboratory setting, and in the community so that our students contribute not only to their diverse fields of study, but also to their surrounding communities and abroad.

Today, we have the opportunity to observe the extraordinary efforts of our students and faculty, and to become inspired by their presentations. Perhaps some of us will even be motivated to become invested in future research endeavors. My thanks to MSU Denver's Undergraduate Research Program, which "lives" within the Applied Learning Center, and all of the dedicated faculty and staff who helped to organize and ensure the success of this wonderful event.

I also thank each and every one of you who has participated in undergraduate research this year and I applaud those of you whose work has culminated into the presentation that you are giving today.

Sincerely,
Dr. Vicki L. Golich
Provost and Vice President for Academic & Student Affairs

Keynote Presentation



Dr. Wendy Suzuki

Wendy Suzuki, Ph.D. is a Professor of Neural Science and Psychology at New York University. Her research focuses on two main questions. First, she is interested in understanding how our brains allow us to learn and retain new long-term memories for facts and events. Second, she is interested in understanding the effects of aerobic exercise on our learning memory and cognitive abilities. Wendy is a recipient of numerous grants and awards for her research including the prestigious Troland Research award from the National Academy of Sciences and NYU's Golden Dozen Teaching award. She is also passionate about supporting women in science. Her first book entitled "Healthy Brain, Happy Life" was published by Harper Collins in May of 2015.

Conference-at-a-Glance

8:15 am-3:30 pm: Conference Participant Sign-in
North Classroom Building- Atrium
Light refreshments will be provided in the morning

9:00-10:15 am: **Conference Session I**
Oral Presentations- North Classroom
Room 1322: Humanities/Social Sciences
Room 1323: Humanities/Social Sciences
Room 1324: Natural Sciences
Room 1325: Technology

Poster Presentations Session I (9:30-10:30 am) – North Classroom Atrium

10:30-11:45 am: **Conference Session II**
Oral Presentations- North Classroom
Room 1316: Humanities/Social Sciences/Professional Studies
Room 1322: Humanities/Social Sciences
Room 1323: Humanities/Social Sciences
Room 1324: Natural Sciences
Room 1325: Humanities/Social Sciences

Poster Presentations Session II (11:00-12:00pm) – North Classroom Atrium

12:15 pm Lunch
Turnhalle, Tivoli Student Union

12:45-1:45 pm Keynote Speaker: Dr. Wendy Suzuki
Healthy Brain, Happy Life

2:15-3:15 pm: **Conference Session III**
Oral Presentations- North Classroom
Room 1316: Panel on Secondary Lesson Planning for Diverse Classrooms
Room 1322: Humanities/Social Sciences/Hospitality
Room 1323: Humanities/Social Sciences
Room 1324: Humanities/Social Sciences/Mathematics
Room 1325: Humanities/Social Sciences

Poster Presentations Session III (2:15-3:15 pm) – North Classroom Atrium

3:30-4:30 pm: **Conference Session IV**

Poster Presentations Session IV (3:30-4:30 pm) – North Classroom Atrium

Acknowledgements

We would like to extend our thanks and appreciation to the following offices and individuals for their contribution to the success of the conference.

Applied Learning Center Staff
Auraria Library (especially Lorrie Evans)
MSU Denver Alumni Relations
All Volunteers
The Writing Center
Session Moderators
MSU Denver Career Services
Keynote Speaker: Wendy Suzuki
Elizabeth Kleinfeld
Studio M Class

Special thanks to Jessica Ellerbrock for designing the poster for this year's conference. We would also like to thank Scott Surine for enlisting his Studio M class in the development of poster designs.

Undergraduate Research Grant Recipients

Vlonjat Alija
Matthew Coughlin
Stephen Cowperthwait
Jessica Daniel
Tim Erickson
Lisa Fetter
Cynthia Forsythe
David Harper
Jena Jacobs
Susan Jett
Nicholas Kuehl
Katherine Ludeman
Samantha Marazita
Ricky Martinez
Evan Morrison
Mallory O'Connell
Faye Olsgard
Alicia Payne
Joshua Pedrick
James Richardson
Elizabeth Shields
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Moderator Coordinator

Dr. Sheryl Zajdowicz (Biology)
Salina Blea, M.A. (Applied Learning Center)

Scheduling/Conference Program

Dr. Sheryl Zajdowicz (Biology)
Salina Blea, M.A. (Applied Learning Center)

Presentation Abstracts

(*listed alphabetically by primary student's last name)*

Incorporating Blind and Low-Vision Students in Chemistry Laboratories

Winta Abraham – Biology

Coauthor: Ebony Miller

Faculty Mentor: April Hill

Students with blindness or low vision (BLV) are often excluded from the chemistry laboratory due to safety concerns. However, hands-on experimentation is a key component of any chemistry curriculum. This presentation introduces a range of adaptive technologies, from low-tech alterations to high-tech commercial equipment, which allow BLV students to obtain their own quantitative data through hands-on experimentation. A BLV-compatible experiment, adapted from the Vernier Chemistry Laboratory Manual, is also presented. A student with low vision performed the experiment and provided informal feedback, which will be used to improve the adapted procedure. Once effective BLV-compatible experiments have been developed, they will be evaluated using IRB-approved pre- and post-surveys to determine whether they were effective in improving the students' understanding of the concepts and laboratory practices involved. The long-term goal of the project is to produce a BLV-compatible version of the Vernier laboratory manual so that teachers can effectively incorporate BLV students into their chemistry laboratory courses. This will ensure that BLV students with an interest in chemistry are not turned away by a lack of equal access to the laboratory.

(Oral Presentation, Session I 9:00-9:15 AM, NC Room 1324)

Water Quality Monitoring in Lower Bear Creek

Stephen Aderholdt – Biology

Coauthors: Rachel Hansgen,

Faculty Mentor: Rebecca Ferrell

Lower Bear Creek (LBC) is an urban waterway that flows through the southwest Denver metropolitan area for about 8 miles, from Bear Creek Lake dam in Lakewood to its confluence with the Platte River in Sheridan. This waterway is used extensively for recreation including fishing and swimming. The U.S. Environmental Protection Agency (EPA) has placed LBC on its list of impaired waterways due to unacceptable levels of *Escherichia coli*, an organism that indicates possible sewage contamination. Sewage in the waterway is of obvious concern due to the risk of fecal-to-oral transmission of pathogenic microorganisms. Groundwork Denver is a non-profit organization that is committed to monitoring and community organizing in an effort to clean up LBC within EPA's mandated time limit. Undergraduate research students in our lab collaborate with Groundwork and EPA to assist with sampling and analysis using culture-based and molecular biology approaches; in the summer samples are analyzed at the EPA Region 8 lab, and in winter all analysis is carried out at Metro State. Water is monitored for physical characteristics (e.g. temperature, conductivity, estimated flow rate) and *E. coli* is measured with Idexx quantitrays using ColiLert medium. DNA is isolated from samples for molecular analysis. After nearly 3 years of data collection, trends in *E. coli* levels have emerged. There is a strong correlation between pollution levels in LBC and socioeconomic indicators in the surrounding community. We are investigating the hypothesis that aging infrastructures, especially poorly maintained septic tanks, may be a significant contributor to this problem.

(Poster Presentation, Session I (9:30-10:30 AM), Poster #1)

TRANSitions

Eliza Albin– Psychology

Faculty Mentor: Cynthia Erickson

Interviews with transgender (trans) people have become an increasing phenomena in American media. Some of these interviewers tend to ask highly personal questions that seem to have no place in a professional interview. This study looks at the frequency of those intrusive questions, and if similar questions are asked of gay, lesbian, bisexual (LGB), and the control group, heterosexual cis gender (people who are not transgender) individuals. The study is a qualitative look at videos with adult interviewees that can be found on the internet. For each interview with a trans person there is a corresponding interview with an LBG interviewee and a heterosexual cis gender interviewee. The rhetoric of the interviews was analyzed to see if there were intrusive questions like asking about a person's genitals. Additionally, the study looked at whether the interview included discussion about relevant social issues, and whether the purpose of the interview was because the person was not heterosexual or cis gender. The questions were then broken down into eleven topic that we were looking for. The study found that interviews with trans people contained more of the questions that the study was looking for. The questions occurred at a rate of twenty two to eighty nine percent more in interviews with trans individuals than in interviews with LGB people, while interviews with LGB people had the questions occur only approximately ten percent more than in the interviews with the control group.

(Poster Presentation, Session I (9:30-10:30 AM), Poster #2)

Mitochondrial Gene Order in *Pyrgulopsis bruneauensis*

Vlonjat Alija – Biology

Faculty Mentor: Hsiu-Ping Liu

The purpose of this research project is to determine the gene order of the mitochondrial gene in, *Pyrgulopsis bruneauensis*. It is known that gene order changes frequently in the Phylum Mollusca. Gene order can be used to solve higher phylogeny in snails. The first part of research project focuses on the location and order of the genetic information coding for the proteins, Cytochrome c oxidase subunit I (COI) and II (COII), part of the electron transport chain in the mitochondria. Since DNA is double stranded structure there can be only four possible combinations where the gens coding for COI and COII are located, and each possible location can be determined based on a combination of primers for both genes. The combination of the forward primer for COI and the reverse primer for COII works for P. *bruneauensis*, suggesting the side-by-side order for those two genes. The second part of this research project focuses on the relative location of the genes coding for the proteins NADH dehydrogenase subunit I (NDI) and Cytochrome B (CytB). The same logic applies. The combination of forward primer for NDI and reverse primer for CytB worked, suggesting NDI and CytB are side-by-side. Currently, my research focuses on amplifying the entire mitochondrial genome in two pieces using long polymerase chain reactions based on sequence data obtained from my earlier results.

(Poster Presentation, Session I: (9:30-10:30 AM), Poster #3)

Investigation of Protein Expression Profiles in Patients with Meningioma

Kinda Alquatli– Biology

Coauthors: Anthony Fringuello

Faculty Mentor: Xiaoli Yu, Michael Graner, Sheryl Zajdowicz

Meningioma is a brain tumor that surfaces from the meninges and may grow inward causing compression on the brain and spinal cord, or enlarge outward causing the skull to thicken. The purpose of this study is to develop techniques to evaluate the levels of total protein and immunoglobulin G (IgG) in the sera of Meningioma. Bicinchoninic Acid Assay (BCA Assay) was used to measure total protein concentrations, and Enzyme-linked Immunosorbent Assay (ELISA) was applied to determine the levels of total IgG antibody. A total of 40 Meningioma and 20 control samples were studied. Sera samples were treated with water at 65°C or diluted with PBS (untreated) at room temperature. To determine the effect of temperature, we also compared the total protein levels in samples stored at 4°C and -80°C. We found that a significantly higher levels of total protein in all samples stored at 4°C compared to that of freshly thawed, indicating the process of protein degradation. Importantly, we show that in freshly thawed samples, there are significantly lower levels of total protein and IgG antibody in sera of patients with meningioma compared to healthy or inflammatory controls. Further studies are needed to investigate the key individual proteins with altered levels of expression and related molecular mechanism in the disease. Determination of protein and IgG concentrations in meningioma may provide strategies for biomarker identification

(Poster Presentation, Session II (11:00 – 12:00 PM), Poster #1)

Phylogenetic and Taxonomic Clarification Between Cave Snails: *Antrobia*, *Holsingeria,* and *Preatodrobia* in the Southwest Region of North America

N. Leticia Anaya– Biology

Faculty Mentor: Hsiu-Ping Liu

This study intends to use specific DNA fragments resolving phylogenetic relationships of three cave snails from the family *Hydrobiidae*: *Antrobia*, *Holsingeria* and *Preatodrobia*. It is difficult to determine relationships based on morphological characters in cave snails due to reduced morphology. Thus mitochondrial ribosomal gene (16s) and nuclear ribosomal genes (18s and 28s) will be used to study relationships. Not much is known about these cave snails, especially the relationships between cave and non-cave snails.

(Poster Presentation, Session II (11:00 – 12:00 PM), Poster #3)

Taxonomic Clarification of the Species Status of the Yaqui Springsnail (*Pyrgulopsis stearnsiana*)

Caitlin Babbitt– Biology

Faculty Mentor: Hsiu-Ping Liu

This project has clarified the species status of the Yaqui Springsnail (*Pyrgulopsis stearnsiana*). *Pyrgulopsis stearnsiana* is endemic to central coastal California, from Sonoma County to Monterey County. Clarification of the species distinctiveness and geographic distribution of *P. stearnsiana* is

important to ongoing efforts to conserve and manage this species in California. *P. stearnsiana* residing in this area have previously been thought to be one species, however recent molecular data and isolated drainage systems suggests multiple species may actually exist. Genetic analysis was used to determine the species of snail from different locales and to generate phylogenetic trees, which show evolutionary relationships between similar species. The cytochrome c oxidase subunit-1 and NADH dehydrogenase subunit-1 of *P. stearnsiana* specimens from 19 locales were amplified, sequenced, and analyzed. The genetic analysis comprised of comparing sequence data from the 19 locales to sequence data from the type locality. The analysis also included generating phylogenies to determine whether specimens not matching the type locality belong to an existing species or constitute their own unnamed species. Results of the genetic analysis confirmed populations of true *P. stearnsiana* and identified three locales containing genetically unique and previously unidentified species. This clarification of the species status of *P. stearnsiana* and the determination of their geographic distributions will aid in identifying conservation priorities for protecting these endemic species and their freshwater habitats.

(Poster Presentation, Session III (2:15 - 3:15 PM), Poster #1

A New Efficient Method of Polymerase Chain Reaction for Snail Samples

Caitlin Babbitt– Biology

Faculty Mentor: Hsiu-Ping Liu

Polymerase chain reaction (PCR) is a widely used technique used to extract and amplify a target sequence of DNA. PCR is used daily by a wide range of professionals for medical diagnostics, crime scene analysis, and in this case snail identification. The main ingredients in a polymerase chain reaction include nucleotides, oligonucleotide primers, DNA template, and a heat resistant DNA polymerase. The DNA template is typically extracted from tissue cells from the organism of interest via a lengthy process. DNA extraction in snails typically takes three days due to the high mucus quantities that must be removed and the high inhibitory protein levels found within the cells. VersaTaq Direct PCR Polymerase is a mutant Taq polymerase that is resistant to common transcription inhibitors including many inhibitory proteins. This mutant DNA polymerase allows for direct PCR amplification from whole snail tissue samples. Using the VersaTaq Direct PCR Polymerase, target sequences were amplified from whole snail samples eliminating the lengthy DNA extraction procedure. Furthermore, different target sequences were successfully amplified using the previous PCR product as template. Further investigation into the limits of VersaTaq Direct PCR polymerase is needed, however preliminary results indicate it is a much more effective method for extraction and amplification of target sequences in snails.

(Poster Presentation, Session I (9:30 – 10:30 AM), Poster #4

Comparative Analysis of Repeated DNA Sequences and Antibiotic Resistance of *Escherichia coli* from Known Animal Sources

Laura Baldridge – Biology

Faculty Mentors: Rebecca Ferrell

One of the biggest challenges in maintaining public water quality is the mitigation of fecal contamination. Numerous pathogens are present in human feces, and, thus, prevention and eradication of contamination are major public health concerns. Under current guidelines, levels of human sewage contamination are assessed by testing water samples for fecal indicator bacteria, especially *Escherichia coli*, which is found

as a commensal in the gut of many animal species. An inherent problem with using fecal indicator bacteria is that the source of the contamination is not readily known, as *E. coli* is not specific to humans. Source typing and strain analysis allows for assessment of public health risk, which is greatest from human-derived feces, and can provide valuable information for remediation and future prevention of contamination. The purpose of this study was to analyze and compare *E. coli* isolates from known animal sources. *E. coli* isolates were obtained from fecal samples collected from the following animals: dog, cat, Canada goose, raccoon, squirrel, deer, opossum, cow, horse, and western grouse. Different repetitive sequence polymerase chain reaction (rep-PCR) methods are being analyzed and evaluated for the presence of genetic markers that may distinguish between *E. coli* isolates from different animal sources so they may be differentiated from human-source *E. coli*. Resistance to commonly used antibiotics is also being analyzed for each isolate in hopes of observing patterns that may be useful to this differentiation.

(Oral Presentation: Session I 9:15-9:30 AM, NC Room 1324)

Variations between Urban and Rural Lake Water Quality

Bryan Balducki – Environmental Science

Coauthor: Clayton Oughtred

Faculty Mentor: Randi Brazeau

The purpose of this project is to identify the differences between rural and urban lakes in the Denver area and foothills to the west. Why a lakes water quality might be poor or healthy helps in restoring and maintaining these water storages for public use as well as the health of ecosystems. This research also clarifies the effects of urbanization on lakes. pH, temperature, nitrogen, phosphorus, *Escherichia coli*, and conductivity will be measured to assess a lake's health. The measurements will be taken directly at the four lakes being tested. Equipment such as a thermometer, pH meter, conductivity meter, nitrogen tablets, phosphorus tablets, and e-coli tablets will be checked out prior to collecting samples and analyzing of such samples. Sloan's Lake and Standley Lake (urban lakes) are to be contrasted versus Echo Lake and Lake Dillon up in the mountains. Echo Lake is located off of the intersection between CO 103 and CO 5 which is just south of Idaho Springs. Lake Dillon is located on the southern side of I-70 as one passes through Frisco. Standley Lake is close to Kipling St. and 88th Avenue in Westminster while Sloan's Lake is by Sheridan and Colfax Avenue. Samples are to be collected during spring turnover to ensure proper mixing of the lake.

(Poster Presentation, Session III (2:15-3:15 PM), Poster #2)

Attitudes and Opinions About Issues Affecting Your Generation

Bryana Barkate – Psychology

Coauthors: Laura Blackmond, Jessica Francavilla, Michaela Hughes, Nicole Mancini

Faculty Mentors: Lesley Hathorn

The objective of this study was to assess whether participants who sat facing a mirror and participants who sat facing away from a mirror responded incompatibly when presented with questions concerning moral behavior (The Defining Issues Test) and the abbreviated Right Wing Authoritarian Scale. Research suggests that the presence of a mirror acts as a deterrent to socially undesirable behavior (i.e., dishonesty, condemnation, and obliviousness). However, for those predisposed to aggression and narcissism, a mirror may function as an exaggerator of combative and deplorable behaviors. Participants were randomly

assigned to either face the mirror or face away from the mirror to answer the two sets of survey questions (The Defining Issues Test and the Right Wing Authoritarian Scale). Preliminary results of this study revealed that the majority of participants identified as Stage 4: Law and Order Orientation (the individual recognizes that the law is absolute and social order must be preserved). No apparent differences exist between experimental and control groups in relation to the abbreviated Right Wing Authoritarian Scale. However, nearly all participants scored low in Traditionalism, demonstrating a low degree of compliance to the traditions and social conventions that are favored by society and its authorities. One-third of participants scored high in Conservatism and Authoritarianism. The former indicating a high degree of obedience to establish and lawful authorities and the latter indicating an overall aggressiveness targeted at nonconformists and outgroups. Furthermore, all male participants scored high in Authoritarianism, and, conversely, all female participants scored low in Authoritarianism.

(Oral Presentation, Session I 9:00-9:15 AM, NC Room 1322)

The Introduction of a Technology Center at Westwood

Maria Barraza – Civil Engineering Tech

Faculty Mentor: Aaron Brown

The purpose of this research project was to help the marginalized community of Westwood by the introduction of new appropriate technology. The population of Westwood is predominantly Hispanic and overwhelmingly poor. The majority of its residents live at or below poverty level. Westwood is a neighborhood located in the western edges of Denver. Several steps have been taken to help this community and its population who are in desperate need of help and improvement. The idea during this research was to continue helping the community, finding more innovate and interesting ways of development. The goal was to help the population in this area by introducing a community center that would offer access to technology training and makers' spaces. The development of the community center brought the opportunity to many individuals to express creativity through the makers' space and offered technical training opportunities that might improve their capacity for jobs and encourage future education. To ensure success, research was conducted to investigate similar successful projects related to the development of community centers and makers' spaces. Based on the research, best practices were adapted in this project, complemented with new and improved ideas to guarantee success. Community surveys in the area were conducted as well, to better understand how the center could be directed to better serve this particular population. The community center will be created and designed based on previous information. Always looking for ways of improvement to make the creation of this community center and makers' spaces a success.

(Oral Presentation, Session I 9:00-9:15 AM, NC Room 1325)

Did the Legalization of Marijuana Increase the Number of Homeless People Living in Shelters in Denver?

Josette Barraza – Criminal Justice & Criminology

Coauthor: Brittany Parker

Faculty Mentor: Rebecca Trammell

For this project, we interviewed representatives from eleven homeless shelters in the Denver area to see if they experienced an increase in the number of homeless clients since the legalization of marijuana in 2013. Representatives from eight shelters claimed that they saw an increase in homeless clients. According to the rosters/sign in sheets presented by three interviewees, they saw an increase of 15-30%.

Representatives stated that they see an increase in young, white, male clients who are trying to get into the marijuana business. In other words, they know the increase is tied to marijuana because that is what their new clients are telling them. However, they claim that this increase did not cause any property or violent crime in or around their shelters. Instead, they claim that public smoking is harming their clients who are trying to maintain sobriety. Also, the increase in clients is depleting their resources. Finally, there is a concern that drug testing will increase the number of homeless people as employees fail urine tests and lose their jobs. More studies are needed to examine the increase of homelessness in the state of Colorado as well as other social problems tied to the marijuana industry.

(Poster Presentation, Session II (11:00-12:00 PM), Poster #20)

Determination of Trace Metals in Brown Trout Roe from Georgetown Reservoir

Brenna Birt – Chemistry

Faculty Mentor: Gary Farmer

A method has been developed over the last two years that uses Inductively Coupled Plasma-Mass Spectrometry (ICP-MS) to determine trace amounts of metal in fish tissues. There was a correlation found between metals in the water and in the fish tissue samples. The *Salmo trutta*, or brown trout, was collected from Clear Creek, upstream of Georgetown reservoir. The reservoir is downstream of the Silver Plume mining district. Tissue samples from this trout were digested and analyzed by Flame Atomic Absorption Spectroscopy (AA) and ICP-MS for trace metals. In addition, roe samples were collected, digested, and analyzed by the same methods. This poster presents the results of the roe analyses in comparison to the tissue analysis. The metal determined to have the highest concentration was zinc through AA. Other metals found were copper, nickel, and potentially cadmium. An odd correlation was that the concentration of metals was 3-100 times greater in the roe samples in comparison to the tissue samples.

(Poster Presentation, Session I (9:30-10:30 AM), Poster #23)

Nonlinearity, Bifurcations, and Chaotic Dynamics in the Belousov-Zhabotinsky Reaction: An Independent Investigation

Julia Blackmon – Chemistry

Faculty Mentors: Michael Jacobs and Kamran Sahami

Oscillating chemical reactions were first discovered and characterized in the 1950s and 1960s by Russian biochemists Boris Belousov and Anatol Zhabotinsky. They are incredibly prevalent phenomena in nature—a large and growing body of research has shown that their mechanisms and mathematical dynamics can be used to understand the rhythms of heartbeat, cardiac fibrillation, bacterial and biofilm growth, tumor metastasis, the changing colors of autumn, cyclic biochemical processes, and an overwhelming wealth of other naturally occurring phenomena. While there are dozens of known oscillating reactions, the Belousov-Zhabotinsky reaction (commonly abbreviated to BZ reaction) is a robust and canonical example of an oscillating reaction; its ability to display transient spatiotemporal chaos is the focus of this project. Through literature review, phase plot analysis, and Fast Fourier Transform of experimental UV-Vis spectroscopy data, we show that spatiotemporal chaos is truly present in the BZ system and that the oscillations are the result of a Hopf bifurcation. Furthermore, an optimized

procedure for running BZ reactions in the laboratory was devised and reaction evolution was documented in detail with high-resolution time lapse photography.

(Poster Presentation, Session III (2:15 - 3:15 PM), Poster #20)

Expertise and Visual Memory

Julia Blackshear – Chemistry

Faculty Mentors: Cynthia Erickson

The present project seeks to address the question, "Does expertise have an impact on developing a larger capacity for visual memory?" In their famous experiment, Craik and Tulving (1975) demonstrated that memory for things we understand (semantic encoding) are better than memory for information we have only processed superficially. In that study however, subjects were tested for memory of words not pictures. In previous research, expert chess players remembered a chessboard better than novice chess players (Chase & Simon, 1973); however; radiologists did not have better memory for radiographs than control participants (Evans et al., 2011). To resolve this issue, we will examine memory for visual images in individuals with backgrounds in art and anthropology. Participants will be shown a slideshow of 100 color photographs. Photographs of bones and paintbrushes will be intermixed with the control images. For each image participants will be asked, "Do you remember this image?" and answer yes or no on a machine-readable data sheet. After the slide show, participants will be asked a series of trivia questions. Performance on the trivia questions will be used to categorize participants as experts in the areas of anthropology or art. Specifically, we expect that art students will have better memory for pictures of paintbrushes and anthropology students will have better memory for pictures of bones. A better understanding of visual memory will allow us to create effective methods for applying visual memory techniques as a teaching tool.

(Poster Presentation, Session II (11:00 – 12:00 AM), Poster #28)

My Love was Lost

Emerald Boes – Art

Faculty Mentor: Natascha Seideneck

My Love Was Lost is a creative-based project to represent the human condition after the loss of a loved one. Through my own experience and the experiences of others, this project will use photography and writing to create a collaborative artistic community. The purpose of this collaborative is to begin a discussion about each personal experience of bereavement and how they are all unique. With this project, I hope to find the connection between art and the healing expression of the grief that comes with bereavement. Art has been a therapeutic tool for psychologists since the late 18th century, either through the patient's creation or analysis of art. This practice can be helpful to visualize and discuss emotions of grief and loss of a loved one when verbalization fails. The grieving process is never over, but through creative collaboration, a community can be formed to explore art's connection with the grieving process. Through the use of photography and writing, an importance will be placed on the positive effect that art and creativity has on grief from the loss of a loved one.

(Poster Presentation, Session I (9:30-10:30 AM), Poster #13)

Which Historical Malaria Vector Lives in Colorado? *Anopheles freeborni* or *Anopheles hermsi*, or Both?

Tariq Bouaichi – Biology

Coauthors: Alissa Bonetti and Michael Weissman

Faculty Mentor: Robert Hancock

In North America, the historical malaria vector mosquitoes *Anopheles* (*Anopheles*) *freeborni* and *An*. (An.) *hermsi* are cryptic species that exhibit indistinguishable morphology. Past research has suggested that *An. freeborni* was not present in Colorado (CO), but *An. hermsi* was. *Anopheles* spp. were collected during 2014 and 2015 in CO2-baited CDC mini light traps from 8 collection centers within 5 (of the 7) state-wide river drainages. Species identification was performed using PCR-based species-diagnostic assays and confirmatory DNA sequencing. Contrary to previous studies, *An. freeborni* was present, but only found in the South Platte River Basin (SPRB) in the northeastern part of the state. Conversely, *An. hermsi* was not present the SPRB, but was present in the other 4 river basins tested: Arkansas River Basin (SE CO), San Juan Dolores River Basin (SW CO), Gunnison River Basin (Southwest Central CO) and the Colorado River Basin (Northwest Central CO). Because *Anopheles* are relatively rare in light trap collections our sample sizes were limited. We propose for the future more targeted Anopheles sampling to better elucidate the biogeography of *An. freeborni* and *An. hermsi* in the state. The second internal transcribed spacer (ITS2) of ribosomal RNA displays quantitatively different base pair (bp) segments of DNA between the morphologically indistinguishable *Anopheles* species *hermsi* and *freeborni* when run through a PCR-based species-diagnostic assay.

(Poster Presentation, Session III (2:15-3:15 PM), Poster #3)

Universal Health Care: How a Single System Would Improve Health and Reduce Costs in the US

Ryan Boyle – Integrative Healthcare

Faculty Mentors: Jeffrey Helton and Emily Matusewicz

The cost of health care in the United States has been rising consistently for decades. This rise in cost may be viewed as an acceptable increase to account for inflation, but these elevated expenses have led to a massive debt shared among citizens. In fact, the United States spends twice as much as its next competitor. Despite this high expenditure, the health of its citizens continues to decline due to increased prevalence of preventable chronic illnesses (i.e. diabetes, obesity, heart disease, etc). Systematic review of health care systems in other countries and state policies within the country has indicated that a shift towards a single-payer universal care plan would reduce cost and increase efficiency. From that body of research, it has been determined that additional resources could be allocated to preventive medicine sectors, like primary care, to enhance the quality of life and health of the US population. It is suggested that utilization of other non-invasive lifestyle changes like diet or complementary and alternative medical therapies would provide more cost-efficient treatments as well as increase the number of treatment options that a patient could choose from -- a way to provide autonomy while simultaneously revoking it. This work is meant to depict our urgent need to change the US health care system to a single payer system that utilizes a portion of its savings to engage more patients in preventive health care modalities.

(Oral Presentation, Session II 10:30-10:45 AM, NC Room 1316)

Application of an RT-PCR TAQMAN Assay to Examine the Impact of Pool Size and Epidemiological Zone Size on Vectorial Indices for the Mosquito *Culex tarsalis* in Colorado

Sarah Bradlaw – Biology

Coauthors: Juliana Flemming and Alyssa Stanley

Faculty Mentors: Robert Hancock and Sheryl Zajdowicz

West Nile virus (WNV) is an extreme threat to both wildlife and humans in Colorado; in 2014 alone, there were 118 human cases in addition to numerous equine and avian cases. For much of the state, surveillance and control is based on weekly trapping of the principle mosquito vector *Culex tarsalis* within specific and typically large "Surveillance Zones" (often defined by County, municipality, etc.) followed by virus determination in pools of 50 mosquitoes. Control, as implemented by evening spraying of insecticides, is then justified according to a calculated Vectorial Index (VI) based on an estimated proportion of the mosquito population infected. We propose that by reducing both zone sizes (more accurately defining natural populations) and mosquito pool sizes that we will produce higher resolution data on WNV activity in the state and, more importantly, more informative and accurate vector indices. In this on-going study, we have utilized a TAQMAN reverse transcription polymerase chain reaction (RT-PCR) assay to identify WNV in positive controls and are presently assaying pools of 10 *Cx. tarsalis* from selected traps deployed in 2014 within a smaller defined area within the Longmont, Colorado Surveillance zone.

(Poster Presentation, Session III (2:15 - 3:15 PM), Poster #8)

"The War has Come to Help the Poor Negroes" – Enslaved Americans, The Enlightenment and Slave Insurrection in the Time of Revolution

Robert Brehm– History

Faculty Mentor: Shelby Balik

The common practice when studying the American Revolution is often focused upon figures such as Jefferson and Washington and their interaction with Enlightenment thinking, leading them to rebel in a war of liberty against the British Crown. Instead, the purpose of this project is to re-examine the Revolutionary Period in the United States and its relationship to Enlightenment thinking, but through the perspective of the enslaved peoples living in the colonies before the outbreak of and during the war.
This research and its conclusions are demonstrated by examining primary sources including letters, court documents and diaries left behind by both white and enslaved non-whites. These sources come from all angles of the Revolutionary War including wealthy white slave-owners, soldiers fighting for the American cause, British military leaders, religious figures, representatives of slaves in court and black loyalists who ended up fleeing the colonies upon the British defeat. Through this documentary evidence, it can be determined how these Enlightenment ideas became pervasive and fully comprehended even in the largely illiterate communities of enslaved peoples in the colonies. These ideas of freedom, liberty and equality were then applied to the conditions of servitude in which these Americans lived in and caused them to view the war as their own struggle for human rights. Thus it is demonstrated that the actions of enslaved Americans during the Revolutionary War lead to the conclusion that the war was not only a colonial fight for independence, but also the largest slave revolt in North American History.

(Oral Presentation, Session I 9:00-9:15 AM, NC Room 1323)

Determining Whether Extra Small, Small, or Medium/Large Family Size Influences Purchase Behavior for Organic Foods in Participants from the 2009-2010 NHANES

Maggie Brown – Human Nutrition-Dietetics

Coauthors: Raquel LaBriola, Jennea Tobin, Helena Gallegos, Kari Schoen

Faculty Mentor: Melissa Masters

Purpose with Research Question: Production and purchase of organic foods in the United States has increased since the 1980's, reaching nearly 5 percent of the total food market in 2014. Driving factors include the perceived health benefits for consumers, farmed animals, and the environment. Current research investigates the varied levels of certain nutrients in organic foods, while others explore behavioral motivations behind the purchase. The purpose of this study was to explore the relationships between family size and the likelihood to purchase USDA-labeled organic foods.

Methods: The data set used for this review included 5,876 participants from the 2009-2010 National Health and Nutrition Examination Survey cycle. Participants were categorized into three family sizes: extra small (1-2), small (3-4), and medium-large (5+). Prevalence of the likelihood to purchase organic foods and frequency of various organic food purchases were examined for the entire sample and for family size categories.

Results: Extra small families were most likely to purchase organic food items (44.36±2.07%) while medium-large families were least likely to do so (35.19±2.58%). For the entire sample, the most frequently purchased item was organic eggs (24.98±1.50%) while organic baby food (5.22±0.72%) was the least frequently purchased.

Implications: Overall, the study revealed that the likelihood to purchase organic foods decreases as family size increases. In order to mitigate this imbalance in nutrition-related consumer behavior, more research is needed to understand the perceived health benefits and the availability of organic foods to all households.

(Poster Presentation, Session I (9:30 – 10:30 AM), Poster #20)

Noise Exposure in Everyday Environments, Occupational, and Recreational

Andrew Burleson – Speech Language & Hearing Sciences

Faculty Mentor: Jessica Rossi-Katz

Noise induced hearing loss (NIHL) secondary to occupational and recreational sources is a common and preventable source of damage to the auditory system. Both sound level and duration of exposure affect susceptibility to auditory insult; these were explored using a dosimeter (Etymotic ER-200WD8).
Sound exposure levels were measured in a variety of everyday situations including during sleep, varied musical scenarios including rock and jazz concerts at local venues, amplified rock during rehearsal, and daily exposure averages in an office, a college classroom, and a busy restaurant. Listening profiles of two individuals were collected. The dosimeter was configured with a 70 dBA threshold, 85 dBA/8 hour criterion and a 3-dB exchange rate (National Institute for Occupational Safety and Health recommendations). Results are presented according to daily nose dose by type of listening environment. Additionally, noise exposure during sleep will be presented with sleep diary data including quality and

quantities of sleep. We frame daily exposure findings against levels that may cause noise induced permanent threshold shift (NIPTS) and therefore potential hearing loss as a function of different listening environments.

(Poster Presentation, Session II (11:00-12:00 PM), Poster #15)

Oppressed Bodies: Scientific Isolation, Dissection, and the Suppression of Community in Moby-Dick

Emily Butler-Probst – English

Faculty Mentor: Craig Svonkin

This study explores Herman Melville's depiction of madness in Moby-Dick and the way he uses madness to critique individuals who privilege excessively detached forms of observation over interpersonal, and multicultural contact. Some scientists used this detachment to obsessively catalog human racial diversity, objectifying the human beings they were studying. Excessive objectivity presents the dangerous potential for individuals to treat others merely as tools for satisfying their intellectual curiosity, a potentiality that is displayed in Captain Ahab. While several theorists have explored the symbolism behind Ahab's demise, and others have looked at the connection between Ahab's mannerisms and excessive rationality, this study combines both pursuits with historical information about nineteenth century perceptions of madness in order to argue that Melville's exposure to writings on madness helped to shape his portrayal of an excessive, isolated pursuit of objectivity as a form of mental illness. Melville uses a rational variety of madness to depict Ahab as a strategic thinker who uses his crew as chess pieces to help him destroy Moby-Dick. As Ahab isolates himself and exploits those around him, he personifies an obsessed scientist who dissects diversity rather than embracing it and allows his desire for intellectual discovery to overshadow his connection to humanity. This lack of interpersonal connection ultimately destroys Ahab along with the people that he has exploited. Melville's depiction of Ahab captures his concern with detachment that objectifies others in the search for truth but also suggests that Melville was partially drawn to the same certainty that Ahab desires.

(Oral Presentation, Session II: 10:30-10:45AM, NC Room 1323)

Understanding the Birth Weight Gap: Healthy Food Access for Women of Color

Lizeth Caldera – Psychology

Faculty Mentor: AnnJanette Alejano-Steele

Previous studies have shown health disparities in pregnancy outcomes in the U.S., whereby infants born to women of color are typically lower in birth weight than infants born to white women. Most research on birth weight disparities has focused on socioeconomic factors, such as education and income, to explain this birth weight gap. Although these studies have helped shed light on the birth weight disparity there is much more we can learn from examining different socioeconomic factors. This paper considers nutrition and healthy food access as main contributors to birth weight outcomes. The cost and access to healthy foods for women of color living in Denver, Colorado is also examined.

(Oral Presentation, Session II: 10:30-10:45, NC Room 1322)

Relationships Between Attitudes, Knowledge, and Experiences with Stutterers and Bullying Involvement

Ashley Cambria– Speech Language & Hearing Sciences

Faculty Mentor: Cheryl Sanders

The current study sought to investigate attitudes about people who stutter (PWS), knowledge about stuttering, and familiarity with PWS. In addition, the potential relationship between these variables and involvement with bullying was investigated. One hundred fifty-one undergraduate students (58 males, 93 females; mean age = 23.70 years) enrolled in Introductory Psychology completed online surveys assessing traditional bullying experiences, cyberbullying experiences, attitudes about PWS, perceived knowledge about stuttering, familiarity with PWS and other demographic variables. Face-to-face bullying was measured by the Olweus Bully/Victim Questionnaire (Olweus, 1993), while cyberbullying was assessed utilizing the Cyberbullying and Online Aggression Survey (Patchin & Hinduja, 2015). The Public Opinion Survey of Human Attributes – Stuttering (POSHA-S) (St. Louis, 2011) was administered to measure attitudes, perceived knowledge, and experiences with PWS. Results from a 2 (male vs female) X 2 (bully vs non-bully) multivariate analysis of variance (with dependent variables being attitude about stuttering, experience with stuttering, perceived knowledge about stuttering, and bullying victimization) revealed a significant difference in perceived knowledge about stuttering. Individuals reporting high levels of bullying indicated significantly lower perceived knowledge about stuttering than did participants with low tendencies to bully. In addition, bullies experienced significantly higher levels of victimization compared to their non-aggressive peers. Lastly, a significant interaction was found with regards to experiences with stuttering. Males who do not bully reported significantly more experiences with stutterers than did female bullies and male and female non-bullies. These findings support the importance for educational outreach regarding the topic of stuttering.

(Poster Presentation, Session III (2:15 - 3:15 PM), Poster #4)

Writer, Publish Yourself!

Willow Laurie Chandler – English

Faculty Mentor: Lisa Suter

The purpose of this research is to identify the resources creative writers need to self-publish, and equip them with the skills to succeed. This research is primarily derived from professionals in the independent publishing industry, as well as from third party data that identifies trends in the broader publishing industry. Professionals in the industry provide firsthand knowledge of the most advantageous avenues to self-publication and understand proficiencies required to become an accomplished independent writer. As the publishing industry becomes more dynamic and diverse, third party data serves to advise the writer to prioritize their target means for self-publication.

(Oral Presentation, Session I 9:15-9:30, NC Room 1323)

Community Gardens as a Resource for SNAP Recipients

Daniel Clark – Land Use

Faculty Mentor: Sarah Schliemann and Sara L. Jackson

This research looks at the spatial relationship between SNAP recipients and community gardens in the Denver Metropolitan Area in order to assess their usefulness as a supplement to the SNAP Program. SNAP benefits may be used to purchase seeds and plants for growing food. This may help to provide more nutritious food to SNAP recipients, however many SNAP recipients lack a yard in which to grow their own food. Community gardens could help to alleviate this problem, but these gardens present their own obstacles. SNAP recipients might not have transportation to the gardens, or may not have time to work their plot. This research uses the geographic location of 150 Denver Urban Gardens and SNAP data (S2201) from the American Community Survey 2014 5-year estimates in order to understand where community gardens lie in relation to SNAP recipients. This research also looks at RTD bus stop data (2016) to assess garden accessibility from the RTD network. Spatial patterns were analyzed with ArcMap 10.3. Clustering of SNAP recipients was determined with Moran's I spatial autocorrelation, this determined regions of high density. Farms that fall within these regions are of interest to this research because they are the most accessible. Accessibility to the RTD network was determined by distance to the nearest stop. This research is useful to policy makers interested in understanding how to improve nutrition accessibility to low income regions of Denver, and anyone interested in how community garden can be used a community service.

(Oral Presentation, Session I 9:30-9:45 AM, NC Room 1324)

Design, Construction, and Implementation of a Low Cost Zebrafish Housing System

William Clarke – Environmental Science

Coauthor: Travis West

Faculty Mentors: Vida Melvin

Zebrafish (*Danio rerio*) have become an important model organism in the biological sciences, ranging from developmental biology and genetics to studies of toxicology and drug development. The zebrafish genome shares significant homology to that of humans making them a relevant model for analysis of human disease. However, compared to other vertebrate models, zebrafish are relatively cheap and easy to care for. High water quality is a leading factor to maintenance of a healthy fish colony and successful breeding. Important considerations are water temperature (28.5oC), pH (7.5), dissolved O2 (6.0ppm), and minimal ammonia and nitrate levels. The design of our system is based on preexisting, established housings used in other research facilities that has been modified and improved to meet the specific requirements of our research. The apparatus makes use of recirculating water pumped through a network of custom-fit valves, tubes, and manifolds, which provides water to multiple housing tanks. Several stages of filtration (biological, UV, and mechanical) are in place for reduction of ammonia and potential pathogens. We also designed and implemented a unique water return system that provides filtration of particulate waste from the housing tanks and recirculates the water into the system. This custom housing system mimics the capabilities of commercial housing systems costing upwards of $15,000 at a fraction of the cost (~$2,000). Our system is currently operational and we are performing preliminary test to analyze water quality test and the health and fecundity of the fish housed on the system.

(Poster Presentation, Session II (11-12:00 PM) Poster #29)

Water Quality Changes in a Zebrafish Housing System as the Biofiltration Progresses as an Indicator of Biofilm Health

William Clarke – Environmental Science

Faculty Mentors: Randi Brazeau

Excellent water quality is the main factor of success and long term maintenance goal in a healthy fish colony. Water quality goals include; a temperature of 28.5 degrees Celsius, a pH of 7.5, dissolved oxygen of 6.0 ppm, and trace ammonia and nitrate levels. To acquire this goal a healthy and robust bio-filtration consisting of nitrifying bacteria must be in place. This study can be important in helping to identify the characteristics of water quality in new plumbing by identifying if bio-films are a persistent problem. Using a newly built zebrafish housing system and a control replicate, the progress of the bio-filtration in comparison to water quality will be monitored. Monitoring will be executed by measuring Total Organic Carbon, Total Nitrogen, and bacterial count using the Heterotrophic Plate Count in addition the aforementioned water quality standards for comparison. Collection of water will be taken from areas of the greatest residency time of the water such as the tanks and sump. Collection of bacteria samples will be taken from the sump and from exposed PVC in the drain system to the sump. Using a two sample T-test, analysis of healthy bio-filtration vs water quality will be determined once a large statistically significant sample size is acquired.

(Poster Presentation, Session III (2:15-3:15 PM) Poster #29)

Correlating Metals in Brown Trout Tissue to Metals Measured in the Colorado Mountain Stream Waters They Live In

Matt Coughlin – Environmental Science

Faculty Mentor: Gary Farmer

Many Colorado mountain streams and rivers are impacted by historical mining. Clear Creek is one of those streams. Approximately 50 miles west of Denver, Clear Creek flows through the historic Silver Plume mining district and then through Georgetown, and Georgetown Reservoir on its way to Denver. We were given a female brown trout by a fisherman who caught the fish from Clear Creek just upstream of Georgetown Reservoir in mid-November 2015. Using an inductively coupled plasma-mass spectrometry (ICP-MS) analytical method we have been developing for the last 2 years, we were able to identify several metals in 5 replicate fish tissue samples. Zinc, copper and manganese were found in low levels in the fish tissue samples. These metals were also found in Clear Creek water samples collected in November 2015 and March 2016. The levels of metals found in this brown trout are substantially lower than found in a rainbow trout collected from Georgetown Reservoir in 2014. The lower levels of metals found in the female brown trout may be related to it being caught during spawning season and having put much of its energy into egg production.

(Poster Presentation, Session IV (3:30 – 4:30), Poster #1)

Design, Construction, and Testing of a Small Homopolar Spot Welder

Stephen Cowperthwait – Mechanical Engineering Tech

Coauthors: Matthew Marcotte and Michael Li

Faculty Mentor: Devi Kalla

Resistance spot welding is a manufacturing process that uses a pulse of electrical energy to heat and fuse metal work pieces between electrodes. Existing spot welders with the ability to store energy typically do so with capacitors. By designing, building, and testing a full-scale prototype, this project will study the effectiveness of a spot welder using kinetic energy storage via a rotating flywheel. By rotating within an axial magnetic field, a conductive flywheel and shaft act as a homopolar generator, which enables the extraction of high current pulses of electrical energy from the system in exchange for flywheel momentum. While homopolar resistance welding has been studied within the industry specific lens of pipeline welding, these devices and resulting studies are on an industrial scale. Specifically, this project intends to evaluate the effectiveness of a small homopolar spot welder designed to operate from a 115 VAC, 20A power outlet. By destructively testing weld sample strength, sample welds will be examined and tested across a variety of sample thicknesses. Comparing this to published welding thickness capabilities of commercially available spot welders will indicate the relative abilities of the small homopolar spot welder. It is anticipated the energy storage and spot welding capabilities of such a welder will exceed the capabilities of commercially available 115 VAC, 20A spot welders. While small spot welder technology has readily adopted capacitive discharge based systems, the industry has not yet realized the energy storage advantages possible for pulsed power applications by using homopolar generator based systems.

(Poster Presentation, Session I (9:30 – 10:30), Poster #5)

An Examination of Significant Tornadoes Across the High Plains

Tyler Croan – Meteorology

Faculty Mentor: Sam Ng

The majority of the tornadoes that occur in the High Plains tend to be relatively short lived and weak. While significant tornadoes are rare across the high plains, they do occur in this region and pose a significant risk to an area of increasing population density. As the population of the High Plains continues to expend, the threat presented by significant tornadoes in the region will only continue to increase. The purpose of this study is to examine and determine thermodynamic conditions that are associated with the occurrence of significant tornadoes in the High Plains Region of the continental United States. To achieve this research, a database of derived soundings from the Rapid Update Cycle model will be used to determine the mean values for thermodynamic parameters associated with significant tornadoes. These calculated mean values will then be compared to the values of thermodynamic parameters associated with the occurrence of significant tornadoes across the United States, in order to better understand the High Plains environment that is conducive to the occurrence of significant tornadoes.

(Oral Presentation, Session II 11:15-11:30AM, NC Room 1324)

Home Brew System

Colby Dalman – Mechanical Engineering Tech

Coauthors: Zach Kaes, Zach Baumann, Kevin Youngling, Barrett McConnell

Faculty Mentor: Devi Kalla

There are an estimated 1.2 million home brewers living in the United States, most of whom brew in rudimentary ways. For our project we have elected to fabricate a 10 barrel home brew system which will incorporate temperature controls and pumps to make the brewing process easier for home brewers. Creating a consistent flow rate and heating the liquid at precise temperatures are arguably the most important aspects to brewing, therefore our goal is to make these two problems completely controllable which allows for a much easier process. Our project also incorporates a heating method which is rarely used in home brew systems sold commercially. The system will use microcontrollers to control the submersible heating element allowing for a uniform heating of the liquid instead of a centralized burn like propane heating inflicts. The system will also involve two pumps which will move liquid throughout our kettles at an even pace. This will help eliminate human error as well as make the process less strenuous for the home brewer. The system, once manufactured, will be able to regulate kettle temperatures to hover within a few degrees. This will make the process easier as well as making it consistent. Consistency is a very important aspect when dealing with a homebrew system and almost impossible to control without the controllers incorporated within this system. The home brewing industry is growing exponentially every year. With this system home brewers will have a reliable and user friendly product that will make brewing at home much easier.

(Oral Presentation, Session I 9:15-9:30 AM, NC Room 1325)

Optimization of Electrochemical Biosensors for Medical Applications

Jessica Daniel – Chemistry

Faculty Mentor: Andrew Bonham

Electrochemical biosensors are able to detect target proteins, such as botulism and ricin toxins, in small concentrations with reliable results. Although these rationally designed biosensors perform well in buffered media under lab-based conditions, this is insufficient for real world diagnostic performance. Thus, the goal of this research project is to develop biosensors that are able to function with both small sample volumes and in complex media, delivering rapid and accurate analysis. Through optimization of surface passivation, pretreatment chemicals, surface protection / filtering, and creating software analysis front-ends, we will design biosensors that are successfully able to function in complex media, such as undiluted blood and serum, and deliver rapid, clear results. This will enable the biosensors to be utilized in industrial fields and as point-of-care diagnostic sensors.

(Poster Presentation, Session II (11:00 – 12:00 PM), Poster #18)

Examining Variables Related to Cognitive Reappraisal

Jennifer DeLange – Psychology

Coauthor: Holly A. Hickman, Kelsie S. Howell, Liliana Alvarez, Dillon R. Slagle

Faculty Mentor: Lisa Badanes

Cognitive reappraisal, the strategy of reframing a situation in order to minimize the emotional impact, is a component of emotion regulation. The current study aimed to identify race, depression, emotional contagion, and mindfulness as potential predictors of cognitive reappraisal. Cognitive reappraisal lowers depressive symptoms by modifying the trajectory of the emotional response (Troy et al., 2010). It is also associated with overall wellbeing (Haga et al., 2009). Additionally, emotional contagion occurs when emotions are unintentionally transferred from person to person (Neumann & Strack, 2000). Emotions can influence mindfulness, an awareness of both internal and external experiences while simultaneously maintaining open-mindedness towards those experiences (Cardaciotto et al., 2008). Previous research suggests that mindfulness can increase a sense of acceptance and minimize the impact of negative emotions (Igna & Stefan, 2015). In the current study, participants were 201 Introductory Psychology students, 62% female and 69% White. Predictors of cognitive reappraisal were measured by analyzing participant responses to questionnaires. Independent samples t-tests were used to examine race differences in cognitive reappraisal, with non-White participants showing higher levels of cognitive reappraisal, $t(182) = 2.07$, $p < .05$. A linear regression model accounted for 32% of the variance in cognitive reappraisal. Individuals who were lower in depression, higher in emotional contagion, and higher in mindfulness scored high in cognitive reappraisal. The current study demonstrated that scoring lower in depression, higher in emotional contagion, and higher in mindfulness awareness predicts cognitive reappraisal. Discussion will utilize these findings to speculate on ways to increase cognitive reappraisal use.

(Poster Presentation, Session I (9:30 – 10:30 AM), Poster #6)

Who's Out There: Integration of Stationary Point Counts and Conservation Photography to Assess Reef Fish Biodiversity

Caitlin Dempsey – Biology

Coauthors: Kimberly Richard, Lance Olson, Michelle Norden

Faculty Mentor: Robert Hancock

In the face of declining coral reefs due to human impacts, periodic assessments of "reef health" have been implemented. Conventional scientific methods include standardized fish counts executed in defined areas on randomly selected reefs by trained SCUBA divers. These counts rely predominantly on in situ identifications of fishes by the divers with adjunct photography being performed for unknown fishes. Examined in this study was the utilization of underwater photography and fish counts with intentions to enhance representation of the biodiversity in demersal reef fishes. We coupled stationary point count surveys in designated 10 M cylinders with free roaming photography to compare measurable indices of biodiversity between openly fished areas, and ecologically similar no-take preserve areas within the Florida Keys National Marine Sanctuary. The availability of high quality digital photography and videography conjoined with high capacity memory storage enabled a visual census to be catalogued in a greater capacity than past methods allowed. Preliminary results indicate differences in biodiversity between openly fished and the preserved reefs.

(Poster Presentation, Session II (11:00 – 12:00 PM), Poster #4)

Establishing Kinetics of Gringard Reactions

Chancery Denbrook – Chemistry

Faculty Mentor: Russell Barrows

In most chemical reactions the intermediates or transition states largely control the outcome of chemical reactions. The project we're presenting was designed to develop hands-on/inquiry-based laboratory exercises that demonstrate this basic principle of chemistry that is often overlooked or ignored by students. It is critical for students to understand that intermediates and transition states control the outcome of most chemical reactions in order for them to accurately predict the outcome of chemical reactions. To investigate this important attribute of chemistry the following project is measuring initial rates of reactions of phenyl magnesium bromide and a variety of esters to quantitatively show how intermediate states control the overall outcome of the Grignard reactions. The following presentation reports on our progress to measure several different types of initial reaction rates of intermediates in the reactions of Grignard reagents and esters. The first step was to develop a reliable analytical method for the measuring of reactions products. The analytical method that showed the greatest accuracy and reliability was the Internal Standard method. Concentrations of consumed starting materials and reaction products are being determined by integrating the Total Ion Current (TIC) chromatogram of each analysis and verifying the identity of each peak using MS spectroscopy. Reactions are being run in thermally jacketed reaction vessels, which allow for running Grignard reaction of interest at different temperatures.

(Poster Presentation, Session III (2:15 – 3:15 PM), Poster #28)

Assessment of the Antimicrobial Efficacy of Tooth and Gums Tonic on Common Oral Microbiota

Arielle Dening – Biology

Faculty Mentor: Sheryl Zajdowicz

Due to the harshness of and sensitivities to strong alcohol-based mouthwashes, the dental industry and consumers have shown an increased interest in naturally antimicrobial oral care products. Tooth and Gums Tonic (TGT) by the Dental Herb Company is an alcohol-free mouthwash that contains essential oils and plant extracts and claims to reduce harmful oral bacteria while promoting gingival health and healing. This study evaluates the antimicrobial efficacy of TGT against four common strains of oral bacteria: *Streptococcus mutans*, *Streptococcus salivarius*, *Streptococcus sanguinis*, and *Lactobacillus casei*. Cinnamon, which is one of the main ingredients in TGT, has documented antimicrobial effects; therefore, we predict that TGT will be effective against these oral bacteria. Additionally, this study also aims to determine the individual or synergistic efficacy of the various TGT ingredients. Representative bacteria were plated onto Brain Heart Infusion agar plates and were exposed to TGT or the individual essential oils that comprise TGT. The results suggest that TGT and its essential oils may be a viable alternative to antiseptic and antibacterial compounds to which sensitivities exist. Ongoing analysis will focus on TGT's efficacy against biofilms, which are found more often in the human oral cavity than separate and distinct strains of bacteria.

(Poster Presentation, Session I (9:30 – 10:30 AM), Poster #24)

Interpreting *Drosophila* Embryogenesis Through a System of Differential Equations

Robin DeVries – Biology

Faculty Mentors: David Ruch and Vida Melvin

Morphogens are a class of diffusible molecules that pattern whole tissues and multi-cellular structures in developing embryos. Drosophila melanogaster, the common fruit fly, has a multi-nucleated embryo that allows for large-scale diffusion of morphogens. Using laboratory data, I have crafted a system of partial differential equations in order to model the interactions between morphogens that establish the anterior-posterior axis of the fruit fly. Assuming a steady-state solution, I use both the diffusion equation and a hill-type nonlinearity to recreate the predicted trajectory of the solutions. Using Euler's Method, I approximate a numerical solution to the system.

(Oral Presentation, Session II 11:00-11:15 AM, NC Room 1324)

Automated Control Systems in Aquaponics, Improving the Filtration and Usage of Aquarium Nitrogen and pH

Joseph Dogue – Mechanical Engineering Tech

Coauthors: Thien Bui, Ionel Ticu, Bipesh Tuladhar

Faculty Mentor: Devi Kalla

Aquaponics produce organic vegetation and fish in a system that later will be used as a source of food once the population is regulated. Aquaponics is the combination of growing plant and fish in one closed, fully self-sustaining ecosystem to provide a source direct form of nourishment to small or large community settings. This projects system will address all five engineering question statements. Current aquaponic systems do not have a sustainable aquatic environment that is resulting in shortened aquatic lifespan. The project will follow a project management methodology, which contains five-process groups that include: initiation, planning and design, execution, monitoring and controlling, and closing. This project will develop an automated monitoring system, which will accurately determine the nitrogen, and pH levels of the nutrient enriched solution released by the aquatic life. Proper monitoring of these chemical levels will ensure optimum plant growth within the system. The heart of the system will be conducted within a microcontroller and nitrogen sensors, which will determine if the solution is within specified ranges of 5.5-7.5 on the pH scale. Having a system such as this enables users to have the ability and flexibility to maintain and monitor an aquaponics system for a period of time without the need for human interaction.

(Poster Presentation, Session III (2:15 - 3:15 PM), Poster #5)

Mule Deer and White Tail Deer Habitat Density and Population Density in Chatfield State Park

Thomas Duff – Biology

Faculty Mentor: Christopher Cooley

Historically mule deer (*Odocoileus hemionus*) and white tail deer (*Odocoileus viginianus*) have occupied different areas in which was considered their home ranges. Mule deer were generally found in the western

portions of North America spanning as far north as Canada and as far south as Mexico, while white tail deer generally occupied the eastern portions of North America spanning from Canada to the southern United States. Since their decline in the 1990's deer populations have begun to increase in size and range. Human populations, along with urban sprawl have also continued to encroach on *O. hemionus* and *O. viginianus* habitats and increased pressures on populations. This has led to the hypothesis that the two species of deer, living sympatrically within an area, must compete for resources and habitat. I used quadrat sampling, fecal pellet count, track counts as well as ground counts to determine population density as well as habitat preference in the southeastern quarter of Chatfield State Park, Littleton, Colorado. The results of the study showed that although there was some interaction between the two species, it was not significant, and that habitat preference greatly determined population concentrations and density. The results indicate that at present population densities for the given area there is no significant competition between *O. hemionus* and *O. viginianus*.

(Poster Presentation, Session IV (3:30 – 4:30 PM), Poster #2)

Microbial Communities in Barrel-Aged Berliner-Weisse Beer Identified by Next Generation Sequencing

David DuMoulin – Biology

Coauthors: Alec Rippe, James Richardson, Sara Ferber

Faculty Mentor: Helene Ver Eecke

Berliner-Weisse is a German beer style that ferments in wooden barrels and imparts a microbial community of both yeast and bacteria that creates complex flavor profiles. These barrels are inconsistent in microbial make-up, which can lead to an unpredictable product. Avery Brewing Company, from Boulder, CO, – contributed 13 samples from their barrel-aged Berliner-Weisse project. Our research aims to identify the microbial population within the samples in order to better understand what metabolic processes may be influencing the fermentation process and the beer's flavor. Identification of as many members of the microbial community as possible, and using the known characteristics of these organisms could expose the metabolic processes and byproducts that impact the beer. In order to identify the microbial community present in the samples, our research employs both culture-dependent (growing microbes) and culture-independent (sequencing DNA) analyses. Our previous culture-dependent results included analysis of samples plated at various concentrations on 6 varieties of selective and differential solid media chosen to enrich a breath of both yeast and bacterial species: LWYM, MYPG, CuSO4, WLN, HLP, GMC+CYC, and GMC. Primary enrichments were observed weekly and were propagated to isolate pure cultures. Current culture-independent results identify the complete microbial community present within one of the primary beer samples. This was accomplished by PGM next generation sequencing and bioinformatic analysis of all of the bacterial/archaeal 16S rDNA genes and all the fungal ITS regions.

(Poster Presentation, Session II (11:00 -12:00 PM), Poster #16)

Self-Sufficient Down Draft Gasifier

Tim Dunning – Mechanical Engineering Tech

Coauthors: Emmanuel McKee, Steven Webber, Angel Castillo, Ryan Reppe

Faculty Mentor: Devi Kalla

The process of gasification has been known for more than 200 years, and gasification has been used industrially for more than 150 years. While this process is well known and fairly well understood, it is relatively hard to control, and therefore underutilized as an alternative and renewable energy source for small scale energy needs. Additionally, there are currently several design constraints that require additional energy inputs in order to convert large quantities of biomass into large quantities of syngas. These additional energy sources are simply not available in many areas of the world where gasification technology could have a real and meaningful impact for small scale energy generation. Our group will study current gasifier designs, and address the technological issues of gasification regarding fuel selection constraints and mitigation of additional energy sources, in the process developing an alternative gasifier design that is capable of efficient processing of multiple fuel types, without the need for any outside electrical power.

(Poster Presentation, Session IV (3:30 – 4:30), Poster #3)

Synthesis and AntiFungal Activities of Fluconazole and Six Novel 1,2,4-triazole Based Antifungal Compounds

Dania El-Batal – Chemistry

Faculty Mentor: Ethan Tsai

Fluconazole, the most prescribed broadband antifungal treatment on the market (Richardson et al., 1988), is only effective for select infections. One major advantage of fluconazole is its relatively low toxicity and an absence of major deleterious side effects. Unfortunately, despite its prescription as a broadband antifungal, its relative efficacy compared to other broadband antifungal agents appears to be merely equivalent, and not superior (Andriole, 1999); and coupled with development of resistance to azole and triazole medications, fluconazole is a medication that is need of reassessment, as well as further development to design and test novel analogs. Six novel derivatives of fluconazole were identified from literature. Alongside a designed synthesis of the fluconazole control, novel syntheses were developed for the identified analogs. The synthetic routes designed were developed to provide a "plug-and-play" architecture for the rapid syntheses of each analog.

(Poster Presentation, Session IV (3:30 – 4:30), Poster #4)

Concept and Design of an Autonomous Surface Vehicle with Deployable Operated Vehicle

Tim Erickson – Mechanical Engineering Tech

Coauthor: Matt Cleveland, Shinieng Lee

Faculty Mentor: Devi Kalla

Historically, remote-operated vehicles (ROVs) and their operators have been constrained to operate within the radius of the communication and power tether, most often originating on the deck of a host ship. However, with the utilization of modern wireless technology, an ROV should be able to be controlled from and communicate data (i.e. video, sensory data) back to a remote terminal, enabled by a surface station. Our research will attempt to demonstrate an independent marine-based system with all of the communication done by humans, either from shore or a stationary location. The research in question is

how to wirelessly control an underwater vehicle that is tethered to a surface vehicle. The ultimate goal of this project is to research the ability of an autonomous surface vehicles (ASV) to deploy, control, and recover a mechanically tethered ROV through the use of wireless communication. The design method of this concept is based largely off of existing ASVs and ROVs designed and employed in ongoing research by the Woods Hole Oceanographic Institute (WHOI), such as the JetYak ASV and the Artemis, under the technical advisement of Dr. Peter Kimball, a researcher and robotics engineer at WHOI. However, the presented concept will attempt to merge the two vessels into one system, in which the ASV will be responsible for translating and powering the ROV through commands that are sent from a remote location. Major direction will be taken by technical resources through the Marine Technology Society (MTS). The research team will also work closely with several developer and hobbyist communities in robotics and radio-controlled platforms, including OpenROV, Arduino and Raspberry Pi. The resulting system may be applicable to various marine activities including, but not limited to; marine vessel inspection, search and rescue operations, geological/archeological reconnaissance and surveying operations.

(Poster Presentation, Session I (9:30 – 10:30), Poster #27)

Architectural Design of Modern Libraries and the Role of Communication: Implications on Changing Societal Values

Jordan Farmer – Speech Communication

Faculty Mentor: William Huddy

This research proposal shall consider a review of the literature in regards to how architectural design is influenced or is being influenced by changing communication practices, with special attention being paid to libraries as a representation of public spaces. Libraries will be viewed as gathering places within local communities and as operating as buildings of information, knowledge and cultural exchanges. The literature will be reviewed with regards to common design themes found in present day design and recent architectural design and how these choices are affecting or being influenced by the communication behaviors of the modern person. The hopes of this review is to better understand the literature already conducted on this communication phenomenon and to ultimately discover whether or not architectural design is controlling the communication styles, or vice versa with communication styles controlling the design. Communication shapes our lives and it is imperative that we study how architectural design helps to shape our communicative outlooks and tendencies in order to better understand the changing values and cultural norms taking place in today's modern world.

(Oral Presentation, Session I 9:15-9:30 AM, NC Room 1322)

Electrochemical-Aptamer Biosensor against ENOX2 for Cancer Diagnostics

Lisa Fetter – Biology

Faculty Mentor: Andrew Bonham

Human Ecto-Nicotinarhide Dinucleotide Oxidase Disulfide Thiol Exchanger 2, better known as TNOX or ENOX2, is an isoform of a protein expressed in all individuals, ENOX1. Research suggests that ENOX1 may act as a driving force of the ultradian cellular biological clock and it is likely a major component of growth. Its isoform, ENOX2, is expressed only in patients with specific types of cancer, and has been heavily researched as a potential biomarker for cancer. Since both proteins are released into the blood and the presence of ENOX2 is cancer-specific, ENOX2 is a highly attractive target for blood testing that may

diagnose cancer. Due to this fact, it is also an attractive target to be detected by a DNA-based biosensor. Thus, the primary goal of this experiment is to design and functionalize an electrochemical, aptamer-based biosensor that is sensitive and specific to the ENOX2 protein. Ideally, the biosensor will be optimized to function in blood, eventually yielding a novel, rapid, and clinically-relevant diagnostic tool for cancer.

(Poster Presentation, Session III (2:15 – 3:15), Poster #6)

Selected Geochemical Relationships of an Alpine Tundra Soil Cover to an Underlying Mafic Iron Dike and Granitic Pegmatite Source in Rocky Mountain National Park

Ryan Finley – Applied Geology

Faculty Mentor: Uwe Kackstaetter

Using chemical elements to indicate covered lithologies, especially ore bodies, is an established practice in geochemical exploration. While this method has been employed in a variety of geomorphic settings, the application and data collection on soils of the Alpine Tundra are rather limited. Within particular soil environments, and under particular pH conditions, chemical elements indicative of the source lithologies should be mobilized and redistributed in predictable manners. As these weathering characteristics are identified for localized areas, the soil geochemistry should point to the underlying rock units. In Rocky Mountain National Park there are numerous unmapped units of mafic dikes and granitic pegmatites which are both outcropped as well as overlain by alpine tundra soils. By identifying and sampling exposed portions of the target rock units, and sampling the soil development at increasingly further distances downhill of these outcrops, we can compare the soil analytical values against the geochemistry of the source rock and graph the results, allowing changes in target element concentrations at increasing distances to be visualized. In future exploration for unexposed portions of these target rock units, this geochemical data could be used as a signature for underlying source rocks to more accurately map covered lithologies in this Alpine tundra environment.

(Poster Presentation, Session I (9:30 – 10:30 AM), Poster #7)

William Shakespeare: Art Thou Relevant?

Brittney Finley – English

Faculty Mentor: Lisa Suter

This research project focuses on the issue of how Shakespeare's works are still relevant in modern education settings. My work begins with the establishment of the concern that Shakespearean works have in the view of some (parents, students, and some teachers) become old, archaic, and irrelevant. In my argument I concede that it makes sense to challenge what is taught to our children. Parents should be praised and encouraged to be involved with what their students are learning. I argue that while Shakespeare is older there are plenty reasons why he should still be taught in modern elementary schools and secondary schools. Critics also argue that with American public schools increasing with diversity Shakespeare does not represent other cultures and therefore fails to engage students. Once again, I present evidence that Shakespeare in fact does represent other cultures and can be engaging through adaptations done of his works. This is all presented through my research pulled from professionals in the Education and English fields.

(Oral Presentation, Session I 9:45-10:00 AM, NC Room 1323)

Social Media: The Communicative "Glue" for Corporations

Samantha Fleischmann – Speech Communication

Coauthor: Michelle Fierros

Faculty Mentor: William Huddy

This proposal investigates a variety of scholarly, peer-reviewed journals, and published articles to support the following claim. Companies that feel a lack of communication presence attempt to reach out to their stakeholders through social media engagement. We suggest that as a company feels a deprivation in their level of communication within the company itself, and between clients, or consumers, they turn to the use of social media to improve their overall communication. We will be arguing that social media increases company engagement and outreach, creating a more tight- knit and fundamentally successful company through the use of effective communication. By offering consumers an outlet of communication through social media sites, customers are able to participate in what is going on with the company. By being able to feel "apart," of the company, in a sense, consumers are far more likely to build a long- term connection with the company and become an ideal, emotionally invested, long- term customer.

(Oral Presentation, Session II 10:45-11:00 AM, NC Room 1322)

Genetic Variation of *Pyrgulopsis kolobensis*, a Springsnail Found in Utah and Nevada

Cynthia Forsythe – Biology

Faculty Mentor: Hsiu-Ping Liu

The study of *Pyrgulopsis kolobensis* (springsnails) is important to the ecological health of our freshwater springs and rivers in the western United States. Springsnails are bio-indicators and indicate the relative health of the ecosystem in which they live. Because they only live in freshwater springs, pollution, reduction in groundwater, and other changes to their environment could result in their extinction. This would have a negative impact on the entire ecosystem that relies on them. There are 46 species of snail in the United States listed as threatened or endangered by the U.S. Fish and Wildlife Service, including nine species of *Pyrgulopsis*. My research project focuses on using two DNA markers to analyze the species status of springsnails (*Pyrgulopsis kolobensis*) populations collected from eight locations in southern Utah and eastern Nevada in May 2015. DNA was extracted from at least four specimens from each of the eight sampled populations, amplified, sequenced, and then analyzed. The sequences were compared to the sequences of *P. kolobensis* from type locality to determine if springsnails from southern Utah and eastern Nevada are variations of *P. kolobensis* or if they are genetically distinct lineages. Analysis of these DNA sequences show that there are eight distinct lineages of springsnails in this region of the United States.

(Poster Presentation, Session IV (3:30 – 4:30 PM), Poster #5)

Has Modern Society as a Whole Regressed Due to the Lack of Involvement/Appreciation of Paternal Involvement?

Sean DeMarco Garcia– Anthropology

Faculty Mentor: John Schultz and Eric Baus

The purpose of this research is to highlight the importance of Stay at home dads in the 21st Century and study the impact of that status on little boys, relationships within the home and the world outside of the home, particularly focusing on children of color. The central research question addressed in this presentation is, "Has modern society as a whole regressed due to the lack of appreciation of paternal involvement?" The information in this research came from personal experience, no less than thirty credible sources. (Scholarly articles, hardcover books, paperback books, personal interviews, etc.) This also includes citations, references and fact checking. I have also taken advantage of social media to connect with various stay at home dads throughout the United States. The findings and implications of my research led me to accept as true that society would be better off if more fathers were encouraged to become further involved with their children during their early, more formative years. My research has led me to conclude that while dad cannot be mom; and mom cannot be dad, life itself, sometimes happens. This research was not conducted to encourage debate regarding one gender being a better parent than the other is. From where I stand, we each need one another to co-parent effectively to ensure that the next generation is able to contribute to the advancement of humankind efficiently. I am merely stressing the importance of the forgotten black male figure in the household.

(Oral Presentation, Session II 11:00-11:15 AM, NC Room 1322)

Preserving Chatfield State Park is for the Birds

Kasi Garcia – Biology

Coauthor: Ricky Martinez

Faculty Mentor: Erin Bissell

The Army Corps of Engineers has approved an expansion project at Chatfield Reservoir that is projected to help water districts in the Denver Metro area meet the increased demand of a growing population. The plan will flood more than 500 acres of the park and inundate cottonwood trees near the reservoir, destroying habitat for multiple species of birds. In this study we compared species richness and abundance of avian populations found in the vicinity of legacy cottonwood trees (diameter at breast height, i.e. DBH > 100 cm) and stands of cottonwood trees (D.B.H. < 100cm) at Chatfield State Park in Littleton, Colorado. We observed a total of 230 birds, belonging to 23 different species. We found that abundance was greater in legacy trees compared to stands during every sample episode and these differences were statistically significant. Species richness comparisons between the sites varied among the observation dates. The results of this research will be useful for future studies to better understand how avian species use the different cottonwood habitats. We consider these results preliminary as they were collected as part of a pilot study. We plan to make the observations again during the upcoming migratory season when the bird populations may be more diverse. This data could potentially be used to inform the mitigation plan proposed by the Chatfield Reallocation Project Participants to help protect these species and their habitat.

(Poster Presentation, Session IV (3:30 – 4:30 PM), Poster #6

LGBTQIA People of Color: The Impact of Adversities on Self-Efficacy

Bianca Gonzalez – Psychology

Faculty Mentor: Jovan Hernandez

The Lesbian, Gay, Bisexual, Transgender, Queer, Intersex, and Asexual (LGBTQIA) community has struggled with marginalization for many years. Fortunately, because of the recent change in the public perception, efforts to gain equal rights have garnered support. Although this movement is currently in progress, many LGBTQIA individuals still face prejudice and discrimination at a legislative and personal level. If one also identifies as a person of color, the devaluation of identities doubles (Bjorkman & Malterud, 2012). While previous research has looked into the role of adversities faced by LGBTQIA or people of color, an increased need has arisen for research expanding to the population that identity as both to provide unique experiences within each ethnic group of sexual minorities (Harris, 2014). In addition, previous research does not focus on self-efficacy and each individual's motives and identity perception as a person of color and LGBTQIA. The purpose of this research is to bring to light the impact that adversities have on individuals who identify as LGBTQIA and their impact on identity through a series of online questionnaires and open-ended questions to supplement the data. This study will analyze the hardships faced by both LGBTQIA people of color and LGBTQIA who are Caucasian and compare the effects of identity on self-perception, self-efficacy, and belonging. The implications of this research are to help build a more inclusive community in LGBTQIA programming and centers and understand additional stigmatization that may be faced because of the double marginalization.

(Oral Presentation, Session I 9:30-9:45, NC Room 1322)

Renee Cox and Racially Performative Photography

Lauren Granado – Art

Faculty Mentor: Deanne Pytlinski

My research through an art historical lens focuses on the racialized visual language that is deliberately implemented to instill ideological beliefs, and the way artists of color resist this visual identification and create new avenues for interpretation, and ultimately, autonomous agencies and identities.

Renee Cox is a female African American artist who addresses the stereotypes and intersections of performative gender and racial roles imposed upon black females in the United States. I focus on the performative nature of these roles that have been established under capitalist patriarchy. Once these issues are discussed, I argue the ways in which Renee Cox directly combats these integrative roles through her artwork and creates a disruption to the white male gaze in order to create an alternative narrative to our patriarchal society. I analyze the way in which she addresses the notion of the black female body as other that validates both masculinity and whiteness. I address the notion of the Jezebel and the ways that stereotype is projected onto African American women, and how, specifically, in the series Liberty in the South Bronx, Renee Cox has taken an authoritative stance, breaking from chains, to assert her agency as more than a black female body. This is also a powerful statement of defiance against the objectification of the white Patriarchy.

(Oral Presentation, Session II 10:45-11:00 AM, NC Room 1316)

Diving into Bear Creek

Cody Griffith – Mathematics

Coauthors: Caitlyn Cole, Ian Greenwald

Faculty Mentor: Elizabeth Ribble

In this presentation, we address the growing *E. coli* problem in our local Bear Creek through the use of statistical modeling. Bear creek runs from Morrison and meets with the South Platte River in Englewood, so many residents in the Denver and Jefferson Counties are directly affected by contamination in the creek. The *E. coli* populations in the creek have exceeded the EPA recommended safety level and we have focused our attention to discovering why. Is it a human source? Weather and climate change? We will get to the bottom of this problem.

The approach we have taken is to establish a multiple regression model to factor in many potential contributing sources. This also allows us to make predictions about when the E. coli levels are unsafe based on a few key factors. We have used kriging to establish a spatiotemporal model for visual representation of the *E. coli* population, which can show the spatial dependency as well as the time dependency of the population. This will help identify where and when the populations reach a relative maximum!

(Poster Presentation, Session I (9:30 – 10:30 AM), Poster #8)

Useful Artifacts: The Body as Text in Transploitation Cinema

Eleven Groothuis – Sociology

Faculty Mentor: Rebecca Gorman O'Neill

This presentation examines transgender characters and imagery in films dating between the 1950's and the 1970's that fall under the category of exploitation — an intersection known as transploitation. Transploitation cinema exploits transgender images, characters, and aesthetics and transforms the trans body into a text to be read by cisgender audiences. Specifically, this presentation will trace the use of transgender bodies as medical and cultural texts. As medical texts, trans bodies become sites of medical knowledge, privileged codes, which require institutional medical expertise to decipher. As cultural texts, trans bodies bear the physical ramifications of metaphor and become symbolic of larger cultural movements and ideas. In each case, trans people cease to exist as people and become artifacts overburdened with meaning. These films and their ways of speaking about gender variance are still relevant to the question of trans discourse and how we as a culture depict trans people.

(Oral Presentation, Session I: 9:45-10:00 AM, NC Room 1322)

Demographics and Food Insecurity

Jasmine Gunderson – Human Nutrition-Dietetics

Coauthors: Elisa Shigeta, Montoya Walker, Jeredd Redman, Rachel Benson

Faculty Mentor: Melissa Masters

A wide range of demographics have been shown to influence food insecurity among young adults. Previous studies have identified that different variables including higher cost of living, increasing tuition rates, higher food costs and the number of residents per household can play a role in food insecurity in college students. The rise of food insecurity on college campuses has led to the development of university run food banks.The purpose of our research was to investigate characteristics of MSU Denver Food Bank users as well as use of and satisfaction with the food bank. A 46 Questions survey was developed, utilizing Qualtrics Research site. Questions were both qualitative and quantitative in design and included questions from the USDA's U.S. Household Food Security Survey Module: Six-Item Short Form to assess for food insecurity. Registered users of the MSU Denver Food Bank were sent the survey through email, and given two weeks for completion. Analysis of the results suggest that 50% of the MSU Food Bank users are enrolled in 13-15 credit hours, 59% are of senior standing, and 45% live in the Denver Metro area. Other data provided evidence that 91% of students were self-supported, and 60% were dependent on loans and grants. In the last 12 months 76% of MSU Denver Food Bank users had to decrease size or skip a meal because there was not a sufficient amount of money for food. This research indicates that food insecurity is prevalent among MSU Denver Food Bank users.

(Poster Presentation, Session I (9:30 – 10:30 AM), Poster #9)

Proton Transfer During Hydrolysis of Carboxylates

Ana Gutierrez – Chemistry

Faculty Mentors: Russell Barrows

The hydrolysis of carboxylate compounds can be achieved in both acidic and basic conditions. In either case, the leaving group must first be protonated to allow for the formation of the acid. The extra proton can come from an intramolecular transfer, or can be obtained by an intermolecular transfer from the solvent. In order to study this mechanism, the base-catalyzed hydrolysis of an amide was studied. The first step of the project required hydrolyzing the phenyl benzamide in a non-aqueous solutions. This was accomplished using dry DMSO (dimethyl sulfoxide) and sodium hydroxide or sodium deuteroxide. The goal of the second step of the project involves determining if the necessary proton transfer to the leaving group is inter- or intramolecular for the hydrolysis of the phenyl benzamide to benzoic acid. Experiments are currently underway to answer this question using deuteroxide and deuterated water. If the hydrolysis reaction is intramolecular deuterated aniline will be produced. The reactions are being run under two different conditions: 1) hydrolysis with sodium hydroxide and workup with deuterated water, and 2) hydrolysis with sodium deuteroxide (Na+OD-) and work up with water. The products are being analyzed by gas chromatograph/mass spectroscopy (GC/MS) in order to determine if the intramolecular transfer is occurring. The GC/MS is a Hewlett Packard 6890 Gas Chromatograph fitted with a HP 5973 Mass Selective Detector, controlled by HP ChemStation.

(Poster Presentation, Session I (9:30 – 10:30 AM), Poster #10)

An Examination of College Students' Attitudes Regarding Capital Punishment

Alia Haley – Criminal Justice & Criminology

Coauthors: Lucy Protze, Brittany Parker, Josette Barraza, Kriro Higgins

Faculty Mentor: Rebecca Trammell

In the wake of the James Holmes mass murder case, we examine the attitudes of current Denver college students regarding the issue of capital punishment. For this project, we also focus on the important issue of race and gender to determine key differences in how college students explain how and why they favor or oppose capital punishment. White Americans are more likely to trust the government and white support is also correlated with racial prejudices. We add to this discussion by focusing on this important topic in the wake of one of the more notorious death penalty cases in Colorado's history.

(Poster Presentation, Session I (9:30 – 10:30 AM), Poster #16)

Saving Lives Matters: The Effects of Trends on Promoting Attitude Change toward Organ Donation

David Harper – Psychology

Coauthor: Courtney R. Lemmon

Faculty Mentor: Courtney A. Rocheleau

There are currently more than 120,000 people on the waiting list for a transplant in the U.S. (UNOS, 2016). This study's purpose was to investigate the role of behavioral trends and subjective norms in organ donation decision-making (i.e., donation-related attitudes and intentions). Rocheleau (2001; 2013) found that religious attitudes and affiliation significantly predict organ donation willingness. Similarly, Gueguen, Bourgeard-Delfosse, and Jacob (2015) found exposure to a religious symbol increased willingness to sign a donor card. Basic research on subjective norms has demonstrated that people are more likely to behave in norm-consistent ways when messages regarding positive descriptive norms are combined with information showing that normative support for the behavior is growing over time (Mortensen, 2015). The current study expands on previous research by testing these effects in an applied context. Specifically, participants were randomly assigned to one of four donation-promoting messages in a 2 (peer referent: Americans or religious peers) x 2 (norm data: descriptive norm alone vs. with positive trend) factorial experiment. Data collection is complete and analyses are underway. We expect participants to report more pro-donation beliefs when presented with normative data supporting this act, particularly when framed as coming from one's own religious group and particularly when such information is paired with evidence that organ donation is a growing trend. These results will contribute to the basic literature on the role of trend data in subjective norms appeals and to the applied literature on organ donation promotion.

(Oral Presentation, Session II 11:00-11:15 AM, NC Room 1316)

A Case Study of the 2012 High Park Fire in Colorado

Amanda Hazelton – Meteorology

Faculty Mentor: Keah Schuenemann

In 2012 the worst heat wave on record hit the United States. This record-breaking phenomenon caused an outbreak of wildfires in Colorado. Government and emergency crews have a limited understanding of how such fires behave, since fires are not studied as much, or as often, as some other weather events. The High Park fire in Colorado was documented extensively and will be the focus for a case study.
The High Park fire in Colorado in the summer of 2012 was a very well documented fire for the state. It was named for the area that the fire was started in. Since 2012 was a very hot and dry summer, the fire itself expanded rapidly. It burned from June 9th, 2012 to June 30th, 2012. It burned 87,284 acres and was caused by lightning. The fire created its own pyrocumulus clouds, showing how hot this epic and

devastating fire burned. This in turn increased the winds on the ground, helping to spread the fire. Humidity In the area was very low, there was no rainfall for most of the spring and the summer leading up to the fires. There was an unusual and unseasonal downslope windstorm that helped to spread the fire, and this perfect storm of adverse conditions will be the focus of this case study.

(Poster Presentation, Session II (10:00 – 11:00 AM), Poster #5)

Witnessing Rudeness Between Authority Figures: Considering the Implications Involved

Holly A. Hickman – Psychology

Coauthors: Kelsie S. Howell, Aryanna M. Wiggins, Ian A. Maxwell

Faculty Mentor: Lisa Badanes

Acts of incivility in the workplace generate deleterious effects on employee well-being and workplace productivity (Andersson, & Pearson, 1999; Cortina, 2001; 2009). Research indicates that incivility, or acts of rudeness, can be detrimental to workplace productivity when the act is merely witnessed (Porath & Erez, 2009). Witnessing rudeness from peer-to-peer and authority-to-peer roles demonstrates a decrease in performance, in addition to an increase in aggressive responses on brainstorming tasks. The current study sought to extend the literature by examining the effect witnessing rudeness between authority figures has on brainstorming tasks.

201 introductory psychology students (62% female, 69% White) were randomly assigned to one of two conditions: one in which participants witnessed rudeness between a confederate and an experimenter (authority-to-authority) ($n = 98$), or one which replaced rudeness with a neutral disruption ($n = 103$). Following the interruption, participants in both conditions completed a brainstorming task. Responses were measured in terms of fluency and aggression. Results indicated no significant differences overall between conditions in fluency. However, results indicated witnessing rudeness between authority figures elicited a significant increase in aggressive responses on the brainstorming task compared to those in the control condition, $t(181) = 2.10$, $p < .05$. This suggests that witnessing rudeness between authority-to-authority dyads affects the observers' future task performance, specifically, increasing aggressive responses. Understanding the effects of witnessed rudeness on behavior and production in all realms can add beneficial insight to applied research in the area of workplace incivility, as it could aid in the prevention of these phenomena.

(Oral Presentation, Session II 11:15-11:30 AM, NC Room 1322)

Determine Species Status of Pebblesnails found in Umpqua-Rogue basin using DNA sequences

Niko Hubbart – Biology

Faculty Mentor: Hsiu-Ping Liu

Pebblesnails found in Umpqua-Rogue basin have never been formally evaluated and described taxonomically. The objective of this project seeks to clarify the "Frest" species concept and determine the species status of these pebblesnails using DNA sequence data. Mitochondrial cytochrome c oxidase

subunit I (COI) and cytochrome b (CytB) genes were amplified and sequenced. The data collected shows six genetically distinct lineages and does not support the "Frest" species concept.

(Poster Presentation, Session III (2:15 - 3:15 PM), Poster #7)

Debris-Covered Rock Glaciers in the Aconcaua River Basin: Outflow of Melt Water from Debris Rock Covered Glaciers Based on Amount of Snow Coverage

Lane Hines – Environmental Science

Faculty Mentor: Jason Janke

Santiago, Chile relies heavily on snow/ice melt from the central Andes mountain range for their water supply. This includes water from the snow, glaciers, rock glaciers, and debris-covered glaciers. Methods to gather data included two data loggers that were both placed at a certain depth at different elevations throughout rock glacier located in the Juncal watershed of the Aconcacua River Basin. These data loggers record the temperature of the glacier at a depth of 30 cm. We can conclude the overall trends of snowmelt and internal water flow from the underground glaciers.

(Poster Presentation, Session IV (3:30 – 4:30 PM), Poster #27)

Sensitive Serologic Detection of Pathogenic *Mycoplasma* via Electrochemical Biosensor

Jena Jacobs – Biology

Faculty Mentor: Andrew Bonham

Mycoplasma pneumoniae infects 2 million people every year and is responsible for upper respiratory infections and "walking pneumonia." Here, we describe the creation of a novel electrochemical biosensor capable of detecting these pathogenic *Mycoplasma* for use in academic, research, and clinical applications. Current diagnostics of *Mycoplasma*, such as molecular-based assays, PCR and serological analysis, are time consuming, expensive, and not particularly accurate. Serological analysis is our main focus, not only because it is not available in the United States, but due to the fact that current "serological kits" do not measure the presence of the microorganism, but instead measure the host immune response, creating the possibility of a false negative result for most infected individuals. In response, our biosensor is designed for rapid, reliable, and reagentless serological detection of several common *Mycoplasma* strains. We are able to detect this subgroup of Mollicute bacteria by detecting a protein that is commonly secreted by many pathogenic mycoplasmas, P48 protein. A modified aptamer against P48 was incorporated into a custom oligonucleotide scaffold and is used in a gold-electrode-bound fashion to give a robust, dose-dependent electrochemical signal change upon binding the secreted P48 target. Ultimately, this biosensor should bring improvements to diagnosis and thus treatment of *Mycoplasma* in patients who present a proposed infection.

(Poster Presentation, Session IV (3:30 – 4:30 PM), Poster #15)

Uranyl Ion Biosensors for Water Quality and Safety

Susan Jett – Chemistry

Faculty Mentor: Andrew Bonham

We have developed a novel electrochemical biosensor for the purpose of detecting uranium, in the uranyl ion form, in untreated water samples at low levels for use in academic, research, and professional settings. This could lead to applications in ongoing water quality monitoring, as well as improve targeting and efficiency of remediation of contaminated water sources. Uranium contamination of a water source has far reaching implications as a connected water system allows for contaminates to pollute all connected water systems over many miles, in turn effecting the organisms that rely on that water supply. This system uses a modified uranyl-binding aptamer that has been inserted into an oligonucleotide scaffold to create a conformation-switching element. This oligonucleotide is then integrated into an electrochemical biosensor platform. Ongoing work is determining the detection limits and sensitivity to the target ion of our scaffold biosensor, with the goal of parts per billion detection of uranyl, allowing compliance measurement against EPA standards of uranium limits.

(Poster Presentation, Session II (10:00 – 11:00 AM), Poster #8)

Mechanisms of Landslide: Analysis of the Sr-530 Landslide, Oso, WA

Jon Kell – Environmental Science

Faculty Mentor: Barbara EchoHawk

On March 22, 2014, a debris-avalanche flow (DAF) dammed the North Fork Stillaguamish River, destroying an entire neighborhood and killing 43 people. Empirical evidence and numerical simulation will explore the hypothesis that higher mobility was caused by liquefaction of water-saturated basal sediments. Scarp stratigraphy, geotechnical properties, and initial conditions are inferred from core samples taken of intact strata at the head of the slide area. Pre and post event LiDAR transects, North Fork Stillaguamish River stream gauges, and 18 nearby seismometers provided data for numerical simulations; aerial photos and satellite imagery aid in interpretation. Starting as a large rotational slump block detached from the head scarp, the dynamics of the initial debris avalanche caused widespread basal liquefaction of underlying glaciolacustrine deposits. The resulting debris flow crossed the river valley and reflected back tens to hundreds of meters, then spread laterally to an extent of ~0.4km2. Seismic data shows the lack of a deceleration phase, i.e., after acceleration, forces spread in space and time, which implies a decrease in landslide frictional forces consistent with undrained loading and liquefaction. The speed and travel distance exceed prior historical slides in the region, and comparable landslides elsewhere. Numerical simulations show that without high initial pore-water pressures that a relatively slow landslide with little movement would have occurred. Abundant data demonstrate that record high precipitation, in-situ stratigraphy, and high initial pore-water pressure lead to the runaway liquefaction conditions, which has implications in predicting potential slide hazard areas.

(Poster Presentation, Session IV (3:30-4:30 PM), Poster #28)

Utilizing R to Predict Trends in Biodiversity and Temperature on MSU Denver's Green Roof

Alexander Kelley – Biology

Faculty Mentor: Robert Hancock

Environmental variations on the microhabitat scale are an often overlooked factor in the sampling of biodiversity, especially that of insects (Mehrabi 2014). For the last two years, undergraduate research on insect ecology of the MSU Denver Green Roof has accumulated a large collection of arthropod specimens and environmental data. These data conform to a square meter quadrat grid that has been superimposed over the roof for purposes of field sampling. This scheme has allowed the data to be subjected to a spatial Kriging technique using the statistical computing language R in order to predict trends in biodiversity and environmental factors across the area of the green roof. This method was used to extrapolate these values from approximately 10% of quadrats to the entire green roof area, generating a diversity index and mean temperature for each quadrat. Results have shown an inverse correlation between these two factors. In general, biodiversity increases with increasing temperature (Mayhew 2012), though this trend exists on large habitat scales. However, on the microhabitat level, especially in a unique urban setting such as our green roof, this trend may not exist. Our results are likely indicative of an arthropod response to anthropogenic heat and materials such as gravel and glass.

(Poster Presentation, Session III (2:15 - 3:15 PM), Poster #16)

Effects of Atmospheric Deposition on Sulfate, Iron, and Nitrate Levels in the Boulder Creek Watershed

Jordan Kingery – Environmental Science

Faculty Mentor: Randi Brazeau

This study ascertains the levels of sulfate, iron, and nitrate levels in the Boulder Creek so as to determine whether their concentrations (if any) are at levels that are toxic for: Human & animal consumption, use in agricultural endeavors, and use for recreational activities. Dissolved solids are frequently found in open waterways due to natural sediment deposition and air-shed deposition. Due to the increased population of nearby Denver and the massive flooding sustained to the Boulder Valley region in recent years, levels of sulfate, iron, and nitrate will be at higher levels than previously tested years. Testing conducted in this study indicates whether levels of the aforementioned minerals are moving towards a toxic state. Toxicity of Boulder Creek would have vast ramifications to the human, animal, and plant life in the Boulder Valley. There is a large number of residents in the Boulder Valley that are dependent on the cleanliness of the water derived from the North Boulder Watershed. The local ecosystem is also dependent on this water source. Agricultural operations derive most of their water for crops from here, and are ultimately the furthest downstream from the headwaters. This testing ultimately aims to determine whether anthropogenic activities from the Denver Metro Area are saturating the airshed shared with Boulder, and whether mining practices are leeching into the creek slowly due to structural integrity issues caused by flooding. Testing was conducted by collecting water samples (via the catch method) from varying depths (e.g. surface, 0.5 m, 1 m., creek bottom; deeper depths will be sampled where available). Samples were pulled from the Boulder Watershed at random sampling sites and at the confluence of Boulder Creek & Coal Creek in Erie. All sample sites were documented and geo-referenced using decimal degrees of latitude and longitude, altitude, and ambient temperature. Samples were done weekly, and after an inclement weather event. Samples were collected and processed in accordance with standard USGS

procedures throughout the process. Samples were tested to find the mineral and nutrient concentrations by using a TN/TC Analyzer & an Ion Chromatograph.

(Poster Presentation, Session III (2:15 - 3:15 PM), Poster #9)

There is No Reason to Continue

Katelin Knox – Speech Communication

Faculty Mentor: William Huddy

Some relationships have caused enough damage in your life that they create a challenge when trying to leave your baggage in the past, especially when trying to proceed with a new, healthy relationship with someone else. But when the relationship entails domestic abuse or violence, it leads the individual to damaging one's self-image and causes people to fear rather than embrace. Mental, emotional and verbal abuse have been the main segments of abuse studied as the abused begins to feel worthless, incompetent, and unlovable. After all, when someone says, "I love you for who you are," then it must be true. My proposal for this paper is to answer these three research questions, "how is communication affected by abusive relationships?", "what steps can the abused and the abuser take to destroy this habit?" and "how do previous relationships impact the communication within a new relationship?"

(Oral Presentation, Session I 10:00-10:15 AM, NC Room 1322)

Female Choice and Pair-Bond Success in the Monogamous Biparental Convict Cichlid (*Amatitlania nigrofasciata)*

Stacy Kosiba – Biology

Coauthor: Michelle Norden

Faculty Mentor: Jennifer Gagliardi-Seeley

Most studies in sexual selection focus on female mate choice; however, in biparental organisms, male mate choice may be equally important. Convict cichlids (*Amatitlania nigrofasciatus*) are biparental and pair-bond formation significantly increases when males are given a choice of more than one female. In this study, we focused on male mate choice by determining which factors increase pair-bond formation. We predicted that pair-bond formation would increase when two females are present and when females interact in competition. This experiment had 4 treatment groups: 1 female, control; 2 females, no interaction; 2 females, with female interaction, without male observation; 2 females, with female interaction, with male observation. Females were separated into their own compartments with the larger female on one side and the smaller female on the other side with a neutral compartment in the middle. Males had free range in the front of the tank to choose between the two females. An average of 5 observations of the males' location were taken every day for 21 days. The male's choice was defined as him spending at least 70% of the observations with one female. Male courtship was filmed for 15 minutes on days 1, 7, and 14 to confirm his choice. Preliminary data suggests that female interaction increases pair-bond formation and males prefer larger females.

(Poster Presentation, Session III (2:15 - 3:15 PM), Poster #12)

Synthesis of Novel Bent-Core Liquid Crystalline Materials

Nicholas Kuehl – Chemistry

Coauthors: Val Toman, Mitchell Magrini

Faculty Mentor: Ethan Tsai

The goal of this research is to synthesize and characterize thermotropic bent core liquid crystals of varying non-polar perfluorinated tails in the hopes of finding new phases of matter. The characterization of these novel liquid crystals assists in developing an improved model for predicting liquid crystalline behavior. Several organic reaction methods will be utilized in the synthesis of these molecules including, Suzuki-Miyaura coupling, hydrogenation, triflation, Steglich coupling. Final products will be characterized using polarized light microscopy, nuclear magnetic resonance, differential scanning calorimetry, and X-ray diffraction. The hydrophobic hydrogenated carbon tail analogues of the desired products have been synthesized and have exhibited chiral conglomerate phases, namely the B4 phase. The B4 is a unique liquid crystalline phase due to its helical structure. Similar macromolecular isotropic chiral phases are expected for the target molecules. The exploration of aforementioned molecules macromolecular form will give a greater insight and improved model of bent-core liquid crystalline behavior.

(Poster Presentation, Session III (2:15 - 3:15 PM), Poster #10)

Millenials' Political Attitudes Toward Women Presidential Candidates

Mitchell Kusick – Psychology

Faculty Mentor: Leslie Rossman

The purpose of this research is to examine Millennials' political attitudes toward women Presidential candidates in the 2016 election. Millennials are America's youth born between 1982 and 2000. Serious women contenders for the Office of the President have emerged within a similar timeframe that this generation has grown up in. It is my belief that the Millennial generation is capable of subverting the hegemonic masculinity that saturates the American bureaucracy as this unique cohort is adopting new, fluid understandings of gender by doing away with static, binary categories. The initial phase of this research encompasses a critical discourse analysis that serves as a framework for understanding generational idiosyncrasies with regard to gender socio-political inequalities. The positions taken throughout this qualitative method establish a theoretical basis for further exploration in order to confirm or deny the posited stances. The final phase of this research comprises quantitative data collection that will examine the relationship between cognitive flexibility and Millennial political attitudes toward women Presidential candidates and determine whether cognitive flexibility aids in the prediction of attitudes toward future women Presidential candidates above and beyond known predictors. The implications of this line of research are pertinent in that the Millennial generation is quickly ascending to the age in which they will constitute the majority of the nation's political system. They will face decisions that may effectively redefine social institutions by abandoning the traditional patriarchal norms through alternative cognitive perspectives that enable a woman to be elected President of the United States.

(Poster Presentation, Session II (11:00 – 12:00), Poster #6)

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(Oral Presentation, Session I 9:30-9:45 AM, NC Room 1323)

To Shave or Not to Shave: The Taboo of Womanly Body Hair

Lindsay Lake – English

Faculty Mentor: Sandra Posey

The purpose of this project is to demonstrate how an act as small as shaving perpetuates gender inequality across America. This presentation will question what society's attitudes towards those who defy body hair norms demonstrates about American culture and the differences in beauty standards among women and men. By discussing my completion of a ten-week no-shave challenge and blending my personal history of shaving with a history of shaving in the United States through the medium of Creative Non-Fiction, I hope to inspire others to question routine acts that enforce ideologies taught by society.

(Oral Presentation, Session II 10:45-11:00 AM, NC Room 1323)

Secondary Lesson Planning for Diverse Classrooms

Jeff Leavitt – English

Coauthors: Kristina Harrison, Allie Joyce, Marrena Martinez

Faculty Mentor: Gloria Eastman

As educators in classrooms of ever-increasing diversity, it is essential we reassess the ways in which we value, familiarize, and affirm the diverse voices in our classrooms. Creating a safe and authentic environment in which students can explore and discover their identities, as well as gain empathy and

respect for individuals and cultures that differ from their own, is not an easy task. It is however an imperative one. Educators must advocate new strategies and fresh texts that contribute to a system of education that celebrates students from all backgrounds.

Our panel seeks to present four language arts lesson plans that foster student awareness of diversity issues, tolerance, and empathy. Each presenter provides mentor texts, activities, graphic organizers, and assessments that can be used immediately to affirm the diverse voices in a secondary classroom. Language arts educators can use these plans as-is and educators from other content areas can incorporate the presentation's key concepts into their own planning. These plans reflect the latest scholarship on teaching language arts through diverse literature and focus specifically on using literary theory, framed in age-appropriate explanations, to improve the degree of rigor and critical engagement students will have with texts. Attendees will be exposed to a pedagogical approach that prepares students to analyze and critically interrogate information presented in the many mediums they encounter. This approach is practical, meets the Common Core State Standards, and fosters skills that will prepare students to engage thoughtfully with the adult world.

(Oral Panel Presentation, Session III 2:15-3:15 PM, NC Room 1316)

Chicana's Representation in Anthologies

Elizabeth Ledesma – Psychology

Faculty Mentor: Anahi Russo Garrido

The idea that Latina women are promiscuous or have a motherly instinct has been reinforced and instilled by the media and family systems for many years. The ideals of sexual purity and Marianismo that are supposed to be embodied by a Chicana were first introduced during the Spaniard conquest. In this paper, I examine Chicana writings on sexuality and reproduction in Chicana women anthologies. I argue that Chicana's are taught to silence their sexuality because of religious morality, familism and lack of education on reproductive and sexual systems. I will research the effects of religious morality, familism, and lack of education on reproductive and sexual systems by analyzing anthologies of Chicana women writings. These anthologies are not examined often to understand Chicana sexuality. I will also gain some insight on how silence plays a role on why Latina's are among the highest at risk to be infected and be transmitted HIV, and tend to have higher rates of teen pregnancy. These are all important questions to consider why this particular population is experiencing these phenomena.

(Oral Presentation, Session II 11:00-11:15 AM, NC Room 1323)

Survival of *Escherichia coli* in Filtered Storm Sewer Water

Joyce Levis – Biology

Coauthors: Desiree Quintelier, David Watson

Faculty Mentor: Rebecca Ferrell

Enumeration of *Escherichia coli* is a widely-used regulatory standard for water quality because these bacteria are normal intestinal microbes that are released in fecal material, and so their presence is generally interpreted to indicate sewage contamination of water. Regulatory agencies, including the U.S. Environmental Protection Agency, may impose fines and other sanctions in communities where waterways display elevated *E. coli* counts. There are concerns, however, that *E. coli* may be able to reproduce under some environmental conditions, which would result in counts that do not correlate with

actual fecal contamination, and could lead to inappropriate regulatory actions. The purpose of this investigation was to determine if *E. coli* can flourish in filtered water from storm sewer outfalls without the addition of nutrients. Water obtained from storm sewer outfalls was filtered through a 0.2 µm filter to remove all cellular organisms, and then inoculated with a known amount of *E. coli* cells. The *E. coli* strains used in this study were isolated from the same storm sewer outfall that provided the water. Daily plate counts were done to determine the number of *E. coli* surviving in the filtered water. In preliminary experiments involving 6 *E. coli* strains isolated from a single outfall, composition of the storm sewer water appears to be a key factor in *E. coli* survival.

(Poster Presentation, Session IV (3:30 – 4:30), Poster #10)

Alternative Energy Propulsion

Xander Littrell – Physics

Faculty Mentors: Duane Bird Bear

My idea proposes the uses of electromagnetic power to launch probes into deep space at speeds faster than anyone has ever achieved.

(Oral Presentation, Session I 9:30-9:45 AM, NC Room 1325)

BMI, Education, and Income in Relation to the Knowledge and Usage of the 2005 USDA MyPyramid in US Women Aged 25 to 45 Years

Natasha Lopez – Human Nutrition-Dietetics

Faculty Mentor: Melissa Masters

Background: The 2005 USDA food guidance system MyPyramid, provided food-based guidance, within a pyramid structure, to implement dietary recommendations based on food groups. The effectiveness of implementing this design structure could be based on several factors: BMI, education levels, and income levels.

Objective: To examine the relationship of BMI, income, and education levels on the both the knowledge and usage of the 2005 Food Guidance System MyPyramid, in women aged 25-45 years.

Design: A cross-sectional analysis of the National Health and Nutrition Examination Survey (NHANES).

Participants: A total of 1,097 females, aged 25-45 years, from a nationally representative sample of US individuals participating in NHANES 2009-2010.
Statistical Analysis Performed:
Body mass index (BMI), poverty income ratio (PIR), and level of education were assessed for the entire sample. Mean and prevalence values for both the knowledge and usage of MyPyramid were based on BMI, PIR, and education levels in females aged 25-45 years.

Results: Prevalence of knowledge of the 2005 Food Guidance System was highest among women who reported to have a college level education (66.0%±3.0%) and earned mid-level income (67.0%±4.0%). Both obese (36.0%±5.0) and low-income (36.0%±3.0%) groups had the highest prevalence of participants who had tried MyPyramid.

Conclusion: Education and PIR appear to influence knowledge of MyPyramid and BMI and PIR appear to influence usage of MyPyramid. However, more research is needed to examine if BMI, PIR, or education are constant factors that influence knowledge and usage of current food guidance systems.

(Poster Presentation, Session IV (3:30 – 4:30 PM) Poster #7)

Organizing Ferritin Proteins Using Java

Chanda Lowrance – Chemistry

Faculty Mentor: Emily Ragan

Ferritin is crucial for the storage of iron in living organisms ranging from bacteria to insects to humans. Iron in invertebrate animals serves many purposes, such as assisting enzymes in the metabolism, division and detoxification of cells. In our previous research, we compared the ferritin sequences in a variety of arthropods and found that the heavy chain ferritin was highly conserved in insects and crustaceans. We also viewed a 3D image of the ferritin protein found in *Trichoplusia ni* using the NCBI tool Cn3D 4.3. In our current research, we will use a Java Graphical User Interface (GUI) to organize the insect and crustacean ferritin proteins found in the NCBI Protein Database. Using the GUI was inspired by my Computer Science II course.

(Poster Presentation, Session II (11:00 AM – 12:00 PM), Poster #2)

Optimization of Process Parameters in Direct Metal Laser Sintering to Advance TiO2 Reinforced Ti6Al4V Metal Matrix Composites

Katherine Ludeman – Mechanical Engineering Tech

Faculty Mentor: Devi Kalla

Benefits of advanced manufacturing are vast and encompass nearly every aspect of life. Direct Metal Laser Sintering (DMLS), as compared to traditional manufacturing, typically produces parts with inferior mechanical properties due to ferocious heating and cooling during deposition that yields martensitic microstructure. Mechanical properties are directly correlated to microstructure, and therefore DMLS process parameters. Research has shown that effectively controlling energy density, average energy applied per unit volume, can lead to acicular alpha' martensite in-situ decomposition into near-equilibrium lamellar microstructure, and notably produce superior mechanical properties over traditional manufacturing. We predict our research can enhance the service performance of additive manufactured titanium composite parts by carefully selecting DMLS processing parameters. Discontinuously reinforced Ti6Al4V metal matrix composite samples with hard, temperature-resistant Tio2 ceramic particles will be fabricated with continuous wave Yb-fiber laser for high-temperature synthesis. This study will initially evaluate the efficacy of process parameters using density comparisons, saturated mass, dry mass, volume, and impact hardness testing. Initial phase data will be analyzed to make recommendations for optimal parameters. Once parameters are defined, scanning electron microscopy and X-Ray diffraction analysis will investigate microstructure. The right selection of DMLS process parameters can produce expected results of alpha+beta--phase between lamellar and equiaxed without undergoing losses in strength distinct to annealing. Results will inform additive manufacturing about techniques to produce titanium metal matrix composites with superior high-temperature creep behavior, hot corrosion resistance and wear resistance for the production of prototype and end-use parts to meet needs cost effectively and with speed.

(Poster Presentation, Session II (11:00 AM – 12:00 PM), Poster #26)

The Impact that Media Exposure has on Self Esteem Among Women and Men's Body Image

Ashlee Luna – Speech Communication

Faculty Mentor: William Huddy

In today's society it seems that everyone has an obsession with social networking and how much attention is drawn to their profiles or how many likes they get on their photo. My research is constructed to investigate how and if social media exposure has an impact on the way women and men save face while trying to uphold to society's ideal beauty. A person who has a positive self-esteem may prevent the negative effects of social media. On the other hand, low self-esteem can cause someone to be influenced by media images. My research analysis will center on Ting-Toomey (1985) face negotiation theory and Festinger (1954) social comparison theory. "Individuals make comparisons between themselves and others who pose certain desired qualities of traits and these comparisons help the individuals to establish their body image identity." Women and men are both confronted with the pressure to uphold society's ideal beauty as well as trying to portray an image they want others to see and the media is the most powerful way to spread these images of "perfections." This study analyzed how and if the impact that social media exposure has on the self-esteem amongst women and mens body images.

(Oral Presentation, Session II 11:30-11:45 AM, NC Room 1322)

Yoga Decreases Stress in Incarcerated Women

Traci Lundstrom – Psychology

Faculty Mentor: Cynthia Erickson

Research shows that incarcerated individuals exhibit a high instance of stress-related disorders, including addiction and PTSD, as well as the added stress of captivity. It has also been shown that chronic stress can lead to long-term health issues. Yoga has been used to provide stress reduction in many settings. Can yoga provide effective stress reduction with this population? This study uses information that was previously obtained as a self-awareness measurement for female prisoners and parolees before and after attending a yoga class. There are two separate populations in the jail and a community class offered to women once released (parolees). Each group's environment has significantly different factors that relate to stress. The measurements were determined on a Likert scale (1=no stress/10=highest level of stress). The women were told to rate their stress according to their own definition of stress for themselves. The data was analyzed to determine whether the stress scores had decreased after attending yoga and for differences between the groups. Yoga was shown to decrease the stress in all three groups. While there no significant differences between the jail populations, the community population scores showed a significant difference from both jail populations. Future research would add a physiological measurement of stress to compare to self-report of stress, due to the high levels of chronic stress noted in this population. Heart rate variability has been used as a non-invasive measurement of stress in previous studies, and therefore would be an appropriate physiological measurement for this population.

(Oral Presentation, Session II 11:15-11:30 AM, NC Room 1323)

Development of a Botulism Neurotoxin Sensitive Lateral Flow Assay Biosensor for Clinical Applications and Medical Settings

Marcos Maldonado – Biology

Faculty Mentor: Andrew Bonham

One of the many great challenges that medical diagnostics face is the need for sensitive, reliable, and rapid detection of molecules in very complex solutions such as blood or urine. DNA-based biosensors have shown great promise in terms of sensitivity and reliability for target detection, but the need for rapid testing has considerably slowed their use in practical applications within the medical world. Within the research we have worked on, we explore the incorporation of DNA-based biosensors into a lateral flow assay format (similar to the common at-home pregnancy test for human chorionic gonadotropin in urine). To facilitate this, we are developing a gold nanoparticle decorated with a functional DNA probe that recognizes and binds to botulism neurotoxin variant A (BoNTA). This conjugate then wicks across a nitrocellulose membrane to specific capture points, allowing rapid visual assessment of the BoNTA contamination of a sample. In the future, we aim to demonstrate that this represents a generic platform for detection that could be used with any existing DNA aptamer-based biosensing technique and can be applied to many medical settings, including small clinics, without the need for technicians to operate the biosensor.

(Poster Presentation, Session I (9:30 – 10:30 AM), Poster #19)

The Intersection of Musical Preference and Creative Capacity

Julian Malek – Psychology

Coauthors: Kelsie Howell, Jacqueline Snyders, Brandon Gale, Tina Martinez, Kathryn N. Davis

Faculty Mentor: Lisa Badanes

Musical preference is often derived from idiosyncratic temperaments intermingling with the unique vagaries of happenstance. Nevertheless, some have wondered whether what music you like is an embodiment of more fundamental traits. The purpose of our study was to see if a clear correlation between musical preference and creative capacity exists. We investigated this phenomenon by probing a large (201 participant) sample with the STOMP inventory while simultaneously assessing their creative fluency and originality with the Alternate Usage Task. The AUT encourages participants to conceive of all possible (traditional and nontraditional) alternative uses of a prototypical brick in a 5-minute span. Corresponding to Rentfrow & Gosling's (2003) results, we found that a preference for Reflective & Complex music (jazz, classical, folk and blues music collectively) significantly correlated with higher fluency scores (number of answers) and higher originality scores (uniqueness of answers) on the AUT ($p<.05$). Reflexive & Complex music is designed for introspection and stresses musical convolution. Hypothetically, those with greater intellectual vitality gravitate toward music that mirrors the internal structure of their own thoughts, explaining our findings. High working memory capacity could also enable greater appreciation of R&C music, and WM and creativity are highly interrelated. We also found that white participants outperformed non-white participants on creative fluency to a statistically significant degree. Non-white participants usually suffer from Stereotype Threat which can lead to underperformance. Stereotype Threat is an anxiety-provoking cognitive impediment that fears conforming to negative stereotypical outcomes of poor domain-specific racial performance. These findings warrant further investigation.

(Oral Presentation, Session I 10:00-10:15 AM, NC Room 1323)

Impact of Ski Industry on Water Quality and Human Health, Keystone, Colorado

Madison Mangines – Environmental Science

Faculty Mentor: Randi Brazeau

The Snake River Watershed, located in the White River National Forest, experiences high trace metal concentrations from acid mine drainage and natural acid-rock drainage. The Pennsylvania Mine, a superfund site, is discharging acid mine drainage into Peru Creek, a tributary of the Snake River. Keystone Resort is producing artificial snow with acid mine drainage effluent directly below Pennsylvania Mine. The purpose of the study is to determine human health impacts from inhalation of trace metals from artificial snow at Keystone Resort. Water and soil samples will be collected two times a month for three months at specified locations along the Snake River. DO, pH, conductivity, phosphate, sulphate, ammonia, nitrate and certain trace metals characteristic of acid mine drainage will be tested in the field and laboratory. Concentrations will be compared to federal inhalation exposure limits to determine impact on human health.

(Poster Presentation, Session IV (3:30 PM – 4:30 PM), Poster #8)

The Novel: A Screenplay: The Movie: A Reflection: The Presentation

Liukura Mariman – English

Faculty Mentor: Rebecca Gorman O'Neill

What moral obligations, if any, does the storyteller have to their audience and creation? This is the question running through the heart of this screenplay, and in its accompanying reflection the pursuit of answers to the question will be further explored. Looking at the foundations of plot structure and the archetypal conflicts of storytelling, there seems to be a running theme of characters' lives running afoul of the storyteller's craft. While this may not seem so awful given the fictional nature of the work, consider the influence of story structure on our lives and how we create conflict.

There is of course inherent conflict in the world, at least in the obtaining of basic survival necessities; this much seems unavoidable. It is not hard to argue however, that there exist superfluous conflicts as well: disputes over ownership, differences in ideology, identity. And with all of this conflict effecting us every day, personally and on the global level, it is our obligation to search ourselves for the reasons that we continue in this paradigm. By analyzing important works in literature, and the story crafting process itself, this screenplay and reflection will discuss whether the conventions of storytelling have bled through into the ways that we conduct our lives, and by extension, if the storyteller then has an obligation to address and correct this behavior.

(Oral Presentation, Session II 11:30-11:45 AM, NC Room 1323)

Revealing the Absent Referent on your Plate: Exposing the Lives of Nonhuman Animals and Farmworkers in the Food Industry, A Feminist Analysis

Jessica Marshburn – Women's Studies

Faculty Mentor: AnnJanette Alejano-Steele

The purpose of this thesis is to illuminate how all sentient beings involved in the food industry are erased. I argue that farmworkers, slaughterhouse workers, and sentient nonhuman animals are made invisible and are the absent referent within the industry, on our plates, and in our minds. Furthermore, I argue that this erasure is made possible by intersecting systems of domination and oppression constructed under white supremacist, patriarchal, capitalist, anthropocentric ideologies and economies. I will be using Young's Five Faces of Oppression as an objective criterion for judging the existence of oppression of different groups (Vee, 2015). These ideologies are embedded in the system we live in today and by their very nature are intended to operate invisibly so that they inform our worldviews. I propose that we move away from this erasure and progress into recognizing the lives that toil, hurt and die in this industry. I envision an abolitionist approach to veganism that rejects reform and regulation of animal exploitation, as well as an end to US-sanctioned worker programs that are poorly regulated and renown for human rights abuses.

(Oral Presentation, Session III 2:45-3:00 PM, NC Room 1322)

Incivility, Cognitive Function, and the Role of Gender

Ian Maxwell – Psychology

Coauthors: Austin Haider, Sean T. Vieau, Aryanna Wiggins

Faculty Mentor: Lisa Badanes

Incivility is ubiquitous. Incivility in the workplace has been shown to have negative outcomes on task performance and helpfulness (Porath & Emir, 2007). When examined individually, incivility has been shown to be a stressor (Penney & Spector, 2005) as well as having extended social consequences (Foulk & Erez, 2015). Stress has been shown to have negative consequences to job performance and cognitive performance (Wood, Van Veldoven, Croon, & de Mendez, 2012). Much of the previous research has investigated either physical stress such as the Cold-Pressor Test (Cahil, Gorski, & Le, 2003), or high psychosocial stressors such as the Trier Social Stress Test (Schoofs, Preuß, & Wolf, 2008) which can both be seen as high acute stressors. Executive function has been shown to be impaired by high acute stressors while low acute stressors have been shown to enhance executive function (Andreano & Cahill, 2006). Further, reaction to stress is different depending on one's gender (Kudielka & Kirschbaum, 2005). Incivility is also an effective low acute stressor which effects cognitive performance (Porath & Erez, 2009). It was hypothesized that there would be a difference in working memory performance depending on the gender of the uncivil source. 183 individuals were randomly assigned to either a control group or an incivility group. Individuals in the incivility group observed an uncivil event between the group moderator and a confederate. Results show that when the uncivil confederate was male, working memory improved. Results also show no effect to working memory when the confederate was female.

(Oral Presentation, Session III 2:30-2:45 PM, NC Room 1323)

Creative Writing Workshops and the University Student

Natalie McAnulla – English

Faculty Mentors: Elizabeth Kleinfeld

My research examines the student's creative writing process. To that end, I scheduled and advertised three creative writing workshops that would be the field on which I would study. Then I created lesson plans detailing what the hour would entail as well as the tools required for the task. Life and tutoring experience informed my structure, as did research from several writing craft professionals.

Each workshop had a unique theme to focus on a specific aspect of the writing process. My goal for each workshop was for the student writer to leave with as much personally written material as possible. This demonstrates to students what can be accomplished in a small period of time as well as provides them with different experiences and strategies to enhance their own creative writing. I collected data at the end of each workshop in the form of a three question survey which I constructed with the aid of Dr. Kleinfeld and professional research. The most interesting thing I learned from this experience and research was that every single student wanted more; more time, more writing experiences, more workshops. Each hour was begun with an introduction to the purpose of and goal for the following hour. Timed writing as a productive creative writing activity was explained. Then the students wrote for three, ten minutes intervals with varying direction that depended upon the theme.

(Oral Presentation, Session III 3:00-3:15 PM, NC Room 1325)

21st Century College Readiness Center Out-of-School Research

Rachel McGill – Human Development

Faculty Mentors: Bethany Fleck-Dillen

The objective of this research study is to analyze if afterschool program students have a change in their academic achievement, fixed or growth mindset, motivation, or academic self-handicapping. The participants completed a survey packet that included: The Assessment of Implicit Theories (IT), Personal Achievement Goal Orientations Scale (PAGO), The Academic-Related Perceptions, Beliefs, and Strategies: Academic Efficacy (AE), the Academic Self-Handicapping Strategies (ASHS), and the Student Information Questionnaire: written by the CUE staff requesting demographic information and recent course grades. The preliminary data had 143 participants with an average age of 14.02 years (SD = 2.17). There were 66 (46.2%) males and 77 (53.8%) females. The average score for IT Orientations Scale was 11.77 (SD = 4.18) indicating a relatively fixed mindset. The average score for the PAGO Scale for internal goal orientation was 21.45 (SD= 3.61). The average score for the PAGO scale for external goal orientation was higher, 28.12 (SD= 8.44). The average for the AE scale was 19.82 (SD= 3.87). This is a high score demonstrating high beliefs in academic skills. The average for ASHS was 16.39 (SD= 5.76), indicating moderate handicapping behaviors. All averages are from the beginning of the school year and will be computed again at the end of the school year to assess if there was change.

(Poster Presentation, Session II (11:00 – 12:00 PM, Poster #27)

The Production and Analysis of Biodiesel from Water Sources

Sean McManus – Chemistry

Coauthors: Kenneth Marincin, Ana Gutierrez, Seth Yannacone

Faculty Mentors: Michael Jacobs and Shamim Ahsan

The process of changing waste vegetable oil into a usable biofuel via base catalyzed trans-esterification, has been studied by this research group using potassium hydroxide and sodium hydroxide. Using a base catalyzed reaction of this nature requires the waste oil to meet certain specifications such as low water content, low free-fatty acid content and be free of any particulate matter. For waste oils that do not meet these requirements other catalysts have been employed. This research group has been testing several catalysts including sulfuric acid homogeneous catalysts and heterogeneous metal oxide catalysts to produce biofuel. Once the biofuel is produced it is analyzed by several ASTM tests, and additional steps are being researched to decrease the cloud point increasing the usability of the biofuel. With these different catalysts and standardized tests in mind, this team hopes to provide a better method and understanding of biofuel production from waste sources.

(Poster Presentation, Session I (9:30-10:30 AM, Poster #29)

Proliferation of Presentations and the Variables that Make for a Compelling In-Person Presentation

Benjamin Michaels – Hospitality Tourism & Events

Faculty Mentors: Cynthia Vannucci

Audiences are inundated each day with YouTube presentations, Tedx presentations, and inspirational shorts on Facebook. This researcher seeks to understand why face to face presentations are still being utilized and what makes a live face to face speech more effective. A conducted a survey was given to NSA of Colorado determine what makes for a good speaker to measure socioeconomic characteristics of the speakers from the NSA Colorado. Finally to determine top five variables of why they become speakers. We found that 45% of speakers think the most important variable of a good speaker is to be truthful and ethical when delivering their speech. This is compared to 80% of speakers who feel they must be authentic in order for an audience to be moved by their topic. 54% of Speakers felt telling a good story is what makes for a good speaker. Of significant interest uncovered through the findings that a speaker is far more likely to be effective to an audience if they research an audience beforehand. A series of other valuable findings were presented as a result of this study.

(Oral Presentation, Session III 2:30-2:45 PM, NC Room 1322)

Does Dietary Choline Mitigate the Effects of Adolescent Stress on Cognitive Behavior in Male Rats?

Ebony Miller – Biology

Coauthors: Ashley Ellmaker, Andrew Strosnider, Anna Quaife, Danelle Whisenhunt

Faculty Mentor: Irina Grichtchenko

Stress contributes to increased anxiety and impaired memory function, during perinatal and adolescent stages. The brains cholinergic system mediates anxiety-related behavior and memory function, and interventions targeting the cholinergic system have effectively mitigated the behavioral effects of stress experienced during the prenatal period in rodents. Whether adolescent intervention may also be effective is not known. The current study tested the hypothesis that adolescent intervention with dietary choline supplementation ameliorates the negative effects of adolescent stress on spatial memory function in adulthood. The specific memory task employed here, the T-maze, is a pre-frontal cortex (PFC) dependent task. Rats were divided into 4 groups of adolescent stressed (AS) or nonstressed (NS) males that received choline supplementation during adolescence stage (21-31 days of age) or a normative choline diet. The experiment was done using the T-maze test, where 5 consecutive trials were performed. The rats (approximately 80 days of age) were placed in the bottom portion of the T-maze where they are given a choice between the left and the right arm. If memory function is intact, we expect to see a distinct inclination to choose a novel arm over the one more recently explored, resulting in an alternating pattern of exploration across trials. We predict AS will impair alternation patterns and choline supplementation will normalize alternation patterns of stressed rats in the T-maze. Future research will be to determine the effectiveness of choline supplementation in human clinical trials. The results are currently being analyzed and will be presented at the conference.

(Poster Presentation, Session II (11:00 – 12:00 PM), Poster #22)

Marijuana Smokers in High Schools Throughout Colorado in Effect to the Legalization of Recreational Use

Austin Miller – Criminal Justice & Criminology

Coauthor: Ian Evans

Faculty Mentor: Richard Jackson

The purpose of this study is to not only identify the amount of high school students who experiment or frequently use marijuana, but to indulge on the aspect of reports filed, and the drug awareness programs that are implemented within the educational institutions of Colorado. The first phase of the study incorporates interviews on the administration (e.g. Deans, Principles, and Vice Principals), the School Resources officer(s), and the faculty within the educational institutions in Colorado. The second phase of our study is to identify a phenomenon within the interviewed schools, and to analyze the qualitative data to potentially find and present a pattern within the educational institutions. The greater aspect of our study is to indicate if our drug awareness (or prevention) programs are being enabled in schools, and the marijuana policies that follow for administration and School Resource Officers. This will allow an in-depth analysis on the effective programs towards drug awareness and prevention that taxpayers forfeit through their city/town, county, and state.

(Poster Presentation, Session I, (9:30 – 10:30 AM), Poster #11)

Quantification of Acyl-Homoserine Lactone Produced by *Nitrobacter winogradskyi*

Clarence Mills – Biology

Faculty Mentor: Rebecca Ferrell

It was recently reported that *Nitrobacter winogradskyi*, the model chemolithotrophic bacterium that oxidizes nitrite to nitrate, contains a functional N-acyl-homoserine lactone (AHL) synthase typical of two component quorum sensing systems. Quorum sensing (QS) is a form of intercellular chemical signaling

by which bacteria of a single species collectively coordinate gene expression based on cell density and distribution. QS systems commonly feature two enzymes: a signal synthase that continuously produces basal levels of signal, which are subsequently transported out of the cell, and a signal receptor, which regulates transcription. As a bacterial population grows, the amount of signal in the surrounding environment increases and eventually begins to diffuse back into the cells, binding the signal receptor and triggering a regulatory cascade responsible for the expression of traits that can include biofilm production, antibiotic synthesis and growth regulation. While it is clear that *N. winogradskyi* produces AHLs, it is still unclear what phenotypic responses they may elicit. We have cultivated *N. winogradskyi* under different growth conditions and quantified AHL production using an *Agrobacterium tumefaciens* strain engineered to respond to AHL by producing β-galactosidase in proportion to the level of signal. A Miller assay then quantifies β-galactosidase activity, which can be correlated with level of AHL signal. We are quantifying AHL production throughout *N. winogradskyi*'s lifecycle to better understand the relationship between its growth kinetics and QS system. Ultimately, we hope to clone the putative QS genes into *Escherichia coli* to verify that they are indeed responsible for QS in *N. winogradskyi*.

(Poster Presentation, Session II (11:00 -12:00 PM), Poster #7)

Trinitite and Environmental Soil Dissolutions for Isotopic Analysis via ICP-MS

Jared Minaga – Chemistry

Coauthors: Enrique Grimaldo, Joshua Holloway

Faculty Mentor: Eric Ball

The field of nuclear forensics focuses on the analysis of radioactive materials found within the environment. The presence of radionuclides may be due to natural sources, industrial nuclear waste, nuclear accidents (such as the recent Fukushima reactor disaster), or fallout from nuclear weapons testing. One challenging step in preparing environmental samples for analysis is achieving complete dissolution, which traditionally involves the use of hazardous reagents such as hydrofluoric acid (HF). The goal of this research is to completely dissolve relevant samples with the use of potassium hydroxide (KOH) in order to detect the presence of radionuclides via inductively-coupled plasma mass spectrometry (ICP-MS). Soil samples were taken from various locations that may contain radionuclides from natural sources as well as fallout from stratospheric nuclear tests. In addition to soil samples, Trinitite and synthetic Trinitite were treated with varying concentrations of KOH with the aim of achieving incremental and complete dissolution. Synthetic Trinitite is a cost-effective and non-hazardous glass used to emulate radioactive Trinitite. Dissolution of the samples was monitored and target radionuclides were detected using ICP-MS. The dissolution methods have potential to be applied to a wide variety of topics, such as pollen analysis in soil samples.

(Poster Presentation, Session IV (3:30 – 4:30), Poster #9)

Level of Food Insecurity and Correlates Among Metropolitan State University of Denver Food Bank Users

Stephanie Mitchell – Human Nutrition-Dietetics

Coauthors: Samuel Banister, Yoko Burde, Jahaira Vigil

Faculty Mentor: Melissa Masters

Background: Food insecurity has emerged as a major contributor to poor academic performance. Research suggests that college students exhibit a greater rate of food insecurity than the overall population. More research is needed to describe this population's level of food insecurity and its effects on academic performance.

Objective: To identify correlates of food bank usage including demographics and level of food insecurity among users of the MSU Denver Food Bank. Aspects of users overall satisfaction with the food bank will also be examined.

Methods: A cross-sectional survey administered via Qualtrics Research Suite was made available to participants for a 2-week time period. The survey was emailed to participants using email addresses obtained from MSU Denver Food Bank records. The survey was formed to provide data on demographics, usage, and satisfaction. Food insecurity was assessed using the U.S. Household Food Security Survey Module: Six-Item Short Form.

Results: Of the 67 participants, 67% indicated "very low" food security. Approximately 91% of participants said they support themselves financially, with 60% reporting income <$15k. While 87% of participants claimed to be utilizing >7 (of 10) points per week, 73% said that ≤ 30% of their food needs were met by the MSU Denver Food Bank. The average GPA of participants was 3.29.

Conclusion: On-campus food banks provide important access points for food insecure college students, providing nutritious and adequate foods through this outlet should be prioritized. Future research should assess on-campus food bank utilization nationwide

(Poster Presentation, Session I (9:30 – 10:30 AM), Poster 12)

The Effect of Cognitive Behavioral Therapy for Victims of Military Sexual Trauma

Erin Mittoo – Human Services

Faculty Mentor: Brian Bagwell

Cognitive Behavior Therapies (CBT's) have been some of the most effective treatments for Post-Traumatic Stress Disorder (PTSD) resulting from Military Sexual Trauma (MST). Therapies such as Prolonged Exposure Therapy (PET) and Cognitive Processing Therapy (CPT) have been compared against Present Centered Therapy (PCT) in case studies and research. These empirical studies give evidence that CBT's has been more effective than PCT in reducing the effects of MST. Therapies that use prolonged exposure have significant results in reducing the number of Negative Cognitions (NC's) about an individual's self, the world, and the future. At times the outcomes can even result in remission of PTSD. This presentation focuses on the basic functions of prolonged-exposure therapy, the demonstrated results of its effectiveness, and how CBT's have been shown to have superior effects over PCT.

(Oral Presentation, Session III 2:15-2:30 PM, NC Room 1323)

Caffeine as an Indicator of Anthropogenic Waste in the South Platte River

Emelie Mollersten – Biology

Faculty Mentor: Randi Brazeau

The purpose of this study is to evaluate the presence of caffeine in the South Platte River and how well caffeine can serve as an indicator of anthropogenic waste in a surface water system. Maintenance and monitoring of surface water systems used for drinking and recreation is essential as contamination of these systems can pose severe risk to human and environmental health. The presence of caffeine in surface water often mean the co-occurrence of other organic compounds and contaminants such as pharmaceuticals, fecal pollution, pesticides and personal care products (PCPs). The sources of caffeine in surface water are largely anthropogenic, with effluents from wastewater treatment plants, leaking septic tanks and storm water runoff as the primary pathways. Water samples will be collected three times during Mars and April of 2016 from the South Platte River both before and after the Robert W. Hite Wastewater Treatment Facility. The caffeine concentrations will be quantified using Solid-Phase Extraction and Gas-Chromatography/Mass-Spectrometry. Before analysis the samples will be spiked with 13C3 – labeled caffeine to serve as an internal standard. Nutrient levels will be analyzed in the field with a colorimeter. Total coliform will be estimated by performing most probable number tests (MPN). If a positive correlation is found between caffeine levels and coliform and/or between caffeine and nutrient levels, it would indicate that caffeine could help track the origins of human contamination in surface water.

(Poster Presentation, Session II (11:00 – 12:00 PM), Poster 9)

Exploring Young Adult Literature: Its Definition and Importance in Society and the English Community

Andre Morgan – English

Faculty Mentor: Lisa Suter

I'd like to present an academic essay that I submitted for my Young Adult Literature course in the fall of 2015. The essay opens seeking to find a definitive understanding of what Young Adult Literature is, but immediately runs into issues as no authority agrees on what defines this complex genre. The essay goes on to construct a definition of YA Lit is by examining what the genre is composed of and has accomplished. It first discusses how diverse YA Lit is in presentation using examples from film, graphic novels and verse novels to name a few. Second, it explores the variety and intensity of YA Lit subject matter, especially noting how YA Lit addresses hot topics in society like teen bullying, drug abuse and suicide. The last the essay relates YA Lit's importance to the English discourse community, and considers how the genre is a manifestation of popular theory within the community. While the topic of the essay is Young Adult Literature, more than 20 works of popular Young Adult Literature and peer-reviewed academic essays are used to construct a definitive interpretation of what Young Adult Literature is and its importance to the most critical stage of development, adolescence.

(Poster Presentation, Session I (9:30 – 10:30 AM), Poster #14)

Determination of 3' Cap Independent Translation Enhancer Structure in Black Currant Reversion Virus Genome 2

Evan Morrison – Chemistry

Coauthor: Elizabeth Shields

Faculty Mentor: Megan E. Filbin-Wong

Non-canonical translation initiation of the Black Currant Reversion Virus RNA 2 (BRV-2) is directed by a 3' cap-independent translation enhancer (CITE). CITEs are long noncoding, structured RNAs that function to bind and deliver eukaryotic initiation factors to the 5' end of viral genomes in order to promote non-canonical translation initiation. Our goal is to determine how the BRV-2 CITE structure directs its function. Although detailed CITE RNA folding predictions have emerged, no experiments have resolved the secondary or tertiary structures directly. Here, we report the use of native gel electrophoresis and chemical probing techniques to identify secondary structural motifs and the presence of higher-order folding. Native gel analysis of the CITE confirmed the existence of multiple secondary structures that fold into two tertiary structures in the presence of magnesium. Chemical probing via selective 2' hydroxyl acylation analyzed by primer extension (SHAPE) and dimethyl sulfate base-modification are beginning to highlight differences in RNA fold predicted in silico from what is observed in vitro. Future research relies on modification of specific base-pairs using site directed mutagenesis in order to confirm both secondary and tertiary CITE structures. Ultimately, luciferase translation experiments will provide insight into how CITE structure confers function.

(Poster Presentation, Session III (2:15 - 3:15 PM), Poster #13)

Sky Pond and Glass Lake Water Quality Analysis

Jacob Moyer – Environmental Science

Faculty Mentor: Randi Brazeau

This experiment is designed to provide a full water quality analysis of the Loch Vale river basin, more specifically the inlet tributaries of both Sky Pond and Glass Lake, as well as a quality assessment downstream. There are multiple purposes to this experiment, one being the analysis of nutrient quality of the inlet tributaries and downstream tributaries of Sky Pond and Glass Lake including quality fluctuations downstream and possible causes for these fluctuations such as geologic influences or human-caused pollutants. The analysis will include standard quality measurements such as pH, temperature, dissolved oxygen and conductivity as well as an assessment of chemical species throughout the area, their concentrations, and how they deviate downstream. A total carbon analysis will also be provided to add further understanding of the chemical and physical makeup of the designated tributaries. Sampling will occur two or three times before spring snowmelt (February through March), and two or three times after spring snowmelt (March through May). Considering the remoteness and serenity of the area, as well as the importance of the glacially-fed, freshwater tributary system, it is necessary to fully understand the chemical and physical makeup of these waters and how they fluctuate downstream, and also develop both understanding and techniques to reduce the possibility of degradation to these environmentally crucial areas.

(Poster Presentation, Session II (11:00 – 12:00 PM), Poster #17)

Implementing Probabilistic Reasoning Models with Prolog

Bennett Alex Myers – Mathematics

Faculty Mentors: Jody Paul

Probabilistic reasoning models such as Bayesian networks are used to represent and solve decision problems in domains that exhibit uncertainty, and the inference and learning capabilities of these models are of significant importance in fields such as artificial intelligence and machine learning. Here, we investigate how conducive a logic programming language such as Prolog is at implementing a probabilistic reasoning model to make decisions.

(Poster Presentation, Session I (9:30 -10:30), Poster #26)

Bird Diversity on Costa Rica's Reforested Pastures and Plantations

Ashleigh Nakata – Biology

Coauthors: Ricky Martinez, John Paul Delong, Vinson Turco

Faculty Mentors: Jennifer Gagliardi-Seeley and Christy Carello

Surveys conducted on breeding bird populations in North America have shown significant declines in the abundance of migratory songbirds. The reasons for these declines are varied but habitat loss, fragmentation, and degradation in breeding areas are considered primary factors. Little is known about habitat requirements and condition on their wintering grounds. Several studies suggest that populations of Neotropical migrants are being limited by conditions at their tropical wintering grounds. In the Monteverde region of Costa Rica, a large-scale effort has been made to restore habitat and create connectivity of primary and secondary growth forests. Our experiment compares species richness and abundance of avian species across a variety of potential habitats in this region. We conducted 15-minute point counts to compare species richness and abundance of birds in mature secondary forest (used as a control), reforested pasture, and reforested coffee/sugar plantation. Counts were conducted between 0600-0900 for an 8-day period between January 4 – 14, 2016. We also mist netted birds between 0530-1400 for one day at each location. We will use the results of this study to make recommendations for habitat restoration in the area.

(Poster Presentation, Session I (9:30 – 10:30 AM), Poster #15)

Computational Analysis of the Microvariability of Blazars

Robert Nelson – Computer Science

Faculty Mentor: Alberto Sadun and Masoud Asadi

Blazars are a classification of active galactic nuclei (AGN), posited to be indicative of infalling matter from an accretion disk of a supermassive black hole at the center of an active galaxy. Perpendicular to this accretion disk is generated a pair of relativistic jets, extremely powerful jets of plasma moving at relativistic speeds often reaching hundreds of thousands of light years in length. Among AGN, Blazars are notable for the fact that their relativistic jets are positioned in the relative direction of earth, giving them an unusually high apparent magnitude for AGN. This allows for observation of variability in their optical brightness, which gives us a rare chance to analyze the mechanics behind both the creation of the jets, and the nature of galaxies in the very early universe. Through use of observations of the blazar Markarian 501 and a program written in the Wolfram Language, we mathematically model the variability

of the given blazar, with the long-term goal of applying frequency analysis to expose patterns within the data. By use of these methods, we hope to further the understanding of AGN and the early universe.

(Poster Presentation, Session I (9:30 – 10:30 AM), Poster #17)

Test-Taking Strategies: Belief in the First Instinct Fallacy

Rachel Nielsen – Psychology

Faculty Mentor: Cynthia Erickson

When taking multiple- choice exams, many students believe that changing an answer from their first, or 'gut' response, will result in a lower grade. The incorrect belief that sticking with one's first impulse answer on a test is better than changing that answer is termed the First Instinct Fallacy. The purpose of this study is to identify the various factors that influence students' beliefs about test taking strategies in relation to the First Instinct Fallacy. For example, students who are not very confident when taking exams may believe that using a 'rule', such as the First Instinct Fallacy, will help them feel more assured in their answers. In addition, students who are high in need for cognition and metacognitive awareness will be more likely to rethink answers they choose and change from their first choice if they are unsure about an answer. We are collecting survey data from Introductory Psychology students to address this issue. The survey includes questions about test-taking strategies, the need for cognition and metacognition inventories, a confidence scale, and test questions one might see in an introductory psychology exam. The results from this study may help Introductory Psychology students develop better test taking strategies.

(Poster Presentation, Session I (9:30 – 10:30 AM), Poster #18)

Do Service Learning Courses Impact Integrative Health Care Students' Post-Graduation Planning at Metropolitan State University of Denver?

Mallory O'Connell – Integrative Health Care

Faculty Mentor: Carol Jensen

The purpose of this study is to evaluate the impact of service learning coursework in the Integrative Health Care (IHC) program at Metropolitan State University of Denver on students' post-graduation planning. Quantitative and qualitative data has been collected using an online survey sent to IHC students of junior and senior status. Students who have not participated in service learning courses are considered the control group. Study findings will help guide future service learning courses in the IHC program to ensure post-graduation success.

(Poster Presentation, Session II (11:00 -12:00 PM), Poster #10)

Seasonal Assessment of Transient and Resident Arthropod Communities on a Horticulturally Modified Urban Green Roof

Maribeth Oestereich – Biology

Coauthors: Shawn Ward, Ted Heron

Faculty Mentor: Robert Hancock

In 2011 an extensive green roof, planted with a mixture of 13 cultivars of non-native Sedum spp. and associated landscaping materials, was installed on the Student Success Building (SSB) on Auraria Campus in Denver, CO. Green roofs can function as microclimate wildlife corridors, which can be important in urban areas where there is significant disruption to the natural ecosystem, both in continuity and availability. Green roofs can also provide insulation, reduce energy consumption, mitigate storm water runoff, and filter pollutants. Ongoing arthropod biodiversity studies beginning in 2013 have identified stable resident populations of flight-limited detritivores, as well as various transient species such as orders Diptera and Lepidoptera. Many of these transient species utilize the green roof as a waypoint refuge. Since the installation of the green roof on the SSB, student research has focused on observing resident and transient invertebrate populations that utilize the space, with an emphasis on resident populations. Changes to the current protocol will be made in order to further observe the transient invertebrate community, through the expanded usage of malaise and light sheet traps. Additionally, native plant species will be introduced. We will also be collecting information concerning abiotic factors, specifically relative humidity and temperature, which affect the invertebrates that colonize the habitat. Combined with the current protocol and future adjustments, this study aspires to understand how the green roof is utilized as a transient passageway while functioning as a residential habitat for native invertebrate species within Denver's urban sprawl.

(Poster Presentation, Session II (11:00 -12:00 PM), Poster #19)

"To Find Oneself is to Find Our Humanity" (Deredia y Amoretti, 2013) The Regla Site Skulls of Costa Rica: Forensic Facial Reconstruction Research Project

Faye Olsgard – Anthropology

Faculty Mentor: Ted Shin and Sarah Harman

This research is an archaeological investigation to identify Costa Rica's ancient people, placing a face on their history. The bones will be given a voice, reclaiming the identity of a country's lost human heritage as a bequest to the children who are the face of Costa Rica's future. According to the radiocarbon date of 500 BC burials at the archaeology site of Regla, Gulf of Nicoya, Costa Rica contains some of the oldest human skeletal specimens in Central America. Anthropologists using traditional methods of osteologic analysis of craniometric data can establish a biologic profile of these excavated individuals however; these methods cannot portray the facial likeness of the ancient person. Three-dimensional forensic facial reconstruction can generate a facial likeness but traditional techniques require the application of physical materials directly on the skull, which chance damage to the specimen. This research project is designed to expand the scope of osteological analysis using a multidisciplinary approach. The goal is to produce an accurate facial portrait of a living individual without risk to the original artifact. Planned sequential research began with medical imaging or computed tomography (CT) scanning of an ancient female cranium and mandible and an associated shell artifact. Based on these data sets, a 3/D printer will create an anatomical model. A forensic facial reconstruction using sculpted clay will be formulated directly on the model (instead of the actual skull) resulting in a physical representation of this individual during life. Additional multiple burials excavated from the Regla site are secondary "bundled burials" and represent disarticulated remains that are heavily concreted. Traditional osteologic analysis is impossible in this present state. If this research project using a sequential multidisciplinary approach is successful in combining traditional methods with medical imaging and rapid prototyping to generate an accurate biological portrait of the ancient female individual, the project will be expanded to include the analysis of additional bundled remains. Under direction of The Museo Nacional de Costa Rica, the resulting facial

reconstructions are nominated to anchor the new archaeological exhibit of patrimony in San Jose, Costa Rica.

(Poster Presentation, Session II (11:00 -12:00 PM), Poster #14)

All the World's a Chain: Using Markov Chains for Literary Works Attribution

Efosa Osazuwa – Economics

Faculty Mentor: Shahar Boneh

We set out to generate a classification algorithm that can identify if a particular literary work can be attributed to a particular author. The central driver behind this algorithm will be the use of Markov Chains, specifically transition matrices. The literary works that will be analyzed are the entire works of William Shakespeare, both known and contested. We will also analyze the eighty five articles in the Federalist Papers, attempting to attribute the three authors to their respective papers. The experiment design will be such that once a transition matrix is made via an author's entire corpus, we will figure out the likelihood of various sentences. The algorithm will be trained on some writings within the author's body work, as well as random works, and then be tested against a new set of works to see if Markov Chains provide an appropriate model for this purpose.

(Oral Presentation, Session III 2:30-2:45 PM, NC 1324)

Investigating Family Structure's Influence on Academic Performance

Abelard Palmer – Psychology

Coauthor: Sophia Dennis, Freddy Devora, Rosangelica Guerrero, Keitha Berry

Faculty Mentor: Steven Anderson and Brandi Scott

In this study, we investigated the relationship of family structure and academic performance among TRIO SSS participants. TRIO SSS is a student persistence program serving first-generation college students, students who qualify as low income, and/or students with a documented disability. The survey asked participants to describe their family structure, to discuss how they feel their family structure influenced their academics and to describe how they are performing academically. We then analyzed the responses, looked for patterns and correlations, and offered recommendations to the TRIO SSS program to improve its services. We found that students were affected in a variety of ways, with few clear trends emerging. However, the research provided a multitude of follow up questions and an opportunity to continue this research.

(Poster Presentation, Session II (11:00 -12:00 PM), Poster #11)

Geology of Colorado's Front Range: A Student's Journey in Solitude

Gregg Parrott – Land Use

Faculty Mentor: Barbara Echohawk

Colorado's Front Range is a geological field trip always waiting to happen. Field trips are great when a guide is present, but does a student navigating a geological field trip in solitude lessen their ability to observe and identify geological formations? This project focuses on a student and their geologic adventure to the open range at the foot of the Rocky Mountain Front Range in Colorado. While hypothesizing the expectations, the idea was that if an exposure of rock strata was able to be located, then geological observations could be conducted. After parking the car on Plainview Road near the base of the Front Range just North of Coal Creek Canyon Road (CO HWY 72), the lone expedition headed west through the brush and located an outcropping of exposed tilted strata. Strike and dip, length of exposure, visual observations, and small samples for lab tests were taken. An area was located that included tilted sandstone and shale beds. Visual observations of the area revealed indicators of depositional environments including ripple marks, bioturbation, and what appear to be crocodile scratches. The observational results supported my hypothesis by showing that I was able to locate an area of interest that included an exposure of rock strata and geological observations were able to be performed. The results largely overcame early expectations and added to the author's enjoyment of geological explorations.

(Poster Presentation, Session IV (3:30 – 4:30 PM), Poster #11)

Engineering Independence

Joshua Patterson – Mechanical Engineering Tech

Faculty Mentors: Aaron Brown

Handicap accessibility is an increasingly important topic of discussion in today's society. Engineering has provided many solutions for the disabled allowing independence that they could not have otherwise. I will use accessibility design to improve an aspect of a subject's life. A series of questions were asked to gauge the economic, social, and personal needs of the user, and the design was forged around this criteria. The subject is a 30 year old quadriplegic mother in need of a way to cook for herself and her son, but cannot afford to have a handicap accessible kitchen. My design fills all of her needs. However, how much utility must be exchanged, if any, to make a handicap accessible design more affordable? I will use qualitative data, collected before and after the introduction of the product, to gauge the amount of improvement experienced by the subject. I will then compare this to various other attempts at improvement in this area. With this information I will be able to qualify the improvement experienced by my design. This will allow me to judge how much utility, if any, must be sacrificed to make accessibility designs more affordable.

(Oral Presentation, Session I 9:45-10:00 AM, NC Room 1325)

Identifying *Physa natricina* in the Snake River

Alicia T. Payne – Biology

Coauthors: Winta M. Abraham

Faculty Mentor: Hsiu-Ping Liu

Physa natricina is a freshwater snail that has been labeled as an endangered species. There is little evidence that they are indigenous to one particular region. However, there is speculation that they can be found along the Snake River in the state of Idaho. Along this river, lies a power plant that uses water from the river to fuel its energy. Hundreds of snail samples have been collected from this area. If there are indeed *P. natricina* in the area the plant uses as a resource for energy, then changes will be made in order

to protect this species. Due to variations in shell morphology, *P. natricina* are hard to identify amongst the family Physidae by physical characteristics alone. *P. natricina* vary from other *Physa* species by the position and size of the preputial gland, pigmentation patterns of the head-foot, mantle, tentacles, and position of the male genitalia. Therefore, the soft tissues and DNA need to be examined in order for them to be correctly classified. The intent of our research is to sequence the DNA of every sample, and identify if *P. natricina* resides in the area that has been surveyed. Of the samples that have been collected each will be genetically examined for sequences of *P. natricina.* This will be accomplished by extracting the DNA of each specimen, running a polymerase chain reaction, running an electrophoresis gel, and cycling the product through a sequence analyzer. Thus far, there is no evidence that *P. natricina* is in this area.

(Poster Presentation, Session IV (3:30 – 4:30 PM), Poster #12)

Testing "Frest" *Fluminicola* Species Concepts Using DNA Sequence Data

Joshua Pedrick – Biology

Faculty Mentor: Hsiu-Ping Liu

The purpose of this project is to test Frest's morphologically based *Fluminicola* species concepts with molecular data. Data from mitochondrial cytochrome-b (Cyt-B) and cytochrome-c oxidase (COX I) have been selected and compared to delineate species from samples collected in Upper Klamath Lake. Frest used morphological characteristics, such as pigmentation or shell shape, to describe species of *Fluminicola* living in the Upper Klamath Lake area. These are poor characters for species delineation as they are often influenced by environmental factors. Frest's species concepts were never published in a scientific journal or subjected to the usual peer review process. My research results suggest genetically distinct lineages that do not support Frest's species concepts.

(Poster Presentation, Session II (11:00 – 12:00 PM), Poster #12)

Characteristics of the Test-Anxious Student: The Roles of Personality, Motivation, and Control Beliefs

Tiffiny Pereira – Psychology

Faculty Mentor: Courtney A. Rocheleau

Test anxiety (TA) is a nationwide epidemic; according to the American Testing Anxieties Association (AMTAA, 2015), students report that tests and schoolwork cause more anxiety than anything else in their lives. Fitch (2004) reported that students with high levels of neuroticism and conscientiousness are especially vulnerable to TA. Poor academic self-efficacy, poor self-regulatory skills, and external academic locus of control also predict TA (Chamorro-Premuzic, Ahmetoglu, & Furnham, 2008).

The current study's aim is to identify additional potential predictors of TA, such as academic motivation, additional personality traits, and control beliefs. It is hypothesized that the positive correlations between neuroticism and conscientiousness and TA, as observed in Fitch (2006) will be replicated, as will relationships between extrinsic motivation and control beliefs and poor academic self-efficacy and TA. Additionally, we hypothesize that personality, motivation, and control beliefs may have multiplicative effects on TA. Other relationships among constructs will be examined in an exploratory fashion.

Data collection is in-progress (current n = 99); our final target sample size is 150 students collected from the Psychology subject pool. Relationships among the study variables will first be examined using bivariate correlations, followed by hierarchical multiple regression analyses.

These results can be used to identify students who may be vulnerable to TA early in their academic careers and to develop evidence-based strategies to assist students to manage their anxiety and prevent the negative consequences of TA on academic performance and self-esteem.

(Oral Presentation, Session III 2:15-2:30 PM, NC Room 1325)

Intergenerational Communication: Undergraduate Perspectives

Andrew Plevak – Speech Language & Hearing Sciences

Coauthor: Saskia Bagatais

Faculty Mentors: Jessica Rossi-Katz and David Kottenstette

Communication exchanges are shaped by many factors including but not limited to the participants' perceptions of each other. Our research investigates intergenerational communication through semi-structured interviews and guided narratives with young and older adults. In this poster, we present our preliminary findings from the semi-structured interviews with younger adults. Participants were MSU Denver students who, at the time of data collection, were enrolled in a Communication Arts and Sciences class. Participants were asked a series of eight questions that included the age at which someone is considered old and how they adapt their conversational style when communicating with older adults. Initial results show great variance in the ages that participants consider someone to be an older adults. Our participants frequently interact with older adults, and when they do, they report modifying their speech, usually speaking slower or in a more formal manner. As data collection continues, we will analyze participants' responses as to perceived barriers to effective communication. We will use these findings to develop a narrative theatre piece focused on optimizing intergenerational communication.

(Poster Presentation, Session I (9:30 – 10:30 AM), Poster #21)

Efficacy of Antimicrobial Fibers Containing Microsilver

Karly Portenier– Biology

Faculty Mentor: Sheryl Zajdowicz

Antimicrobials are a growing tool in today's sanitation practices and can range from natural products found in nature to chemical compounds created in a lab. Various household cleaning cloths are available that contain silver nanoparticles and are advertised as having antimicrobial properties for kitchen, body, and food cleaning. One popular patented product known as Norwex® is a line of antimicrobial ultra-microfiber cloths consisting of fibers treated with a micro silver antibacterial agents; Norwex® claims to have both bacteriostatic and fungistatic properties. This study evaluates the efficacy of various types of Norwex® cloth on both Gram positive and Gram negative organisms, as well as on *Candida albicans*. Representative organisms were plated on Brain Heart Infusion agar and uniform pieces of cloth soaked in saline were applied. Results showed that the cloth containing higher amounts of micro silver were able to inhibit the growth of all organisms used in this study. To further test the antimicrobial activity, a known number of organisms were applied to the cloth and measured after 24 hours of exposure to measure the bactericidal activity. These results suggest that these cleaning cloths could be a useful alternative to cleaning with cleaners containing harmful chemicals.

(Poster Presentation, Session I (9:30 – 10:30 AM), Poster #22)

Effect of the Aromatic Ring Substituent on Thiophosphoramidate Synthesis

Lucie Portilla – Biology

Faculty Mentors: Susan M. Schelble and Jonathan M. Cook

Thiophosphoramidates can be synthesized by reacting primary amines with thiophosphoryl chlorides. In this type of the reaction, the primary amine acts as the nucleophile, where a lone electron pair of the nitrogen attacks electrophilic phosphorus of thiophosphoryl chloride. Due to the conjugated system, the substituent on the aromatic ring can greatly increase or decrease reactivity of the amine reagent. The research assessed three model amines: aniline, p-toluidine and o-nitroaniline. An electron donating group of p-toluidine and electron withdrawing group of o-nitroaniline were compared to aniline which differ only in lack of the additional substituent on the aromatic ring. The results were analyzed next to the theory. Understanding of the chemical behavior of primary amines has a great importance in synthesis of the thiophosphoramidates. The thiophosphoramidates are novel molecules that can be used as precursors for antiviral drugs synthesis. They have potential as retroviral protease inhibitors, and thus inhibit retroviral proliferation. These novel compounds may offer a solution for HIV or feline leukemia patients. Due to its medical application, detailed characterization of the drug precursors is necessary. Moreover, the detailed study of the reactivity of the starting material can offer decreased cost of the future drug and thus greater accessibility for a wide range of patients.

(Poster Presentation, Session I (9:30 -10:30 AM), Poster #25)

Sympathy for the Devil: Understanding Humanity through Monstrousness

Alessandra Ragusin – English

Faculty Mentor: Pamela Troyer

The Devil: part human, part inhuman, entirely monstrous. In his book, "Monster Theory", Jeffrey Jerome Cohen hypothesizes that literary and historical monsters live in cultural and societal borderlands; monsters are human enough for humans to relate with them, but are simultaneously entirely inhuman to serve as a warning, or a representation of cultural boundaries that should not be crossed. Enter Satan, perhaps one of the most well-known monsters in history. As a representation of subversive cultural ideals, the Devil has taken many symbolic and metaphorical forms throughout history. Without the monstrousness of the Devil, it appears that his antithesis, God, is unnecessary and unknowable. The Devil helps define the moral majority by what it is not. He/it is the ultimate representation of base human nature, making him a sympathetic character, but one who drastically pushes the boundaries of what the ruling morality of the time considers dangerous. Using historical and cultural analysis filtered through the lens of Cohen's monster theory, I will examine what the Devil, as a constantly shapeshifting and evolving character, has represented throughout history, and what he has come to represent in modern cultures and societies.

(Poster Presentation, Session II (11:00 -12:00 PM), Poster #13)

Interracial Couples Treatment

Amber Rasmussen – Psychology

Faculty Mentor: Cynthia Erickson

Throughout the years, there have been many different types of laws banning interracial marriages making them illegal and punishable by death. Interracial dating was considered taboo and illegal prior to the Supreme Court ruling in 1976, Loving v. Virginia. There are no longer laws against interracial relationships, but how has the general public's attitudes towards interracial relationships changed over time? This content analysis examines treatment of interracial couples decade by decade, on television shows based on the assumption that mainstream media reflects the attitudes of society. The television shows featured interracial couples and the type of comments that were made towards, or about them by others, codding the comments as either complimentary, derogatory, or no comment. Starting with 1950's, a handful of derogatory comments were displayed, decreasing throughout the 1960's. In the 1970's and 1980's few television shows featured interracial couples. Within the past two decades there has been an increase in the prevalence of interracial couples with no comments about race, instead mentioning social class of the character. The main results from this study is that comments about interracial dating were largely negative in the 1960's and have changed to no comments about race. The results will be compared to attitudes about interracial couples through questionnaires. A limitation to this study is only one researcher viewing shows and deciding what was considered derogatory comments. This will allow future research with measuring media, independent surveys, and interviews for viewpoints on interracial couples.

(Poster Presentation, Session II (11:00 -12:00 PM), Poster #21)

Compositional Dynamics of Striped Parrotfish Herds on a Florida Reef

Kelsey Renfro – Biology

Coauthors: Alexandria Martini, Abbegayle Lindel

Faculty Mentor: Robert Hancock

The striped parrotfish, *Scarus iserti*, is an abundant fish within the Florida Barrier reef. Like other parrotfish, this sequentially hermaphroditic protogynous fish passes after larval recruitment through a juvenile phase (JP), an initial (female) phase (IP) and a terminal (male) phase (TP). Generally, initial phase striped parrotfish will join a defended feeding territory, a nonterritorial stationary herd or a roving group depending on environmental conditions and population size. Recording these behaviors in a natural setting is both qualitatively and quantitatively improved with the use of modern video cameras. During on-going morning SCUBA dives on the Florida Barrier reef off of Marathon Key, FL, U.S.A., all phases of striped parrotfish, were observed in groups and recorded within several different inner and outer reefs, fishing and no-take zones. Several types of groups were observed: exclusively IP striped parrotfish, striped parrotfish of mostly IP with some TP, and mixed groups of predominantly IP striped parrotfish and other species including IP stoplight parrotfish *Sparisoma viride*, JP and IP Clown Wrasses *Halichoeres maculinna* , IP slippery dick *Halichoeres bivittatus* and IP blue tang *Acanthurus coeruleus*. Differences in groups (group size, fish length and species composition) between inner and outer reef locations and take versus no-take locations do not indicate clear relationships. Documenting the composition of these groups using video technology allows for accurate species identification, the capacity to collect a wealth of data, and the ability to revisit observed behaviors.

(Poster Presentation, Session III (2:15 - 3:15 PM), Poster #11)

Larval *Culex pipiens* Size as Influenced by Water Temperature and Pre-Ovipositional *Bacillus thuringiensis israelensis* Application in Small Suburban Stormwater Sites in Colorado

Kelsey Renfro – Biology

Faculty Mentor: Robert Hancock

Laboratory experiments indicate that mosquito growth rate and size are impacted by food availability, larval density and water temperature. For *Culex pipiens* breeding in small controlled semi-permanent man-made water collections sites, we predicted that larval size would decrease with increasing temperature. Hobo water temperature pendant® monitoring probes were deployed in four small suburban watersheds in Northglenn, CO from June 2015 to October 2015. Weekly larval sampling was performed and Vectobac G®, a granular formulation of *Bacillus thurengiensis israelensis* (Bti), was applied at a scaled rate of 5-10 lbs/acre based on abundance. For each sample, the average 4th instar larva length was plotted against mean temperatures for the week leading up to day of collection. Only one site presented a significant negative correlation between length and water temperature ($r= -0.607$, $n=11$, $p=0.048$). Three sites did not show a significant difference between length and water temperature, however there is a negative trend between the two variables. Our results clearly indicate that mosquitoes oviposited on, and hatched in sites with residual Bti as shown by degree-day modeling. Larval size may be impacted by more than just water temperature, demonstrating a much more complex ecological relationship than previously hypothesized.

(Poster Presentation, Session II (11:00 – 12:00 PM), Poster #25)

Integrative Healthcare: An Exploration of Students who Choose this Undergraduate Major

Teresa Reynolds – Integrative Healthcare

Faculty Mentors: Michelle Tollefson, Leonard Wisneski, Nancy Sayre, Jeffrey Helton, Emily Matuszewicz, Carol Jensen, and Jennifer Gravestock

The aim of this study was to explore and understand who chooses to study integrative healthcare at an academic institution and why they choose to do so. To examine the demographic characteristics of the student population, their background, and postgraduate plans. Utilizing a cross-sectional survey design, 105 declared majors at a large, urban, public university with an undergraduate Bachelor of Science program in integrative healthcare were surveyed. Online research software collected anonymous survey responses during a 2-month period. Survey participants were more likely to be white and full-time students compared with the general undergraduate population. Many respondents discovered the integrative health major and then decided to enroll at the university. Most had used complementary and alternative medicine modalities, such as massage, yoga, and meditation, and an interest that influenced their declared major. More than half of the survey participants were dissatisfied with conventional/Western medicine and its providers; and want to become a complementary and alternative medicine provider. Most survey participants plan to pursue postgraduate training/education in an integrative healthcare–related field. Students who choose to study integrative healthcare in an undergraduate academic institution may mirror the patient population of complementary and alternative medicine practitioners. Their profile, rationale, exposures, and intentions, may be helpful to universities considering adding this type of program or postgraduate education programs in attracting new students to integrative health fields. It also informs existing integrative healthcare programs regarding program

enhancement. A larger sample involving more integrative health academic institutions would be useful for a future study.

(Poster Presentation, Session III (2:15 - 3:15 PM), Poster #22)

GamerGate: A Case Study

Sean Rhodes – Speech Communication

Faculty Mentor: Katia Campbell

In the fall of 2014 a movement on the internet formed under #GamerGate. This movement was a fringe movement that garnered support when they described themselves as being about "Ethics in Games Journalism." As it grew it became increasingly clear that GamerGate was not really about ethics in Games Journalism but was more of an anti-feminist movement. However, a great deal of people involved in GamerGate really did believe it was about ethics. The major question is: To what extent did those who joined GamerGate know they were partaking in an Anti-Feminist, even misogynistic movement? As this presentation shows, a great deal had no idea what they were joining at first. This presentation seeks to talk about how those who joined GamerGate with the best of intentions ended up joining, how they aided the movement and how they left while still maintaining that they were not engaging in misogynistic behavior. This presentation looks to talk about conformity and the balance of power using GamerGate as a case study to make the point that "good" people can easily become persuaded to join a movement that can go against their own morals and judgments.

(Oral Presentation, Session III 2:45 -3:00 PM, NC Room 1324)

Assessment of the Microbial Population and the Enrichment of Sulfate-Reducing and iron-Reducing Bacteria from Sites Recently Contaminated with Acid Mine Drainage

James Richardson – Biology

Coauthors: Deva DeAngelis-Lowe, David DuMoulin

Faculty Mentor: Helene Ver Eecke

Acid mine drainage (AMD) contains dissolved iron-sulfides that interact with oxygen and water to form sulfuric acid; the then very acidic drainage leaches toxic heavy metals such as zinc, lead, and cadmium. The research examined the microbial population of water and soil samples at Upper Gold Kings Mine (N:37°,52,36.’’E:-107°,38,40.4’’), which in August 2015 experienced a large previously contained. Water samples were collected at various locations on four regions of the sampling site: “dirty” mine water, fresh water stream, confluence (where fresh water met dirty), and mixed (downstream from confluence). pH was measured at each site with pH strips; all water sites had a pH of 5. Two soil samples were taken on the edge of the dirty water’s riverbed. To assess the microbial population, samples collected were assessed with culture-dependent techniques and culture-independent techniques. Samples were inoculated into a variety of media to promote growth of bacterial groups known to participate in AMD bioremediation: postgate sulfate reducing medium at pH4 and pH6, anaerobic iron reducing medium at pH4 and pH6, general acidophilic medium at pH 5 prepared both aerobically and anaerobically, and general culture WLN medium. DNA was extracted using the Powersoil Mobio DNA extraction kit on primary field samples: soil samples and primary water samples that were concentrated via a 0.22µm filter.

DNA was similarly extracted from primary enrichments taken from sulfate-reducing media tubes' aerobic and anaerobic regions. High quality DNA was sent out to Mr.DNA for illumina sequencing of all 16s rRNA.

(Poster Presentation, Session III (2:15 - 3:15 PM), Poster #18)

Protocol Optimization of Recovering and Culturing Yeast from Bottled Beer

Alec Rippe – Biology

Faculty Mentor: Helene Ver Eecke

Yeast harvesting is often performed on large volumetric samples and/or samples with high viable cell numbers. On occasion preciously rare bottles of beer come into the hands of brewing microbiologists and chemists with perhaps only 12oz to work with and potentially little to no viable cells. This research problem requires significant forethought on how to process the sample to maximize one's likelihood of recovering and culturing any viable cells. Our research goal was to determine an optimal protocol of recovering and culturing yeast from a single bottle of beer. This protocol can be applied to various beer samples to confidently assess if the sample contains any viable cells and to successfully get those cells into pure culture. Various permutations of cell concentration methods (filtration/centrifugation), handling methods (anaerobic/aerobic/microaerophilic), and media types (general/selective and solid/liquid) were tested to determine the optimal protocol that yields the highest rate of cells in culture. These experimental protocol screenings were performed on spiked controls (a mixture of a known viable cell concentration and cell-free beer) and then unfiltered beer samples from various commercial bottles with unknown cell concentrations. Knowledge gained from these experiments yields a best approach to process a one-of-a-kind bottle sample. This precious, multi-decade-old, sample was provided by the historical Tivoli Brewery, which recently reopened in the Tivoli building of Denver, CO.

(Poster Presentation, Session IV (3:30 – 4:30 PM), Poster #14)

Self-Sufficient Water Purification Unit Using UV Light

Martin Rivera Ritchie – Mechanical Engineering Tech

Coauthors: Michael Dolan, Mark Psotny

Faculty Mentor: Devi Kalla

This report is a comprehensive compilation of everything that went into researching and creating the project. Potable water is a commodity in developed countries that is often taken for granted. For this project to be successful the unit needs to be able to filter debris, kill parasites -and viruses- common in stagnated water. What sets the idea apart is that the unit works independently of land lines whether they be water or electricity; which makes it portable. The unit shall be able to purify up to a gallon of water in a matter of minutes using UV lights. The UV Lights will be powered by generators, the generators will turn with help of Pelton turbines, and the turbines will rotate with the dirty water that's being poured into the unit.

(Oral Presentation, Session I 10:00-10:15 AM, NC Room 1325)

How Lavender Can Aid in Stress Reduction

Jasmine Rodriguez – Integrative Health Care

Faculty Mentor: Debbie Bruce

(Poster Presentation, Session IV (3:30 – 4:30 PM), Poster #16)

On the Extension of Permutation Groups to Music

Eric Roon – Mathematics

Faculty Mentor: Amanda Schaeffer Fry

The use of major and minor chords in music is as prolific as it is essential and has a vast amount of hidden symmetry. Group theory is a mathematical amalgamation of ideas that precisely describe the symmetries of incredibly diverse objects. We utilize the methods of this theory to examine major and minor triples and to derive mathematical relationships via the actions of algebraic constructions called permutation groups. Our explicit goal is that these discussions illuminate hidden mathematical structure behind major and minor chords and other musically mathematical phenomena. We show that a group of chord inversion permutations, I3, is cyclic of order three. This group has connections to a different permutation group called (P, L, R) studied in Neo-Riemannian theory. The P, L, R permutations were developed by music theorists in the nineteenth century to relate specific tones in a given chord to the tones of other chords. These two groups operate on the same set, i.e. the same chords, so we can create a structure combining the groups (P, L, R) and I3, with an internal direct product which we name Φ. This product is a group, and we show it is equivalent to a better understood form as the direct product of the dihedral group of order twenty-four and the cyclic group of order three. We continue an examination of the (P, L, R) group and show that the subgroup generated by two of the permutations, called (P, R), is dihedral of order eight.

(Poster Presentation, Session II (11:00 – 12:00 PM), Poster #23)

The Application of Electromyographical Signals to Create an Additive Manufactured Transradial Bionic Prosthetic

Lauren Rudman – Mechanical Engineering Tech

Coauthors: Daniel Bye, Ryan Robarge, Kevin Santos, Jesse Sfetsas

Faculty Mentor: Devi Kalla

The interface between the human nervous system and medical implants is rapidly becoming more and more complex. The aim of this research project is to design an additive manufactured transradial prosthetic which will be actuated by electromyographical (EMG) signals generated by residual muscles of an amputee. This prosthesis will restore an amputee's independence as well as give them back a functioning hand. The design of this prosthetic will use lightweight additive manufacturing materials consisting primarily of polylactic acid (PLA) and thermoplastic polyurethane (TPU). The prosthetic will be additive manufactured from a cohesive design that is both highly functional and aesthetically pleasing. The use of additive manufacturing will create a low cost prosthetic that is easily adaptable for personalization from subject to subject. Through the use of a simple pulley design and small servos controlled by an Arduino board, the prosthetic will run off of EMG sensors externally adhered to the

subjects existing muscle groups. The use of EMG sensors is noninvasive, requires little training, and harnesses a reliable medical diagnostic technique. This method has been used successfully in several existing prosthetic designs. Through placement testing of the EMG sensors, the final product will have sensors that are optimally placed to control the fingers.

(Poster Presentation, Session III (2:15 -3:15 PM), Poster #14)

Reclaiming the Feminine in Classic Maya Cosmology

Elizabeth Sanchez – Women's Studies

Faculty Mentor: Anahi Russo Garrido

The jaguar has long been a symbol of masculinity throughout Mesoamerica. In Maya cosmology, the jaguar played a key role as the god of the underworld. This identified the jaguar with primarily masculine traits. Maya cosmology, however, focuses on balance and equilibrium in all things, including their pantheon of deities. In this paper I argue that the jaguar embodied many feminine aspects that informed women's lives, both in their spiritual practices and in their daily roles. I examine the many ways the jaguar is depicted in Classic period cosmology in order to explore the connection of those feminine aspects to Maya women.

(Oral Presentation, Session II 10:30-10:45 AM, NC Room 1325)

Learning Human Anatomy: Evaluation of Modalities

Johnny Sandoval – Biology

Faculty Mentor: Barbekka Hurtt and Jeffrey Simpson

How do students learn best in science courses, particularly a human anatomy course? We set out to gain a deeper understanding of this question in our research at The University of Denver (DU) in the Human Anatomy laboratory. Students worked in groups of four or two (depending on the specific lab activity), and self-selected their working groups. Students utilized four different educational modalities during the last 8 weeks of the 10 week course: cat dissection, interactive modeling, 3D visualization, and peer teaching. Assessment occurred in three ways: 1) online survey, 2) face to face interviews, and 3) in-class observations. All data collection was approved by the DU Institutional Review Board (IRB), and was completed during the last 10 days of the course. Our online survey was modified from the On-line Student Assessment of their Learning Gains (SALG) by Seymour, Wiese, Hunter, and Daffinrud (2000); the design of our face to face interview questions was modified from The Science Students Skills Inventory (SSSI) by Mathews and Hodgson, (2012); the student engagement analysis was based upon Varsavsky, Matthews, and Hodgson (2013) student engagement study. Overall, students felt that the interactive modeling was best for learning, followed by the cat/sheep dissections, with the 3D system being the least preferred modality. However the challenge of learning cat dissections and the 3D system appeared to influence the findings, as well as the availability of these modalities (only one of each/lab). The value of peer learning appeared to vary by modality and topic covered in lab.

(Poster Presentation, Session IV (3:30 – 4:30 PM), Poster # 13)

From Midwives to Medicalization: Childbirth in the United States

Lauren Sanford – Women's Studies

Faculty Mentors: Anahi Russo Garrido

This presentation examines the medicalization of childbirth in the United States and the systematic removal of midwives from the birth process through cultural and authoritative knowledge. I argue that the medical establishment in the United States portrays birth as a medical emergency rather than a natural process by emphasizing that laboring women trust technology and physicians over their own experience. Treating laboring women as patients, rather than empowering them, gives medical establishments jurisdiction over birth but does not produce better outcomes. Research indicates that midwife-assisted childbirth consistently generates lower maternal mortality rates and better birth outcomes than births overseen by physicians alone. Midwifery views birth holistically meaning birth is treated as a physical, mental, and spiritual experience, where the laboring woman guides the process. Many parts of Europe have far better birth outcomes and utilize midwives consistently. The United States spends one fifth of its health care costs on childbirth annually and cesarean sections are the most commonly performed surgery on women of childbearing age. Expensive medical interventions during childbirth, although portrayed as best practices, do not place women at the center of the birth experience and do not create better birth outcomes.

(Oral Presentation, Session II 10:45-11:00 AM, NC Room 1325)

Analyzing Results of a Critical Thinking Schema in General Chemistry II

Lindsey Schaller – Biology

Faculty Mentor: Connie Gabel

In earlier research, the development of a critical thinking schema was explored for General Chemistry students through implementation in Supplemental Instruction (SI) sessions. Therefore, to further study its efficacy among a greater number of students, the next step was to study the schema and analyze results within a General Chemistry II class. The critical thinking schema is general, and therefore applicable for a variety of topics—such as in kinetics. The schema is composed of four components: framing the question, understanding concepts, organizing knowledge, and justifying the answer. Students are more successful in solving calculation-based word problems found in general chemistry when using the schema. Additionally, students develop confidence in comprehending questions and show improvement in test performance. The critical thinking schema is introduced to general chemistry students, so that it may be used in the class, as well as in future courses. Data from the first two lecture exams were examined for the General Chemistry II class, as well as pre and post-test results for Supplemental Instruction.

(Poster Presentation, Session IV (3:30 – 4:30 PM), Poster # 17)

Nowcasting Surface Snowfall Rates by Utilizing X-Band Radar Reflectivity and Vertical Wind Profiles

Andrew Schwartz – Meteorology

Faculty Mentor: Scott Landolt

Snow events can have significant impacts on human activities such as agriculture, business, transportation, and recreation. Aircraft de-icing and anti-icing procedures and the clearing of snow from airport runways and public roadways is paramount to safety when snow accumulation is occurring. In order to accurately predict and respond to snowfall accumulation events, a better understanding of mesoscale spatial distribution of snowfall rate is required. A common tool for the determination of snowfall rate and areal distribution is radar, but due to slow snowfall velocities (~1-2m/s) and the impact of wind speed on horizontal snow particle velocity, determination of snowfall rate at ground level can be difficult when utilizing radar scans at higher elevations. Most weather radar systems such as the National Weather Service's Weather Surveillance Radar, 1988, Doppler (WSR-88D) radar systems as well as X-band research radars are equipped a doppler capabilities that can create wind velocity profiles at numerous points in the atmosphere. This project's objective is to provide a proof of concept for a snowfall nowcasting system that utilizes the wind velocity profiles in conjunction with radar measured snowfall rates to give a more accurate determination of ground level snowfall rates that can then be verified by ground-based all weather precipitation gauges.

(Poster Presentation, Session IV (3:30 – 4:30 PM), Poster # 18)

Can Denver Broncos' Fans Provide Insights into Racial Relations?

Amy Shepherd – Psychology

Coauthor: Colt Wiebold

Faculty Mentor: Cynthia Erickson

The Contact Hypothesis is a specific method for reducing prejudice developed by Gordan Allport. He identified four conditions that must be met for optimal reduction of prejudice: 1) equal status, 2) common goals, 3) the situation must allow participants to get to know each other, 4) the intergroup effort must have social support (Whitley & Kite, 2010). These conditions can be observed in racially diverse professional sports teams such as those in the National Football League (NFL). In this study, we postulated that reduction of prejudice may occur vicariously by watching professional athletes perform successfully as a team. The 2016 Broncos Super Bowl victory parade was an opportunity for a naturalistic study to see if there was a correlation between the ethnicity of the person wearing the shirt and the ethnicity of the Denver Broncos NFL player named on the jersey. Students from MSU Denver observed a total of 406 individuals wearing Denver Broncos NFL jerseys. Each individual noted the gender, ethnicity, approximate age, and jersey number the individual was wearing. There were a total of 17 African Americans, 212 Caucasians, 12 Asians, and 132 Hispanics. Our research showed that 43% of Caucasian people wore jerseys of African American players whereas 57% of Caucasian players wore jerseys of Caucasian players; 56% of Hispanics wore jerseys of African American players and 44% of Caucasian players. Based on these results, many Denver residents identify with a player who is not of their same race.

(Poster Presentation, Session II (11:00 – 12:00 PM), Poster #24)

Determination of a Viral Cap-Independent Translation Enhancer RNA Structure Using Computer Modeling and Chemical Modification

Elizabeth Shields – Biology

Coauthor: Evan J. Morrison

Faculty Mentor: Megan E. Filbin-Wong

The Black Currant Reversion Virus (BRV) has two positive-sense, single-stranded RNA genomes. Each genome is composed of non-translated regions (NTRs) bordering the open reading frame at both the 5' and 3' ends. These NTRs do not provide protein-coding information, but rather are essential for translation initiation through RNA structure-dependent recruitment and attachment of the ribosome. The 3' NTR forms a unique structure called a cap-independent translation enhancer (CITE). This CITE is proposed to interact with eukaryotic initiation factors and deliver them to the 5' end of the genome, effectively replacing the function of the canonical 5' cap. Our goal is to deduce the native conformation of the CITE RNA in the BRV1 genome in order to subsequently determine how the CITE structure dictates function. In silico thermodynamic modeling predicts a variety of possible RNA folds within the CITE structure. In order to determine the native conformation, the BRV1 CITE DNA sequence was cloned into a universal cloning plasmid, PCR amplified, and in vitro transcribed into CITE RNA. Secondary and tertiary structures of the CITE RNA will be determined utilizing acylating and methylating agents, as well as RNase cleavage assays. Ultimately, mutational studies and experiments probing function will verify the importance of CITE structure for viral behavior, providing key insights into BRV translation and other ssRNA virus-CITE mechanisms.

(Poster Presentation, Session III (2:15 - 3:15 PM), Poster #15)

Reasons for Eating Out: A Cross-Sectional Study Based on Single Males and Females Aged 20-30 Years

Hannah Sims – Human Nutrition-Dietetics

Coauthors: Renae Henjum, Jessica Mumaugh

Faculty Mentor: Melissa Masters

Reasons for eating out are dependent on many different factors. This study examined if reasons for eating out differ between single females ages 20-30, and single males of the same age using the data from the 2009-2010 National Health and Nutrition Examination Survey (NHANES). Based on information from the NHANES Consumer Behavior Questionnaire, reasons for eating at Fast Food/Pizza or Restaurant establishments were categorized into: cheaper, more nutritious, tastes better, more convenient, or to socialize with family or friends. The prevalence of reasons for eating out were estimated using SAS (version 9.4) for males and females. Results indicated that more males ate at fast food/pizza places based on convenience (91.0%±2.1%) compared to females (83.7%±2.8%). Both male (93.8%±2.0%) and female (95.8%±1.8%) participants indicated that restaurants are not more nutritious than cooking at home. Additionally, male (93.3%±1.2%) and female (91.0%±3.4%) participants reported that restaurants are not cheaper than cooking at home. This study found the major reasons for eating out were convenience even though a vast majority of male and female participants knew eating out was less nutritious and more expensive than cooking at home. Strategies for making healthy foods more convenient can help improve the health of Americans while accommodating their busy lifestyles.

(Poster Presentation, Session III (2:15 - 3:15 PM), Poster #21)

Water Sampling and the Effects of Plastic Adsorption on Heavy Metals

Haley Sir – Environmental Science

Faculty Mentor: Randi Brazeau

For this research, I am examining the effects of plastic adsorption on aqueous heavy metals. I believe that variations in water sampling techniques, along with storage conditions, may be the cause for inaccurate reported values in heavy metals in surface water. To determine likely conditions, I have researched the data records from the recent Colorado Gold King Mine spill collected from the Las Animas River. Based on the data I have reviewed and the environmental concerns associated with the high levels recorded, I have chosen to focus specifically on lead, arsenic, and cadmium. Twelve sampling bottles, half plastic and half glass, filled with spiked river and DI water are being used to determine plastic adsorption of these metals of concern. Concentrations of the metals are measured using an ICP-MS while also taking into account total carbon, temperature, and pH of the water in each sampling container. Due to the potential hazards of mine drainage events in Colorado, such as the Gold King Mine spill, and its effects on our natural waterways, it is important to focus on the variables that may cause inaccurate readings when sampling in the environmental field. By considering how plastics play a role in aqueous metal absorption, I hope to minimize the variation of sampling techniques and provide evidence for an increased standardization in the type of sampling bottles used in the field.

(Poster Presentation, Session I (9:30-10:30 AM), Poster #28)

Predicting Depressive Symptoms in College Students: Understanding the Potential Impacts of Neuroticism and Mindfulness

Dillon Slagle – Psychology

Faculty Mentor: Lisa Badanes

Neuroticism is a personality trait marking the tendency for people to feel negative emotions (Jeronimus, Ormel, Aleman, Penninx, & Riese, 2013). This tendency has been shown to be related to depressive symptoms (Feldman, Robinson, & Ode, 2009) among other problem behaviors (Genetics of Personality Consortium, 2015). Previous research has shown mindfulness, or the ability to be in the moment with oneself in a non-judgmental way, can negate depressive symptoms in people who score high in neuroticism (Barnhofer, Duggan, & Griffith, 2011). The current research sought to extend these findings. We hypothesized that women and those who scored high in neuroticism would score higher in depression. We also predicted that mindfulness would serve as a buffer against depression. The sample consisted of 201 undergraduates. The participants were 62% female and 69% White. Data was obtained using self-report questionnaire packets containing mindfulness, neuroticism, and depression scales. A t-test demonstrated that females still scored higher on depression than males, $t(198)=3.92$, $p<.001$. A linear regression revealed 52% of the variance in depression predicted by our three variables of mindfulness, neuroticism, and gender (see Table 1). Participants who scored higher in neuroticism were more vulnerable to depressive symptoms, while those who scored higher in mindfulness scored lower in depressive symptoms. In addition, the effects of neuroticism on depression were moderated by level of mindfulness (see Figure 1). These findings prove useful in clinical practice and application, encouraging mindfulness techniques as a way to minimize the impact of neuroticism on depression.

(Oral Presentation, Session III 3:00-3:15 PM, NC Room 1323)

The Impact of Technology on Communication: For Better or For Worse?

Parker Smagac – Speech Communication

Faculty Mentor: William Huddy

Rapid and widespread technological advancements have drastically changed interpersonal communication by making face to face communication more and more "out dated". When in all actuality efforts should be made to make it better and keeping it strong. Although communication via email, text, and social media have made virtual communication more accessible, these forms of communication have had a separating and isolating effect on every participating member of society. But communication through media may also be easily misinterpreted by either party for a number of reasons, and in addition does not allow effective discussion. research in the area suggests reliance on media needs to be lessened and we as people need to start relying more on our communication roots because that is the only way we will grow and advance our communication skills. It doesn't matter how many apps are created or different ways of communication we come up with, it will all mean nothing and will all amount to nothing if we do not keep our roots strong.

(Oral Presentation, Session III 2:30-2:45 PM, NC Room 1325)

Divine Sex and Common Gratification

Emily Snyder – History

Faculty Mentor: Kimberly Klimek

Stylized images of women and their place in mythology often relate to their sexual status in ancient culture, and the prevalence and discussion of female-female relationships and most importantly, female self satisfaction ranges across Mediterranean cultures from prehistory to Ancient Rome. Goddesses are key in this discussion, as their own sexual exploits reflect on the society and women who worship them. The way societies view their goddesses, their women, and sexual pleasure directly correlates with rates of female self-gratification. In societies where goddesses have more freedom in choosing their sexual partners and exercise their sexual needs, often, higher levels of sexual freedom are found among the common people, and far fewer instances of female self-satisfaction at home.

(Oral Presentation, Session II 11:00-11:15 AM, NC Room 1325)

Emotional Contagion of Anger and Belief in a Just World as Predictors of Hostile Attribution

Jacqueline Snyders – Psychology

Coauthors: Austin J. Haider, Dillon R. Slagle, Holly A. Hickman

Faculty Mentor: Lisa Badanes

The relation between levels of emotional contagion (EC) of anger, hostile attribution, and belief in a just world (BIJW) were examined. When emotions are unintentionally transferred from one person to another it is known as emotional contagion, such as feeling sad when a friend is sad (Neumann & Strack, 2000). Hostile attribution is the inclination to perceive ambiguous behavior as intentionally harmful (Barefoot et al., 1989). Belief in a just world is driven by an intrinsic need for fairness. Individuals who score high on measures of BIJW believe that the world is a fair and just place in order to quell their fears that they are not in control of their fate and are susceptible to misfortunes (Lerner, 1980). We found that high scores in both emotional contagion of anger and belief in a just world were both significant predictors of hostile attribution. Those individuals that had high scores in BIJW and EC anger tended to score high in hostile attribution, as well. The reason for this could be that BIJW is expressed by the individual either consciously or heuristically. Heuristic BIJW has the ability to alter the individual's perception of fairness. This factor, when combined with high levels of EC anger, has the potential to lead the individual to misinterpret an ambiguous situation as a hostile one. Understanding the relationship between these three traits may lead to better assessment of their mechanisms.

(Oral Presentation, Session III 2:45-3:00 PM, NC Room 1323)

How Does Race/Ethnicity and Age Affect Whether or Not Food Labels are Utilized in the US?

Katrina Stechler – Human Nutrition- Dietetics

Coauthors: Julie Breidenst, Melani Feinberg

Faculty Mentor: Melissa Masters

Research indicates that utilizing nutrition labels can result in weight loss and lowering trans fat consumption. Previous research has examined the influence of age, gender and race/ethnicity on the utilization of food nutrition labels. This study examines whether age or race/ethnicity had any impact on nutrition fact labels or ingredients lists usage in a nationally representative sample of adults. Data was gathered from the 2009-2010 National Health and Nutrition Examination Survey (NHANES). Prevalence of the utilization of nutrition facts and ingredient lists on food labels were separately analyzed among race/ethnicity groups (Hispanic, white, and black) and age groups (20-34, 35-49, 50-64, 65+). Data was analyzed using the Statistical Analysis System 9.4 (SAS 9.4, 2012, SAS Institute Inc.). A higher prevalence of nutrition label utilization was found among whites and the older age group. Usage of nutrition facts labels was highest among whites (33.2% + 1.0%), then blacks (25.6% + 1.2%), and lastly Hispanics (22.4% + 1.8%). Among different age groups, usage of nutrition labels was highest in the 65+ age range (40.0% + 2.0%), followed by 50-64 ages(34.2% + 2.0%), 35-49 years (28.1% + 1.9%), and 20-34 years (25.0% + 2.1%). It was concluded that there is a deficit in the utilization of nutrition facts labels among the younger generations, Hispanics, and blacks. These findings could be used to further study why certain groups utilize nutrition fact labels and address the possible associated health implications.

(Poster Presentation, Session III (2:15 -3:15 PM), Poster #23)

Elevated Zero: A Paradigm to Evaluate the Mitigating Effects of Dietary Choline Supplementation on Adult Anxiety from Adolescent Stress

Andrew Strosnider – Biology

Faculty Mentor: Irina Grichtchenko

Adolescent stress is often associated with cognitive deficiencies in both adult humans and animals. It has been shown that adolescent stress (AS) impacts anxiety-related behavior in rodents. This study investigated whether an intervention targeting the cholinergic system is capable of buffering the deleterious effects of AS. Specifically, we studied whether dietary choline supplementation during adolescence mitigates the effects of AS on adult anxiety. Our hypothesis predicts that AS will impair anxiety levels in individuals fed a control diet, but have no effect in individuals fed a choline-supplemented diet. Male Sprague-Dawley rats experienced unpredictable variable stressors 2-3 times daily between postnatal days 23-31 (early adolescence). Half of all AS and non-stressed (NS) individuals were fed a choline-supplemented diet during adolescence (days 23-31), and half were fed a control diet. Following stress, the individuals were assigned to AS or NS groups and all animals were fed a control diet. The research is currently ongoing, but we predict that AS will increase anxiety-related behavior in rats fed a control diet but not a choline-supplemented diet during adolescence.

(Poster Presentation, Session III (2:15 - 3:15 PM), Poster #17)

An Analytical Laboratory Investigation of the Formation of Cerargyrite (AgCl) in the Springdale Sandstone of Silver Reef Mining District, Southwestern Utah

Travis Sullivan – Environmental Science

Coauthor: Jessica Davey

Faculty Mentor: Uwe Kackstaetter

In Silver Reef, Utah, a rare economic deposit occurrence of silver chloride, was found and mined in the early 1900's. While many theories allude to conditions of formation, this undergraduate research revolves around a laboratory experiment designed to replicate these conditions using two solutions containing silver cations (Ag+) and two salt brines containing chloride anions (Cl-). Metallic mineral solutions were created with silver sulfate (Ag2SO4) in sulfuric acid (H2SO4) and silver nitrate (AgNO3) in deionized water. These silver solutions were then tested independently with both saline solutions to determine variance in cerargyrite production. For the anion donor solutions, pure sodium chloride (NaCl) with water, and an artificial sea salt solution were used. The cation and anion solutions were reacted in micro-quantities to allow observation through a microscope. All combinations of metallic and saline solutions immediately formed a white precipitate upon contact. All combinations formed the precipitate at similar rates and quantities. Because of the chemistry and appearance, this precipitate was assumed to be cerargyrite (AgCl). After initial observation, the white precipitate was isolated and dissolved in hydrochloric acid (HCl), and then the solution was placed on a slide and allowed to dry. The resulting crystal formation of the assumed cerargyrite (AgCl) precipitate fits the optical and crystallographic properties of a laboratory mineral standard. The results show that cerargyrite (AgCl) can be formed through contacting solutions that may be present in natural settings. Further experimentation will be done forming precipitate within collected sandstones from the area, replicating the geologic conditions.

(Poster Presentation, Session IV (3:30 – 4:30 PM), Poster #19)

Investigation of Hydrologic and Geologic Factors in the Active Mass Movement of an Urban Open Space Slope

Travis Sullivan – Environmental Science

Coauthor: Joshua Gillmore

Faculty Mentor: Barbara Echohawk

In the spring of 2015, a slow progressive mass movement developed on a north-facing slope within the undeveloped land of Coyote Run Open Space in the City of Louisville, Colorado. During the study of the region, both lateral and upslope propagation and downslope movement of the failure area were observed. The top of the slope is a residential development and below the slope lies a wetlands area. Various features and characteristics specifically dealing with the hydraulic water movement, the stratigraphy, and the geomorphology of the immediate area were investigated. This type of mass movement is likely to occur during intervals of high precipitation and above average ground saturation and this movement began in the same manner. The orientation of the slope as well as the steepness and basal sapping of the slope paired with the stratigraphic sequence of low-permeability, fine-grained bedrock and superjacent permeable alluvium all contributed to the failure of this slope. The overlying soil layer includes a permeable, topsoil layer and a subjacent, low-permeability, clay-rich soil layer acting as an aquitard has also contributed to the growth and progression of this mass movement. This study seeks to confirm the roles that the stratigraphy, the hydrogeology, and the geomorphology of the area continue to play in the propagation of this mass movement.

(Poster Presentation, Session III (2:15 -3:15 PM), Poster #19)

Microbial Variance Between Commercial and Non-Commercial Cave Ecosystems

Francisco Tapia – Biology

Faculty Mentor: Helene Ver Eecke

The unique ecosystem within caves presents a relatively untapped source of microbial life that is uniquely different from better-studied environments. In natural cave systems the primary produces and successors of these ecosystems are actively living in oligotrophic (low nutrient availability) conditions and in the total absence of light. Previous studies of cave microorganisms have revealed microbes evolved to perform novel metabolisms, have novel growth characteristics, and produce novel antimicrobial compounds. The tourist fascination with caves has led to several caves in America to be commercialized with tours of non-decontaminated people being shuttled through lit corridors. Caves being naturally dark, and oligotrophic with a low redundancy population would logically make them particularly vulnerable to the introduction of light, nutrients, and nonresident microbes. This study attempts to assess potential differences in microbial populations in commercialized and non-commercialized caves in Colorado. Methods include devising a sampling plan, spelunking to collect cave samples, and sample analysis with both culture-dependent techniques (to enrich microbial cultures of particular metabolisms), and with culture-independent techniques (to extract, sequence, and analyze microbial DNA). These sample techniques will hopefully shed light on the ecological shift that may be happening in commercialized caves, which may be reducing science's access to novel microbes. Primary enrichments and pure cultures cultivated from cave samples will provide the research team isolates to characterize to hopefully better understand the microbial activity within caves.

(Poster Presentation, Session IV (3:30 – 4:30 PM), Poster #20)

Legal Marijuana and the Effect of Tourism in Colorado

Jacob Thinnes – Hospitality Tourism & Events

Faculty Mentors: Jackson Lamb and Robert Farmer

This case study examines the effects that the legalization of marijuana has had on tourism in the state of Colorado since its inception on January 1, 2014. Specific topics include changes in hotel occupancy levels and the frequency of smoking violations, as well as the investigation of respective policies and documentation methods used at various properties. These findings are tied together to explore the relevance of cannabis legalization on current hospitality education programs and the impact it will hold in years to come.

(Poster Presentation, Session III (2:15 -3:15 PM), Poster #24)

Trace Metal Ion Analysis of Human Dentin using Inductively Coupled Plasma Mass Spectrometry

Jonathan Thomas – Biology

Faculty Mentor: Michael Jacobs

Teeth are primarily comprised of the mineral hydroxyapatite [Ca10(PO4)6(OH)2]. Human dentin is the portion of the tooth that surrounds the pulp and is encased by the enamel. Dentin, in addition to the hydroxyapatite, consists of proteins and trace metals. Trace metal analysis of human teeth can provide important information about diet, environmental factors, and oral hygiene. For this study, dentin was separated from the enamel via separation methods. Then, the metal ion content of dentin was analyzed using inductively coupled plasma-mass spectrometry (ICP-MS). The results were comparatively examined, accounting for various influential health and environmental factors: in particular, caries and periodontal disease. Contrasting the findings with those of literature, a discussion ensued regarding the possible implications given by the presence of various metal ions in dentin.

(Poster Presentation, Session IV (3:30 – 4:30 PM), Poster #21)

Faith, Duty, and Defensive Action: An Analysis of Violent Anti-Choice Rhetoric

Katherine Thomas – Speech Communication

Faculty Mentor: Anahi Russo Garrido

This paper analyzes the violent anti-abortion rhetoric of Paul Hill using Kenneth Burke's theories of identification, terministic screens, and the guilt-victimage cycle. Using word cluster analysis of Paul Hill's book, it is possible to gain insight into Hill's motives in murdering Dr. John Britton and James Barrett in 1994. This analysis makes it possible to see that Hill believed abortion was a form of mass murder, and that resorting to violent action to stop abortion is an essential duty of the Christian faith. This belief created a terministic screen, or particular view of reality, through which Hill viewed the world. At the same time, Hill viewed abortion as a symbol of the separation of society from Christian beliefs, and therefore abortion was the scapegoat, or "incarnation of evil," for society's sins (Hart and Daughton, 2005, p. 270). This separation forced Hill to feel what Burke termed as guilt, which enabled Hill to view violence as a necessary action to purify society, compelling him to commit murder in order to resolve the

guilt he felt. Finally, Hill's book provides a way for future violent anti-abortion activists to identify with Hill's cycle of guilt and victimage, drawing them into the cycle as well. Understanding this guilt-victimage cycle can help us understand the continued use of violence against abortion providers, as violent anti-abortion activists since Hill's crime who have relied on the same philosophy, often crediting Hill for their stance.

(Oral Presentation, Session III 2:45-3:00 PM, NC Room 1325)

Using Policy in the Fight to End Human Trafficking

Rebecca Tiell Krekeler– Social Work

Faculty Mentor: AnnJanette Alejano-Steele and Lori Darnel

Human trafficking is one of the largest and most controversial crimes of our time. It has recently become more widely publicized, and yet the crime is still widely misunderstood. According to the Trafficking Victims Protection Act, passed in 2000 by the United Nations, human trafficking is defined as:

…the recruitment, harboring, transportation, provision, or obtaining of a person for labor or services through the use of force, fraud, or coercion for the purpose of subjection to involuntary servitude, peonage, debt bondage or slavery; or sex trafficking in which a commercial sex act is induced by force, fraud, or coercion or in which the person induced to perform such an act has not attained 18 years of age (TVPA, 2000).

Since 2000, policy has continued to play a crucial role in the fight to end human trafficking. Recently, a lot of legislation has been passed both federally and statewide. The federal bill H.R. 469- Strengthening Child Welfare Response to Human Trafficking Act of 2015 is being considered right now in Congress. This research will analyze the potential effects of this bill on the Child Welfare system and the anti-human trafficking field. Can the Child Welfare system handle the requirements stated by Congress? And if not, will the practical resources and aid be given to Child Welfare to maintain a smooth transition for the system as a whole? How will these policies influence the anti-trafficking field, if at all? The researcher will also provide current news from the anti-trafficking field surrounding upcoming policy and what the future holds for the anti-trafficking movement.

(Oral Presentation, Session II 11:15-11:30 AM, NC Room 1325)

The Monopoly Chain

Kaitlyn Tinsley – Mathematics

Coauthor: Collin Fausnaugh

Faculty Mentor: Shahar Boneh

Monopoly is a popular board game where players move pawns around a board as determined by rolling a pair of dice. The probabilistic nature of movement and the universal understanding of the rules make Monopoly ideal as a topic to study Markov Chains. We will explore the use of Markov Chains to develop and examine strategies for the game, then evaluate the effectiveness of these strategies.

(Oral Presentation, Session III 2:15-2:30 PM, NC Room 1324)

Design and Synthesis of Liquid Crystals that Manifest Phases that Exhibit Negative Gaussian Curvature

Valerie Toman – Chemistry

Coauthors: Nicholas Kuehl, Mitchell Magrini

Faculty Mentor: Ethan Tsai

Phases that exhibit negative Gaussian curvature are fundamentally interesting from an applications standpoint; for example, molecular wires, organic zeolites, and other nanoporous membrane technologies. Applications that require infinite minimal surface, such as organic zeolites, are most commonly achieved using lyotropic liquid crystals (liquid crystals that utilize immiscible multi component mixtures). However thermotropic liquid crystals (where phase behavior is dependent only upon temperature) provide potentially more facile and cost effective processing, as an all-solids alternative to lyotripics. Unfortunately, thermotropic liquid crystals relatively rarely manifest phases that exhibit negative Gaussian curvature, compared to their lyotropic cousins. Our research takes a two-pronged approach to developing these types of materials: (1) amplification of extreme nanophase segregation in highly curved phases, (2) extreme frustration in volumetric disparity in molecular shape. Initial results indicate design approaches focusing on amplification of frustration (from a molecular basis) of extreme nanophase segregation or shape disparity are promising.

(Poster Presentation, Session IV (3:30 – 4:30), Poster #22

The Use of Nutrition Facts Panels in Relation to Education Level

Lindsay Van Nice – Human Nutrition- Dietetics

Coauthors: Maureen Shay, Kimberly Grieve

Faculty Mentor: Melissa Masters

Background: Nutrition facts panels have been shown to promote healthy dietary behaviors. The influence of education level on the use of nutrition facts panels has received little attention. The aim of this study was to determine if education level influences the use of nutrition fact panels in adults ages 20-35.

Methods: This study utilized data for 1,533 participants 20-35 years of age from the 2009-10 National Health and Nutrition Examination Survey (NHANES).Education levels were grouped into two categories: Educated level 1 (ED1) was composed of participants with a high school diploma/GED or less education; Educated level 2 (ED2) was composed of some college/college degree or higher education. Prevalence of reading nutrition labels and reasons for reading or not reading food labels were assessed for the education categories. All analyses were conducted using SAS Version 9.4.

Results: "Making better choices" had the highest prevalence among both groups for a reason to read food labels; ED1 (55.5%±3.3%), ED2 (73.8%±2.0%). "Avoiding certain ingredients" had the largest gap among the two groups; ED1 (24.5%±1.7%), ED2 (48.4%±2.8%). "Don't have time" as a reason not to read food labels had the highest gap between the two groups; ED1 (31.5%±7.2%), ED2 (6.2%±2.8%).

Conclusion: Educational differences existed for both prevalence of nutrition label reading and reasons for nutrition label reading. Overall less educated participants had a lower prevalence of reading nutrition labels. Additional research is needed to examine factors associated with lower education (i.e. time constraints, knowledge) that could influence use and understanding of food labels.

(Poster Presentation, Session III (2:15 - 3:15 PM), Poster #27)

Age-Associated Retention Change in Visual Memory

Marlene Ventura – Economics

Coauthors: Charles Walters, Julia Blackshear, Amber Rasmussen, Eliza Albin

Faculty Mentor: Cynthia Erickson

In order to preserve memory throughout the lifespan, it is important that we explore any resource that may counter the natural cognitive decline that come with aging. One potential neurobiological explanation for cognitive decline in aging primates are higher neuronal firing rates and fewer inhibitory neurons in the hippocampus, a region of the brain critical for memory (Thomé et al., 2015). The net result of these neurobiological changes is a decreased ability to filter out distracting stimuli. This means that older individuals complete simple tasks as well as young individuals, but show impairments once tasks involve focusing on some stimuli while ignoring others or when multiple rules are required to solve a task. Our research group has developed a simple touch-screen task for assessing multiple forms of memory. The first task involves learning, through trial-and-error, which of a pair of images is correct. The next is a short-term working-memory task. The correct response in this task changes from trial-to-trial depending on which image was presented as the sample to be held in mind. The third task combines both stimulus-response learning (1st task) with short-term working memory (2nd task). Preliminary data show that older individuals perform well on the first two tasks, but exhibit diminished performance on the third task. Individuals of all ages perform well on simplified versions of the task, indicating that the deficits observed are not due to non-cognitive problems such as visual acuity. This study serves as the groundwork for a future study examining the gut-brain interaction.

(Poster Presentation, Session III (2:15 – 3:15 PM), Poster #26)

Reduced Fat Foods: Are They a Better Choice?

Carolyn Wahl – Human Nutrition- Dietetics

Faculty Mentors: Shahar Boneh and Michael Bizeau

Consumers attempting to lose weight might be tempted to choose food products labeled as “reduced fat” or “low fat”. It has been suggested that reduced fat foods may have higher sugar contents to maintain palatability. This research aims to determine if “reduced fat” foods should be considered healthier (namely, contain less calories and sugar per serving) than their “original” counterparts. Thirty-five packaged food products, with an "original" and "reduced fat" (or “low

fat") counterpart, were randomly selected. The caloric and sugar contents for a single serving size of each version were recorded and statistically analyzed. The conclusions are that on average, there are less calories in "reduced fat" food products, but this is not necessarily that case with regard to sugar content. While the difference in calories between the two groups is statistically significant, whether this difference is actually significant is questionable. This is important for consumers to note, as any caloric differences may be nullified by food behavior in response to marketing. Studies by Wansink and Chandon have shown that "people… eat more calories of a snack food when it is labeled as 'low fat' than when it is labeled as 'regular'", and that "low-fat nutrition claims lead all consumers… to increase the amount they believe to be an appropriate serving size" (Can "Low-Fat" Nutrition Labels Lead to Obesity? Journal of Marketing Research. 2006;43:605-617.). Consumers should think twice before choosing "reduced fat" or "low fat" foods when attempting to lower their overall caloric intake.

(Oral Presentation, Session III 3:00-3:15 PM, NC Room 1322)

The Progression of Denver Metro Air Quality: An Analytical Review of the Last Five Decades

Lindsay Walker – Environmental Science

Faculty Mentor: Shamim Ahsan

Major metropolitan areas around the world have experienced a demographic shift throughout the past century of population movement from rural areas towards urban city centers. While many individuals benefit from the move, metropolitan areas on the whole have faced challenges associated with this mass rapid growth. One such challenge is the decline of local air quality due to increased infrastructure demand, among other factors. The Denver Metropolitan Area is no exception. The purpose of this paper is to present a succinct review of Denver's air quality history and the contributing factors to variations in such, as well as to draw conclusions regarding Denver's past, present and future air quality potential.

Over the past fifty years, Denver has experienced significant growth in industry, population and personal transportation use. As such, Denver has suffered with its notorious "Brown Cloud" since well before 1960. EPA and state regulations have decreased the Brown Cloud's constituent pollutants on the whole; however, key pollutants still plague Denver, despite local and federal environmental regulations. Though anthropogenic factors are not entirely to blame for Denver's air quality predicament, they add to the natural basin effect the local topography creates. The most recent economic prognoses have presented an optimistic picture of economic growth with continued migration of population to the city. However, in conjunction with these positive developments, there is also a great need to assess and address changes in the local environment, specifically in air quality.

(Poster Presentation, Session IV (3:30-4:30 PM) Poster #29)

Molecular Detection of *Bacteroides dorei* Does Not Correlate with *Escherichia coli* Counts in Urban Storm Sewer Outfall Water

David Watson – Biology

Coauthors: Jon Novic

Faculty Mentors: Rebecca Ferrell and Megan E. Filbin-Wong

Escherichia coli is a commensal organism found in the gut of many vertebrates, but it is also capable of exploiting a wide variety of food sources and habitats, allowing for environmental growth. The U.S. Environmental Protection Agency (EPA) uses *E. coli* as an indicator of human sewage contamination in surface waters, but mounting evidence indicates that this is not ideal. A proposed alternative method involves molecular quantification of DNA from *Bacteroides dorei*, a strictly anaerobic bacterium which is thought to be specific to the human gut. Its inability to survive in aerobic conditions means that it is unlikely to proliferate in the environment, so its presence indicates recent human fecal contamination. In this study, we compare the EPA approved IDEXX method of *E. coli* quantification with molecular quantification of *B. dorei* by a Taq-Man Q-PCR method. Four storm sewer outfalls located along the Platte River in Denver near its confluence with Cherry Creek and known to discharge effluent containing high levels of *E. coli* were selected for this study. *E. coli* in discharges from the outfalls sometimes exceeds the upper quantification limit for E. coli (>24,196/100ml), but this does not necessarily correlate with high molecular signals for *B. dorei*, while in some samples, low counts of *E. coli* have been recorded with high levels of *B. dorei.* One interpretation of our findings is that *E. coli* is not a reliable indicator for the public health risk of human fecal contamination in storm sewer outfall waters.

(Oral Presentation, Session I 10:00-10:15 AM, NC Room 1324)

Frontier Formation Thickness Analysis of the Bairoil Region of Wyoming

Cailleach Way – Applied Geology

Faculty Mentor: Barbara Echohawk

The purpose of this research is to investigate the possibility of abnormally thick accumulations of sandstone, more specifically the Frontier Formation, within and surrounding the Lost Soldier Oil Field located in Bairoil, Wyoming. The methods used to conduct this research were the analysis of scout tickets for formation thicknesses of the five target formations; Frontier, Mowry, Phosphoria, Tensleep, and Amsden, from wells within and surrounding the Lost Soldier Oil Field. Wells were selected based on the presence of specific pairs of formations, including contacting sandstone and shale formations. Data from the scout tickets regarding the formations' thicknesses and well locations were then mapped and analyzed using ArcGIS. Results of this study suggest the presence of an abnormally thick accumulation of the Frontier Formation northwest of the Lost Soldier Oil Field. Further analysis of the accuracy of the measurement, the extent of the abnormal accumulation, and the possible cause of such sporadic difference in thickness within a limited regional expanse will need to be investigated for more substantiated conclusions.

(Poster Presentation, Session IV (3:30 – 4:30 PM), Poster #26)

Garter Snake (*Thamnophis* spp.) Habitat Partitioning Research

Travis West – Biology

Coauthor: Sean McNearney

Faculty Mentor: Jennifer Gagliardi-Seeley

Habitat partitioning is the divergence of the habitat by competing species that use resources similarly, which assists in the two species coexistence. This research focuses on habitat partitioning within sympatric populations of the western terrestrial garter snake (*Thamnophis elegans*) and the plains garter snake (*Thamnophis radix*) in riparian habitats along the Colorado Front Range. We hypothesize that within sympatric populations *T. elegans* will be found closer to permanent water sources than *T. radix*. Along with abiotic measurements of the environment and biotic measurements of each captured snake, GPS coordinates were taken and entered into GIS to obtain distance to water. Preliminary data suggests *T. elegans* is found closer to water than *T. radix*; thus, habitat partitioning appears to be occurring among these sympatric populations.

(Poster Presentation, Session IV (3:30 – 4:30 PM), Poster #23)

A Choline Rich Diet and the Major Factors of Change

Danelle Whisenhunt – Biology

Coauthor: Ebony Miller, Ashley Ellmaker, Andrew Strosnider

Faculty Mentor: Irina Grichtchenko

Stress can be defined as the brain's response to any demand. Many things in the environment although subtle can induce a stress response. Although these subtle environmental changes may be permanent, these changes may have a long term impact on brain development prenatally as well as post-natal development. What has largely been unexplored is supplementing a diet rich in choline to counter act the bodies stress response in post-natal development of the hypothalamic pituitary adrenal axis and the changes in the prefrontal cortex before and after maturity age in both females and males. Using a rodent model consisting of Sprague Dawley's, the current study implemented an aim at buffering the potential effects of stress with a choline rich diet prenatally, there will be a diet implemented with choline after prenatal development. Blood serum levels of specific hormones produced (adrenaline, noradrenaline, cortisol, norepinephrine, and serotonin) by the hypothalamic-pituitary adrenal axis will be measured and a comparison of prenatal development born rats, and post-natal development born rats will be measured.

(Poster Presentation, Session IV (3:30 – 4:30 PM), Poster #24)

Can I Help? Increasing Helping Behavior After Witnessing Rudeness

Aryanna Wiggins – Psychology

Coauthor:s Kelsie S. Howell, Holly A. Hickman, Ian A. Maxwell

Faculty Mentor: Lisa Badanes

This study investigated the relationship between witnessing rudeness from individuals in an authority role and citizenship or willingness to help. Previous research demonstrates decreased helping behavior after witnessing rudeness to a confederate posed as a study participant (Porath & Erez, 2009). A total of 201 (38% female, 69% White) introductory psychology students participated for academic credit. The participants were randomly assigned to a control group (no rudeness) (n = 103) or experimental group (rudeness condition) (n = 98). Participants in the experimental condition witnessed a confederate rudely questioning the experimenter about using the room for the study. In the control condition, the confederate briefly excused themselves after inadvertently interrupting the study. After exposure to either rudeness or the control condition, citizenship behavior was measure by asking participants if they were willing to help rearrange the room after the study. Results suggest that individuals who witnessed rudeness to a male experimenter were significantly more likely to help than those who did not witness the rudeness event, $\chi 2 = 4.02$, $p < .05$. Participants in the experimental group said they would help the male experimenter 76% of the time, compared to participants in the control group, who said they would only help the male experimenter 24% of the time. Discussion will focus on the implications of these findings as they pertain to increasing helping behavior in others.

(Oral Presentation, Session III 2:15-2:30 PM, NC Room 1322)

Expression of Iron Binding Proteins in *Drosophila* S2 Cells

Austin Wilkerson – Chemistry

Faculty Mentor: Emily Ragan

Iron is a vital component of the mechanisms required for a cell's biological processes. Iron homeostasis is well understood in mammals; however, the mechanism through which insects intake iron into their cells is widely unknown. An understanding of the insect protein mechanism for iron importation into cells could possibly give insight into an earlier evolutionary mechanism for iron transport. It is known that insects exhibit both transferrin, as well as light and heavy chain homologues of ferritin. Both of these are possible contributors to the protein mechanism of iron transport in insects. This project is still in the initial stages, however S2 *Drosophila* cell cultures will be grown in the lab and reverse transcriptase PCR will be used to confirm or deny expression of target proteins. Primers for reverse transcriptase PCR were determined using melting temp and product length to run the reverse transcriptase PCR for ferritin light and heavy chains, as well as transferrin at the same time. A western blot will then be used to confirm that the S2 cells being investigated do indeed exhibit all three of the subject proteins. These cell lines will be used to run experiments in the future regarding transferrin, and ferritin. It is essential to confirm that the S2 cells do indeed exhibit these proteins in order to accomplish these further experiments. Additionally, this is the first time this lab has grown and maintained S2 cell lines for experimentation.

(Poster Presentation, Session IV (3:30 – 4:30 PM), Poster #25)

The Effect of Social Media on Relationships

Quaynae Williams – Speech Communication

Faculty Mentor: William Huddy

With the world in the midst of social media revolution, it's apparent that social media like Facebook, Twitter, Instagram, etc., are used extensively for the purpose of communication. Social networking is a current phenomenon that consists of both web-based communication with Internet users through websites and interaction with others via cellular phones. One of the most important advantages of the use of social media is the online sharing of knowledge and information among different group of people. Recent technological advancements have had a significant impact on the way individuals communicate. Too often at events, dinners, or parties, people are attached to their smartphones tweeting or texting, but no one is truly engaging or interacting with the people around them. This study describes or examines the influences of social media in connection to how it is affecting relationships. Relationships can be seen as friends, co-workers, partners, parents, etc. Findings suggest that social media has a negative effect on both the quality and quantity of face-to-face communication.

(Poster Presentation, Session III (2:15 – 3:15 PM), Poster #25)

Sexual Genes: The Role of Genetic Factors in Sexual Identity

Alexandra Wright – Biology

Faculty Mentor: Anahi Russo Garrido

Why do people identify as gay, lesbian, bisexual, heterosexual or transgender? To what extent do genetic factors contribute to the self-definition of these sexual identities if any at all? The purpose of this essay is to examine this question through new research from, not only a biological point of view, but a feminist theory perspective as well. Throughout time, studies have been conducted in order to explain why people identify with sexual identity categories. While various social and cultural explanations detail the construction of sexual identity categories, biological, and more particularly genetic explanations have been hypothesized as a factor. Within this essay, the hypothesis that sexual identities could be an inheritable trait that people are simply born with, and the extent to which genetic factors contribute to the self-definition of sexual identities will be discussed.

(Oral Presentation, Session II 11:30-11:45 AM, NC Room 1324)

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