

8th Annual

# URC

## UNDERGRADUATE RESEARCH CONFERENCE

A Symposium of Scholarly Works + Creative Projects

April 19, 2019 | 8:00 am - 5:00 pm | North Classroom



METROPOLITAN STATE UNIVERSITY  
OF DENVER  
Undergraduate Research Program

---

APPLIED LEARNING CENTER

---

*now part of Classroom to Career Hub*

SAVE THE DATE

04|24|20

NINTH ANNUAL

URC

UNDERGRADUATE RESEARCH  
CONFERENCE

A Symposium of  
Scholarly Works  
and Creative  
Projects



METROPOLITAN STATE UNIVERSITY<sup>SM</sup>  
OF DENVER  
Undergraduate Research Program

# UARC

03

WELCOME

12

CONFERENCE-AT-A-GLANCE

04

KEYNOTE SPEAKER

13

MAP OF EVENTS

05

ALUMNI STORIES

14

ABSTRACTS

10

ACKNOWLEDGEMENTS  
& THANK YOUS

TABLE OF  
CONTENTS



METROPOLITAN STATE UNIVERSITY<sup>SM</sup>  
OF DENVER  
Classroom to Career Hub

*APPLIED LEARNING CENTER & OFFICE OF CAREER SERVICES*

*now part of*

# CLASSROOM TO CAREER HUB

# C2 HUB

*Stay tuned for exciting new opportunities in career preparation!*

Administration Building:

Suite 270 - Careers | 303.615.1133

Suite 325 - Internships & Experiential Learning | 303.615.1333

# WELCOME

It is with great enthusiasm that we welcome you to the 8<sup>th</sup> Annual Undergraduate Research Conference: A Symposium of Scholarly Works and Creative Projects. It is always an honor to celebrate and promote student and faculty research and creative projects at one of MSU Denver's largest events. The work showcased here today derived from hard work, trials and errors, successes and failures. Each presentation represents a contribution to the world of knowledge. Additionally, students are preparing themselves for future endeavors outside of MSU Denver and gaining essential skills that both employers and graduate schools are looking for in candidates.

Just this past year, the Undergraduate Research Program piloted some new and great opportunities to continue to help promote research within our university. This past fall, we offered the first ever Undergraduate Research Prep course (CPD 390-E), a course aiming to provide tools and resources for students who want to get started with research at MSU Denver. This course ran again this spring and will be picked up for the 2019 fall semester, showing a student need for this type of curriculum. The URP also partnered with Dr. Elizabeth Kleinfeld and Dr. Sheryl Zajdowicz to implement their initiative of creating MSU Denver's very own undergraduate research journal, The Rowdy Scholar. This journal will provide students with an opportunity to publish their work. Be on the lookout for these and other opportunities in the future.

As we close another year of research and begin this celebration of students and faculty, we would like to thank all of you for your continued support. Because of you, this program continues to be successful and grows bigger each year. MSU Denver is known for its uniqueness, and the work being showcased here is nothing short of that. To those of you currently conducting research and those of you who are interested, please take this time to celebrate and open your mind to new ideas.

Sincerely,



Salina Blea, M.A.

Undergraduate Research Program Coordinator

Applied Learning Center (now part of Classroom to Career Hub)

# KEYNOTE

## *“The Quest to find Extraterrestrial Life”*

Carol Cleland, Ph.D.



The question ‘what is life?’ is foundational to biology and especially important to astrobiologists, who may one day encounter truly weird life. The most popular approach to answering this question is to provide a definition of life. In the first part of this talk, I explain why this approach is mistaken. Definitions are inadequate tools for explaining the nature of life. A scientifically compelling understanding of the nature of life presupposes an empirically adequate scientific theory of life, and theories and definitions are very different sorts of things. But this doesn’t solve the problem. Because our experience with life is limited to a single example (familiar Earth life) we are in no position to formulate a truly general theory of life. So how is it possible to search for truly alien extraterrestrial life? In the second part of this talk, I sketch a strategy for searching for strange forms of life without the guidance of a definition or universal theory of life. I close with an application to NASA’s fledgling search for extraterrestrial life.

### *Biography:*

Dr. Carol Cleland is a philosopher of science. She is Professor of Philosophy and Director of the Center for the Study of Origins at the University of Colorado Boulder. She received her BA in mathematics from the University of California

(Santa Barbara) and her Ph.D. in philosophy from Brown University. Her current research focus is on scientific methodology (especially differences between the field and laboratory sciences) and issues in biology (especially microbiology, the nature and origin of life, and astrobiology). Dr. Cleland has been affiliated with the NASA Astrobiology Institute (NAI) since 1998, having been a Co-Investigator and (currently) Key-Collaborator on several NAI Teams. Her published work has appeared in major science journals (e.g., *Current Organic Chemistry*, *Origins of Life and Evolution of the Biosphere*, *Geology*, *Astrobiology*, *International Journal of Astrobiology*, and *Theoretical Computer Science*) as well as in leading philosophy journals (e.g., *British Journal of Philosophy of Science*, *Philosophy of Science*, *Synthese*, and *Biology and Philosophy*). She co-edited (with Mark Bedau) the anthology *The Nature of Life: Classical and Contemporary Perspectives from Philosophy and Science* (Cambridge University Press), and is the author of *The Quest for a Universal Theory of Life: Searching for Life as We Don’t Know It* (coming out this coming fall with Cambridge University Press). In 2013, she received a prestigious Boulder Faculty Assembly award for Excellence in Research. Dr. Cleland’s work has been widely discussed in popular media, including *Scientific American*, *New Scientist*, *National Geographic*, *Skeptical Inquirer*, and *Popular Science*. She was one of 20 “leading scientists” featured in *Scientific American’s* “20 Big Questions about the Future of Humanity” (2016).

# A L U M N I

STORIES

# Blurring

STORY | LISA KIM  
PHOTO | SCOTT HOUCK

Chase Buerck worked in construction for nearly a decade before pursuing life as a professional ceramic artist. While Buerck considers himself a self-taught artist, his time in the construction industry undoubtedly helped Buerck become the inventive mixed metal ceramic artist he is today.

## An Artist's Journey

Like many Denverites, Buerck is a transplant. Buerck grew up in Perryville, MO, a small town of roughly 8,000 people—barely half the size of MSU Denver's current student population. It was in Perryville, during his elementary years, where Buerck first learned to craft simple shapes and figures out of ceramic clay.

Buerck later took a ceramic arts course in high school. He immediately gravitated towards ceramics, namely the way clay took on different forms on the pottery wheel. From that moment on, Buerck began pursuing ceramic arts as a regular hobby, making functional wares like cups, bowls, and plates.

At the same time, Buerck began working at a local construction company, where he developed a strong work ethic and an entrepreneurial spirit. "I learned to appreciate hard work," Buerck says. "I enjoyed the physical nature of construction and having the ability to use my hands." Perhaps he was always destined to be a craftsman, building and designing functional pieces with modern materials and new technology.

## Chasing the Dream

When Buerck and his wife moved to the Denver Metro area in 2010 for her PhD program, Buerck saw the move as an opportunity to embrace new challenges. Buerck started his own business, Chase UR Dreams Studio, and committed full-time to his craft.

Buerck knew he needed studio space to get his project off the ground. As luck would have it, Denver's art scene was beginning to boom with shared and co-op studio spaces for artists and entrepreneurs. Buerck rented space at the former Dry Ice Factory on the corner of 33rd and Walnut in Den-

ver's River North (RiNo) Arts District, just north of downtown Denver. The Dry Ice Factory is a vintage landmark that has been repurposed as usable space for artists of all backgrounds, including painters, sculptors, and ceramicists.

Sharing a space with a dozen artists allowed Buerck to develop camaraderie with other local talent. This is where Buerck met a fellow ceramic artist, Mike McDowell of Mudpuppy. Together, they collaborated on the production of large commercial orders. Buerck and McDowell continued their partnership for more than five years, allowing Buerck to engage in meaningful work while pursuing his Bachelor of Arts in Ceramic and Fine Arts at MSU Denver.

## The Joy of Happy Accidents

In the spring of 2014, Buerck took a Current Practices in Ceramics course. He was working on a project using different colorants and happened to add red iron oxide to his clay material. When Buerck fired his experimental metal work in the kiln, the clay changed to resemble a metal material and created a similar metal sheen. "This was a happy accident and I was intrigued by the result," Buerck laughs in recalling this incident. "But I was also, like, 'What happened to my project?!'"

Buerck's ceramics professor, Robin Johnson, suggested he continue exploring the question further and pointed him to the Undergraduate Research Conference. Seizing on another spontaneous opportunity, Buerck took inspiration from his early days in construction and focused on creating objects that have the architectural framework of a building. "I want to stop people in their tracks and make them need to examine my sculpture to figure out what material was used and how it was possible to achieve such structures and finishes with clay."

"Through my research, I found that there were other artists who used glaze applications to imitate the look of metal on clay."

## Writing a Winning Grant

Buerck's desire to follow his curiosity and connect with a broader audience is what makes him a two-time grant recipient of the Undergraduate Research Conference's grant program. Buerck's first research was titled "Pushing the

# Lines

Boundaries of Ceramics.” It was followed by new research, “Blurring the Lines of Ceramic and Metal,” the next year. Buerck included many specific components in his grant proposal:

- a clear objective and strong purpose.
- timelines and measurable steps to meet project milestones.
- a detailed list of supplies, materials, and costs to support his research.

His advice for writing a winning a grant? “Just try.”

Buerck also sees an opportunity to help other artists and local organizations write winning grants. “Many artists don’t know or have never written a grant. They don’t know how to start and become overwhelmed. But once you do one, you realize you can, in fact, get through the arduous process.”

## Living the Dream

Today, Buerck draws parallels between his experience with the Undergraduate Research Conference and the artist’s journey.

“As ceramic artists you’re either a functional potter or you’re on the sculptural side as a gallery artist. I went into school as a functional artist but came out as a conceptual artist. So, I feel, when it comes to opposing views and our differences, I want to reinforce the art of conversation.”

Regardless of what the future holds, one thing Buerck has learned over the years is to create opportunities to reinvent himself.



# BROKEN BONES. NO PROBLEM.

STORY | **SALINA BLEA**  
PHOTO | **ERIC URAN**

MSU Denver alumni Josh Kenning, Michaela Beadles and Dan Skousen got their close-up at the 7<sup>th</sup> Annual Undergraduate Research Conference when CBS4 News sent a reporter and videographer to cover their innovated research project: a 3D printed cast. Once the segment aired, these Mechanical Engineering Technology alums received numerous inquiries from businesses asking to work with them.

Flashback to fall 2017, when the idea emerged the way many good ideas seem to emerge; that is, over a few beers. “Hey, can you 3D print a cast?” asked a colleague. Thus began a research journey for Kenning and team. The team’s original research project involved using a gaming console’s motion sensor to scan an injured extremity to get its exact measurement and then successfully print an orthopedic support that fit perfectly. They then presented this idea at the 2018 URC and for CBS4 News viewers.

The presentation led to several offers from outside investors. This immediate and unexpected success compelled the group to take a few steps back. “We realized that as intriguing as the physical artifacts were, our work was not done,” says Kenning. While they had fun 3D printing cast prototypes, they also knew their process needed tweaking. “This led us to realize that what we are really after is software that will incorporate aspects of CAD and medical needs to make it very easy for a medical professional to design a support to the specific needs of a patient”.

As much as they wanted to devote every hour to perfecting their research project, the focus quickly turned to finding jobs after graduation. Kenning just accepted a new position as a Facilities Engineer/Maintenance Manager with ESS Metron. He will be maintaining a plant and production machinery, ensuring EHS/OSHA compliance and supporting the maintenance technicians. Kenning credits research for helping him build these essential skills that employers are looking for, “I became a better listener, organizer, researcher and presenter. When you can talk about doing research, going to conferences, and evaluating your work, you crush the competition.”

Through their experience, Kenning and team are hoping



to encourage other students to dive into research. “Don’t feel bad if you don’t have some super-whiz-bang amazing technical project,” he says. “The whole point of undergraduate research is to first and foremost learn how to research.” The group also emboldens students to make connections and absorb as much knowledge as they can from their faculty mentor. “While you may be doing the actual work, they will have insights that you do not.” Kenning, Beadles and Skousen credit both Dr. Devi Kalla and Dr. Anadel Paudel for believing in them.

These three are proof that participating in research opens up many doors.

Emily Ragan, Ph.D. certainly knows a thing or two about why students benefit from doing research at the undergraduate level. She has been mentoring research students at MSU Denver since 2013. Check out her advice below!

**Q:** What are some of your favorite projects you worked on with your students?

**A:** In my first years at MSU Denver we were working with live beetles, a stored-grain pest called *Tribolium castaneum*. We had to work very carefully to get a technique, called RNAi, to work and got some great photos of beetles with different colored eyes. More recently we've been studying iron uptake in fruit fly cells that we grow in dishes. This research is really exciting because we are making discoveries about iron uptake and transport that could ultimately help us understand some iron disorders in humans better.

**Q:** Why should students get involved with research at the undergraduate level?

**A:** Undergraduate research takes you deeper than you can go in your classes. It is an opportunity to integrate what you have learned and apply it, as well as a chance to develop lab skills in a deeper way. You get opportunities to fail and try again that are essential if you want to continue with research in some capacity in the future and are helpful for other careers, too.

**Q:** What advice would you give students wanting to get started in research?

**A:** Don't be shy about reaching out to faculty who have undergraduate research opportunities. We are here to support undergraduate researchers! If we don't have space in our lab we can help brainstorm other faculty that might be a good fit for your research interests. Do be realistic about the time research will require. Expect to spend at least eight to ten hours a week doing research and remember that you will still need time to study, too!

**Q:** How does conducting research help them prepare for their future?

**A:** I have had former research students ace interviews and land jobs because of the skills they learned in the lab, and I have had former students go on to graduate school and pharmacy school. By participating in undergraduate research you learn more about yourself in a way that will help you with career decisions, which can help you land a job that you will enjoy having!

**Q:** Any additional advice?

**A:** Don't be afraid to try something new! Sometimes the new experience will lead to an amazing opportunity, and other times it might not work out directly but will give you additional information. You will be able to find an amazing career by paying attention to what you like to do and finding opportunities to use those skills. For me this meant realizing, as a graduate student, that I actually like teaching more than I do spending time in the research lab! I now have my dream job because I get to combine teaching with research and mentoring.

**Emily Ragan, Ph.D.**  
Associate Professor  
Chemistry



**Bio:** Emily Ragan received her Bachelor's degree in Biochemistry and Molecular Biology from the University of California, Berkeley in 2002. She continued on to graduate school at Kansas State University, where she completed her PhD in 2008 in Dr. Mike Kanost's lab studying proteins involved in insect immunity. She stayed on as a postdoctoral research assistant for two years and then spent three years adjunct teaching, two years in the San Francisco Bay area and one year in Tulsa, Oklahoma, before starting at MSU Denver in 2013. In addition to having six undergraduate research students in her lab, Dr. Ragan is also bringing an element of her research into Biochemistry II through development of a Course-Based Undergraduate Research Experience module.

## Undergraduate Research Grant Recipients:

Ashley Abramson  
Tiffany Aggson  
Haliee Alber  
Lindsay Armstrong  
Kylie Baker  
Laura Baquero Galvis  
Scott-Wesley Bean  
Amy Byerly  
Timothy Byrd  
Kristina Buzinov  
Jared Current  
Brianna Darnell  
Lisa Fertman  
Michelle Franco  
Brandon Garcia  
Austin Haider  
Kerrie Hanlon-Dellas  
Charles Hoge  
Jessica Holst  
Loren Isaac  
Jena Jacobs  
Raymond Jacobus  
Anika James

Mackenzie Kincade  
Katelyn Lauer  
Marcos Maldonado  
Daniel McCullough  
Kurt McDonald  
Mia Miller  
Mason Moomey  
Evan Morrison  
Rachel Murphy  
Anna Nguyen  
Alma Ochoa  
Jasper Overbey  
Tyler Overturf  
Jessy Perez  
Sean Reifman  
Saya "Ted" Richtofen  
Jeffrey Rowell  
Rozanne Roybal  
Kaitlynn Skinner  
Tyler Sodra  
Natalia Walton  
Carly Watkins  
Coby Wikselaar

## Undergraduate Research Grant Reviewers:

Maria Akrabova  
Pamela Ansborg  
Rebecca Canges  
Adam Graves  
Jeffrey Helton  
Andrew Holt

Kristy Lyons  
Bridget Murphy-Kelsey  
Jeffrey Parker  
Emily Ragan  
Amanda Schaeffer-Fry  
Sheryl Zajdowicz

## Community-based Research Grant Recipients:

Sanaa Riaz  
Sara Jackson Shumate

Sarah Schliemann  
Sean Worthy

## Community-based Research Grant Reviewers:

Lori McKinney  
David Parr

David Piacenti

Cover Design/Graphics/Program Design: Salina Blea, M.A.

Moderator Coordinator: Sheryl Zajdowicz, Ph.D.

Scheduling/Conference Program: Salina Blea, M.A.

# THANK YOU

We would like to extend our thanks and appreciation to the following offices and individuals for their contributions to the success of the Undergraduate Research Program and annual conference:



**Janine Davidson, Ph.D.**  
*President*



**Vicki Golich, Ph.D.**  
*Provost & Executive Vice  
President Academic Affairs*



**Will Simpkins, Ed.D.**  
*Vice President  
Student Affairs*



**Adrienne Martinez,  
M.S.W.**  
*Executive Director  
Classroom to Career  
Initiatives*

## **Classroom to Career Hub Staff**

**Auraria Library**

**Keynote Speaker: Carol Cleland, Ph.D.**

**Photographer: Ivette Torres Mata**

**Session Moderators**

**All Volunteers**

**Featured story authors: Lisa Kim, Salina Blea, Emily Ragan**

**Denver Project for Humanistic Inquiry (D-phi)**

**Educational Technology Center**

**MSU Denver Featured Alumni**

**Undergraduate Research Program Advisory Council**

**One World One Water (OWOW) Center**

**University of Colorado Denver**

# CONFERENCE-AT-A-GLANCE

8:15 am - 3:30 pm: Conference presenters and all guests sign-in  
North Classroom Building - Atrium-A  
*Light refreshments will be provided in the morning*

9:00 - 10:30 am: **CONFERENCE SESSION I**  
Oral presentations - North Classroom  
Room 1402  
Room 1403  
Room 1405  
Room 1408  
Room 1603

Poster presentations (9:30 - 10:30 am) - North Classroom Atriums

11:00 am - 12:00 pm: **CONFERENCE SESSION II**  
Oral presentations - North Classroom  
Room 1402  
Room 1403  
Room 1405  
Room 1408  
Room 1603

Poster presentations (11:00 am - 12:00 pm) - North Classroom Atriums

12:15 pm: ***Lunch - Tivoli Turnhalle***

12:45 - 1:45 pm: *Keynote Speaker: Dr. Carol Cleland: "The Quest to find Extraterrestrial Life"*

2:15 - 3:15 pm: **CONFERENCE SESSION III**  
Oral presentations - North Classroom  
Room 1402  
Room 1403  
Room 1405  
Room 1408  
Room 1603

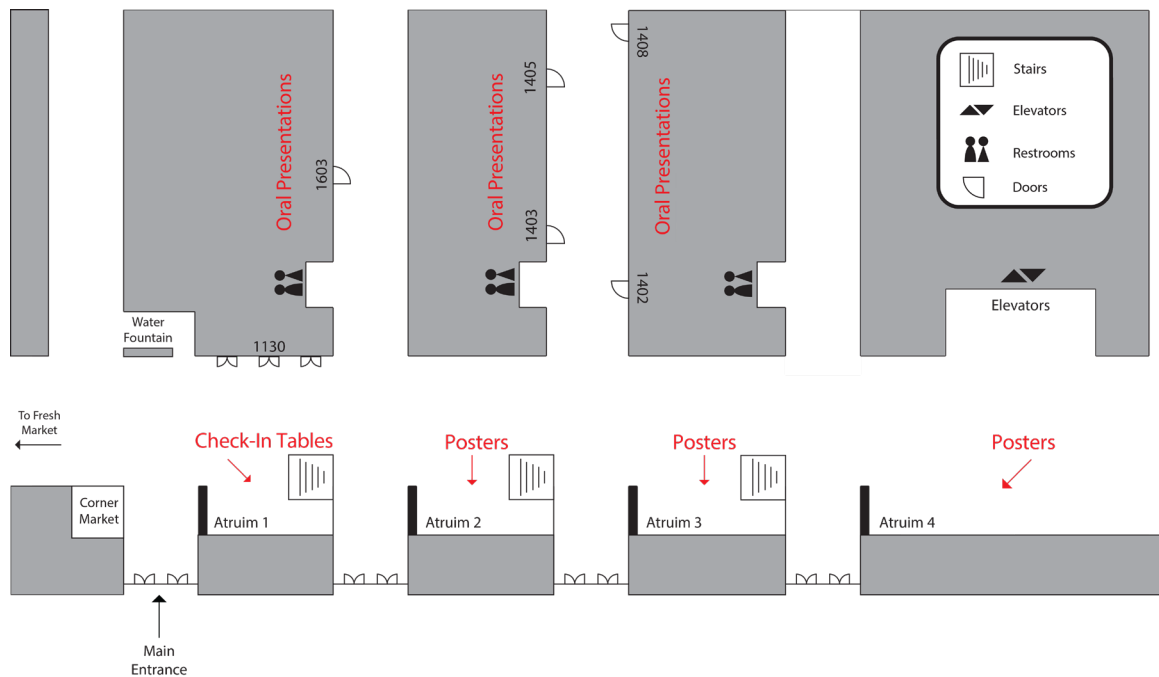
Poster Presentations (2:15 - 3:15 pm) - North Classroom Atriums

3:30 - 4:30 pm: **CONFERENCE SESSION IV**  
Poster presentations (3:30 - 4:30 pm) - North Classroom Atriums

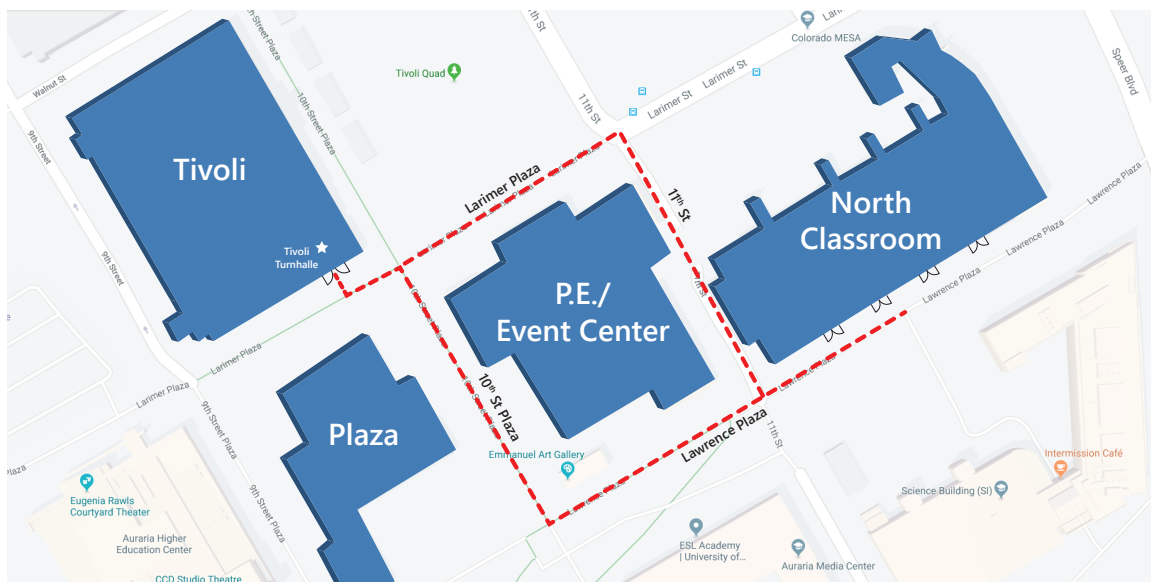
# MAP

## *of EVENTS*

North Classroom - Poster and Oral Presentations:



North Classroom and Tivoli Turnhalle (Luncheon and Keynote):



The background features a smooth, horizontal rainbow gradient transitioning from blue on the left to red on the right. Overlaid on the lower half of this gradient is a solid black silhouette of a jagged mountain range. The word "ABSTRACTS" is centered horizontally across the middle of the image, rendered in a white, thin, sans-serif typeface. The text is positioned such that it partially overlaps the black mountain silhouette and the colorful gradient background.

# ABSTRACTS

# ABSTRACTS

(listed alphabetically by primary presenter's last name)

## **Student Perceptions of Movement-Integrated Learning in the College Classroom**

Tiffany Aggson – Psychology

Coauthors: Ashley Abramson, Hailee Alber

Faculty Mentor: Michael Rhoads

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

College students majoring in psychology often report low interest and engagement in statistics and research methods. The purpose of the current study was to examine potential benefits of integrating movement with learning activities in Introduction to Statistics and Research Methods courses at the college level. A quasi-experimental design examined movement-based learning activities compared to traditional learning activities during class periods. Student perceptions of the activities were assessed using an experience sampling method. A repeated measures MANOVA revealed that students rated the movement-integrated activities higher compared to control activities for the following measures: affect, enjoyment, concentration, and physical and social states, while learning was rated high in both conditions. College students may benefit from integration of these activities into their classes.

## **Pirates Cove Headguard Internal Model Summer 2019**

Hamadi Ali Abid – Management

Faculty mentor: Clay Daughtrey

*Oral Presentation, Session I 9:00 – 9:15 am, NC 1402*

This is a fun project I have been working on for a better part of two months now. It is primarily for me, but with that being said, I was a supervisor on duty last year at Pirates Cove and noticed problems that I might be an asset in helping. One of those was the head guard position and how lack of leadership and accountability was given. I also noticed that throughout the year, life guards would start to fade out and get really tired, resulting in no call no shows. I think I came up with some options on how to maybe fix that. I love presenting, and public speaking is great fun and a skill I am proficient at, but I would love tips, advice, and constructive criticism on how to improve. Essentially, what I am trying to achieve with in this project, is being able to communicate it and structure it properly. I think this is great fun, but I am also aware it is great stress, and if I am not careful on how to deliver my message, it could go extremely wrong and be regarded as very disrespectful and stepping on toes. I think there is an art to speaking and I am really hoping to work on perfecting that skill with this unbelievable opportunity.

## **The Effects of Music on Memory**

Brittany Allen – Psychology

Coauthor: Briana Swank

Faculty Mentor: Cynthia Erickson

*Oral Presentation, Session I 9:00 – 9:15 am, NC Room 1403*

In this study, we sought to determine whether or not music had an impact on memory-based performance. To do so, participants were drawn from a pool of introductory psychology students and systematically assigned to one of three condi-

tions. These three conditions were a control group of silence and two experimental groups; popular music with lyrics, and complex instrumental music without lyrics. The popular condition incorporated songs that have shown high levels of radio popularity over the last couple decades. We hypothesized that it was likely that college-aged students had heard the song before in some capacity, and therefore may be distracted by a familiarity with the lyrics or the music itself. The instrumental condition consisted of complex, alternating instrumental rhythms, which we hypothesized would increase the participants focus and recall abilities. In each experimental condition, the music would already be playing at a comfortably low volume as participants entered the room so it would not draw attention to the nature of the study. Participants were then asked to complete a battery of memory-based assessments that investigated visual memory, reading comprehension, and basic memory recall. Additionally, participants were asked a series of questions regarding their demographics and interests to gain some insight of the participants and provide a time-filler between assessments. After analyzing the results of each participants' performance on the memory assessments, it was determined that participants exposed to popular music with lyrics displayed the lowest levels of performance and participants exposed to instrumental music displayed the highest levels of performance, suggesting that instrumental music may aid in memory and recall. These results proved to be significant in showing that our hypothesis was correct and the complex instrumental beats provide the best overall scores in memory assessment.

### **Collision Cell and Desolvation Strategies for Quadrupole ICPMS Determination of Fe in *Drosophila melanogaster* Sg4 cell cultures**

Hussein Al-Ogaidi – Chemistry

Faculty Mentor: Emily Ragan

*Poster presentation, Session II (11: 00 am – 12:00 pm), Poster #9*

Inductively coupled plasma mass spectrometry (ICPMS) has become the preferred technique for trace and ultra-trace determination of elemental concentrations in a wide variety of sample matrices. In our studies of Fe uptake and metabolism in insect cells, we evaluate different ICPMS procedures to measure picogram to microgram quantities of Fe in whole insects and *Drosophila melanogaster* Sg4 cells. While a well-known spectrophotometric Fe assay with ferrizone suffices for microgram amounts of the elements, ICPMS is imperative for lower level work. The determination of Fe by ICPMS faces several significant challenges: A) samples must be decomposed to mineralize organic matter; B) the separation of Fe from the matrix may be required in some circumstances; C) all sample preparation and analytical processes must be conducted under sufficiently “clean”, low-blank conditions; and D) the interference of polyatomic ions ( $\text{ArN}^+$ ,  $\text{ArO}^+$ ,  $\text{ArOH}^+$ ) upon  $\text{Fe}^+$  ions must be addressed. In this presentation, we describe our strategies for addressing each of these challenges. Samples are digested and mineralized by heating with  $\text{HNO}_3$  at 90°C in fluoropolymer containers; pellets containing ~ 10<sup>7</sup> cells are readily decomposed with 0.1 mL 16 M  $\text{HNO}_3$  in a 10 mL FEP Teflon test tube. “Trace metal” grades of  $\text{HNO}_3$  are found to be satisfactory for minimizing reagent contributions to the overall blank. As quadrupole mass analyzers cannot distinguish between ions of the same nominal mass (e.g.,  $40\text{Ar}^{16}\text{O}^+$  vs.  $56\text{Fe}^+$ ), alternative strategies must be used to suppress the formation of polyatomic ions so that  $\text{Fe}^+$  ions can be observed vs. background signal. We use two different approaches: A) de-solvation of the sample aerosol, where water vapor is removed by a membrane dryer with countercurrent Ar gas flow; and B) the extracted ions are passed through a “collision cell” prior to mass analysis, which selectively attenuates the polyatomic ions via ion kinetic energy discrimination. Using a combination of A) and B) lowers solution detection limits for Fe from ~ 50 – 100 micrograms/liter to < 1 microgram/liter. Quantitative ICPMS analysis is conducted with externally prepared Fe standards, using Co as an internal standard, or by isotope dilution using a 95%  $^{57}\text{Fe}$  spike solution. The need for preparative separation of Fe from digested sample matrices is evaluated and discussed. Quadrupole ICPMS determinations of Fe, even while using de-solvation and collision cells, is validated by sector-field ICPMS measurements, where a higher resolving power ( $m/\Delta m$ ) mass analyzer resolves the elemental and polyatomic ions differing by ~ 0.02 amu. We present optimized procedures for the routine determination of Fe in digested cell and insect tissue samples.

## **Gustav Klimt's Judith I: A Reflection of Viennese Jewish Women at the Turn of the Century**

Paige Arellano – History

Faculty Mentor: Leila Armstrong

*Oral Presentation, Session III 3:00 – 3:15 pm, NC Room 1408*

Jewish women were finding a new voice outside of the traditional one during the turn of the century in Vienna. Klimt, who interacted with many Jewish women and their community members, saw this new change in their demeanor and attitude. Judith I captures this new identity of the Jewish woman. Judith is a femme forte, standing proudly with her accomplishment of killing the man who stood as a threat to her community and her wellbeing. Unlike many Jewish women who at this time found themselves needing to pose as men or have men speak for them to find advancements within their culture, Judith is prideful in her womanly figure and its power. She is a widow that is portrayed as successful without the aid or need of a man. Whereas scholars Freud and Hebbel saw her as a woman who was aching in sexual desire for Holofernes but turned around and killed him when he stole her virginity, Klimt has given us a woman who does need affirmation from a simple act of pleasure. Judith is a woman who knows what she came to do and was able to accomplish her mission. Like Judith, the Jewish women of Vienna at the turn of the century were able to make steps towards achieving what they set out to do, trailblazing for women of all backgrounds to find their own power and voice within a society dominated and ruled over by men.

## **Characterizing Binding Interactions and Elucidating 3D Structure of Aptamer-Based Biosensors**

Lindsay Armstrong – Biochemistry

Faculty Mentor: Andrew Bonham

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

Electrochemical biosensors based on the conformational dynamics of DNA aptamers have found success against a wide variety of proteins, toxins, antibodies, and heavy metals. However, the mechanistic underpinnings of the mechanism by which these surface-bound DNA molecules change conformation upon target binding, thus changing the dynamics of an appended redox-active tag and generating a measurable signal, is poorly understood. Here, we are investigating the DNA component of these biosensors using DMS foot printing. This method will allow us to better characterize the base-pair interactions involved in binding targets, as well as offer clues to the changing three dimensional folded structures of these biosensors. These results will help inform the field of biosensors and aptamers in general on strategies for future optimization.

## **A Study on Chemical Contaminants from Waste Cigarette Butts at Auraria Campus**

Samantha Atkins – Geography

Faculty Mentor: Shamim Ahsan and Michael Jacobs

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

Human action produces heterogeneous types of wastes from households, businesses and industries. Generally wastes are distinctly characterized for the purpose of management and disposal based on their primary characteristics. Cigarette butt (CB) wastes are not predominantly labeled in the main stream of waste cycles. In addition, CB disposals are not appropriately regulated. As many as 5.6 trillion cigarettes or 766,571 metric tons of butts are deposited into the environment worldwide every year [1]. Wastes from cigarette butts may trigger public health nuisance for human habitats and marine environments due to its random nature of disposal. A surfeit of research shows cigarette butts may contain a variety of harmful chemicals resulting from cigarette manufacturing processes and tobacco growth. Most research studies provide evidence of harmful elements in cigarette butts, particular heavy metals, menthol, nicotine and ethyl phenol are the common ones. The chemicals released from tobacco smoke are estimated to be more than 7,000, about 70 of them are carcinogens [2]. Generally, distributions of cigarette butts in an academic setting are primarily linked to the locations, patterns of sales, consumption and individual behavior. At the Auraria Higher Education Center (AHEC), there are nine CB recepta-

cles in smoking areas, where cigarette butts are widely spread in and around in smoking areas. This study will attempt to collect samples from all areas in the vicinity of those receptacles and after sample digestion analyze those samples for different contaminants. As a result of increasing numbers of cigarette butts, there is a growing need to pursue further research on its impact on environment and present management practices.

### **Senior Capstone: From PLP to ULP**

Aurora Baca – Accounting

Faculty Mentor: Gretta Mincer

*Oral Presentation, Session III 2:30 – 2:45 pm, NC 1405*

I have been a Scholar in the Urban Leadership Program for the past year and I was a previous Scholar in the President's Leadership Program at Colorado State University of Pueblo for two years. I will be sharing my Senior Capstone Video highlighting my leadership development experiences and growth at CSU-Pueblo and MSU Denver. I have prepared a short video highlighting courses and experiences helping to grow my understanding of leadership through my time at both Universities.

### **A Geographical Analysis: Effects of Marijuana Legalization on Crime in Denver**

Christopher Baker – Criminal Justice and Criminology

Faculty Mentor: Hyon Namgung

*Oral Presentation, Session II 10:30 – 10:45 am, NC Room 1603*

Recreational sales of marijuana in Colorado began in January 2014 and some studies have looked into the effect of this new policy on diverse social, economic, and cultural areas. This study will explore how the legalization of marijuana has affected crimes in Denver in the years following legalization. More specifically, my research is to perform a geographic analysis of crimes in Denver from 2013-2018 using data collected by the City and County of Denver. Through this research, my goal is to examine the spatial distribution of crime and the temporal change of such distributions.

### **Literacy Practices Comparison: Bridging the Gap between Literacy Practices Used in the Elementary Classroom and the Practices that Teachers Value**

McKenna Beam – Elementary Education

Faculty Mentor: Roland Schendel and Ellen Spitler

*Oral Presentation, Session III 2:15 – 2:30 pm, NC Room 1403*

The need to teach elementary students literacy skills has become a high priority in education. This need has influenced schools to overemphasize literacy over the other content areas, and, in some cases, neglect science and social studies altogether. The International Literacy Association publishes an article called What's Hot in Literacy every year. It is an analysis of an international survey of educators around the world that examines their opinions on popular literacy practices in education; they vote on which practices are hot, or most talked about in education, and which are important, or vital to having a successful classroom in the 21st century. 2018's results show statistical proof that while literacy practices that drive the overemphasis of teaching literacy skills in the classroom are "hot-topics," educators feel that the literacy practices that are not talked about as much are the more valuable topics. The important topics tend to have less to do with standardized tests and more to do with equity and resources within literacy to make teaching more successful. These results inspired a local survey of teachers in an elementary school asking for their opinions on literacy and how they are asked to teach literacy. They were asked a variety of questions about the curriculum they use and strategies they rely on daily, whether they like the strategies or not. This paper explores the analysis of the survey, presents anecdotal evidence, and compares "hot-topic" literacy practices to "important-topic" literacy practices to explain why elementary teachers chose certain techniques and to attempt to bridge the gap between implemented and desired practices.

## **Structure-Function Analysis of the 3' CITE from the Blackcurrant Reversion Nepovirus Genomic RNA 2 (BRV2)**

Scott-Wesley Bean – Biochemistry

Coauthors: Laura D. Baquero Galvis, Evan J. Morrison

Faculty Mentor: Megan Filbin-Wong

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

Canonical eukaryotic translation initiation is enhanced by interactions between the 5' 7-methylguanosine cap (m7G) and the 3' poly(A) tail, which exist on opposite ends of the mRNA molecule in the untranslated regions (UTRs). Viruses, however, hijack translation components using non-canonical methods; typically differing in the structure of their 5' and/or 3' UTRs. Blackcurrant reversion nepovirus (BRV), a virus that infects the blackcurrant plant, has a genome consisting of two positive-sense RNAs (RNA1 and RNA2). Neither RNA has a 5' m7G cap, yet they both have a poly(A) tail. Structures within the 3' UTRs of RNA1 and RNA2 called cap-independent translation enhancers (3' CITEs), are hypothesized to interact with a region of their 5' UTRs. These distinct structural interactions facilitate the recruitment of essential initiation factors needed for translation, but this exact mechanism is not well understood. It is thought that the 5' and 3' UTRs possess conserved and complementary sequences which facilitate interaction. This study seeks to elucidate the specific secondary structure of the RNA2 3' CITE and to correlate such to its role in translation initiation. Using in silico modeling of folded RNA2 and in vitro RNA structural probing, we determined a preliminary secondary structure for the 3' CITE. We also identified structural changes when the putative 5' - 3' UTR complementarity is disrupted. Using a luciferase reporter gene flanked by the RNA2 3' CITE and wild-type BRV2 5' UTR, we show how the putative 5' - 3' UTR complementarity is required for the quantity of and the rate at which luciferase protein is made. We conclude that the 3' CITE is important for promoting translation initiation and the putative 5' - 3' UTR complementarity between the ends of the viral RNA is necessary but not sufficient for protein production. The structure-function relationship of the BRV RNA2 3' CITE will lead to a clearer understanding of how BRV can be controlled to prevent Blackcurrant Reversion Disease (BRD) and shed light on vital processes that govern this unique class of nepoviruses.

## **Automorphisms and Characters of Finite Groups**

Brittany Bianco – Mathematics

Coauthor: Leigh Foster

Faculty Mentor: Mandi Schaeffer-Fry

*Oral Presentation, Session I 10:00 – 10:15 am, NC 1402*

Representations are special functions on groups that allow us to study abstract finite groups using matrices over the complex numbers. Much of the information about representations can be understood by instead studying the trace of the matrices, giving what we call a character. It turns out that various types of automorphisms (like those of the original group itself and those of any field containing the values of the characters) naturally permute the set of characters of the group. We analyze this phenomenon for a finite matrix group called  $Sp(4, q)$  (the “symplectic group of degree 4”) in the context of some important current conjectures in the field of character theory.

## **Urban Leadership Program Senior Capstone**

Joe Brant – Individualized Degree Program

Faculty Mentor: Gretta Mincer

*Oral Presentation, Session III 2:45 – 3:00 pm, NC 1405*

I have been a Scholar in the Urban Leadership Program for the past year. I will be sharing my Senior Capstone Video highlighting my leadership development experiences and growth throughout my four years at MSU Denver. I prepared a short video highlighting courses and experiences that helped me grow my understanding of and appreciation for leadership through my time at the University.

## **Retaining New Donors at Anchor Center for Blind Children**

Kenedy Brazzell - Event and Meeting Management

Faculty Mentor: Cynthia Vannucci

*Poster Presentation, Session IV (3:30 - 4:30 pm), Poster #8*

The term not-for-profit is a clear indicator that an organization's operations rely and function on charitable donations. Consistent donations determine the nonprofit's effectiveness to carry out their mission. Donor engagement models are ways in which nonprofits ensure their donors stay connected and continue to provide financial support. The processes within these models are crucial to fundraising success. According to the 2018 Fundraising Effectiveness Survey, the average new-donor retention rate amongst nonprofits in the United States was 20.2%, compared to an average repeat-donor retention rate of 61%. This report confirms that donors who made a second donation to an organization were three times more likely to continue their support for the foreseeable future. It is crucial therefore, to receive a second donation from new-donors. The purpose of this research project was to investigate the current donor engagement model at Anchor Center for Blind Children (Anchor), located in Denver, Colorado. Founded in 1982, Anchor provides life changing services, such as early education, access to therapists, visions services, respite programs, parent support groups, and more to visually impaired children and their families. The second purpose of this project was to create a strategic plan of how to improve Anchor's new-donor engagement and ultimately new-donor retention. Anchor's current new-donor retention rate has been calculated using existing donor information accessed through the Raiser's Edge Software. An internal review was conducted to understand the current donor engagement process at Anchor. An investigation of donor engagement processes at other nonprofits (Colorado Center for the Blind, Blind Institute of Technology, Friends of the Colorado Talking Book Library, and Colorado School for the Deaf and Blind) serving similar demographics as Anchor will guide decisions made to improve Anchor's donor engagement practices. An objective of this research project was increase new-donor retention by 10% over fiscal year 2020. Ultimately, consistent funding makes it easier for Anchor to fulfill its mission of teaching visually impaired children and their families, providing hope and a nurturing environment where children reach their highest potential.

## **Analysis of Lesson Study with Secondary Pre-service Mathematics Teachers**

Tanya Buchara Camargo – Mathematics

Faculty Mentor: Mark Koester

*Oral Presentation, Session I 9:30 – 9:45 am, NC Room 1402*

The purpose of the research study is to analyze the changes in thinking about lesson planning and teaching mathematics of five MSU Denver secondary mathematics pre-service teachers over the course of a semester where they participate in two cycles of lesson study – a Japanese professional development strategy that consists of a group of teachers collaboratively planning a lesson, implementing and observing it, and examining the results during a debrief. This study used qualitative methods. Audiotapes of the lesson study planning sessions and the debriefs of the taught lessons were made and later transcribed and coded. In addition, each pre-service teacher submitted a Teacher Work Sample (TWS) that included drafts of the initial lesson plans, revised lesson plans, and reflections of their learning from the research lessons. The TWS's were analyzed to support or challenge the audiotaped data. The preliminary findings are that the pre-service teachers revised their lesson plans to include more student anticipations. The significance for practice is that these changes in the lessons are significant for increasing student learning. Through these required lesson study cycles, pre-service teachers viewed lesson study as a form of teacher learning that they can continue to use after graduating to support their continued development as secondary mathematics teachers who focus on enhancing student learning.

## **Impact of Lifestyle Medicine Education in a Student's Undergraduate Degree**

Kaylea Butler - Integrative Health Care

Faculty Mentor: Michelle Tollefson

*Poster Presentation, Session II (11:00 am - 12:00 pm), Poster #20*

Our current leading causes of death all over the world originate from and can be alleviated with lifestyle habits. Lifestyle Medicine has the potential to impact the top three leading causes of death and bring a higher quality of life to patients. To bring the benefits of Lifestyle Medicine to patients, there must be education to the current and future physicians. Changing the core of our healthcare system must start with impacting the way physicians prescribe and treat their patients. Educating them on the ideas of Lifestyle Medicine can be the beginning of a system-wide change. My research is an extended literature review dedicated towards the education of undergraduate students in Lifestyle Medicine. I am exploring how impactful it is for undergraduate students with a pre-medical minor to take classes in Lifestyle Medicine. I will present on the research already done around the world both on how important it is to target undergraduate student's health habits and how impactful learning about Lifestyle Medicine can be to a future medical worker's career. I will touch on what Lifestyle Medicine curriculum looks like at an undergraduate level here at MSU Denver and the potential it has to change our healthcare system today.

## **Nyckelharpa: Mapping the History and Artistic Transformation of the Traditional Swedish Keyed Fiddle**

Kristina Buzinov – Music

Faculty Mentor: Elizabeth Macy

*Oral Presentation, Session I 9:15 – 9:30 am, NC 1403*

Folk music has always performed an essential task of representing a culture's sound. Each culture's folk music reflects its history, community, and artistic development. The folk music revival that occurred in waves since the late 1960s in many European countries, the United Kingdom, and the United States continually strengthened the interest of musicians, inciting them to explore their own and other culture's folk music heritage. My research focuses on Sweden's iconic folk instrument, the nyckelharpa, a type of "keyed fiddle." The nyckelharpa's deep and sonorous sound may be familiar to the fans of the History Channel's TV show Vikings, or popular Nordic neo-folk bands such as Myrkur, Väsen, and Faun. With its popularity rapidly spiking over the past two decades, the nyckelharpa made its way to North America, as well as into the hands of many young musicians around the globe. Today the traditional methods of teaching are still practiced widely in Sweden, though many young musicians (both in and outside Sweden) are beginning to explore new ways of playing the nyckelharpa, experimenting with its sound and applications, and combining traditional nyckelharpa music with classical art music, modern music, or musics of other cultures. My research aims to expand on scholarship about the nyckelharpa: in particular I focus on contemporary nyckelharpa performance. Building on existing research, my presentation draws on fieldwork in Sweden and the United States. I employ participant observation in the form of interviews with contemporary nyckelharpa performers, private lessons in nyckelharpa playing and composition, and my attendance at an annual gathering of nyckelharpa players and builders in Österbybruk, Sweden in summer 2018. My presentation will show how traditional and non-traditional approaches to nyckelharpa playing and performance differ while reflecting on historical and contemporary influences that shaped the instrument's development.

## **Writing Anxiety, Self-Efficacy and Meta-cognition in the Writing Center**

Matthew Candelaria – English

Faculty Mentor: Elizabeth Kleinfled

*Oral Presentation, Session I 9:45 – 10:00 am, NC Room 1403*

Although writing anxiety affects many students, its causes are often unexamined in a university setting. The literature on the subject suggests that writing anxiety and self-efficacy are negatively linked, meaning, students uncomfortable with a writing assignment may be more likely to react in avoidance and procrastination. Similarly, multilingual students are

challenged with a unique form of writing anxiety. As writing center practitioners, and as writers, it is important to know how to address these concerns. Therefore, the presentation will focus on ways to mitigate writing anxiety using peer-peer resources and metacognitive strategies.

### **Ferrozine-Based Assay for Determining Iron Content in Insect Cells**

Mirella Castaneda – Biochemistry

Coauthor: Hussein AL-Ogaidi

Faculty Mentor: Emily Ragan and Maureen Gorman

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

We are optimizing a ferrozine-based assay to analyze the iron content in *Drosophila* S2 cells. We hypothesize that putative ferric reductases CG1275 or CG8399 may be involved in reducing iron in the hemolymph and allowing uptake into cells. We have modified a ferrozine-based assay, in which ferrozine complexes with ferrous ions in solution and forms a stable magenta complex species that can be detected at 562 nm. Using this method with an Ultraspec II spectrophotometer we obtained a limit of detection of 0.30 µg/mL. This method provides a reliable, inexpensive and simple way of analyzing and quantifying the iron content within the S2 cells, allowing us to analyze iron content after RNA interference experiments to knock down CG1275 and CG8399.

### **Bundle Thickness and Morphology of Semiconducting Single-Walled Carbon Nanotube Thin Films for Increased Thermoelectric Power Factor**

Yeng Chang – Physics

Faculty Mentor: Azure Avery

*Poster Presentation, Session II (11:00 am – 12:00 pm), Poster #19*

One promising method for reducing the carbon footprint of energy generation and manufacturing processes is to convert waste heat into usable energy using the thermoelectric energy conversion. Semiconducting single-walled carbon nanotube (s-SWCNT) thin films are being explored for their potential use in thermoelectric energy harvesting devices. Improvements in charge carrier transport and thermoelectric power factor have been demonstrated in previous studies to result from the removal of residual polymer and therefore better contact between the nanotubes in the films. We present AFM images of thin films of polymer dispersed s-SWCNT thin films and measure nanotube bundle thickness and display film morphology of sSWCNT films dispersed in different polyfluorene polymers.

### **Negative Self-Talk as a Moderator Between Childhood Emotional Abuse and Anxiety in Adults**

Deborah Chelin – Psychology

Faculty Mentor: Lisa Badanes

*Oral Presentation, Session I 9:00 – 9:15 am, NC Room 1405*

Background: Adverse childhood experiences (ACEs) are known risk factors for depression and anxiety (Spinoven et al., 2010). One important mechanism may be maladaptive cognitive styles in the face of stress (Gibb, 2002). One element of these problematic coping styles is self-criticism, or the excessive focus on one's perceived failures and shortcomings, as well as a persistent feeling of self-doubt (Sachs-Ericsson et al., 2006). In their 2006 study, Sachs-Ericsson et al. found that self-criticism was an important mechanism linking childhood abuse and subsequent anxiety in adulthood, but questions remain over which form of childhood abuse negative self-talk might be most robustly linked to. The current study further examined the role of self-talk in increasing risk for the development of anxiety in adulthood for those who have experienced childhood abuse.

**Method:** One hundred thirty-seven Introductory to Psychology students (Mage = 22 years, 65% female, 56% white) completed a packet of surveys, including the Adverse Childhood Experiences questionnaire (ACEs; Felitti et al., 1998), the Generalized Anxiety Disorder 7-item (GAD-7; Spitzer et al., 2006), and the Self-Talk Inventory for young adults (STI; Calvete et al., 2005).

**Results:** In our high-risk sample (above average rates of ACEs and anxiety), our models suggest that negative self-talk is an important mechanism linking early adversity with anxiety in adulthood. This was true only for females, and only for emotional abuse, not other forms of childhood maltreatment. For females, emotional abuse, negative self-talk, and our interaction variable were all significant predictors of anxiety. Those who reported emotional abuse, but who scored low in negative self-talk, were buffered against the experience of anxiety later in life.

**Discussion:** Discussion will focus on potential interventions including cognitive behavioral therapy as a tool for reducing negative self-talk.

### **Impacts of using the Compost process to produce energy**

Ann Christianson – Environmental Science

Faculty Mentor: Shamim Ahsan

*Poster Presentation, Session III (2:15 – 3:15 pm), Poster #20*

The process of Composting materials can produce heat because of an aerobic process that occurs when the decomposition and breakdown of organic materials happens. The end products are compost, carbon dioxide, water and heat- and I am exploring the process of using that heat and turning it into a renewable energy source. It can also help manage waste more efficiently, because the globe is generating a lot of waste and we need to manage it accordingly. This idea is already practiced in countries all over the world, where there is an abundance of Municipal Solid Waste that could be composted and there is a shortage of energy sources. There are landfills around the U.S that practice the capture of gas method (being released from the landfills) and turning that into energy, while flaring off the excess. There can be different qualities of gas that is released from this process, and there is a “better gas” for use as energy-which I will be able to go over. I will explore possible negative impacts that are imposed when using this as an energy source, while going over the benefits it brings to the renewable energy sector.

### **Early Life Stress as a Predictor of Cognitive Vulnerabilities, Depression and Anxiety**

Alex Croft – Psychology

Faculty Mentor: Lisa Badanes

*Oral Presentation, Session I 9:15 – 9:30 am, NC Room 1405*

**Background:** The experience of early life stress is linked to the development of cognitive vulnerabilities including negative inferential biases and dysfunctional thinking (Hankin & Abramson, 2001). These cognitive vulnerabilities create risk for the development of subsequent depression and or anxiety. The concentration on the negative aspect and the tendency toward self-blame increases the likelihood that they will feel depressed (Hankin & Abramson, 2001). In addition to causal biases, the experience of early life stress is linked to other types of cognitive vulnerabilities such as negative automatic thoughts (Hankin & Abramson, 2001; Kercher, Rapee, Schniering, 2009). Negative automatic thoughts include automatic appraisals of different situations. When someone appraises a situation as a threat then they are more likely to use more avoidant and emotion focused coping strategies (Ferguson et al., 1999). Emotion-focused strategies tend to amplify the negative emotions felt by a person after they have experienced a stressful life event (Challagalla, 2005), thereby increasing the persons susceptibility to psychopathology.

**Method:** Utilizing a sample of Introductory to Psychology students, the current study sought to expand on these findings. We hope to better differentiate 1) The impact that early life stress has on the development of maladaptive cognitive responses to stressful life events; 2) The ways in which these cognitive vulnerabilities are related to different coping styles

in response to current life stress; and 3) The extent to which cognitive vulnerabilities and maladaptive coping styles moderate the relationship between early or current life stress and the development of subsequent symptoms of depression and anxiety

Data collection is ongoing (projected N=100). Participants complete a packet of surveys that include measures of early life stress, current life stress, coping strategies, depression levels and anxiety levels.

### **The Status of Strippers: A departure from radical and sex radical feminist perspectives**

Olivia Czarnecki – Individualized Degree Plan

Faculty Mentor: Desira Anatasia check spelling

*Oral Presentation, Session I 10:00 – 10:15 am, NC Room 1403*

This literature reviews exposes the ways in which past research in the field of exotic dance views the occupation through the lenses of the feminist sex wars and has served to further sensationalize misconceptions of the profession and marginalize its subjects. Especially for the past 30 years, research on exotic dancers and the clubs in which they perform have been characterized by the dichotomous view of sexuality that emerged in the 1980's debate known as the "feminist sex wars". From this conflict, two modes of thinking arose: radical feminism, which views all sex work as exploitive, and sex radical feminism, which maintains that sex work can serve to subvert the traditional patriarchal confines surrounding feminine sexuality. However, in reviewing previous literature written from either perspective, it is evident that both rely on culturally influenced misconceptions of the profession and serve to further marginalize and stratify those who participate in it. By employing an intersectional approach and considering oppression and empowerment through identity-based frameworks, research in this area has the opportunity to serve its subjects, enhance their quality of life, and help to provide opportunities for collective labor organization.

### **Co-teaching a Senior Event Management Planning Course: The Students Perspective**

Angelina Davis – Event and Meeting Management

Faculty Mentor: Cynthia Vannucci and Eunjoo Kang

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

The student attended a course co-facilitated senior experience course in a university event management program. It is a disruptive innovational experience to co-facilitate the senior experience course; planning an actual event of the students, by the students, and for the students, the authors agreed on three basic rules of the course: 1) facilitating rather than teaching, 2) student-centered environment, and 3) enhancing the teamwork among students. We hope to share this experience and discuss the future direction of co-teaching of junior and senior faculty in a senior experience course in hospitality education.

### **Promoting Academic Achievement through Service Learning**

Sarah dePalo – Elementary Education

Faculty Mentor: Bethany Fleck

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

Under-resourced schools tend to have a high student to teacher ratio with many students who struggle to keep up in class. Students that get left behind and read below grade level need individualized reading support. To help address this problem, students in an MSU Denver psychology class were asked to volunteer as tutors at a local elementary school. Research was conducted to see how this tutoring program, Reading Partners, can help improve the cognitive development of the students enrolled. The program was found to promote cognitive development through intrinsic and extrinsic motivation. The overarching goal of Reading Partners is improvement of comprehension and fluency. However, there are smaller learn-

ing goals, such as understanding how to identify the main idea or learning how to summarize. The achievement of these proximal goals within a lesson, promote intrinsic motivation, which can lead to higher self-efficacy. Students are able to track their progress and continue to set achievable goals. The program also engages in teaching reading strategies. These strategies, when applied to solve a problem, aid a student's comprehension and cognitive development. Students who lack strong reading skills are more likely to drop out or fail to attend college. Programs that successfully promote cognitive development and reading skills are essential in the elementary years.

### **Challenges in Maintain Handwashing Facilities at Public Food Festivals**

Kori Dover – Human Nutrition

Faculty Mentor: Jackson Lamb

*Poster Presentation, Session II (11:00 am – 12:00 pm), Poster #5)*

Handwashing, when correctly done, is one of the most effective tools in preventing and spreading communicable diseases. High-risk areas, such as a food-processing environment requires compliance with proper handwashing resources and techniques. This fundamental principle of food safety is crucial to the success of any public food festival for both the food vendor and consumers. An analysis of handwashing facilities at any public food festival indicates the challenges in sustaining this vital component of food safety.

### **Auraria Campus Xeriscape Transition and Water Savings Estimations**

Aimee Drury – Environmental Science

Coauthor: Francesca Fernandez

Faculty Mentor: Sarah Schliemann

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

The purpose of this project is to estimate the difference between Auraria campus' current water usage and potential water savings achieved with transitioning to xeric landscaping. In order to increase campus sustainability this research will quantify how much water savings (gal/ft<sup>2</sup>) is possible with this vegetative transition. Campus green spaces were digitalized using ArcGIS software, and categorized according to AHEC landscape typologies. Special use areas were exempt from this study, and focus was on aesthetic turf grass and shrub beds. Native Colorado plant species were identified and used as a point of reference for potential water saving capacities. This study suggests that by reducing turf grass on campus, water usage would subsequently be reduced. If the Auraria campus intended to become more sustainable, this course of action would be appropriate in reducing its environmental footprint.

### **Who, But a Fool; Expanding Ethnobiology in the Eremocene**

Samuel Dymerski – Individualized Degree Plan

*Oral Presentation, Session II 11:30 – 11:45 am, NC Room 1408*

The title of this presentation is a manifold reference: its first half, to a quote from American Naturalist Aldo Leopold, and its second to a 2018 New York Times article on "The Insect Apocalypse". Their contexts, as such: From Round River, "If the biota, in the course of aeons, has built something we like but do not understand, then who but a fool would discard seemingly useless parts? To keep every cog and wheel is the first precaution of intelligent tinkering" (Leopold 1972). And from the latter article, "we've begun to talk about living in the Anthropocene, a world shaped by humans. But E.O. Wilson, the naturalist and prophet of environmental degradation, has suggested another name: the Eremocene, the age of loneliness" (Jarvis 2018). Ethnobiology is the interdisciplinary study of anthropogenic relations with our (humanity's) surrounding biome, and the ways in which each impacts the other. Largely, societal groups will interact with a lifeform

(usually a plant or animal) in an exploitative or otherwise transactionary manner: “what can this organism do for us, and how do we best provide for its yield?” If we are to continue inhabiting this planet in the steady-to-expansive manners we have thus far, it would befit us to rethink these relations; to consider our role as mechanisms for ecological perpetuity, and the roles of our cohabiting familiars, and to develop entwined, conditional, and context-flexible methods for human-organism relations.

### **A Representative Survey of Colorado Neurotropic Fungi**

Samuel Dymerski – Individualized Degree Plan

Coauthor: Andrew Wilson

Faculty Mentor: Erin Bissell and Andrew Wilson

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

As Denver has begun to show institutional interest in the decriminalization of hallucinogenic mushrooms (*Psilocybe* sp.), a budding preemptive interest – responsive to the interests and risks posed by potential recreational users – has surfaced in areas of the wider mycological field to circumscribe what (if any) species of Entheogenic or otherwise Neurotropic fungi are commonly represented in Colorado, and if such fungal populations can or should be reliably used or harvested from. With resources provided by the Denver Botanic Gardens’ Sam Mitchel Herbarium of Fungi, and in wider conjunction with the Herbarium’s Colorado Mycoflora Project, this survey proposes a phylogenetic and geodistributional inquiry into the occurrence and taxonomy of psilocin and psilocybin-producing Basidiomycetes, the mechanisms by which they produce these compounds, and speculations as to their potential ecological and economic futures, should Denver seriously consider psilocybin legalization. A brief examination is also performed on a number of *Amanita* species, which also have a reputation for hallucinogenic use, but produce the same end through different secondary metabolites – some potentially toxic. On the outset, it is estimated that few to no “true” *Psilocybes* are endemic to Colorado, their former representation being supplanted by the more recently derived genus *Deconica* – composed of “non-bluing”, psychoactively inert species. Metabolite production, instead, is suspected from local members of the genera *Panaeolus* and *Gymnopilus* – to what extent, however, remains in the realm of speculation.

### **Factors Influencing Conflict in the Parent-Adolescent Relationship**

Brecken Eatherton – Economics

Coauthors: Estrella Gallegos, Hugo Perez, Jordan White

Faculty Mentor: William Huddy

*Oral Presentation, Session I 9:15 – 9:30 am, NC Room 1402*

In all different types of families, various aspects create conflict between parents and adolescents. This paper explores how conversation orientation, conformity orientation, family boundaries, parental favoritism, and marriage and divorce impact the interpersonal communication leading to conflicts between parents and adolescents. Conversation orientation and conformity orientation define the communication style within each family. Additionally, family boundaries dictate what information adolescents share and do not share with their parents. However, parents who demonstrate favoritism towards one of their adolescent children over another risk potential conflict with the overlooked child. While this dynamic between parents and adolescents is complex in a nuclear family, divorced and separated families add another layer of complexity to the situation. With all of these various factors, it is critical to examine each one individually to determine the role it plays in instigating or easing conflict between parents and adolescents. Although these are not the only factors that influence conflict between parents and adolescents, the potential variables not examined in this paper, such as generational and gender aspects, provide areas for future study.

**Keywords:** conversation orientation, conformity orientation, family boundaries, parental favoritism, marriage, divorce, parents, adolescents

## **Dietary preferences of Japanese beetles (*Popillia japonica*) in the Denver metro area revealed by stable isotope analysis**

Bradley Eidsvoog – Biology

Faculty Mentor: Jason Kolts

*Poster Presentation, Session II (11:00 am – 12:00 pm), Poster #14*

Japanese beetles have become an invasive pest in many parts of the United States. They are polyphagous, and skeletonize the foliage and buds of over 300 species of plants, although little is known about their preferences among these species. Japanese beetles are social eaters; they release pheromones which attract more conspecifics to the same location, typically devastating the plant. Japanese beetles are thought to have arrived in Colorado in the early 1990's and have spread throughout much of the Front Range. In this study, we are utilizing analysis of the stable isotope of carbon ( $\delta^{13}\text{C}$ ) to elucidate the dietary preferences of Japanese beetles in the Denver metro area. Because herbivores tend to resemble the  $\delta^{13}\text{C}$  of their diet, and different plants often vary greatly in  $\delta^{13}\text{C}$ , analyzing  $\delta^{13}\text{C}$  of both plant and consumer should indicate the preferred plant taxa of beetles, regardless of which plant they were collected on. We collected samples of beetles and the plant tissues they were feeding on from various locations throughout the Denver metro area. We have processed tissues from seven different species of plants to measure the variation in  $\delta^{13}\text{C}$  among different species of plants from the same site, as well as variation among plants of the same species (particularly Virginia creeper and Siberian elm) in different areas. Assuming significant isotopic variation exists among the different plant species, comparing the  $\delta^{13}\text{C}$  signatures of plants to those of beetles collected in the same area should indicate the dietary preferences of beetles in the Denver area.

## **Blueprints to a Dream**

Lisa Marie Fertman – Human Services

Coauthor: Coby Wikselaar

Faculty Mentor: Shawn Worthy

*Oral Presentation, Session II 11:00 – 11:15 am, NC Room 1405*

Presenting an up to date and reliable resource guide of many free products and services in Colorado for students who are homeless and those at risk of becoming as well as the growing homeless population in our state to access at no charge. Handbook will be printed as well as published on the SHHARE Auraria website. It is presented in an excel spreadsheet for easy reference.

## **Special Relativity and the Lorentz Group**

Courtney Fleming – Mathematics

Coauthor: Keegan Karbach

Faculty Mentor: Mandi Schaeffer Fry

*Poster Presentation, Session III (2:15 – 3:15 pm), Poster #7*

Relativity is the branch of physics that allows us to translate fundamental physical laws between the reference frames of observers who are moving relative to each other. In its most general context, relativity lays the framework for our understanding of gravity, light, and the dynamics of spacetime. Here we will focus on a special case of relativity where the observers are moving at constant speeds. In particular, we will examine the connections between this Special Theory of Relativity, originally proposed in 1905 by Albert Einstein, and the underlying mathematical structure known as the Lorentz group. Our primary goal will be to demonstrate how the abstract mathematical formalism of group theory gives us a better conceptual understanding of the nature of physical reality.

## **Utilization of lambda RED recombination machinery in parallel with a CRISPR/Cpf1 system to inactivate the acetate kinase gene in Clostridium butyricum**

Leah Ford – Biochemistry

Faculty Mentor: Andrew Bonham

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

Due to the increasing concern of global climate change and dwindling oil reserves, microbial metabolic systems are being explored as a means of converting renewable substrates, such as lignocellulose, into fuel precursors. One such microbe, *Clostridium butyricum*, produces butyric acid, which is a precursor to jet fuel. In addition to butyric acid, acetate is another byproduct produced at a 2:1 ratio. In refining the target product, acetate reduces purification efficiency and increases costs. In order to enhance the production of butyric acid, genetic modification to inactivate the acetate kinase gene was proposed in hopes of reducing the output of acetate in *C. butyricum*. A plasmid-bound CRISPR/Cpf1 system was utilized, but the *C. butyricum* were unable to repair sufficiently after the system was introduced, resulting in cell death. The lambda RED recombination machinery controlled by a tetR operator was proposed as an addition to the plasmid, as it promotes repair of targeted genetic modifications. With the utilization of enzyme ligation and transformation of *Escherichia coli* grown plasmids into *C. butyricum*, a plasmid has been created to include the tetR operator-controlled lambda machinery alongside CRISPR/Cpf1. With the successful implementation of the plasmid into *C. butyricum*, these results should lead to an inactivation of acetate kinase allowing butyric acid to be produced with reduced purification expenses and higher purity.

## **Symmetries and Equivalences in Quarto**

Elizabeth Foster – Mathematics

Faculty Mentor: Diane Davis

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

Quarto is an impartial two-player game using 16 unique pieces that can be represented as 4-digit binary strings. Through the course of gameplay each piece is placed on a 4x4 board in positions chosen in turns by each player, so in the event of a tie by the end of the game the board is filled with a unique arrangement of the 16 pieces (out of 16! possibilities). While others have examined winning strategies, we examine what it means for two filled boards to be equivalent. We define these symmetries over both the game board and the pieces, and draw connections from an affine transformation over  $\mathbb{Z}_2^4$  and the group action of the symmetries of the hypercube.

## **Recruitment: What's Old is New Again and Necessary!**

Taylor Franceschelli – Event and Meeting Management

Faculty Mentor: Cynthia Vannucci

*Oral Presentation, Session III 2:30 – 2:45 pm, NC Room 1402*

As university enrollments slide downward, Trost 2018 research cites three predominate themes to the decrease. First, fewer high school graduates, rising tuition costs, and finally, the belief that the return on investment of time and costs in attending school will not net the college graduate a higher paying salary. Metropolitan State University of Denver (MSU Denver) has experienced similar enrollment decreases, and the School of Hospitality, Event, and Tourism (HEaT) has felt the disappointing enrollment numbers for the last three years. To stem this downward trend for the School of HEaT, a baseline understanding of program awareness in the State of Colorado was needed. A survey was designed and sent to over 240 Colorado High School counselors. The primary objective of the study was to determine an awareness of the hospitality majors, specifically, Hotel, Restaurant, Events, or Tourism management. Results were somewhat disturbing. There was some awareness of MSU Denver's hospitality program, however, there was no awareness of the event and meeting management program or degree. A tactical plan was needed to bring awareness to the Events and Meeting Management major and it also needed to serve as a recruitment tool for the program. Pre-Collegiate camps have always been an integral

part of university sports programs and is often seen as a form of community service for players and staff. Summer Bridge programs have had a long-standing connection for “at risk” high school students to aid in their transition from high school to college. Utilizing a Pre-Collegiate camp for recruitment of high school students is not necessarily a new recruitment idea. However, it is being dusted off and revitalized to aid in awareness and the recruitment of Colorado high school juniors for a Pre-Collegiate Events Planning Camp at MSU Denver, School of HEaT. Utilizing the data collected from a survey given in fall 2018 to Colorado High School Counselor, a senior project was developed to create the Pre-Collegiate Events Planning camp that will be held May 3-4, 2019 at the Hospitality Learning Center and Spring Hill Suites by Marriott on the MSU Denver campus. It is designed to bring awareness to the School of HEaT events major. The research collected aided in determining camp goals, agenda, student scholarship towards attendance and sponsorships.

## **Global Mascaraed**

Michelle Franco – Art

Faculty Mentor: Sandra Lane

*Poster Presentation, Session IV (3:30 - 4:30 pm), Poster #9*

Global Mascaraed is a way to take the facts of climate change and take them into a more creative aspect. This will engage the viewer by letting them see that they, along with the rest of the world, are a part of the problem and the solution. This socially engaging artwork will hopefully inspire the viewer to make changes in their life that are both beneficial for themselves and for the planet equally. The method I am using to illustrate this is by making masks that individually speak about specific subjects on what is happening globally with climate change. Each mask will represent a different topic on climate change. These masks will be hanging from a steel rod frame with wire strings that intertwine each other. The strings are all linked together because even though each topic of climate change may be vastly different, they all come together as part of our planet. The strings will be at an average eye level facing away from the wall so that there is enough space for people to walk behind the masks and look through them. This will capture the audience’s attention through its frontal view. In front of the masks there will be mirrors with inscriptions of statistics on how people are impacting our planet and how each person can fix it. The viewer will have to look through the masks in order to read what is inscribed in the mirror to help the viewer understand that each person can make a difference. Each person individually is part of the problem as well as the solution. The expected result is that the audience will leave with an open mind and realize that climate change is not a joke and will leave inspired. Perhaps make changes in their life that will benefit themselves and the planet equally.

## **High Impact learning of Study Abroad**

Blanca Franco Ugarte – Event and Meeting Management

Faculty Mentor: Cynthia Vannucci

*Oral Presentation, Session III 2:45 – 3:00 pm, NC Room 1402*

Many don’t see the point in Study Abroad and what it has to offer, but having experienced the Prague Study Abroad program myself, I argue otherwise. Study Abroad helps you experience different cultures and diversities beyond the confinements of American influence. You are not merely just traveling overseas for the fun of it. You are traveling overseas to build a connection with your peers, professors, and the locals and to grasp a personalized experience with the host country. Traveling and attending classes in another country extends the opportunity for you to expand your mind in terms of better understanding the world outside of the American perspective and experience another culture intimately as you get to navigate the foreign country as a student for extended amounts of time beyond a mere tourist experience. Study Abroad helps individuals appreciate and gain a better understanding of the different beliefs, cultures and values of foreign countries and their communities.

In order to fully enjoy and engage with the Study Abroad program you need to be willing to travel to a foreign country with a curious mind. You have to be willing to experience a new environment and culture unlike that of which you are used to. Doing so leads you to adventures and experiences unlike any other, in which you can immerse yourself wholeheartedly into another countries culture and customs.

Participating in Study Abroad not only gives you boosted self-confidence in your abilities and understanding of the world, but it also helps open career opportunities, can help you make lifelong friends, and help you gain personal development through your unique experiences in the program. I could not recommend the opportunity of Study Abroad programs enough, as it has helped humble and enlighten me in my own experiences, and has helped me see beyond the sole American perspective I had once been accustomed to.

### **Drosophila CG1275 Expression, Antibody Production, and Western Blotting**

Brandon Garcia – Biology

Faculty Mentor: Emily Ragan and Maureen Goodman

*Poster Presentation, Session II (11:00 am – 12:00 pm), Poster #15*

Little is known about iron absorption in insects. One potential mechanism involves the action of a ferric reductase to reduce Fe(III) to Fe (II), which can enter the cell through a divalent metal transporter. CG1275 is a potential ferric reductase that is found in *Drosophila melanogaster*. By replicating, cloning, and expressing the N-terminus of CG1275 we can develop a reagent to allow us to observe a protein knockdown after RNA interference (RNAi) experiments. We cloned a cDNA encoding the N-terminal 107 amino acids of CG1275-PA, the region before the first transmembrane helix, into pET-32a. This was confirmed by restriction digestion. Expression of the N-terminus of CG1275 along with a thioredoxin (Trx) tag and 6xHis tag from the vector was performed in BL21 (DE3) *E. coli*. We then purified the protein using Nickel-column affinity chromatography. The purified protein was separated by SDS-PAGE and the protein bands of interest were cut out and sent for antibody production. The antibodies to CG1275 will then be used for western blots of S2 cell lysates to determine if they recognize CG1275 and are able to verify successful CG1275 knockdown after RNAi experiments.

### **Writing Experiences of STEM Students at MSU Denver**

Caila Garcia – Biology

Faculty Mentor: Elizabeth Kleinfled

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

While most university science faculty agree that writing in the sciences is a vital component of their work as professional scientists, undergraduate programs often lack significant discipline-specific writing instruction. Writing in the sciences is not only important as a professional tool, but research suggests that writing-intensive courses that emphasize interaction with scholarly literature and practice communicating to a variety of audiences is important in developing the scientific identity of students. This study is meant to measure the prevalence of writing assignments in STEM courses as well as student comfort levels with writing in the sciences. It is predicted that while students are likely comfortable with writing a simple lab report for a chemistry course, students may struggle more with constructing an impactful research report or abstract. It is common for students to consider writing in the humanities to be a world apart from writing in the sciences, so it is likely that students do not think to transfer important skills from their First Year Writing courses (i.e. ENG 1010, 1020) into their science writing. Furthermore, it is likely that STEM students rarely get the opportunity to work significantly on these writing skills unless they participate in undergraduate research during their career. This study will act as a diagnostic measure to determine if there is a need to improve scientific writing support at MSU Denver. If there is a gap in science writing instruction, researchers will use data gathered to develop Writing Center activities and consultant strategies to assist science faculty in closing this gap.

## **Seasonal Variability of Escherichia coli in Branta canadensis Fecal Samples**

Lilly Gonzales – Biology

Coauthor: Jaziah Beck

Faculty Mentor: Rebecca Ferrell

*Oral Presentation, Session II 10:30 – 10:45 am, NC Room 1403*

Canada geese (*Branta canadensis*) are often assumed to be vectors of *Escherichia coli* contamination because they tend to congregate around bodies of water. This assumption may not be entirely true, especially during colder months. An ongoing survey of *E. coli* in fecal samples collected from the local *B. canadensis* population suggests seasonal variability of its occurrence. Fecal samples were obtained from Canada geese after observed defecation. These samples were then processed by utilizing a sterile swab to inoculate plates of Eosin Methylene Blue (EMB) agar and solidified Colilert, which were then incubated at 35 C for 24 hours. *E. coli* is a gram-negative organism that grows on EMB agar producing a metallic green sheen as a result of vigorous lactose fermentation. Due to concern that EMB may be too harsh for field isolation of *E. coli*, samples were also plated on solidified Colilert medium, where *E. coli* is expected change the medium from colorless to yellow, and its colonies will fluoresce under UV light. During warmer months (July-October) *E. coli* was present in almost every sample, whereas during colder months (January-April) *E. coli* was rarely detected. Understanding the complexity of wildlife contributions to *E. coli* contamination can aid in determining its source, especially when considering the management of recreational waters with elevated *E. coli* levels. The seasonal variability observed in Canada geese raises questions about possible variations in the *E. coli* contributions of other wildlife as well.

## **Computational Characterization Binding Interactions and 3D structure of Aptamer-Based Biosensors**

Austin Haider – Chemistry

Faculty Mentor: Andrew Bonham

*Poster Presentation, Session II (11:00 am – 12:00 pm), Poster #2*

For both personalized medicine and academic research, there is pressing need for tools to enable the rapid interrogation of an array of biological targets associated with diseased states. Electrochemical, DNA-based (E-DNA) biosensors utilize the dynamic nature of nucleotide polymers to quantify the concentration of a specific peptide, substrate, or heavy-metal species contained in a biological sample. A critical limitation of E-DNA biosensors is the complexity associated with designing a nucleotide sequence that maximizes sensitivity while maintaining specificity. This dilemma is further complicated by the vast number of conformations that can exist for a given sequence. While great strides have been made in computationally predicting the folded structures that DNA and RNA-based biosensors may assume, interpreting whether such predicted structures would be effective biosensors and using that knowledge to design functional E-DNA biosensors *ab initio* remains challenging, suggesting the utility of an *in silico* approach to E-DNA sensor design. We have created a program called Fealden, which automates the process of aptamer-based biosensor generation. Fealden utilizes several programmatic paradigms to build an ideal E-DNA biosensor sequence; the validity of this sequence is then assessed by assigning thermodynamic values and conformational distance metrics to each possible fold. Using these metrics, Fealden can provide the user with several candidates for an E-DNA aptamer biosensor that are sensitive to the target of interest. Fealden has already been applied to optimize the detection of the antibiotic tobramycin with minimal human interaction. This work provides insights into applying an algorithmic approach to utilize the wide pool of existing aptamers as E-DNA biosensors in practical applications spanning such diverse fields as food safety, environmental monitoring, and clinical diagnostics.

## **Photophysical Properties of Olfactory Peptides**

Austin Haider – Chemistry

Faculty Mentor: Joshua Martin

*Poster Presentation, Session III (2:15 – 3:15 pm), Poster #21*

We report spectroscopic studies of two olfactory peptide (OFP) chains that contain a phenylalanine residue substituted with a nitrile on the second carbon (2-PheCN). In prior work, the 2-PheCN residue was shown to have a molar absorptivity and fluorescence quantum yield four times higher than that of phenylalanine, making it an ideal site-specific probe of peptide dynamics. The OFP chains contain twelve amino acid residues with a tryptophan at the C-terminus, but have a 2-PheCN residue at different locations: in OFP Long, the 2-PheCN is located at the N-terminus, whereas in OFP short 2-PheCN is the ninth residue. The 2-PheCN and tryptophan act as a Forster Resonance Energy Transfer pair, where energy transfer occurs following selective excitation of one chromophore and the efficiency of the transfer varies with the length between the acceptor and donor. These results expand upon previous studies of intrinsic, spectroscopic reporters that can probe the dynamics and local solvent environment of static or folding proteins.

## **River Channel Variation and Its Effect on the Cottonwood Forest Along the South Platte River, Logan County, Colorado, 1956-2016.**

Haley Hampstead – Geospatial Sciences

Faculty Mentor: Gabrielle Katz and Jessica Salo (University of Northern Colorado)

*Poster Presentation, Session III (2:15 – 3:15 pm), Poster #1*

Over the past 150 years, cottonwood forests have spread along the South Platte River in northeastern Colorado. This expansion was associated with water management beginning in the 1880s, which stabilized and augmented stream flows. As a pioneer species, intermittent flooding is required for the establishment of cottonwood seedlings. However, large floods can also remove trees, creating complex patterns of hydrology-forest interactions over time. This research documents historic spatial patterns of cottonwood forest development to aid future resource management. We posed the question, how did variation in the river channel affect the riparian forest? To answer this, we digitized riparian vegetation using orthophotos at roughly decadal increments for a 30 km section (total area of 5120 hectares) of the South Platte River in Logan County, Colorado. We then documented the change in the majority land-cover type in each 60 m<sup>2</sup> cell over time, allowing us to measure the rate of change of forest, riparian herbaceous vegetation, and the active channel within each time interval. We found that years of low streamflow were associated with high expansion rates for herbaceous vegetation and forests. From 1998-2006 when the channel loss was 96,320 m<sup>2</sup>/year, the forest expanded by 298,004 m<sup>2</sup>/year, while herbaceous vegetation expanded by 281,725 m<sup>2</sup>/year. In contrast, high flow periods were associated with high loss rates for herbaceous and forest cover. From 2006-2015 when channel expansion was 159,166 m<sup>2</sup>/year, forest loss occurred at 202,172 m<sup>2</sup>/year, while the rate of herbaceous loss was 460,215 m<sup>2</sup>/year. These results indicate that riparian vegetation cover is sensitive to streamflow at decadal intervals.

## **Examining the Implicit Theory of Ego Depletion in an Indoor Cycling Task**

Jordan Hidalgo – Psychology

Coauthors: R. David, Suhad, Salah, Mike El Bitar, James Webster

Faculty Mentor: Michael Rhoads

*Oral Presentation, Session I 9:30 – 9:45 am, NC Room 1405*

Self-control is the ability to resist behaviors or actions that contradict one's own values, morals, and social expectations (Baumeister, Vohs, & Tice, 2007). These behaviors range from maintaining a strict diet, pushing the snooze button on the morning alarm for class, or the urge to overspend money at the store. The term ego depletion (ED) is used to refer to the phenomenon in which an act of self-control causes a short-term impairment in subsequent self-control task (Baumeister et al., 2007). The purpose of this study is to replicate the Englert and Wanja study (2015), which demonstrated that ED occurs for participants who completed an indoor cycling task. In order to test this theory, 40 participants were exposed to a Stroop task to induce ED. This was followed by an indoor cycling task, in which performance on the task was measured with rotations per minute (rpm) and heart rate. Participant's belief in ED was measured using a scale developed by Job and colleagues (2010). This was accomplished by administering a stoop task, and then measuring heart rate and rpm to assess cycling performance. Self-control was measured using a standardized test BSCS-Brief Self Control Scale. Participants were asked to perform a Stroop task and endured an average of (M = 174.5, SD = 52.5) milliseconds of Stroop ef-

fect. Findings demonstrated that the incongruent version of the Stroop task did take longer to complete than the congruent version. Based on the participant's results for the rpm, subjects in the incongruent condition did not perform significantly better than the subjects in the congruent condition.

### **Examining the Implicit Theory of Ego Depletion in an Indoor Cycling Task**

Jordan Hidalgo – Psychology

Coauthors: R. David, Suhad, Salah, Mike El Bitar, James Webster

Faculty Mentor: Michael Rhoads

*Poster Presentation, Session II (11:00 am – 12:00 pm), Poster #18*

Ego depletion is the phenomenon in which an act of self-control causes a short-term impairment in subsequent self-control (Baumeister, Vohs, & Tice, 2007). Research by Englert & Wanja (2015), demonstrated ego depletion occurs for participants who completed an indoor cycling task. We want to extend this research by examining whether participants' belief in ego depletion modifies their performance. Our current research will seek to provide support for ego depletion in a sport specific context. In addition to the controversy regarding the existence of the ego depletion effect, there are also alternative explanations as to why an effect might be found. In attempting to further understand ego depletion, Job, Dweck, and Walton (2010) suggest that a temporary decline in self-control can be explained by people's beliefs that will power is a limited resource. In their research, they provide evidence that people who believe will power is a limitless resource do not experience ego depletion (Job, Dweck, & Walton, 2010). In total, approximately 40 subjects participated in our study. We had participants complete a Stroop task to induce ego depletion. This was followed by an indoor cycling task, in which performance on the task was measured with rotations per minute and heart rate. We examined participants' belief in ego depletion using a scale developed by Job and colleagues (2010). We will analyze the data using a repeated measures analysis of variance. Our findings may elucidate the underlying mechanisms of ego depletion. Finally, for practical purposes, these findings will help to inform coaches and athletes in terms of how to prepare for, and optimize performance in sports settings.

### **Halophilic organisms within horse manure-containing soil samples**

Christina Hobbs – Biology

Faculty Mentor: Sheryl Zajdowicz

*Poster Presentation, Session II (11:00 am – 12:00 pm), Poster #4*

Halophiles are "salt-loving" organisms that require high saline conditions to survive and are highly diverse, having representation in all three domains of life. Commonly found in soil, water, and as part of the microbiota of many animals, the salt requirement for halophiles is varied, having a requirement as low as 2% NaCl to as high as 30% NaCl. The purpose of this study was to identify halophilic microorganisms isolated from soil samples from a garden soil/horse manure mixture collected in Bailey, CO. We hypothesize that halophiles identified in the garden soil/horse manure mixture originated from the horse manure used to make the mixture. To identify halophiles in garden soil/horse manure, manure compost, and fresh horse manure, samples were plated on media supplemented with 15% and 25% salt. After two weeks, a diversity of colony growth was observed on all plates containing 15% salt, while the 25% media showed no growth; however, after three weeks of incubation, growth was observed on plates containing the higher amount of salt. Growth enrichment and plating on media containing 5%, 10%, 15%, and 25% salt will also be performed in an attempt to further distinguish halophiles. Following growth, 16s rRNA sequence will be used to identify the microbial taxa. Future analysis will include culture-independent identification, using molecular analysis, to gain a more complete understanding of the halophiles present.

## **My Internship at OUR Center**

Danielle Holmes – Political Science

Faculty Mentor: Robert Hazan

*Poster Presentation, Session I (9:30 – 10:30 am), Poster #3*

Higher Education is truly my salvation. I am a non-traditional, first-generation student. I came into adulthood by way of being a Ward of the State. Immediately, I married and started a family. It was a struggle to maintain this status and I eventually ended up making a series of poor choices. These choices further added to the oppression that my existence was. Something propelled me to go to the local Community College and apply for FAFSA. I found out that I was eligible for the Pell Grant and my life was forever changed. I appreciate this opportunity to gain an education and make the most of it.

Previously, I have been able to obtain scholarships, as well as Leadership positions. I have had the pleasure of being voted as the State Student Advisory Council Member, representing Front Range Community College on a state board. I held the position of Community Service Chair of the National Society of Leadership and Success. I have also been awarded a number of prestigious scholarships. Doris Buffett has continually awarded me through the Women's Independence Scholarship Program. I won the National Housing and Leasing Association with funds provided by Amico and a local scholarship from Boulder County, A Woman's Work.

Currently, I am interning for my local community center, the OUR Center, advocating for the needs of the participants. This platform has provided opportunities to speak in front of City Council and at the OUR Center's annual banquet. I have also initiated a Participant Advisory Council designed to gain perspective of the participant's needs from them directly. I will continue with this effort over the course of the semester.

## **Investigating a cytochrome b561 family member in insect cellular iron uptake**

Jessica Holst – Biochemistry

Coauthors: Alma Ochoa

Faculty Mentor: Emily Ragan and Maureen Gorman

*Poster Presentation, Session II (11:00 am – 12:00 pm), Poster #10*

Iron is an essential element to many functions of an animal's life, yet it is also toxic. Because iron is both essential and harmful, tight regulation of its concentration, location and ionization state is vital to animal livelihood. While we understand much about iron uptake in mammals, the mechanism for its transport is poorly understood in insects. We know iron is significant to many aspects of an insect's life, including: energy metabolism, detoxification of pesticides and as a nutrient for symbionts and commensals. We have identified a cytochrome b561 family member in *Drosophila melanogaster*, CG1275, that is similar to mammalian duodenal cytochrome b, a known ferric reductase involved in iron uptake. CG1275 is well expressed across all life stages of *Drosophila* and we hypothesize that it may be involved in the uptake of iron to non-intestinal insect cells. To test this hypothesis, we are performing RNA interference (RNAi) experiments to attempt knockdown in the expression of the gene coding for this protein. Previously we relied upon traditional polymerase chain reaction (PCR) to qualitatively observe whether knockdown had occurred. Now, by using real-time PCR, we have quantified the CG1275 knockdown observed in our RNAi experiments. Next we will measure the iron concentration levels of our S2 cells to determine whether CG1275 plays a role in iron uptake to non-intestinal insect cells.

## **Internal Attributions of Others: Effects of Reframing on Forgiveness and Empathy**

Lauren Hunt – Psychology

Faculty Mentor: Pamela Ansburg

*Oral Presentation, Session I 9:45 – 10:00 am, NC Room 1405*

Why did that madman just cut you off in traffic? Fritz Heider, a prominent Gestalt Psychologist, proposes that we see behavior as a result of either internal dispositions or external situations. Chances are you attribute that driver's behavior to their subpar character. You are not alone; this common mental shortcut is called the Fundamental Attribution Error. We disproportionately describe others' behavior as the result of their personalities over situational factors, and our own behavior as a result of the situation over our own personality (Myers, 2010). I hypothesize that we can positively alter the internal attributions we are bound to make, resulting in increased forgiveness and cognitive empathy. This will be done through reframing, a technique used in Cognitive Behavioral Therapy that re-contextualizes ineffective thought patterns (Huffman, 2007).

First a modified version of the Ambiguous Behaviors and Attribute Interpretations Measure (Brown, 2009) will be used to manipulate positive or negative reframing of the internal attributions of others. Next, participants will complete the Heartland Forgiveness Scale (Thompson, 2005) and the Questionnaire of Cognitive and Affective Empathy (Reiners, 2011) in randomized order.

I expect to find that positive reframing will cause an increase in forgiveness and cognitive empathy scores. Current research focuses only on negative causal attributions as predictors of forgiveness (Ook, 2015). My study will help to explore positive causal attributions. I also expect to see an increase in cognitive empathy: the mental perspective taking that helps us with social navigation (Smith, 2006). Reframing requires choosing to step into a new perspective and consider information from another angle, which I believe to be a function of cognitive empathy.

## **Characterizing expression of tfap2a transcript variants during zebrafish development using in situ hybridization**

James Isaac – Biology

Faculty Mentor: Vida Melvin

*Poster Presentation, Session III (2:15 – 3:15 pm), Poster #18*

The neural crest is a population of multipotent stem cells in vertebrates that migrates to locations within the developing embryo to form the pigmentation of the skin, the peripheral nervous system, and parts of the facial skeleton. Key events in the development of the neural crest and its derivatives are orchestrated by the transcription factor AP-2A. The sequence of tfap2a is highly conserved in vertebrates and contains seven exons which encode the protein's dimerization, transactivation, and DNA binding domains. Loss of function studies with zebrafish homozygous for a mutant form of the tfap2a gene called lockjaw indicates that the transcription factor is essential for the development of the neural crest derived melanocytes, peripheral nervous system, and parts of the craniofacial skeleton. Although a number of tfap2a transcript variants in mice, sheep, humans, and various other species are known to exist, it is currently unknown which variants are extant within zebrafish. We are performing whole mount in situ hybridization using antisense RNA probes specific for sequences in three 5'-transcript variants (1a, 1b, and 1c) to characterize their presence at several developmental timepoints. Combined with the work of other students in the lab, these experiments will provide a more comprehensive knowledge of tfap2a transcript variant expression during zebrafish development.

## **Adverse Childhood Experiences Impact on Adult Quality of Life With Moderating Factors**

Amanda Iverson – Psychology

Coauthors: Dave Eccles, Luke Tilsley, Meghan Larimore-Butler, Tyler DeVries, Kaiba Linthicum, Ruth Delgado

Faculty Mentor: Cynthia Erickson

Adverse Childhood Experiences (ACE) can dramatically impact the trajectory of a person's life. Whether from a prestigious home with every material need provided for, or from the depths of the lowest poverty, all children have the chance of experiencing trauma. Some people are irreversibly damaged from their childhood hardships and become a statistic in the ever-growing number of chronic health conditions, depression, and suicides attributed to a high ACE count. For the purposes of this study we operationally defined a "high ACE count" as having 4 or more Adverse Childhood Experiences before the age of 18. These adversities consist of acts of commission such as sexual, physical, emotional abuse, as well as acts of omission such as emotional and physical neglect and witnessing intimate partner violence. According to the number of "yes" answers on the Adverse Childhood Experiences Scale, each participant was given a total numerical score from 0-10 that served as their ACE count. Participants were then asked to complete a Community Resilience Asset (CRA) Likert-type scale which provided information about community support, sources of resiliency, and an "Always Available Adult" (AAA) before the age of 18. Lastly, a Quality of Life (QOL) scale was administered. The scale means to measure how satisfied the participant is with many different aspects of their lives such as, material comfort, health, relationships, learning, work, and other facets. This study anticipates that participants with high ACE counts will also have lower QOL scores. However, if the person also has substantial CRAs, specifically an AAA, the negative effects of childhood trauma on adult QOL will be moderated. Those with an AAA, a component of CRA, are anticipated to have even higher QOL scores than those with CRAs in general.

### **Therapeutic Interventions for Runaway and Homeless Youth with Complex Traumatic Histories**

Samantha Jackson – Psychology

Faculty Mentor: Randyl Smith

*Poster Presentation, Session II (11:00 am – 12:00 pm), Poster #21*

Understanding the complex trauma experienced by homeless youth is instrumental in addressing the subsequent needs of this highly vulnerable demographic, specifically in targeting high-risk situations to secure a reduced rate of homelessness after rehousing stabilization has occurred. Youth who become homeless often experience pervasive levels of domestic and intra-familial abuses prior to becoming homeless, this includes physical, psychological, and sexual violence. While homeless, these youth are at an increased risk of revictimization, additionally, those who became homeless as a result of childhood victimization are more susceptible to amplified trauma responses. This literature review highlights the therapeutic interventions that work to reduce the effects of complex trauma, and application for interventions in conjunction with community based services for a reduced rate of retraumatization in social integration.

### **Detection of Mycoplasma secreted protein P48 via Electrochemical DNA-based Biosensor**

Anika James – Biology

Coauthors: Jena Jacobs

Faculty Mentor: Andrew Bonham

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

There is an ever present need of rapid and reliable detection of disease-causing Mycoplasma strains. Mycoplasma bacteria are highly infectious agents of human disease and laboratory contamination. For example, Mycoplasma pneumonia infects almost two million people every year with contagious upper respiratory infections also known as atypical or 'walking pneumonia'. In addition to causing human disease, Mycoplasma is a major source of contamination of laboratory human cell cultures. However, current methods of detection for Mycoplasma strains, such as molecular-based assays, PCR and serological analysis, are time consuming, expensive, and less suitable for working under stringent conditions such as extreme temperature or pH. Moreover, current serological methods create possibilities of false negative results for most infected individuals because they do not measure the presence of the microorganism. They instead focus on measuring the host immune response. In order to provide a rapid and accurate alternative, we have focused on detecting the presence of Mycoplasma with a diagnostic electrochemical biosensor that detects lipoprotein P48, which is shed from the surface of

several strains into the surrounding blood serum or growth media. This biosensor is based on a previously identified DNA aptamer that binds to the secreted P48 protein with high affinity. We have expressed P48 recombinantly in *E. coli* to serve as a positive control, and our results show rapid and sensitive binding of the target, as well as convenient electrochemical signaling from these binding events. This approach will allow us to potentially improve both prevention and diagnosis of *Mycoplasma* in cell culture platforms as well as patients who present a proposed infection.

### **Conservation in the Cytochrome B561 Protein Domain of *Drosophila melanogaster* CG1275, CG8399, CG8776, and *Homo sapiens* CYBRD1.**

Gregory Kane – Biology

Faculty Mentor: Emily Ragan

*Poster Presentation, Session II (11:00 am – 12:00 pm), Poster #12*

Iron is essential to many physiological processes in a plethora of organisms, however, iron can also be toxic. The regulation of iron is of critical importance for the survival of many organisms. Ingestion of dietary iron is primarily in the form of ferric iron [Fe(III)], which is not a reactant in the toxic Fenton reaction, but highly insoluble. The reduction of ferric iron to ferrous iron [Fe(II)] is vital both for absorption into the digestive cells as well as for the utilization of iron in many crucial physiological processes. Iron metabolism in *Homo sapiens* is relatively well understood, whereas iron uptake in insects is currently not. The purpose of this study is to compare the well-known *H. sapiens* duodenal cytochrome b (Dcytb) oxidoreductase protein to three related proteins in *D. melanogaster* – CG1275-PA, CG8399-PA, and NEMY-PB. From an evolutionary perspective, if the conservation between *H. sapiens* Dcytb and any of the *D. melanogaster* isoforms is significant enough then it is reasonable to propose a similar function of the *D. melanogaster* isoform in the process of iron. Based on careful analyses of protein sequence alignments, *D. melanogaster* CG1275 and NEMY have more conserved amino acids with *H. sapiens* Dcytb, especially those involved in ligand binding and electron transfer. It is reasonable to propose that *D. melanogaster* CG1275 and NEMY may be involved in iron uptake.

### **The Value of a Naturalist on Closed Trails**

Rebecca Keen – Biology

Faculty Mentor: Christy Carello

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

Naturalists play a critical role in public education. Naturalists are generally employed when natural areas are open to the public. Our objective is to investigate the value of a naturalist during periods of closures in an Open Space system adjacent to the Town of Breckenridge, CO. Spring and early summer trail closures during sensitive periods for wildlife have been shown to reduce human induced stress on wildlife during reproductive time periods. Locations that generally have naturalists as part of their public education programs, generally only have them when trail systems are open. Our study was unique because we investigated the value of a naturalist on a closed trail system. We hypothesize that a naturalist at a closed system will fill a vital role in public education at a closed trailhead. In addition, the naturalist will also act as a deterrent for people who might enter trails regardless of closures. Our study involves both the use of trail cameras and surveys to document trail use and to understand the public perceptions of closed trails when a naturalist is present or absent. In a system with increasing visitor use every year, we found that the presence of a naturalist had a significant decrease in trail use from an average of 16.5 people/day to 5 people/day ( $t=3.20$ ;  $p=0.01$ ) when trails are closed. Approximately 300 people were surveyed and were asked whether they thought the trail closure was necessary, 92% of those that interacted with a naturalist felt the closure was important compared to only 49% of those surveyed who did not interact with a naturalist. Thus, public perception of the trail closure was much more favorable when a naturalist interacted with the visitors and explained the rationale for trail closures and also provided information on open trails nearby. While existing studies focus on the value of a Naturalist on an open preserve trail, this study is unique in its focus on the value of a Naturalist on a closed trail. We suggest that land managers consider the value of a Naturalist on closed trails and the capacity they serve as both educator and enforcer.

## **Web Accessibility for Traumatic Brain Injury**

Eryn Kelsey-Adkins

Faculty Mentor: Aaron Gordon

*Poster Presentation, Session IV (3:30 - 4:30 pm), Poster #3*

The Internet has become the primary way to communicate, stay informed, and manage day to day tasks and has become so ubiquitous to modern life that the United Nations has declared Internet access a human right [1]. The Internet has removed many barriers to communication, and accessibility web design aims to further reduce barriers by increasing accessibility to people with a “diverse range of hearing, movement, sight, and cognitive ability [2].”

In 2013, there were approximately 2.8 million emergency department visits, hospitalizations, and deaths due to traumatic brain injury (TBI) in the United States [3]. While each injury is unique, some neurocognitive disturbances are common across all levels of TBI severity. These include defects to attention, memory, and executive function [4]. This research proposes to explore potential accessibility issues caused by the most common effects of traumatic brain injury, how web design can exacerbate these issues, and propose changes to web design to increase accessibility for a diverse range of cognitive abilities [5].

## **Thermal Tolerance of Various Colorado Fish Species**

Mackenzie Kincade – Biology

Coauthors: Amy Byerly, Austin Haider

Faculty Mentor: Douglas Petcoff

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

Throughout the 20th Century, several non-native species of fish have been introduced to Colorado waters resulting in a broader diversity within our rivers and streams. The native Mountain Whitefish (*Prosopium williamsoni*) and the non-native Brown Trout (*Salmo trutta*) and Rainbow Trout (*Oncorhynchus mykiss*) have different abilities to tolerate changes in water temperatures. In order to resist stress, each species has regulatory heat shock proteins (HSP) that aid in responding to these stressors (Iwama et. al, 1998). A controlled collection was conducted by gathering four fish from each of the three species listed above to acquire tissues necessary for examination and comparison for each fish’s HSPs. Each fish was collected from the Yampa River in Steamboat Springs on August 2nd, 2018 after the water had reached 80 degrees F (26.6 degrees C), which is stressful for all three of these species. Samples were gathered from the gill, blood, and liver of each fish. Through use of RNA isolation and RT-qPCR examinations, the HSPs from each fish are being compared and contrasted in order to gain information regarding the upper thermal tolerance limits for each species. Although HSP production can be initiated via many influencers, the main purpose of this experiment is to test for the production or lack of productions of HSPs as the result of specific heat fluctuations. The information gathered from this experiment will aid in the future planning for population monitoring and fish-stocking throughout Colorado as it will aid in the understanding of which climates are best suited for each species of fish.

## **The Exploration of Gullah/Geechee Culture and History**

Malaya King – Africana Studies

Coauthor: Charlene West

Faculty Mentor: Judith Strathearn

*Oral Presentation, Session I 10:00 – 10:15 am, NC Room 1405*

The Gullah Geechee Culture has played an instrumental part in American history, yet, their stories are hidden behind Eurocentric narratives. The Gullah Geechee people are direct descendants of West Africans. They were brought to North America and enslaved specifically for the purpose of cultivating rice. Placed on isolated sea lands along the coast of North Carolina, South Carolina, Georgia and Florida, (which is now known as the Gullah Geechee corridor), these enslaved people were able to retain a lot of their African culture. Language, arts, food ways and spirituality have played a vital role

in the continuity of their culture. Examining the uniqueness of the Gullah/Geechee people provides valuable insight into their rich heritage as well as their contributions to American history.

### **Visual Observations of Black Fly Simuliidae Larvae**

Vittoria King – Biology

Faculty Mentor: Robert Hancock

*Poster Presentation, Session I (9:30 – 10:30 am), Poster 13*

Black flies are small hemataphagous insects with aquatic larvae. The larvae move through the water by silk strands stored in their abdomen. They are facultative filter feeders utilizing large labral fans; species who do not have fans exhibit grazing behaviors through their hypostomal teeth, however, little is known about their grazing habits and mandibles. The hypostomal teeth are species specific as well and the evolution of this variation has yet to explore. These animals spend most of their life feeding, with some species showing predatory activities - the specifics of their behavior are poorly known in this life stage. They display behaviors of awareness for their neighbors and respond readily to chemical and physical stimuli that effect both their growth and feeding habits. Using specialized under-water macro cameras, this paper will further explore the subject regarding the duration of their specific behavior phenomena and of the use of their feeding appendages. Capturing close-up footage and distal shots of larvae groups will not only provide visual repeatable evidence of these behaviors, but also allow for further research into any singularities found.

### **Who's Logging on: Differing Attitudes About Online Therapy**

Lena Knechtel – Psychology

Faculty Mentor: Cynthia Erickson

*Oral Presentation, Session II 10:45 – 11:00 am, NC Room 1402*

This presentation explores differences in attitudes towards online therapy by demographics and life experiences. Online therapy is defined as therapy conducted by a licensed psychotherapist over the internet (through text-based programs or video calling programs) and can help address an accessibility gap in current therapeutic interventions. Individuals with disabilities, those who live in rural areas, or those who have poor access to transportation may not be able to access therapy when they may benefit from it. Understanding current attitudes towards online therapy could help increase adoption of it. Therefore, the purpose of this study was to explore areas where there may be differences in attitudes towards online therapy. The participants took an online survey which asked about their demographics, experiences with therapy, comfort level with technology, introversion level, and attitudes towards online therapy.

Current results (N = 1201) indicate that women, non-binary, and transgender individuals value online therapy significantly more than men. Furthermore, highly introverted individuals value online therapy significantly more than moderately introverted or extroverted individuals. Additionally, individuals who have previously been in face-to-face therapy or who are currently considering face-to-face therapy value online therapy significantly more than individuals who have not been in therapy or are not considering it. Finally, individuals who have merely heard of online therapy value online therapy significantly more than individuals who have not heard of it. These results could help shape policy around increasing the adoption rates of online therapy, therefore helping individuals who may not have access to therapy receive therapeutic services.

### **Antimicrobial and Antifungal Efficacy of FreshPaper Food Saver Sheets**

Ashely Langley – Biology

Coauthor: Katja Kleih

Faculty Mentor: Sheryl Zajdowicz

The spoilage of food is a worldwide problem and various products have been developed to prevent spoilage and prolong the shelf-life of fresh fruits, vegetables, meats, and baked goods. One product, FreshPaper Food Saver Sheets, promises to help increase shelf-life through the use of natural products such as fenugreek. Several studies have investigated and shown that parts of the fenugreek plant have antifungal and antibacterial properties. Because there are no studies showing the efficacy of FreshPaper against bacteria and fungi, the aim of this study evaluated two kinds of FreshPaper, specific to either produce or bread, for the ability to inhibit bacterial and fungal cultures. Toward this end, lawns of *Bacillus subtilis*, *Candida albicans*, *Escherichia coli*, *Pseudomonas aeruginosa*, and *Staphylococcus aureus* were grown in the presence of FreshPaper to observe any inhibition of growth. Preliminary results indicate minimal inhibition of *E. coli* grown in the presence of FreshPaper, with no inhibition of growth by any of the other organisms tested. An enhancement of growth of *B. subtilis*, *C. albicans*, and *P. aeruginosa* was actually observed around the FreshPaper. Further research will evaluate any inhibitory effect that FreshPaper has against varying bacterial and fungal cultures and will also investigate if FreshPaper will inhibit common mold isolated from produce, bread, and baked goods.

### **The Role of Explanatory Style and Psychological Flexibility in Response to Trauma**

Meghan Larimore-Butler – Psychology

Coauthors: Dave Eccles, Amanda Iverson, Tyler DeVries, Luke Tilsley, Kaiba Linthicum, Ruth Sherpa, Liz Malagisi, Amy Linares-Francois

Faculty Mentor: Cynthia Erickson

*Poster Presentation, Session II (11:00 am -12:00 pm), Poster #1*

Explanatory style and psychological flexibility have both been found to correlate with various mental health outcomes (Mizrahi et al., 2008; Kashdan, 2010); research finds optimistic explanatory style for negative events (viewing negative events as external, unstable, and specific) and greater psychological flexibility correlate negatively with psychopathology (Peterson, 1991; Hayes et al., 2006). Little research has been done, however, on the influence of psychological flexibility on explanatory style and these variables' compounding effect regarding individual response to trauma. In the current study, we aim to explore this relationship. Participants' explanatory styles will be assessed using the Attributional Style Questionnaire, which contains twelve scenarios to respond to, half positive (e.g. "You become very rich") and half negative (e.g. "You have been looking for a job unsuccessfully for some time"). They will be asked to designate a cause for each scenario and on a Likert-type scale determine the extent to which they attribute the cause to internal or external factors, whether the cause influences just the scenario or all others, and whether that cause will only be present during this scenario or if it will endure beyond it. Psychological flexibility will be assessed using the Acceptance and Action Questionnaire II (AAQ-II), a Likert-type scale ranging from "Never true" to "Always true", which asks participants to respond to statements such as "I'm afraid of my feelings" and "Worries get in the way of my success". Frequency of traumatic symptoms will be assessed using the Traumatic Symptoms Checklist (TSC-40) on a Likert-type scale ranging from "Never (0)", "Sometimes (2)", and "Often (3)". Items on this scale include memory problems and feelings of guilt. We hypothesize greater psychological flexibility will correlate with optimistic explanatory style. Furthermore, we expect to find a negative correlation between psychological flexibility, optimistic explanatory style, and the frequency of traumatic symptoms.

### **The Madness within the Monster: Representations of Mental Illness in Horror**

Katelyn Lauer – English

Faculty Mentor: Charles Hoge

*Oral Presentation, Session III 2:15 – 2:30 pm, NC Room 1408*

Horror as a genre has never shied away from mental illness. In fact, the wide range of psychological conditions have

been used as inspiration to create some of the most terrifying monsters and haunts that have graced the page and screen. Yet in this modern era where the visibility of psychologically divergent individuals continues to grow while the social stigma remains it must be asked if this representation of mental illness in horror is benefiting the mentally ill community or harming it? Sense much of the mental illnesses people suffer from are intangible and often ephemeral (i.e. depression, anxiety, PTSD, Borderline etc.), it can be difficult to explain to the psychologically typical population what it feels like to live with a mental illness. How refreshing it is, then, to pick up a piece of horror literature, such as Shirley Jackson's *The Haunting of Hill House*, and find a perfect description and encapsulation of anxiety written on the page. For those of us who suffer from psychologically divergent disorders having a manifestation of our illness as a creepy monster or a creaky old house can be cathartic in that not only does the horror genre express all the emotions that are so hard to name when it comes to these illnesses, but it often shows that the monster or the axe wielding serial killer can be defeated, just as depression and Bipolar can be overcome and managed. Simultaneously, however, one has to wonder if reading and seeing one's mental illness manifested as the other/a transgression/something unnatural damage more than uplift? Through examination of this genre and the myriad of ways in which mental illness is presented, be it straightforward or through metaphor, I hope to begin a discussion about the pitfalls and triumphs of finding a genre of media that can both adequately understand a disorder while simultaneously othering it. The examination of neurodivergent issues within the geek and pop culture community at large is still in its infancy but I hope that by researching this particular intersection I can contribute to the growing interest in the subject.

### **Cognitive Enhancing Drinks**

Rachel Litzenberger – Psychology

Coauthors: Timothy Byrd

Faculty Mentor: Cynthia Erickson and Katherine Hill

*Oral Presentation, Session I 9:30 – 9:45 am, NC Room 1403*

Many supplement companies make claims that their products are able to improve people's cognitive functions with no research to support these claims. In this study, we assessed the commercially available drink NeuroSonic® to test the effects of this beverage advertised to improve cognitive functions and concentration. Caffeine and L-theanine are the active ingredients the manufacturer's state are responsible for its effects. The results of a previous study of the same product showed no significant improvement. We conducted a double-blind study in which we placed participants into single rooms and provided them either NeuroSonic® or a placebo. Both groups were given surveys and watched videos, then went through a series of cognitive tasks to test executive function, processing speed, attention, working memory and focus. The dependent measures for the tasks included both percent correct and latency to respond. Further, we assessed the participants' mood before and drinking consuming the drink. Current results show no significant improvement of cognitive enhancement in those participants who consumed NeuroSonic®.

### **Pedestrian detection**

Thien Ngo Le – Computer Science

Coauthors: Andrew Roberts

Faculty Mentor: Feng Jiang

*Poster Presentation, Session III (2:15 – 2:30 pm), Poster #2*

Pedestrian detection is an important topic in computer vision. It has been applied in multiple applications in real world such as active transportation safety improvement (automatic braking systems, self-driving cars, etc) and monitoring systems in security applications. Accurate detection and identification of the pedestrian object is the key to successful behavior analysis tasks. However, factors such as lighting conditions, partial occlusions, and the presence of background make it a challenge to detect and identify pedestrian objects accurately. There has been a lot of research in this area. However, most of the current pedestrian detection methods either detect the pedestrian object using the traditional optical image or using the thermal image. The detection accuracy is not guaranteed in challenging conditions. In this project, we develop an automatic pedestrian detection model that detects pedestrian objects based on both optical and thermal images, using advanced machine learning techniques such as "deep neural networks". The advantage of using both optical and thermal

images is that our model is more robust in challenging environments, such as poor lighting conditions, partial occlusions etc. Higher accuracy and robustness of pedestrian detection could be achieved using our proposed approach. This project is funded by 2019 Provost Mini-Grant, MSU Denver. Two senior Computer Science students, Andrew Roberts and Thien Ngo Le are participated under the supervision of Computer Science Faculty, Dr. Feng Jiang. The Metro group is also co-operating with CU Denver “SMART lab”, supervised by Dr. Chao Liu.

### **Bilingualism in Autism Spectrum Disorders: Implications for Speech-Language Pathologists’ Service Delivery**

Shannon Lewis – Speech, Language & Hearing Science

Faculty Mentor: Siva priya Santhanam

*Poster Presentation, Session I (9:30 – 10:30 am), Poster #12*

Bilingual families of children with autism spectrum disorders (ASDs) are often confused about the choice of language for every day interactions. Little is known and understood about recommendations and best practices for service delivery among bilingual families. This review describes the existing research on bilingualism in children with ASD, and highlights family challenges and suggested solutions for speech-language pathologists working with bilingual families. The review culminates in implications for speech-language pathologists.

### **ADHD Symptoms in Adulthood in Relation to Early Life Stress**

Kaiba Linthicum – Psychology

Faculty Mentor: Lisa Badanes

*Oral Presentation, Session II 11:15 – 11:30 am, NC Room 1405*

Attention Deficit Hyperactive Disorder (ADHD) is a neurodevelopmental condition that affects the ability to pay attention and control impulses (CDC, 2018). The prevalence of ADHD in college students is not well known due to reporting inaccuracies but is thought to be around 2-8% of college students (Weyandt & DuPaul, 2006). Adverse Childhood Experiences or ACES are stressful experiences that a person can experience during childhood. These come in the forms of abuse, neglect and household dysfunction. The ACES study conducted in 1998 found significant negative health outcomes for people with four or more adverse experiences before age 18 (Felitti et al., 1998). Since this seminal study, additional research has been conducted with some studies showing a link between ADHD and ACES (Weyandt & DuPaul, 2006). Interestingly, the types of adverse events experienced in childhood may be an important consideration when examining the link between early stressful life events and the subsequent development of ADHD. Physical and sexual abuse significantly increased the chance of having ADHD for participants, however parental domestic violence in the same sample was only shown to affect symptoms in women (Fuller-Thomson & Lewis, 2015). The mechanism behind ADHD and ACES is unclear, but research efforts have focused on how brain structures and function might be shaped by stress, thus creating a vulnerability to the symptomology of ADHD. These vulnerabilities may differ depending on both gender and the types of adversity experienced. In a sample of Introductory to Psychology students (projected N = 100), utilizing self-report measures of ADHD and ACES, the current study extended the previous literature to better understand both the types or early stressors that might create risk for ADHD symptoms in adulthood (e.g. abuse vs. household dysfunction), and the potential gender differences in these vulnerabilities. Discussion will focus on the potential implications of intervention.

### **An Affair with Death and Grief Throughout the World**

Michael Lisanu – Finance

Coauthors: Crystal Magana, Matthew Magnison, Lee Turner

Faculty Mentor: William Huddy

*Oral Presentation, Session II 11:00 – 11:15 am, NC Room 1603*

Death and grieving is always a hard topic to discuss openly. While death is inevitable our perspectives of it as well as the way we mourn are strongly influenced by traditions, rituals, and beliefs. Not only does the process of death and grieving differ from person to person, but it can also differ from culture to culture as well. This paper outlines the wide-ranging perspectives of death and grieving among Mexican, Japanese, Ethiopian, and Iraqi cultures. Death in Mexico is widely viewed as somewhat of a celebration. Although sad, when a loved one passes it is viewed as a natural aspect of life and holidays such as Day of the Dead, are held to commemorate and be with the ones they've lost in spirit. On the other hand, Japanese culture is very different. Rituals that take place after someone has passed are immensely different than the typical wake-then funeral style customs. These rituals include white clothing, and 7 weeks of memorials, one each week on the day which the person has passed, finally mourning ends. On the other end of the spectrum, visible grief is condemned in the culture of Iraq. It is also typical of Iraqi culture to have a mourning period of three days for families, 4 months and 10 days for widows. There are also cultures such as Ethiopia's which incorporate different aspects of traditions into one grieving process. These cultures are discussed in depth within this paper to grasp how death and grieving vastly differ across the globe.

### **Job Satisfaction and Personal Happiness Within College Students**

Noah Liszewski – Psychology

Faculty Mentor: Pamela Ansborg

*Oral Presentation, Session II 11:15 - 11:30 am, NC Room 1603*

Many college students are working a job to support themselves. These jobs are not necessarily “dream jobs” for the students but they are a big part of their life. The present study investigates whether there is a relationship for college students between happiness and satisfaction in their current job. Subjective happiness relates to job satisfaction within career employees in Switzerland (Park et al 2009; Petersen et al, 2005, 2007). This finding held true even when considering different demographics and personality types (Vella-Brodrick et al. 2009). The primary purpose of the present study is to extend the work that showed that subjective happiness correlates to job satisfaction within career employees at a factory in Switzerland. We know employees who are in a career job report higher happiness when job satisfaction is high but is this the same within financially self-sufficient college students? To find this out we will use two measures: one to measure happiness, The Subjective Happiness Scale (SHS) (Lyubomirsky, 1999) and the other test is to measure job satisfaction, the Job Satisfaction Survey (JSS) (Spector, 1985). We will administer the survey online. After these the two tests are completed by the participant their data will be compiled and analyzed to determine the relationship between job satisfaction and happiness. The expected findings will be in line with previous research in this field but could show some changes due to the fact that this set of participants are not settled into their career rather they are just beginning their careers.

### **History of Environmental Impacts in Denver's Elyria/Swansea Neighborhoods**

Stephanie Lopez Vargas – Geography

Faculty Mentor: Sara Jackson

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

A northeast neighborhood in Denver, CO known as Elyria/Swansea was once home to the some Colorado's biggest smelting plants: The Omaha & Grant and the Argo. The two began operation in the 1870s and produced many hazardous wastes such as lead and arsenic. During this time, there were no waste and dumping regulations. Therefore, the two facilities dumped waste in the area causing soil contamination. In the late 1990's, the Environmental Protection Agency (EPA) began to test soils in areas that were contaminated. Lead and arsenic were the two contaminants that the EPA would later find at elevated levels in the community's soil. In 1999, the area was considered a Superfund site by the EPA and was placed on the National Priorities List (NPL) for cleanup. Since then, the EPA has been working with the Elyria/Swansea community to make sure the environment is in livable conditions.

With that being said, Elyria/Swansea is still one of the most polluted zip codes in the United States. Despite the EPA's efforts, many residents distrust the Colorado State Government and the EPA claims about their community being safe. Elyria/Swansea is a predominately Latino community and many communities that hold larger populations of people of

color have suffered from environmental injustice and social inequity. This poster examines how the community still suffers from the legacies of smelting contamination and also current pollution from Interstate I-70.

### **Tales of the Rocky Mountain Pale Panther: *Amanita pantherina* var. *multisquamosa***

Justin Loucks – Environmental Science

Faculty Mentor: Christopher Meloche and Andrew Wilson

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

This research focuses on the systematic identity of the Rocky Mountain *Amanita pantherina* var. *multisquamosa*. This mushroom is given the common name “Pale Panther” due to its pale-colored cap, which is phenotypically different from the classic deep brown-colored cap of *Amanita pantherina*. The North American *A. pantherina* has been a subject of taxonomical debate for several reasons. First, the species was originally described in Europe, and although the N. American variety is morphologically identical, recent DNA sequence data supports the separation of N. American and Eurasian clades. Secondly, after much debate and taxonomic rearrangement, the *Amanita pantherina* of N. America is now thought to exist as a species complex, meaning that it is comprised of multiple species that may be morphologically indistinguishable. Complicating the issue, *A. pantherina* var. *multisquamosa* was originally described in New York, USA as *A. cothurnata*. While it is possible that the northeastern and Rocky Mountain varieties of this species are the same, this study hypothesizes that the Rocky Mountain region harbors a genetically distinct population due to its geographic separation. This proposed population may be an undescribed species unique to the region. To evaluate this hypothesis, this study will use DNA sequence data from multiple genetic markers to compare Rocky Mountain *A. pantherina* specimens with other members of the *A. pantherina* complex from across the North American continent to gain a better understanding of this North American *Amanita pantherina* species complex.

### **Non-Special Education Teachers Teaching Special Education Students**

Brianna Lyons – English

Faculty Mentor: Pamela Troyer

*Oral Presentation, Session III 2:30 – 2:45 pm, NC Room 1408*

This paper exams the ways in which autistic, and learning-disabled students, could benefit from therapy and from teachers in the classroom. Non-Special Education educators should have the resources to be able to teach these students, without the constant help of a para-educator. This paper examines the ways in which autism is discovered in a child, the therapy they may go through in able to learn the same way as non-autistic children, and how non-special education teachers are just as capable at teaching these students.

### **Do Seasons Matter When it Comes to Auto Thefts?**

Sachae Lyons – Criminal Justice and Criminology

*Oral Presentation, Session II 10:45 – 11:00, NC Room 1603*

This research will compare spatial distribution of auto theft in the summer months compared to winter months in Denver. Through geographic analysis of crime, this study attempts to see when auto theft rises the most and if the seasons are linked to it. Using publicly available data on Denver Open Data Catalog website, this research examines spatial and temporal patterns of crime in Denver and the results will have implications for police activities to prevent crime.

## **Designing guide RNAs to target MACC1 & NDNF for knockdown in zebrafish using the CRISPR-Cas9 system**

Jonah Maggard – Biology

Coauthors: Sarah Gunlikson, Sara Higgins

Faculty Mentor: Vida Melvin

*Poster Presentation, Session II (11:00 am – 12:00 pm), Poster #7*

Human craniofacial disorders, such as cleft palates and Apert Syndrome, are due to failures in normal craniofacial development. The molecular mechanisms that drive craniofacial development are highly conserved across vertebrates, spanning from humans to zebrafish, *Danio rerio*. To identify new genes involved in craniofacial development, Melvin et al. targeted 80 genes using Morpholino gene knockout technology in zebrafish. These studies identified MACC1 and NDNF, as novel genes required for normal craniofacial development. Loss of MACC1 resulted in significant reduction in craniofacial cartilages of both the lower and upper jaws; whereas, loss of NDNF gene caused a reduced ethmoid plate, a cartilage homologous to the palate of mammals. Morpholinos disrupt gene expression without altering the genome and thus the gene knockdown is not stable and inherited. To establish a stable, genetic disruption for further phenotype analysis, we will use the CRISPR-Cas9 system, a molecular tool for genome editing. In this system, guide RNAs are designed to recognize and bind to DNA sequences in target genes, here MACC1 and NDNF. The gRNA recruits Cas9 endonuclease to the target site, where Cas9 creates a double-strand break. These breaks are repaired through one of two possible mechanisms: nonhomologous end joining (NHEJ) and homology-directed repair. In NHEJ, the broken DNA ends are trimmed back, removing nucleotides and then ligated closed creating a deletion. The purpose of our research is to design guide RNAs to target the MACC1 and NDNF genes in zebrafish to further study the phenotypes of organisms lacking expression of the two genes.

## **Biomedical Applications of Gold Nanoparticles Used in Detection, Therapy and Incorporation into Reverse Thermal Gel for Cardiac Tissue Engineering**

Marcos Maldonado – Biology

Faculty Mentor: Andrew Bonham

*Oral Presentation, Session II 11:30 – 11:45 am, NC Room 1403*

Cardiomyopathies, diseases of the heart, are one of the major causes of death in the United States, and thus there is great interest in preventing and treating these complications. Due to the grave morbidity and mortality of myocardial infarction (MI), research has turned to polymers in cardiac tissue engineering to restore function to the heart. As such, a great deal of work has gone into efforts to produce polymers which mimic the natural cell environment in properties such as binding sites, stiffness, reactivity, and hydration. The core of our model is the incorporation of conductive gold nanoparticles/nanorods (AuNPs) into reverse thermal gel polymers (RTG). The RTG-AuNP was analyzed using long-term in-vitro cell studies with a neonatal rat ventricular myocytes (NRVM) and fibroblast co-culture. In this study, the RTG-AuNP polymer system encouraged long-term survival of the NRVMs and dampening of fibroblast survival when compared to controls. The results of this work indicated that this electroactive polymer construct could have utilization in both future studies and applications in cardiac tissue engineering. The goal of this work aims to improve cardiac tissue engineering, so that it can be directed to ultimately repairing damaged heart muscle and improve overall cardiac function in cardiovascular diseases whether they have been acquired from past medical complications or developed through hereditary traits.

## **A Rapid and Noninvasive Diagnostic based Biosensor Designed for Detecting Celiac Disease**

Marcos Maldonado – Biology

Coauthor: Anna Nguyen

Faculty Mentor: Andrew Bonham

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

Celiac disease (CD) is an autoimmune disorder where ingestion of dietary gluten causes an immune response that leads

to villous atrophy and other gastrointestinal and extraintestinal complications. Approximately, 2 million Americans are affected by CD, 1.4 million of which are undiagnosed<sup>1</sup>. Individuals with undiagnosed CD do not notice or recognize any physical symptoms, but the immune response that leads to villous atrophy still occurs with the ingestion of gluten. One key challenge of this disorder is that diagnoses have historically suffered from difficulties in performing non-invasive positive identification of affected patients. Recently, interacting amino acid sequences on the surface of human tissue transglutaminase (tGT) and gliadin (Glia) proteins from foodstuffs have been identified as the potential recognition sites of commonly developed auto-antibodies in CD<sup>2,3</sup>. In this project, we are exploring the use of this novel epitope that will mimic these key amino acid recognition sites in order to create rapid, non-invasive, electrochemical biosensors to aid in the early detect and diagnosis of CD. These biosensors build on a literature of electrochemical biosensors that offer reagent-less, reusable, and rapid testing directly in small quantities of blood (such as a finger lancet draw). Our goal is to design, synthesize, and validate such diagnostic biosensors.

### **Small Business Owners**

Nancy Martinez Lara – Management

Faculty Mentor: Amy Cardillo

*Poster Presentation, Session II (11:00 am – 12:00 pm), Poster #8*

In my research, I primarily focused on interviewing a few small business owners in order to gain more understanding and knowledge about owning a small business. I asked the small business owners questions that I felt would help me for my research, but as well as questions that I knew would help me fully understand a small business. My goal is to one day open a small business and throughout the research I conducted, I feel I am one step closer to opening my dream business.

### **Opioid Awareness**

Macy Martischewsky – Psychology

Faculty Mentor: Katherine Hill

*Oral Presentation, Session II 10:30 – 10:45 am, NC Room 1405*

This 147-participant study measured awareness of opioid drugs as well as usage of opioids among Introduction to Psychology students at Metropolitan State University of Denver. A survey was created by the researchers to assess general knowledge regarding opioid use and abuse. Some of the survey was based on the BOOK (Brief Opioid Overdose Knowledge Questionnaire; Dunn et al., 2016), with additional questions written by the researchers. The survey also asked about use of opioids and other substances, both legal and illegal. The mean BOOK score was 4.61, on a 9 point scale, indicating typical performance just over 50% correct. Individual items on the BOOK revealed that many students were unfamiliar with opioids. For instance, 64% of the sample was unaware that methadone is a long-acting opioid, and 57% was unfamiliar with its use to treat opioid addiction. A third of the sample did not know the symptoms of opioid withdrawal, and over two-thirds of the respondents did not know that Narcan is a drug used to reverse opioid overdose. Despite some lack of knowledge about opioids, 46% of the sample had received opioid prescriptions. In general, substance use was relatively low among the sample, with the exception of alcohol and marijuana. None of the participants reported using heroin within the last 30 days, and only one participant reported having ever experienced an opioid overdose. Overall, BOOK performance indicates a lack of knowledge surrounding opioid use and abuse but this may be partially related to education level and opioid exposure.

### **Effective Communication Methods for Survey Results**

Sean McAllister – Geography

Faculty Mentor: Sara Jackson

*Oral Presentation, Session II 10:45 – 11:00 am, NC Room 1403*

The Auraria Campus Transportation Survey is a collaboration between faculty and students at the Metropolitan State University of Denver and the Auraria Sustainable Campus Program. The purpose of the survey is to better understand commuting behaviors of students, faculty, and staff and to calculate the carbon footprint of Auraria Campus. Collecting the raw data is imperative to this project, but so is our ability as a team to be able to circulate the findings and desired messages after the data has been analyzed. Throughout this study, I have explored numerous ways that survey data has been effectively communicated on college campuses. I do this by analyzing the communication techniques found in them such as framing, emotional appeal, the idea of message circulation as well as various techniques of persuasion. Studying these communication tools comes in two parts; first, highlighting them in past studies, and second, explaining how the same techniques are being used in the Auraria Campus Transportation Survey by our team. This study further explores how colleges have communicated information that has been collected in regards to sustainability. Understanding how to effectively communicate survey data to create more awareness of sustainability issues and to change commuting behaviors is one of the goals of the Survey. It is necessary for our team to communicate the data that we analyze from the survey to advocate for improved transportation options on Auraria Campus. In my presentation, I will provide a brief overview of the survey results, explain how we are following through with a comprehensive but approachable explanation of the data, and discuss how we are appropriately communicating the importance of the information to a diverse population of stakeholders.

### **The Ethical Use of Complementary and Alternative Medicine in Occupational Therapy**

Blair McBride – Integrative Health Care

Coauthor: Ellie Ingram

Faculty Mentor: Steve Rissman

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

The relation of occupational therapy and CAM therapies collide in their basics principle which is to holistically engage individuals in meaningful occupations. Therefore, the need for occupational therapists and those alike to implement CAM into their scope of practice is an ethically sound need. This project will present on current research in the field of CAM therapies and its effects from implementing it into the field of occupational therapy.

### **Microsatellite Primer Design and Amplification for pebblesnail.**

Daniel McCullough – Biology

Faculty Mentor: Hsiu-Ping Liu

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

The purpose of my research is to develop microsatellite primers for pebblesnail species. A microsatellite is a segment of tandem repeated DNA. The number of repeats is variable in a species, typically 5–50 times, making microsatellites ideal genetic markers for identification of individuals and studying population structure. Primers will be designed from microsatellite sequences and tested using polymerase chain reactions. Gel electrophoresis will then be used to visualize results. Successful designed microsatellites primers will be used to genotype individuals using fragment analysis to further provide genetic information for conservation management.

### **Chicory From Root to Tip: An Understanding of a Minimally Understood Medicinal Herb**

Dominique McKee – Integrative Health

Faculty Mentor: Kelsey Asplin

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

As a versatile medicinal herb *Cichorium intybus*, or Chicory, has been shown to have many actions and uses. By using a

meta analysis study, this research aims to describe the many evidence based implications of *Chicorium intybus* as a medicinal plant. Where many studies have examined the individual chemical properties and associated actions of Chicory, this research will illustrate the complete uses and known actions for the plant, explaining the health implications of previous research in context to today's greatest health risks. The research has shown that the parts used of Chicory include the roots, leaves and seeds. The constituents of these plant parts vary in chemical compounds and have been identified into six distinct groups. The constituents can be extracted with water decoction, in a tea, by alcohol extraction and in a glyceride based compound. The actions of chicory presented in this research are hepatoprotective, hepatorestorative, antidiabetic, antihyperglycemic, antimicrobial, inflammation modulating, antioxidant, and tonifying. The evidence based medicinal uses of this plant include; increasing insulin production, increasing glucose uptake in muscle cells, reducing hepatotoxicity, promoting proper liver function, prophylactically and retroactively treating bacterial or viral infections, reduce chronic inflammation and increasing the strength of visceral tissues. The research presents a broad scope of possibilities for a widely available yet commonly underutilized plant and calls for more scientific exploration of the possibilities of this plant to treat and prevent diabetes, liver disease, chronic inflammation and infections.

### **Incarceration in America; a Call for Wellness Reform**

Dominique McKee – Integrative Health Care

Faculty Mentor: Michelle Tollefson

*Oral presentation, Session II 11:30 – 11:45 am, NC Room 1405*

Among Americas most underserved populations are those who are incarcerated or have recently been released from incarceration, especially in regards to their health care. Composing an estimated 2.2 million Americans in 2016, the health needs of this group are unique and not adequately addressed. This research uses a meta-analysis method to demonstrate that while incarcerated American inmates are more likely to die or become seriously ill from communicable diseases, receive minimal care for chronic illnesses, are likely to be coping with mental illness that is not being treated, are pre-disposed to addiction and relapse and are more likely to suffer from deadly chronic conditions associated with stress and poor diet. Further discussed in this presentation is the call for health care reform in American penitentiaries in an effort to reduce these health disparities for these individuals while incarcerated and during the transition back into community. By connecting the unique health risks and needs of inmates with evidence based lifestyle medicine interventions, this research will illustrate the impact that wellness based penitentiary health care will create. The research aims to demonstrate that not only will this help to improve the health of those currently incarcerated, but it will improve their health outcomes after being released, decrease their propensity for addiction relapse, reduce their risk for reincarceration and serve to lessen the economic burden of their health care. As lifestyle medicine is being incorporated into mainstream healthcare, its inclusion into the care for inmates is necessary to improve health outcomes for these individuals and to improve the health system for all of America.

### **The Mitochondrial Gene Order of Springsnails**

Kevin McQuirk – Biology

Faculty Mentor: Hsiu-Ping Liu

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

This research project is to ascertain the mitochondrial nucleotide arrangement and gene order of the springsnail (*Pyrgulopsis*). A mitochondrion is a double-membrane-bound organelle found in most eukaryotic organisms. It is an organelle within eukaryotic cells that have extremely important cellular functions of respiration and energy production. An animal mitochondrion contains a circular molecule of DNA that is usually about 16,000 base pairs (bp) long. Mitochondrial gene order is conserved among lineages of eukaryotic organisms; however, lineages of Mollusca are known to be vacillate. No information is known about the mitochondrial gene organization in springsnail. The minute freshwater snail is one of the most prevalent and abundant aquatic invertebrates in northwestern North America. These miniscule snails are in the family Hydrobiidae and typically live in lotic habitats and fresh water. *Pyrgulopsis* is the largest genus of freshwater gastropods in the North America. Generally, the mitochondrial genome has 12 to 13 protein coding genes, 2 ribosomal

genes, and 20-22 tRNA genes. To begin understanding the gene order of the *Pyrgulopsis* mitochondria, primers will be developed from sequences already obtained for *Pyrgulopsis*. Designed primers will then be tested using protocols developed by Liu et al. (2007). Propitious primers will then be used to test the gene order and DNA sequence. The forward and reverse primer for each gene will be used to examine the gene orientation. Agarose gel electrophoresis will provide visible confirmation of designed primers. Further analysis using amplified DNA fragments will be sequenced to ascertain the nucleotide sequence. Mitochondrial gene order is a unique mechanism for studying relationships among major families of gastropods. The mitochondrial sequences can also evolve quickly and be a useful tool in determining species of snails. Human development, diversion of water supplies, and contamination has made *Pyrgulopsis* a current focus of study and conservation in the U.S.

### **Resolving the Plankton Paradox: Sharing Ecological Niches Far From Equilibrium**

Kalen Meine – Biology

Faculty Mentor: Christopher Cooley

*Oral Presentation, Session I 9:00 – 9:15 am, NC Room 1408*

The competitive exclusion principle necessitates that two species sharing the same ecological niche will either evolve to partition that niche, or one will be one extinct. This principle has ample observational and experimental support, but clashes with observations of some environments, like planktonic ecosystems, where high diversity persists despite the limited number of distinct resources. A novel benchtop microcosm suggests that the persistent disequilibrium of such environments can explain this apparent paradox.

### **Development of an Olfactometer Bioassay For Investigations of Mosquito Orientation Performance**

Rachel Mello – Biology

Coauthors: Leena Visnak, Michelle Crane

Faculty Mentor: Robert Hancock

*Poster Presentation, Session II (11:00 am – 12:00 pm), Poster #17*

Mosquito orientation behavior has been studied and recorded in laboratory settings using olfactometers. Studies typically involve choice data and “yes/no” responses to chemicals or attractants. There are many factors that influence the amount of time it takes a mosquito to reach its host, including odor detection, flight speed, persistence, etc. and time is therefore a measure of host-finding performance. We hypothesize that host finding performance can be negatively impacted by nutritional deprivation in larval and/or adult states. We report here our development of an olfactometer performance bioassay that can be used to measure the amount of time it takes an individual mosquito to find a close-range host.

### **Vector Disease Control International Internship**

Rachel Mello – Biology

Faculty Mentor: Robert Hancock

*Poster Presentation, Session II (11:00 – 12:00 pm), Poster #17-B*

Databasing and organizing mosquitoes.

### **Global Upheaval in 1919: A New Way to Compile Historical Research**

Shara Merrill – Individualized Degree Plan

Faculty Mentor: Todd Laugen

1919 was a year of Global Upheaval as the world turned to the Wilsonian promise to remake itself in the wake of World War I. Dr. Laresh Jayasankar, MSU historian and author, was researching the democratic impulses that were sweeping the globe for a book about this pivotal era. As his research assistant, I combed through the footnotes of old history books for primary sources. The difficulty was in finding a meaningful way to keep track of the events we were researching and all the information we uncovered. To address this, I developed a research compilation method to track all of the events, sources and information we found using simple .pdf technology. I created a visual reference system to group our research findings by location, and to view the events of the time, both how they unfolded and also how they connected. The results are fully searchable and can be updated online to always reflect the latest findings. Tragically, our research was cut short in Fall of 2018 when Dr. J lost his battle with pancreatic cancer. However the research compilation system I developed for his work may be of use to other historians and researchers. This simple, intuitive and free method for compiling historical research could work in many other fields, and has the potential to revolutionize research methodology.

### **The Counteract of the Orientalist gaze**

Julie Merwin – Art History

Faculty Mentor: Leila Armstrong

*Oral Presentation, Session III 2:45 – 3:00 pm, NC Room 1408*

The portrayal of Islamic women continues to be a prevalent art debate as the limited voices carry on the perpetuation of an ideal woman which has little to do with reality. From a Western Orientalist gaze to the male gaze, the Islamic woman has had an interpretation projected upon her which disregards both the diversity within Islamic people and the diversity of the gender. The exponential increase of Islamic female artists taking back their identity as a fight against the centuries of the forced male gaze is surging in popularity around the world, yet they continue to push back against stereotypes and continual robbery of their own selves in art and the media. Orientalism is a discourse based in academics and continues being taught within universities as well as in general education. The lens is meant to portray Middle Eastern and Islamic countries as ‘needing help’ leading to colonization from the 9th century to the 20th. The juxtaposition to the Orientalist lens being used to see women in the East is by female artists using their religious and cultural background to counteract this portrayal. This new lens is created comes from centuries of oppression and females voices finally being heard. Though this is very limited just as female artists taking the lead, in general, it is even more complicated when the male gaze and the Oriental gaze is being challenged. This essay will compare and contrast these two different gazes and analyze the repercussions within the art of both artists and authors with an Orientalist view, and female Islamic artists that use this concept in their work.

### **Effects of Auditory Distraction on Individualistic and Collectivistic Cultures**

Lindsay Meyers – Psychology

Faculty Mentor: Cynthia Erickson

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

The purpose of this study was to examine if there was a cultural variance when it comes to auditory distraction and video comprehension. The variables included a Deviant Auditory Distraction during a video lecture and a comprehension task, as well as, cultural (AICS -Auckland Individualism and Collectivism Scale) and noise sensitivity measures (MQ - Misophonia Questionnaire). This study involved a deception in which the participants were led to believe the study entailed only of the effects of video lecture on comprehension. Previous research indicated specific types of auditory distractions have more of an effect on learning than others. An Auditory Deviant Sequence (A-A-A-A-B-A-A) has been shown to have a significant effect on learning (Röer, Bell, Körner, & Buchner, 2018). This distraction has been observed to effect recollection of material, both verbally and spatially (Vachon, Labonté, & Marsh, 2017). Surveys have shown that students report changes to learning when exposed to certain environmental noises when either added or removed (Ali, 2013). Individual differences have been noticed; though report no significant effect on overall learning when Misophonia, a neurological disorder regarding the dislike of sound, appears to be present (Seaborne, & Fiorella, 2018). In this study I compare

individuals with collectivistic versus individualistic cultural backgrounds with an auditory distraction during a video lecture. Participants were then asked to take a video comprehension test followed by the AICS and MQ.

### **A Marketing Feasibility Study**

Tera Milligan – Hotel and Meeting Management

Faculty Mentor: Cynthia Vannucci

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

A plethora of new hotel guest rooms have been added to the State of Colorado's hotel room inventory in 2018. The average daily rate for hotels in the Colorado was \$157.51. Revenue per available room was \$108.94. Drilling down further, the City of Colorado Springs experienced an occupancy of 71.10% for 2018, with a REV PAR of \$84.40, and an ADR of \$118.76. Against this back-drop of occupancies and average daily rates, Colorado Springs is seeing a dramatic growth in hotel accommodations. The Kinship Landing Group contacted a senior hospitality student majoring in Hotel Management to conduct a market feasibility study for the shoulder season of January, February, March 2021 for the newly built 40 room Boutique Hotel. The market feasibility study for the Boutique Hotel examined the economy of Colorado Springs, the culture of adventure travelers, current demand generators of Olympic Museum, Garden of the Gods, Pikes Peak, Air Force Academy, and the Incline at Cheyenne State Park for yearly average hotel usage. The culture and the demographics of the adventure traveler was also researched for accommodation patterns. To better understand the strategies needed for a marketing feasibility plan for Kinship, it was crucial to dissect primary data from reports such as Colorado Spring's STR Report, the Longwood Studies for 2016 and 2017, and the Colorado Springs Destination Master Plan. Secondary data that exemplified Marketing plan tactics and SMART Goal was heavily throughout the study. The marketing plan tactics broke down into direct sales efforts, social media efforts, PR efforts, publicity efforts, advertising, and SWOT analysis. The methodology included interviews and intercept surveys, utilizing secondary data to determine demand generators, and preparing a marketing plan calendar of tactics to encourage business for the first quarter of the year, and a competitive analysis of other hotels in Colorado Springs. In conclusion, the market feasibility study will be a marketing recommendation for Kinship Landing based on primary and secondary data collected through research and both first-hand and second-hand references. The goal is to understand Kinship Landing's niche target month and their travel behavior during the months of January, February, and March.

### **Social Communication and Restricted and Repetitive Behaviors in Children with Autism Spectrum Disorders: Is there an Association with Parental Resilience?**

Kayla Murchison – Speech, Language & Hearing Services

Faculty Mentor: Siva priya Santhanam

*Poster Presentation, Session III (2:15 – 3:15 pm), Poster #19*

The ongoing study investigates the relationship between parental resilience and two core features of children with autism spectrum disorders (ASD), namely social communication and restricted and repetitive behaviors. Participants include parents of children with autism between 3 - 18 years of age. We are conducting a survey asking parents of children with ASD to describe their child's social communication and restricted and repetitive behaviors. Parents also complete a questionnaire on their own perceived resilience. Approximately 50 parents are expected to participate in this study. Data collection will be completed by March 2019. Clinical implications for service providers and family members will be discussed.

### **Investigations into Attraction Stimuli and Oviposition Sites in Gravid Zika Vectors, *Aedes aegypti* and *Aedes albopictus***

Stephanie Musick – Other

Coauthor: Leena Visnak

Faculty Mentor: Robert Hancock

*Poster Presentation, Session II (11:00 am – 12:00 pm), Poster #17-b*

An essential step of the female mosquitoes' life cycle is a gathering of a blood meal to fully prep her to deposit her eggs. Once gravid, the female seeks an optimum oviposition site including dark, aquatic environments. The choice in location is a crucial part of the process to ensure the survival of her offspring. Understanding this behavior provides opportunity for data collection and assists in limiting the spread of diseases such as Zika, Yellow Fever, and Chikungunya, by reducing this vector's population. The investigations performed on *Aedes aegypti* and *Aedes albopictus* included the use of a flight tunnel bioassay to evaluate behavioral preference of multiple modalities including chemical, visual, and hydro-environments.

### **Spatial Variation in $\delta^{13}\text{C}$ and $\delta^{15}\text{N}$ of Snail Assemblages in the Denver Metro Area**

Sophiane Nacer – Biology

Coauthor: Danielle Alkire

Faculty Mentor: Jason Kolts

*Poster Presentation, Session III (2:15 – 3:15 pm), Poster #9*

Snails inhabiting ponds and lakes in Colorado commonly serve as the intermediate host for parasitic trematodes. Larval flatworms emerge from infected snails in search of their definitive vertebrate host, often waterfowl such as ducks and geese. They sometimes mistakenly penetrate the skin of humans, causing the painful rash known as Swimmer's Itch or Cercarial Dermatitis. Parasites often alter the behavior of their intermediate hosts to assist their transmission to the definitive host. Prior studies have noted alterations in the grazing behavior of snails infected with parasites. In this study, we are analyzing  $\delta^{13}\text{C}$  and  $\delta^{15}\text{N}$  of both infected and uninfected snails to see whether differences in stable isotope composition of snails indicate an alteration of snail feeding behavior. We collected snails from five sites in the Denver metro area: Walden Ponds, Washington Park, Lowell Ponds, McKay Lake, and City Park. Our initial data suggests no difference in  $\delta^{13}\text{C}$  and  $\delta^{15}\text{N}$  between infected and uninfected snails, nor any difference between the different species of snails collected at each site. However, we did find significant differences among snails collected from our different study areas. We will investigate the mechanisms contributing to this variation as we continue our work on this project.

### **Investigating the function of tfap2a variant 1a in zebrafish development**

Thanh Nguyen – Biology

Coauthors: Jessica Patrick, Cassie Frazer

Faculty Mentor: Vida Melvin

*Oral Presentation, Session I 9:15 – 9:30 am, NC Room 1408*

The transcription factor AP-2a (tfap2a) is an important regulator of neural crest cells (NCC) development in many vertebrates including zebrafish, mice, and human. NCC are a stem cell population that gives rise to many cell types including pigments and craniofacial cartilages. In our model organism, the zebrafish, a mutation in tfap2a called lockjaw shows a reduction of pigmentation and craniofacial cartilage defects. In many vertebrates including zebrafish, there are three highly conserved tfap2a transcript variants called V1a, V1b, and V1c, that differ at the 5'-end of the mRNA. Preliminary expression data using Reverse Transcription PCR (RT-PCR) demonstrates that V1a and V1b are more highly expressed than V1c during early zebrafish development, suggesting that individual disruption of V1a and V1b would result in similar defects. However, our data from microinjecting variant-specific splice-blocking morpholinos (MOs) demonstrates that only disruption of V1b led to similar craniofacial cartilage defects as in lockjaw, while disruption of V1a resulted in either mild or unaffected phenotype. These data suggest that V1a may not play a significant role during zebrafish development. Alternatively, the V1a MO may not disrupt V1a expression, or V1b and V1c are upregulated in V1a morphants and thus compensate for the loss of V1c. To address this hypothesis, we will perform RT-PCR to confirm splicing disruption and examine potential changes in V1b and V1c expression within V1a MO-injected embryos.

## **Identifying Instruments in Irish Traditional Music Samples: Using a Neural Network for Sound Identification**

Peter Nielson – Computer Science

Faculty Mentor: Steven Beaty

*Poster Presentation, Session III (2:15 – 2:30 pm), Poster #5*

Projects such as Dr. Martin Tourish's "Musical Catalyst Framework" (as outlined in his 2013 Doctoral Thesis, "In Process and Practice: The Development of an Archive of Explicit Stylistic Data for Irish Traditional Instrumental Music"), where the choice of musical instrument changes the stylistic context in the performed piece, create implementation questions regarding the importance of the individual instrument in the automated classification process. Unfortunately, identifying instruments in the context of "folk music" is incredibly domain specific with little crossover computationally. The classifier trained here aims to identify an instrument from a given set (button accordion, fiddle, flute, penny whistle, and uilleann pipes) to act as a preprocessing mechanism for future classifiers that are trained specifically to the style of the instrument. The necessary steps, then, to work on this (and most) sound based classifiers is to gather the data (audio samples of playing), preprocess the data so it is fit to be trained upon, and train a neural network as a classifier to predict the primary instrument present in any sample of Irish Traditional Music. The tools used to achieve this are "SoX - Sound eXchange", "TensorFlow", "Keras", and "NumPy", with the languages of choice being "Python 3.6" and the "Bash" scripting language. After completing these tasks, around 500 samples were collected and a classifier was created with 88% accuracy on new "test" audio files and a 97% accuracy on the training set. Furthermore, with new samples completely outside of the training and test sets, the classifier quite accurately predicts on all instruments except for the penny whistle, which is often misclassified as the fiddle. The results from this classifier are certainly suitable enough to be used as the aforementioned preprocessing technique to determine the instrument prior to using a stylistic classifier.

## **Behavior of Soft Climbing Materials in Ice Climbing Environments**

Ty Overturf – Mechanical Engineering Technology

Coauthors: Mason Moomey, Jared Current

Faculty Mentor: Stan Trout and Bryan Ferguson

*Presentation: Poster Presentation, Session III (2:15 – 3:15 pm), Poster #13*

The ability of soft climbing equipment to stop a falling climber is largely based on its ability to stretch and absorb the energy of the climber. Tensile tests were conducted on four common types of climbing materials: nylon and Ultra High Molecular Weight Polyethylene(UHMWPE) slings, standard climbing, and rope treated to reduce water absorption. Three conditions were tested: room temperature control, "dry" and cold, and wet and cold. Elongation, time and force were measured. These measurements provide the maximum force and elongation at failure and can be used to infer the energy and impulse associated with failure of the material. With low sample sizes and there for low confidence, both the dry-cold and wet-cold samples preformed within one standard deviation of the respective room temperature samples for each measurement.

## **Determining Mating Systems and Paternity in Convict Cichlids (*Amatitlania nigrofasciata*) Using Microsatellite Markers**

Vanessa Padilla – Biology

Coauthor: Paola Torres

Faculty Mentor: Jennifer Gagliardi Seeley and Hsiu-Ping Liu

*Poster Presentation, Session III (2:15 – 3:15 pm), Poster #17*

The mating system among convict cichlids (*Archocentrus nigrofasciatus*) exhibit genetic monogamy; however, new research demonstrates 25% of the population exhibits social monogamy. In this project, we used microsatellite markers to verify if social monogamy exists among convict cichlids and to determine whether female, male, or both are having

extra-pair matings. Thirty-five pairs of fish and all of their offspring were caught in the Rio Cabuyo at Lomas Barbudal Reserve in Costa Rica, their caudal fin was clipped, and then released back into the stream. Genomic DNA was extracted from caudal fin tissue samples. Polymerase chain reaction (PCR) was used to amplify DNA fragment. Fluorescently labeled DNA fragment was analyzed and scored. Our preliminary results showed 50% of the families exhibits genetic monogamy and 50% exhibit social monogamy. Furthermore, preliminary data suggest the female in the family participates in extra-pair matings.

### **Oxygen Protection is Crucial for Optimal Yeast Recovery and Reculturing from Bottled Beer**

Kira Pai – Biology

Coauthor: Ginger Stout

Faculty Mentor: Helene Ver Eecke

*Oral Presentation, Session I 9:30 – 9:45 am, NC Room 1408*

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 samples to confidently assess if the sample contains any viable cells for QA/QC objectives and/or for cultivation goals. There are several instances in scientific literature of the common practices of yeast recovery failing to recover yeast when applied to rare bottles containing perhaps only a few ounces to work with and potentially few viable cells. Our experimental protocol screenings were performed on spiked controls and then unfiltered commercial beer bottles. Various permutations of cell concentration methods (filtration/centrifugation), and handling methods (aerobic/microaerophilic/anaerobic) were tested. These two steps were thought to be the most threatening to cell loss because concentration will inevitably misplace/kill cells in the process, and because although yeast is a facultative organism with the genetic capacity of oxygen protection, its epigenetic state within the anaerobic bottle may not protect it from reactive oxygen species (ROS). We did find significant results that protection from oxygen is crucial to optimal yeast recovery; instant oxygen exposure was found to reduce cultivated colonies per unit volume by over 450-fold, as compared to oxygen protected. Instant exposure to oxygen exposes the yeast to ROS, as we detected with 2'7'-dichlorofluorescein diacetate. This oxidative stress may presumably cause excess macromolecule degradation to viable yeast stored in a no/low oxygen state within a bottle. Aerobic recovery, previously the most common practice, may have hindered the recovery of previously assessed bottles. This oxygen protection approach lends to generalizations of the cultivation of the rare biosphere; we must perpetually aim to collect and treat samples in environmentally relevant ways to optimize microbial cultivation and domestication success. Dissemination and application of this knowledge may hopefully provide methodology to promote more novel microbial recovery.

### **Inhibition of tfap2a Transcript Variants in Early Zebrafish Development**

Jessica Patrick – Biology

Coauthors: Thanh Bao, Dan Nguyen, Cassie Frazer

Faculty Mentor: Vida Melvin

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

Vertebrate neural crest cells are a group of multipotent cells induced during early formation of the neural tube. Transcription factor tfap2a plays a critical role in neural crest formation. A loss of function mutation in tfap2a affects the development of vertebrate melanocytes and the craniofacial structures. There are many variant transcripts of tfap2a, but three of them are highly conserved between many species including zebrafish, mice, and humans. These are variants 1A, 1B and 1C, which differ at the 5' end. The Melvin lab has been studying the roles of these variant transcripts in craniofacial development individually by microinjecting splice blocking morpholinos into early zebrafish embryos. Our data has shown that inhibition of V1B seems to be the only variant to phenocopy loss of tfap2a, including loss or inversion of the ceratohyal arch and loss of ceratobranchial cartilages. In contrast, disruption of V1A results in very little to no phenotypic effects, while inhibition of V1C shows a much more severe phenotype than expected, including severe edema of the yolk and pericardium accompanied by severe cartilage defects. This current project investigates the phenotype of the V1c mor-

phants to better understand whether the severe phenotype is specific to loss of the V1c transcript or is a non-specific effect of morpholino injection.

## **Tickling Ears**

Alan Payne – Art Education

Faculty Mentor: Anne Thulson

*Oral Presentation, Session III 3:00 – 3:15 pm, NC Room 1403*

We all too often feed our selfish desires and these desires can be masked in various light. We will gather around willing persons and have them feed our ego or pride. Yet, we want to be humble and listen to those around us, but if that listening requires change then enters the problem. Thus the darkness ensues. This darkness being the resistance to change and compromising. This work is entrenched with the belief we are missing the mark on our true identity, Tickling Ears, examines the willingness of subjection to falsehood and how that impacts our identity. Researching this topic I have found the majority find their worth in what they want to hear, instead of what they need to hear. I believe John Dewey discussed inquiring about the culture around you. ‘...inquiry should not be understood as consisting of a mind passively observing the world...’ Dewey also addresses and stresses the need for artistic expression to be experienced. “Art is a product of culture, and it is through art that the people of a given culture express the significance of their lives, as well as their hopes and ideals. Because art has its roots in the consummatory values experienced in the course of human life, its values have an affinity to commonplace values, an affinity that accords to art a critical office in relation to prevailing social conditions.” This concept is comprised of several components. The main components are five ears (my own) made of a plastic compound, five bird feathers, and five motors. These pieces will be mounted on a 90 degree corner, one feather will be attached to one motor “tickling” the ear. These will be opposite to one another on each wall. All of these feathers will be spinning as to simulate the tickling of the ears. The feathers will be spinning at various speeds. The power source will be a DC plug connected to a Arduino board. The tickling of these ears and the movement within the piece will grab one’s attention.

## **Urban Leadership Program Senior Capstone**

Zoe Payne – Individualized Degree Plan

Faculty Mentor: Gretta Mincer

*Oral Presentation, Session III 2:15 – 2:30 pm, NC Room 1405*

Throughout my time in the Urban Leadership Program, I’ve had the opportunity to enrich my learning and college experience through several different aspects. In the program, learning leadership is emphasized through three different categories: in class learning, growth through community involvement, and outside activities. In my year and a half in the program, I’ve been able to achieve all of these learning outcomes. For class work, I started by taking LDR 1010, in which I learned the basis of leadership and what it meant to me. I then took MGT 3000, which taught me how to apply these concepts to the business environment. I also took CAS 3090, in which I learned how to successfully and productively navigate conflict. For service learning, I worked with Bonfils (now Vitalant) in order to organize a Blood Drive on campus. I also worked with Luvin Arms Sanctuary to promote the ethical treatment of animals. Finally, I worked on the Illuminate Planning Committee two years in a row.

For outside activities, my involvement as a Front Runner in the program has been vital in learning how to lead. I also participated in starting Us to Youth, a program created to bridge the gap between at-risk youth and community resources. Finally, I worked as a member of the Student Scholars Board for the Colorado Leadership Alliance in the Denver Metro Chamber of Commerce, and helped plan a conference for about 200 students throughout the state.

## **(How) Does Identity Taxation Impact Community Practice: The Narratives of LGBTQ and Undocumented Paid Community Organizers**

Jessy K. Perez – Social Work

Faculty Mentor: K Scherrer and Karina Benabe

*Oral Presentation, Session II 10:45 – 11:00 am, NC Room 1405*

Identity taxation refers to the unique burden that faculty of marginalized identities experience while working in higher education--the additional burden of uncompensated but expected work that they perform, mentoring and advocating for students of marginalized identities, serving on committees, and acting as liaison (Hirshfield and Joseph, 2012). Their marginalized identity causes a different expectation from their colleagues with dominant identities. Thus far, identity taxation has been extensively studied in higher ed, but not in other contexts. This study aims to examine whether identity taxation manifests within community practice, and will focus on paid LGBTQ undocumented community organizers. The vast majority of LGBTQ research has been centered on the experiences of white people, and research on people of color has been dominated by the experiences of non-LGBTQ people (DeBlaere et al., 2010). This study has the purpose of filling these gaps in research. The methodology is an in-depth, semi-structured, collection of qualitative interviews with 10 LGBTQ paid community organizers who are or have been undocumented for a period of at least 5 years in their adult lives. Post-study, a greater wealth of data will be available to design protective factors, and this study will contribute to the field with the goal of making recommendations for community organizers in government and nonprofit entities. The study will reveal that identity taxation affects paid LGBTQ undocumented community organizers outside academia the same way it affects marginalized faculty within academia, and provide strategies to minimize the additional burden.

## **Feeding Difficulties in Children with Sensory Processing Disorder**

Anna Pham – Biology

Faculty Mentor: Erin Bissell

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

Eating is a foundational task for children and usually requires little thought. However, for some children with sensory processing disorder, eating is an obstacle that can interfere with health and daily life. Sensory processing disorder (SPD) is a condition where the nervous system does not detect stimuli or stimuli are not processed correctly. This leads to abnormal responses to information that enters the nervous system. Children with sensory processing disorder can have adverse reactions to foods due to their smell, taste, and/or texture and may have a limited diet as a result. Without treatment, feeding difficulties can worsen the child's anxiety around food and increase parental stress with regards to malnutrition and weight changes in their child. Flooding, a traditional treatment method, is effective for children with autism spectrum disorder (ASD) but may worsen feeding difficulties in children with SPD. The STAR Institute for Sensory Processing Disorder utilizes individualized therapy sessions with a child-driven, systematic, family-based approach to help children with feeding difficulties create a positive relationship with food. This approach is much slower than traditional methods and helps children deal with foods in a comfortable environment. This presentation identifies key differences between the flooding method used for feeding difficulties in children with autism spectrum disorder and the methods developed by the STAR Institute specifically for children with SPD.

## **Pika Foraging Choices**

Natalie Pierce – Biology

Coauthors: Jonah Crocker, Ben Dennis, Jenette Skees

Faculty Mentor: Robert Hancock

*Poster Presentation, Session III (2:15 – 3:15 pm), Poster #14*

The American Pika (*Ochotona princeps*) is a small mammal that does not hibernate during the cold months. Due to this

behavior, pikas collect vegetation from their territory which they dry out for storage in haystacks. Once the vegetation is preserved, they store it in a cache so that they will have food over the winter months when vegetation is scarce. Previous research has been done to determine if pikas have a food preference, or if they gather resources that are close to their home. Various studies have shown mixed results, some showing that pikas collect whatever vegetation is abundant and close to their den, while others show a preference for vegetation that may be farther away from their den than is ideal for foraging. Believing that pikas likely have a preferred food source for storage, we conducted a study at Loveland Pass the last weekend of October to see if pikas were willing to travel for desirable vegetation. After marking out five cache sites, three observations were made at each cardinal direction at two and a half meter increments. The observations were conducted by placing a 12 inch by 12 inch cross section above the vegetation located at each two and a half meter distance from the cache. A rough estimate of the percent compositions of each type of foliage, including the absence of foliage (presence of rock) was recorded. The approximate composition of each cache was also recorded. After analyzing percentages of foliage in caches, it was determined that pikas tend to collect vegetation close to their dens. Some slight preference for thistles was noted. However, in areas where there was little thistle available, pikas preferred to collect vegetation closer to their den instead of searching farther out for thistle.

### **Natural Hazard Profiles of Colorado Counties: Avoiding Potential Damage Costs Through Mitigation Strategies**

Kristina Pittman – Geography

Faculty Mentor: Sara Jackson

*Oral Presentation, Session II 11:00 – 11:15 am, NC Room 1403*

There have been 83 natural disaster declarations in Colorado since 1953. The 2013 flood alone generated \$2.9 billion in damages and is considered the largest natural disaster to hit the state. Every dollar spent on hazard mitigation saves society \$4 on average, which also reduces future risks. This research explores the significance of hazards within 9 of Colorado's most populated counties and the potential costs of damages to exposed areas identified in county hazard mitigation plans (HMPs) and compares potential loss to costs of mitigation initiatives. A natural hazard summary was created for each county that includes relevant hazards, probability of occurrence, spatial extent, magnitude of potential damage, and the significance of impacts. Preliminary observations indicate that there is significant hazard vulnerability in all 9 counties and that necessary mitigation initiatives are critically under-funded. By highlighting the cost difference between preparedness and response, mitigation costs can be justified to decision makers. County HMPs contain a comprehensive analysis of these costs, but the content is spread out across 500 - 600 pages in most cases. This research will deliver a more concise account of potential damages that underscore the relevance and importance of increasing mitigation funding to prevent future loss.

### **Female Interaction and Male Mate Choice Influence Pair-bond Formation in the Convict Cichlid**

Jessica Plethcer – Biology

Coauthors: Dylan Riesenman, Emily Salu

Faculty Mentor: Jennifer Gagliardi Seeley

*Poster Presentation, Session III (2:15 – 3:15 pm), Poster #4*

Previous research suggests that female interaction may play an important role in pair-bond formation. Here we determine if giving males a choice between two females and/or female interaction affect pair-bond formation. We predicted that pair-bond formation would increase when two females are present and when females interact in competitive displays. This experiment contains one control (one male and one female) and three experimental groups with two females and one male: 1) No female interaction; 2) Female interaction without male observation and; 3) Female interaction with male observation. After female interaction was completed in two of the experimental groups, all groups had a 4-hour acclimation period followed by a 21-day preference period. During the preference period, 5 daily observations were taken on male location and tanks were videotaped for courtship behavior. Daily observations suggest pair formation occurred more often only in the treatment group with male observing female interaction. We are currently analyzing the videotapes for courtship behavior.

## **Bioinformatic Modeling of Gut Microbiome Data**

Shawn Portwood – Nutrition

Faculty Mentor: Helene Ver Eecke

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

The human microbiome is the collection of microbes that reside in and on the host human. The relationship between host and microbe is varying from an ecological perspective and includes mutualism, cooperation, commensalism, and parasitism. This depends on the balance, or imbalance (i.e. dysbiosis) of species within and on the host human. Microbial dysbiosis has been found to be a root cause of various health conditions and is an avid field of research today. Bioinformatic modeling is the tool being used to gain a more in-depth analysis into the human microbiome. Microbiome research must gather and analyze great volumes of sequence data to establish a baseline of resident microflora and to understand the standard variation between humans. With this study, we aimed to delve into the power of bioinformatics using QIIME2 software. The methodology included obtaining a gut microbiome data set of amplicon sequencing of 16SrDNA. The sequence data was created independently and prior to my analytical study beginning, and we are processing this sequence data from its raw form. In initially looking at the data, it was generally observed that there were similarities and differences in the microbial makeups, but without bioinformatics no direct statistical data could reveal similarities, outliers, or significance. Through inputting into QIIME2, we looked to model likeness clusters, outliers and differentiations amongst the cohort through various modeling techniques. Examples of data output include phylogenetic metrics tables, alpha and beta diversity estimates, relative abundances of represented phylogenetic groups, heat maps comparing presence and absence of represented phylogenetic groups, and ordination plots that cluster more similar phylogenetic make-ups. The implications of this could be expanded for a greater understanding of the uniformity and the expected variation within a cohort's microbiome.

## **Frequency of Gestures in American Political Speech**

Liam Price – Linguistics

Faculty Mentor: Rich Sandoval

*Oral Presentation, Session II 11:15 – 11:30 am, NC Room 1408*

In this paper, I analyze the frequency of batonic and metaphoric gestures in two registers of political discourse. The intent of this paper is to find if the frequency of gestures in political discourse change depending on the context of the speech. The two contexts being analyzed are State of the Union (SOTU) addresses and rally speeches from the last five presidents. These domains were chosen to establish a reasonable separation in formality; the rally speeches can be assumed to be conducted in a lower register than the SOTU speeches. The specific data was chosen in a consistent manner, so as to eliminate possible confounding variables. That is, the rally speeches chosen were typically the last (or as close to last as possible) rally speech the candidate conducted prior to his election, and the SOTU address was the first of the recently elected president's term. For presidents who served two terms, both election processes are analyzed. The gestures are analyzed using David McNeil's categories of classification, with reference to "Kendon's Continuum". The goal of this paper is to make a statement about the role gesture takes in marking the register of political speech in America. The data analyzed so far would suggest that gesture frequency will decline as the speech becomes more formal.

## **Zeromile Magazine**

Jesus Pulido-Davila – Communication Design

Faculty Mentor: Peter Bergman

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

Zeromile (ISSN# 2150-6183) is an annual student managed, researched, authored, edited, and designed print magazine. The publication focuses on contemporary culture through the lens of art and design and is published by an advanced Communication Design publication design class, CDES 4000 Zeromile and Zines. The theme, corresponding research, visual

aesthetic, writing, and collaborative work process are all initiated and defined by the students.

A mini-grant for Undergraduate Research was awarded in Fall 2018 to Communication Design Associate Professor Peter Bergman and Communication Design Senior Jesse Pulido-Davila, the magazine's Marketing Director. The theme of Zeromile 12 was Presence and student responded to that theme by researching writing, and designing articles on, social media, consumer culture, security and privacy, atheism, shopping local, e-sports, physical and mental health.

### **Crime in Denver through a Statistical Lens**

Erik Raab – Mathematics

Coauthors: Jeanna Willson, Daniel Long

Faculty Mentor: Shahar Boneh

*Oral Presentation, Session I 9:45 – 10:00 am, NC Room 1402*

We carried out a study to seek out and understand spatial relationships between the occurrence of different types of crimes; namely violent, non-violent, and traffic; in terms of demographics, neighborhood services, and land use in each neighborhood of Denver. This study is in conjunction with the Data to Policy Program purported to engage students with the Denver community via data-driven policy research, we will present our statistical findings along with policy suggestions.

### **Sustainable Transportation: Neighborhood Perception**

Richy Ramos – Individualized Degree Plan

Coauthor: Christopher Talbot

Faculty Mentor: Sara Jackson

*Oral Presentation, Session II 11:15 – 11:30 am, NC Room 1403*

Transportation is a major source of greenhouse gases (GHGs) and contributes to the overall effect of climate change on the earth's climate systems. Auraria Campus is home to Metropolitan State University of Denver (MSUD), University of Colorado Denver (CUD), Community College of Denver (CCD), Auraria Higher Education Center (AHEC), is known as a commuter campus, and has a population of 47,000 students, faculty, and staff. Due to this large population Auraria Campus is a big contributor of GHGs within the greater Denver community. The overall aim of this study is to determine how students, faculty, and staff who regularly commute to Auraria Campus utilize modes of transportation. Information collected will then be used to promote sustainable transportation methods, policy, and to reduce Auraria Campus' carbon footprint. The research team consists of MSU Denver faculty and students partnering with The Auraria Sustainable Campus Program (ASCP) in an effort to maximize efforts and gain as much support and traction as possible when promoting the survey. Approximately 1,300 responses were received during data collection. This specific portion of the analysis focuses on how neighborhood perception effects transportation choices an individual chooses when commuting to Auraria Campus. A variety of factors can shape what options an individual chooses when commuting, including, but not limited to: distance, gender, income, seasonality, and time of day. Our team wants to understand which factors are heavily coming into play for our campus population and how our future choices around sustainable transportation can be molded to promote sustainable choices while meeting the different needs of varying groups. Qualitative data collected from this survey was quantified to determine which factors heavily influence choice. Geographic information system (GIS) techniques were then used to map what variables effect different neighborhoods within the city and surrounding suburbs when commuting to and from campus.

## **Effects of Urbanization on Squirrel Foraging and Survivorship**

Alexandra Reese – Biology

Faculty Mentor: Christopher Cooley

*Poster Presentation, Session III (2:15 – 3:15 pm), Poster #11*

Squirrels have notoriously been seen as pests due to their abundance in urban populations. For many animals, high volumes of human presence drive them to migrate to other areas. Squirrels, however, are one of the few animals that has adapted to both a rural and urban setting, despite their sensitivity to habitat fragmentation (Reher, Dausmann, Warnecke, & Turner, 2016). Has the excessive exposure to humans altered their predatory awareness in relation to food abundance? According to a study conducted by Michael A. Bowers and Bianca Breland, “Squirrels living in close proximity to humans appear to be either more limited by food or less sensitive to predatory risk than those living in more natural areas” (Bowers & Breland, 1996). My senior experience project will be to study the foraging and behavioral patterns of squirrels in both a rural and urban setting and to observe the differences, if any. To do this, I will study how squirrels forage for food in a high-traffic rural setting (like a trail in Rocky Mountain National Park) versus in a high-traffic urban setting (like Washington Park). A spot like Rocky Mountain National Park will not have as much human-left food as a place like Washington Park will. However, in both settings, the squirrels are frequently exposed to humans. Then, to compare their responsiveness to human presence in relation to foraging, I will lay food out and be nearby said food. I want to observe their willingness to approach humans when there is food close by and available to them, and if/when a human’s proximity to available food is a deterrent. Does the desire to obtain the food outweigh its defensive survival instincts? How close will a squirrel get to investigate said-food in the two different settings, and does trash abundance have an effect on this? I will measure how far away I have to get in order for the squirrel to take the food and compare the distances in both settings.

## **Indexical Artifacts of Existence: An exploration into Ceramic Furniture**

Sean Reifman – Art Education

Faculty Mentor: Tsehai Johnson

*Oral Presentation, Session III 2:30 – 2:45 pm, NC Room 1403*

Through the use of the ceramic medium, artists have conveyed meaning through use, form and intention. Many however, have only looked at this medium’s utilitarian qualities in reference to the dinnerware and objects like planting pots. However, clay has a great quality in its strength to support, given the structure was built to match the medium. This gives way for table and chairs that can be integrated into everyday life and used just like their wooden and metal counterparts.

A few artists over time have explored furniture within the world, but many have been documented poorly, are hard to find, or made for commercial purposes, and are hard to trace. The goal for this project was to not only create the work, but to somehow document the process and discovery along the way, so that others may refer to the building and theoretical concepts in the future.

The artist was fully engulfed within the making process, tirelessly creating more than 40 forms in the trial, development and production of this idea, and, changing little pieces along the way, was able to finely tune these works to fit the aesthetic style and ideas he hoped to convey within the larger work these pieces comprise.

This project focuses on the development and form and function over nearly a year long period, starting with the photos and inspirations that begun the process and culminating with the forms as they have been refined to the present. The artist will be talking about the technical process of making the structures as well as some of the theoretical groundwork behind this body of work which culminates in a B.F.A. thesis show in November of this year.

## **Temperature Buffering in Thick-Walled Nesting Boxes versus Thin-Walled Nesting Boxes**

Hallie Richards – Biology

Faculty Mentor: Christopher Cooley and Robert Cohen

*Poster Presentation, Session II (11:00 am – 12:00 pm), Poster #3*

For my undergraduate research project, I am studying the effectiveness of two nesting box designs. These boxes have been specifically created for use by the tree swallow (*Tachycineta bicolor*). Since the early seventies, several different types of nesting boxes have been placed in Rollinsville, CO by the late Dr. Robert Cohen of MSU Denver to enhance breeding success in these tree swallows. My goal has been to continue the project he started by determining which of his nesting box designs might be more beneficial to the tree swallow. The two specific designs he was examining are thick-walled and thin-walled nesting boxes. Does one design offer any advantage over the other for tree swallows in the unpredictable changes of Colorado weather? To come up with an answer to this question, Professor Chris Cooley placed Onset © HOBO H8 2-channel data loggers in and around 10 nesting boxes that were created and placed by Dr. Cohen in Rollinsville, CO. These loggers recorded the internal temperatures of the boxes, as well as the ambient temperatures around them for about five months in 2014. I will be analyzing the data recovered from these loggers to determine if one type of nesting box is more advantageous than the other in buffering extreme temperature changes. The data gathered from this project could be useful in future efforts to assist the breeding success of tree swallows in the unpredictable spring weather of Colorado. It could also potentially be expanded to other locations where the tree swallows may face similar changes in temperature.

## **A People's History of Alcohol Prohibition in Colorado: Labor, Class, Gender, and Moral Reform 1917-1933**

Saya “Ted” Richthofen – History

Faculty Mentor: Meg Frisbee

*Oral Presentation, Session II 10:45 – 11:00 am, NC Room 1408*

Before the 1920s, Colorado was a rough-and-tumble saloon and brewery state that had strictly gendered norms around the creation and consumption of alcohol. Dubbed the “liquor Oasis” of the USA, masculine identities dominated in public social spaces, and women and minorities were largely prohibited from participating in the public imbibing. Progressives in the state, eager to create a morally pure society reflecting their own Protestant Anglo-Saxon values, drove Colorado to pass one of the earliest statewide prohibitions of alcohol in 1916. Ironically enough, through the prohibition of alcohol, Colorado saw the evolution of increasing social rights for marginalized groups. Disregard of the law created new social spaces for drinking and propelled the public social-mixing of genders and classes, thus creating a decade of increased social rights and cultural revolution. This study includes an analysis of newspapers, police reports, and court cases to show that prohibition in Colorado created a new avenue for women and labor classes to participate in their own economic futures through the production, consumption, and distribution of bootleg liquor.

## **Generating a Tip60 Knockdown Cell Line**

Jose Rios-Ochoa – Biology

Coauthor: Ari Simenauer

Faculty Mentor: Adela Cota Gomez

*Poster Presentation, Session III (2:15 – 3:15 pm), Poster #12*

Tat Interactive Protein 60 kDa (Tip60/KAT5) is an acetyltransferase that controls DNA repair, transcription regulation, and cell cycle/fate. This protein is an important signal-transducer that activates Ataxia Telangiectasia mutated (ATM) when a DNA double strand break (DSB) occurs. When a cell is undergoing genotoxic stresses, it is important for Tip60 to be present in the system to activate ATM by inducing autophosphorylation). Defective activation of ATM has been linked to hyperplastic diseases such as cancer, and may have a role in the pathogenesis of Pulmonary Arterial Hypertension (PAH).. Low levels of Tip60 activity have been shown to cause aberrant ATM activity. It is hypothesized that HIV-1 Tat, a tran-

scriptional viral protein, inhibits Tip60 to create a sustainable environment for HIV to be replicated. However, HIV Tat has also been known to be secreted from infected cells, and absorbed by uninfected cells. Thus, Tat-mediated inactivation of Tip60 is possible even in uninfected cells where it could cause cell cycle deregulation and uncontrolled cell growth. Our lab is interested in deciphering this possible link between the HIV Tat protein and aberrant cell proliferation seen in the vascular neointima of patients presenting with PAH. In this project, we aim to create a knock down/out Tip60 cell line to generate supporting data that the lack of Tip60 activity in a cell has atypical activity levels of ATM leading to improper cell-cycle control affecting genetic activation of many genes. We hypothesize that if Tip60 was to be knocked down, P-ATM activity would be inhibited causing failures in cell cycle control. To further demonstrate the interaction of HIV-1 Tat and Tip60, we transiently inhibited Tip60 by knocking out Tat from cells such as HeLa WT and Human Pulmonary Artery Endothelial cells (HPAEC). In consultation with the Functional Genomics Facility (FGF) of the University of Colorado Anschutz Medical Campus, we transduced HeLa Wild Type (HeLa WT) with a lentivirus vector expressing an ShRNA specific for Tip60 and selected for stable transfectants with 2 µg/ml puromycin.

### **Ferric Reductase Knockdown in Drosophila S2 Cells**

Omar Rodriguez – Chemistry

Faculty Mentor: Emily Ragan

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

Iron is an essential micronutrient that is potentially harmful due to its redox properties. That is why its transport between cells must be a highly regulated process. The process is very different in insects than it is for mammals. Insect cells export iron by a secretion of iron-loaded ferritin. As for how the cells uptake the iron from the hemolymph, very little is known because no receptors for ferritin or transferrin have been identified. The goal of the proposed research is to understand the physiological mechanisms of iron transport in insects. The objective of this experiment will be to test the hypothesis that the reduction of iron ions in the hemolymph leads to iron transport into cells. Hemolymph contains iron in the ferric form, but iron transporters in animal cells are specific to ferrous iron; therefore iron uptake via an influx transporter is likely to require a reduction step. The known reductase that will be studied is CG8399. RNAi will be used to determine if CG8399 contributes to ferric reductase activity and ultimately influences the iron content of the cells. If the CG8399 gene is responsible for the observed ferric reductase activity we should see less ferric reductase activity with RNAi-treated cells and tissues compared to control cells and tissues. The timing and efficiency of the knock down will be determined by Real time PCR (QPCR).

### **Defecting Nefarious Computer Network Traffic with Neural Networks**

Jeffrey Rowell – Mathematics

Faculty Mentor: Steven Beaty

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

This research demonstrates an approach for detecting malicious network traffic in packet capture (PCAP) files with the use of Convolutional Neural Networks (CNNs). Our objective shows that supervised machine learning can be used to identify when a user in a network gets hacked, based on sequential patterns in PCAP data. Assigning benign and nefarious class labels to the data allowed for an accurate model granting a user on a network the ability to detect bad actors. In order to generate data for training, testing, and validating the neural network, execution of penetration tests became vital. The penetration tests ran against Metasploitable 2 using Kali Linux and the data captured using TCPDUMP. The CNN achieved an accuracy of 97.436%, making the chances of false positives and negatives less extreme compared to other approaches such as reinforcement and unsupervised learning. Such an accurate model allows more confident detection of bad actors on intranets. The CNN successfully classifies when a network anomaly from our data set occurs, but more importantly the CNN can successfully detect brand new anomalous behavior from outside of our data.

## **Today's Renaissance is So Shitty!**

Roxanne Roybal – Art

Faculty Mentor: Sandra Lane

*Oral Presentation, Session III 2:45 – 3:00 pm, NC Room 1403*

Fashion reflects, time and era with the social constructs. As an art history fanatic and costume designer, I am ecstatic to combine the two! Today's Renaissance is So Shitty! Centers on the Renaissance and the horrific Bubonic Plague. Some entertain the Renaissance as a romantic and mystical time but in reality, it was a dirty, debauched era, with practices driven by outlandish beliefs. This work combines theater and the uncanny, using unique costume designs associated with the Renaissance era. Saturday Night Live's skit format has inspired this artwork composition, which includes costumes, performance, and video production. My characters are four rats and two doctors who are ignorant with fear due to the fact, that Renaissance medical remedies are derived from bizarre superstitions, such as unicorn horns curing cancer. I liken this piece to how modern society reacts to today's distorted news: it seems as if time and history continues to repeat itself. For example, in today's news, it was reported that Vietnamese medical experts believe rhino horns cure cancer. The two doctors represent the political side of everyday current events while the rat pack of four characters represents street gossip, exaggerated by media portrayals. This exhibit serves as a satirical comedy, making history a bit more tolerable while using creative license. My characters discuss the plague as it relates to our current affairs. Director and actor Mel Brooks said in an interview, "I can never make another movie like "Blazing Saddles" because the comedy was so 'tongue-in-cheek' that it would upset today's audience. Everyone is so sensitive." My comedic political skit allows for constructive dialogue about current issues such as; racism, homophobia, poverty, government, and classism. As a contemporary artist, I am addressing today's difficult issues through history and role playing. The cast and crew are from multicultural and racial backgrounds with various beliefs. Additionally each has different political views and all these characteristics are portrayed in the film.

## **The Role of Female Interaction on Male Mate Preference in Convict Cichlids**

Marika Rushbrook – Biology

Coauthor: Caroline Rogers

Faculty Mentor: Jennifer Gagliardi Seeley

*Poster Presentation, Session I (9:30 – 11:30 am), Poster #4*

Sexual selection studies on convict cichlids (*Amatitlania nigrofasciatus*) have focused predominantly on female mate choice; however, since convict cichlids are serially monogamous and bi-parental, male mate choice may be as equally important. Here, we determine if male mate choice is affected by female interaction and the male observing the female interaction. If size and dominance plays a role in male mate choice, males should prefer the large and/or dominant females. Furthermore, if female interaction and male observation of the interaction affect male mate choice, we predict male preference will be stronger with female interaction and male observation of the interaction. This experiment has three treatment groups: 1) no female interaction (control), 2) Female interaction without male observation and, 3) Female interaction with male observing. In the two experimental groups, females' interactions were videotaped for 15 minutes. All groups had a 4-hour acclimation period followed by a 21 day preference period. During the preference period, 5 daily observations were taken on male location and tanks were videotaped for courtship behavior. Preliminary data on daily observations suggests that males do not have a significant preference for females based on size. Videotapes are currently being analyzed for dominance and courtship behavior.

## **Memory Myths and Misconceptions**

Suhad Salah – Human Development

Faculty Mentor: Cynthia Erickson

*Oral Presentation, Session II 11:00 – 11:15 am, NC Room 1402*

Myths and misconceptions in regard to learning and memory are widespread in the education system, regardless of the lack of supporting evidence. These myths include the common learning styles preferences (visual, verbal, etc.); and the widely-used strategies of rereading and massed practice (cramming). None of these have been linked to better learning or higher achievement. The most widespread myth is that students learn best in their own learning styles (Bertz, 2017). Although it is clear that these myths have been demonstrated to be ineffective, many students and teachers are still in use of these strategies. Several research studies, review articles, and books have been published to investigate how learning is often misunderstood in educational institutions and among learners. Brown, Roediger and McDaniel (2014), demonstrated that the fashion of massed practice and rereading is often linked to temporary knowledge. If these methods are ineffective, what are the best practices? According to Brown et al., (2014), learning strategies such as elaboration, spaced-out practice, interleaved study, and practice retrieval (testing) are supported by empirical evidence and shown to produce better, longer-lasting learning. The purpose of this presentation is to explore how learning strategies are misunderstood and illuminate the most effective ways to learn and encode new information.

### **Aging of Ink Analysis Using PLOT-Cryoadsorption**

LaTisha Salas – Chemistry

Faculty Mentor: April Hill

*Poster Presentation, Session II (11:00 am -12:00 pm), Poster #13*

It is often difficult to determine the date on which a document was signed. This is particularly problematic when it comes to forged documents, such as checks or wills. A new method for headspace sampling could allow investigators to determine the age of ink marks on a suspected document. All materials, including ink, contain volatile (easily evaporated) components, which can be fairly concentrated in the gas phase just above the material. Headspace sampling involves collecting this volatile material, which can then be analyzed using a gas chromatograph with a mass spectrometer (GC-MS). Headspace can be collected in a variety of ways, the simplest being to use a gas-tight syringe to collect a sample of the gas directly above the material being analyzed. A new technique for headspace sampling, called porous layer open tubular cryogenic headspace sampling (PLOT-cryoadsorption), was recently developed. PLOT-cryoadsorption uses an empty gas chromatograph (GC) to heat the sample, allowing the gaseous components of the ink to be released. Helium flows through the GC, sweeping this headspace gas into a PLOT column housed in a cryogenic chamber at 0 °C, trapping the gases in the column. To remove the analytes from this column, methanol is forced through it via a flow of nitrogen and collected in a GC vial for analysis. Ink marks made with a BIC blue pen were analyzed by PLOT-cryoadsorption and two compounds were found to correlate to time since marking: 2-phenoxyethanol (PE) and 1-phenoxy-2-propanol (PP).

### **Escherichia coli monitoring in Lower Bear Creek**

Stephanie Schmidt – Biology

Coauthor: Gabrielle Baldwin

Faculty Mentor: Rebecca Ferrell

*Poster Presentation, Session II (11:00 am – 12:00 pm), Poster #16*

Lower Bear Creek flows more than 8 miles from Bear Creek Lake through Lakewood, Denver and Sheridan, where it joins the South Platte River. This urban waterway is classified as recreational and in warmer seasons people and animals often come into close contact with the water, so monitoring its quality is important for both public health and environmental reasons. For more than 5 years, our lab has collaborated with a non-governmental organization, Groundwork Denver, and the U.S. Environmental Protection Agency, to test water at specific sites along Lower Bear Creek. Water is tested in situ for dissolved oxygen, specific conductance, pH, turbidity, temperature, flow rate and oxygen reducing potential, and taken to the lab for a most probable number (MPN) assay for coliform bacteria and *Escherichia coli* using Idexx ColiL-ert medium in a quantray2000. Sampling occurs twice monthly November-April and weekly May-October. Samples are collected going upstream to decrease the possibility of researchers affecting the results through sampling procedures.

Data from the last year show that mean counts of *E. coli* are lowest at the reservoir (8.35 MPN/100ml), increasing downstream with peak levels near Federal Blvd in Sheridan (500 MPN/100ml), falling to 250 MPN/100ml before Bear Creek enters the South Platte. The mean count of *E. coli* in the South Platte upstream of Bear Creek is 307 MPN/100ml, while immediately downstream of the confluence it is 327 MPN/100ml. Continued monitoring of *E. coli* will be useful in understanding water quality dynamics in Lower Bear Creek.

### **3-D Printable Spectroelectrochemical Cells for Modeling the Electron Transfer Products of a Small, Cyclic Donor-Acceptor System**

Kaitlynn Skinner – Chemistry

Coauthors: Kirk McDonald, Jasper Overbey

Faculty Mentor: Megan Lazorski

*Poster Presentation, Session III (2:15 – 3:15 pm), Poster #10*

Spectroelectrochemistry (SEC), a versatile technique for examining redox processes having a characteristic, detectable spectroscopic signal, is limited by cost and commercial availability. Developing 3D printable SEC cells for various spectral techniques could decrease cost and increase accessibility to the scientific community. Thus, inserts were designed to transform common cuvettes into an architecture enabling SEC measurements. An ultraviolet-visible spectroscopy (UV-vis) insert was machined from polytetrafluoroethylene (PTFE) as a prototype. Replicate inserts were fabricated with a low-cost MakerBot Replicator 2X printer using acrylonitrile butadiene styrene (ABS) and MakerBot dissolvable filament. Initial optimization of the 3D printing technique indicates printing at 230°C with 0.1 mm layers, 15% infill, and dissolvable spacers yields inserts with less exterior ridging. Solubility studies on ABS filament indicate its incompatibility with common spectral and electrochemical solvents. Future work focuses on surface treatments that enhance the chemical resistivity in these solvents. UV-vis SEC can be used to model photoinduced electron transfer products of donor-acceptor compounds used in solar energy conversion schemes, our secondary goal. A small, cyclic compound having a 9,10-bis(bromomethyl)anthracene (BMA) donor and a 4,4'-bipyridinium (V) acceptor is used as a proof-of-concept system. Synthesis of the BMA starting material was performed (37% yield). The BMA product was quantified and characterized via a combination of nuclear magnetic resonance (NMR) spectroscopy, thin layer chromatography (TLC), UV-vis, cyclic voltammetry (CV), and SEC. The coupling reactions to synthesize the full cyclic system and the synthesis of a modified acceptor (2,2',6,6'-tetramethyl-4,4'-bipyridinium = TMV), are underway. Future studies will compare the intramolecular charge transfer (CT) rate in each system using transient absorption spectroscopy. We hypothesize the TMV acceptor will force the donor and acceptor to be perpendicular to one another. The “twisted” conformation could prolong the lifetime of the CT state, which could be used as a basis for improved solar energy conversion materials.

### **Using Varicella-Zoster Virus as a Model for Studying Viral Replication**

Krystin Skinner – Biology

Coauthors: Lorena Alamillo, Amber Gilliam, Katie Hafner, Patricia Merjil, Elizabeth Spear, Jannette Vuksinich

Faculty Mentor: Vida Melvin and Andrew Bonham

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

Varicella-zoster virus is responsible for the notorious illness chickenpox (varicella), which later in life can be reactivated as shingles (zoster). There are currently vaccinations for both diseases, but a major portion of the population in the United States already has the virus resting dormant inside them. Still more, varicella-zoster is also known as Herpes-simplex III virus and is a member of the Herpesviridae family- which includes the more widely known oral and genital herpes viruses. Our research surrounds the replication and dormancy mechanisms of varicella-zoster virus, which we can study using a variety of newly-available techniques. Three projects were simultaneously conducted- the investigation of enzyme pausing, what happens to bystander cells during infection, and the significance of frequently observed genetic codes. Human fetal lung fibroblast cells were used for their receptiveness to varicella-zoster infection and were cultured in vitro before being harvested for analysis. All experiments were done under the supervision and guidance of Randall J. Cohrs, PhD. at

## **The Villainization of Transgender and Intersex Bodies in Horror Films**

Michaela Small – Art History

Faculty Mentor: Ikaika Gleisberg

*Oral Presentation, Session II 11:00 – 11:15 am, NC Room 1408*

Horror films have historically be used to direct a narrative around public anxieties. Villainizing certain individuals in horror films creates a fear of an individual's stereotype that is carried with the audience out of the theater. Making a queer character the villain of a horror film is a device used to increase the general public's fear of queer individuals. For this study, three films are analyzed through queer film theory to study the impact of the villainization of transgender and intersex individuals. The Silence of the Lambs and All Through the House are two classic horror films created to use transgender and intersex bodies as sources of fear for the cisgender audience. In The Silence of the Lambs, the transgender character is villainized as a psychopath who dismembers female bodies. All Through the House offers the audience a castrating intersex individual. Oppositely, Ticked-off Trannies with Knives is a slasher-horror film that reclaims the power of the queer body. Perpendicular to mainstream horror, this film offers an ending not for the traditional cisgender film-goer, and makes drag queens the heroes. Through analysis using ideas from queer theorist Judith Butler and film theorist Laura Mulvey, this research explores the impact of using queer bodies as a way to spread ideologies through horror film, challenges this as a successful film trope, and explores how production influences certain outdated narrative ideologies about gender.

## **Faking It: A Contemporary Theoretical Study of Forged Works of Art**

Michaela Small – Art History

Faculty Mentor: Summer Trentin

*Oral Presentation, Session III 3:15 – 3:30 pm, NC Room 1408*

Forged works of art have more dimension than their use as a dramatic plot devices in Hollywood. Oftentimes, forgeries are looked past or go completely unnoticed and scholars have largely ignored art forgeries and their importance in the art world. Because of this, most academic authorship has failed to address forgeries as anything more than a creation to validate an artist's ego or something to bring in some extra cash. This research focuses on addressing the lack of scholarship on forgeries and explores the importance of forgeries through a theoretical standpoint. To effectively communicate this, theories from Michel Foucault, Edward Said, Karl Marx, and Walter Benjamin are used for analysis. Marxist theory of use-value states the usefulness of objects in a capitalist society. Art forgeries are used as a device to re-establish certain ideologies. During the Renaissance, with the introduction of authorship, as described by Foucault, creators turned into 'artists,' and decorations turned into 'works of Art.' Forgeries were born out of the creation of Art and the artist. With the demand for 'great' works of art comes forgers who duplicate styles of the 'masters.' Furthermore, the fetishization of non-western cultures, as described by Said, lead to collecting. Forged objects meet the demand for artifacts that museums and private collectors want for display. Though they go unnoticed, it is important to recognize art forgeries and how they play an important role in maintaining ideologies of authorship, Orientalism, and romanticization.

## **Genetic characterization of *Populus deltoides*, *P. angustifolia*, and their natural hybrids, *P. acuminata***

Tyler Smerker – Biology

Faculty Mentor: Erin Bissell

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

A persistent hybrid zone for *Populus deltoides* and *P. angustifolia* has been identified along the Front Range in Colorado, including sites along the South Platte River as well as its tributaries, like Deer Creek. Hybrids between *P. deltoides* and *P. angustifolia*, named *Populus acuminata*, are common in areas where their ranges overlap. Leaf samples were collected

from Deer Creek in October 2018. In order to identify the best system for storing samples for DNA extraction, two storage methods were used: 1) cloth bags with silica gel, and 2) plastic bags in freezer (-18°C). DNA extraction and quantification will be performed on each sample to determine if the storage methods differ in preservation of DNA. We will then use Cleaved Amplified Polymorphic Sequences (CAPS) to identify the two species and their hybrids. We will also analyze morphometric data from entire leaves to determine if variation in leaf shape consistently correlates with taxon specific molecular markers. Based on these data, we can be more confident in identification of hybrids and their parent species, which will allow us to estimate the upper and lower elevational limits of the hybrid zone. Clear delineation of the *P. acuminata* range will allow us to better understand the ecological factors that limit the growth and dispersal of hybrids.

### **Our Strategic Ally in the South: A Quantitative Analysis of the U.S./Argentine Relationship since 1983**

Andrew Smith – Biology

Faculty Mentor: Andrew Bonham

*Oral Presentation, Session I 9:45 – 10:00 am, NC Room 1408*

Since the mid 90's, Argentina has been a key ally of the United States and remains the only major non-NATO ally in Latin America. However, in more recent years the U.S./Argentine relationship has deteriorated. This presentation aims to analyze the U.S./Argentine relationship since Argentina's return to democracy by utilizing voting records from the UN Security Council and the UN General Assembly to explain what has changed to make the relationship so fraught. Every resolution voted on in the UNSC and the UNGA since Raul Alfonsin took power was cataloged and analyzed to determine both agreement between the two states and sentiment towards resolution topics. The data confirmed that agreement between Argentina and the U.S. peaked in 1994 and has since fallen dramatically. More importantly, it was found that Argentina has employed three distinct approaches to voting in the UN, which can be mostly explained by their positions on nuclear weaponry, military matters, and the Israel/Palestine conflict. It is of note that the Argentine approach to voting is not influenced by the sitting Argentine president or their political affiliation. This indicates that some force exterior to the Argentine president is a more important determinant of Argentina's approach to foreign policy than the presidents themselves.

### **An observation of the effects of *Neisseria lactamica* on the biofilm formation of *Streptococcus mutans***

Amanda Smith – Biology

Faculty Mentor: Sheryl Zajdowicz

*Poster Presentation, Session III (2:15 – 3:15 pm), Poster #16*

The human oral microbiome is composed of a complex consortium of microbes, and the relationships between them is not well understood. *Streptococcus mutans* is a Gram-positive coccus known to inhabit the human oral cavity. Known for its ability to form biofilms, this species is also implicated in causing carious lesions on teeth due to its ability to produce lactic acid. Being that caries affect many individuals, trying to gain a better understanding of the complex interplays between species in the oral microbiome is important. The genus *Neisseria* contains many commensal species that inhabit the human oral cavity and nasopharynx. It has been shown previously that many species in this genus have the ability to consume lactate, including the lactate produced by *S. mutans*. To determine if commensal *Neisseria* inhibits biofilm formation of *S. mutans*, we will grow *S. mutans* in the presence of *Neisseria lactamica*. Biofilm bioburden will be determined via viable count determination and by measuring luminescence produced by a luciferase-expressing strain of *S. mutans*. After observing the effect of *N. lactamica* on biofilm formation, growth conditions will be altered to determine if there is any way to naturally promote the growth of commensal lactate consuming *Neisseria* species in the human oral cavity. It is hypothesized that there will be an observable effect on the biofilm formed by *S. mutans* when grown in the presence of *N. lactamica*.

## **Electrochemical DNA Biosensors for Detection of Mannose-capped Lipoarabinomannan**

Tyler Sodja – Biology

Faculty Mentor: Andrew Bonham

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

Mycobacterium Tuberculosis (TB) is one of the world's most prevalent bacterial pathogens. It is estimated that almost 10 million cases of TB emerge every year, and roughly one-fifth of these cases are fatal. The current detection and diagnosis of TB is done primarily via two methods; the TB skin test and the TB blood tests. Neither of these tests can differentiate between latent TB infection and TB disease. In order to differentiate these states, time-consuming sputum tests are required, which rely on culturing the mycobacterium. Designing a sensitive serologic biosensor would dramatically decrease the time line of diagnosis and therefore improve patient outcomes. One possible avenue for improved detection lies in the cell wall of TB, which includes many complex glycolipids—many of which are believed to have immunopathogenic mechanisms in physiologic pathways. Mannose-capped lipoarabinomannan (ManLAM) is one of the most prevalent of these glycolipids, and presents a novel target as a bio-marker for the sensitive detection of TB and related Mycobacterium strains. Here, we have utilized an existing aptamer sequence that binds to ManLAM to generate a sensitive electrochemical, DNA-based biosensor for the detection of TB. This biosensor is able to adopt multiple different folded conformations, only one of which presents the core aptamer sequence in a state capable of binding ManLAM. An appended redox-active tag (methylene blue) generates a measurable difference in electrochemical current upon this conformational change, providing a sensitive and quantitative measurement of ManLAM concentration. Such biosensors may ultimately allow rapid, on site, diagnosis of TB infection within the time constraints of patient-doctor interaction.

## **Analyzing acid profiles in sour beer using High Performance Liquid Chromatography and Gas Chromatography-Mass Spectra**

Sara Speak – Chemistry

Faculty Mentor: Michael Jacobs

*Poster Presentation, Session III (2:15 – 3:15 pm), Poster #8*

Since the 16th century, beer has always had some varying degree of sourness due to spontaneous fermentation. To this day, brewers use wooden barrels as fermenting vessels to allow wild yeast and microorganisms to interact with the beer. Bacteria and sour flavors were abolished from beer after Luis Pasteur discovered pasteurization in 1864. Recently though, brewers are now intentionally adding bacteria to beer to create sour flavors. There are a few different strains of bacteria that can produce these acids. The most commonly used is lactobacillus which has two subgroups. Group I of lactobacillus are homofermentative which produce only lactic acid and carbon dioxide from the metabolism of glucose. Group II are heterofermentative and produce ethanol, lactic acid, acetic acid, and carbon dioxide under the same metabolism of glucose. The most common used lactobacillus in brewing is Group II because this group undergoes pleomorphism or structural changes under environmental conditions. Lactobacillus is used to make Saison, Flanders Red and Berliner weisse style beers. Lactic and acetic acid are found in sour beer as the result of bacteria breaking down glucose. While both lactic and acetic acid are essential to the overall flavor of sour beer, too much of either acid will cause off-flavors. Breweries use a method called total acid titration to determine acid profiles. Total acid titration gives overall concentration of acids, but not individual concentrations. Herein, we will present a method to determine lactic and acetic acid concentrations using High Performance Liquid Chromatography (HPLC) and Gas Chromatography-Mass Spectra (GCMS) instrumentation.

## **School of HEaT Student Survey 2018**

Emily VanGetson – Event and Meeting Management

Faculty Mentor: Cynthia Vannucci and Jimi Webb

*Oral Presentation, Session II 11:30 – 11:45 am, NC Room 1603*

There are many forms of communication barriers such as emotional barriers and taboos, lack of attention, interest, or

distractions. One need also to consider the differences in perceptions and view points, which could shut down dialogue and communication. To minimize these barriers and have effective communications, Attention needs to be given to issues of language differences, cultural diversity, gender differences, status differences, and even physical separation to improve communication. Connecting and collaborating is the result of effective communications and requires a tactical plan. In order to improve communications to college students, one must understand methods and types of communication that are currently in use. In addition to types of communications, understanding what methods students would prefer to see and use around campus is helpful for future forms of communication. Students are provided a college e mail address as the official communication tool during their tenure as a student. However, is it their preferred method of communication within their department/program? News.com reported that the number of business e-mails rose in 2018 from 121 to 140 daily. This popular form of communication shows no sign of slowing down. University students and other members of the “Net” generation are highly involved with technology to communicate and to stay connected. According to Rishi, (2007) contemporary students use a new and different model of communicating and obtaining information. Their access is fueled by technology. Lienhart, Ling, Campbell and Percell, 2010, found that 95% of teens use SMS text messaging. Against this backdrop of trends on preferred methods of communication, the Metropolitan State University of Denver (MSU Denver) conducted a survey in Fall 2018 with three objectives: 1. Understand the current demographic of School of Hospitality, Events, and Tourism (HEaT) student population. 2. Procure information on why students chose HEaT as their major 3. Create a tactical communications plan to effectively communicate to current and future HEaT students. The results of the survey has provided the necessary demographics on existing students to begin to compile a tactical to communicate to current and future students. The overall information collected has been crucial in the creation of a communication plan for recruitment of new students to the program.

### **MSU Denver School of HEaT Program Enrollment Research**

Hannah Varble – Event and Meeting Management

Faculty Mentor: Cynthia Vannucci

*Oral Presentation, Session III 3:00 – 3:15 pm, NC Room 1402*

The MSU Denver School of Hospitality, Tourism, and Events recently gained its designation as a school and re branded itself for the future. This new designation gives the program an opportunity to be preeminent among hospitality programs in the Western Region. Our research focuses on the awareness of our program among high school counselors in Colorado, the perception of the program, and to use data to build a marketing plan for the School of HEaT. The School of HEaT is currently down in its enrollment numbers, and is in need of a formal marketing plan; including website redesign, and the implementation of new programs such as a High School Girl Events Camp.

Our research is based on a voluntary survey with a sample size of 100 high school counselors across Colorado, and peer reviewed articles. Our data told us valuable information about our school, its awareness, and how we can improve our enrollment numbers. We believe this research will benefit others hospitality programs and their marketing sectors.

### **Using CRISPR-Cas9 to Deactivate Latent Varicella Virus**

Sean Vieau – Biology

Faculty Mentor: Ravi Mahalingam

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

Varicella Zoster Virus (VZV) is a human exclusive herpes virus that causes chickenpox. VZV stays latent in ganglia and reactivates decades later to cause zoster, also known as shingles. In immunosuppressed individuals, VZV causes a host of neurological conditions, including stroke, encephalitis, hemiplegia, and postherpetic neuralgia. Simian Varicella Virus (SVV) is the primate counterpart to VZV and has been used as an animal model of VZV infection. The present experiment uses a bacmid based approach to insert CRISPR-Cas9 into the VZV and SVV genome, with the goal of creating a recombinant SVV and VZV that will selectively target and destroy the latent virus, serving as a vaccine for shingles.

## **Internship Work With Center of Disease Control Mosquito Museum Specimens and Their Corresponding Data**

Leena Visnak – Biology

Co-author: Rachel Mello

Faculty Mentor: Robert Hancock

*Poster Presentation, Session I (9:30 – 10:30 am), Poster #1*

The main tasks of this internship included decoding and sorting field records. Information like location, date, habitat, sex, as well as life stage of species were logged into a database. From this data insect pinning labels were generated for museum specimens. Working closely with employees at Vector Disease Control International unidentified mosquitoes were categorized and labels were added to those identified. The processing of these Center of Disease Control specimens on their way to the Colorado State University's insect collection increased the intern's knowledge in categories such as museum specimen care and handling as well as species identification and preservation of a leading culicidologist's life work.

## **Motherly Fat, Whorishly Thin, and the Bitch in the Middle: Stereotyping Black Women's Bodies and Internalization of Archetypes**

Natalia Walton – Gender, Women, and Sexualities Studies

Faculty Mentor: Anahi Russo Garrido and Chereka Dickerson

*Oral Presentation, Session II 10:30 – 10:45 am, NC Room 1408*

Contemporary Stereotyping of Black women has a legacy stemming from slavery. During the slave era, there were three core archetypes, the mammy, the jezebel, and the sapphire, created about black women as a means of socialized slavery. In present day, these contemporary stereotypes also function as a means of social control over Black women. Research has been conducted in regards to stereotyping and the psychological effects on Black women's social standing. However, little research has been conducted on the effects of stereotyping on Black women's bodily self-perception and an alternative beauty standard formulated from the core aforementioned archetypes about Black women. My research proposes that black women have a positive self-acceptance, a positive self-body image, and higher self-esteem as a result of their rejection of white beauty standards, and the acceptance of an alternative beauty standard. Additionally, this cultural and social normalcy is systemic and a subconscious reproduction of acceptance of the stereotypes associated with the three core archetypes in bodily form. This research is based on anonymous surveys, literature review, and a focus group of Black women. The purpose of this research is to understand the effects of contemporary stereotyping of Black womanhood on Black women's own perceptions of their bodies. More specifically, I seek to understand how these contemporary stereotypes, as they stand informed by three aforementioned historical archetypes of Black womanhood, effect the bodily self-perceptions of Black women in the United States.

## **Preliminary investigations of attraction to humans by male *Aedes aegypti* and *Aedes albopictus* Mosquitoes in an air flow Olfactometer.**

Shawn Ward – Biology

Faculty Mentor: Robert Hancock

*Poster Presentation, Session I (9:30 – 10:30 am), Poster #2*

Most mosquito reproduction starts in swarms of males waiting for a female candidate to present itself. In *Ae. aegypti* and *Ae. albopictus* these swarms are known to occur around potential blood meal hosts such as humans and in conjunction with positive phonotactic behaviors to female mosquito wing beat sound, the way males locate potential hosts however is little understood. In this experiment we are designing an airflow olfactometer to test close range responses of male mosquitos in both *Ae. aegypti* and *Ae. albopictus*. This olfactometer will be used to test host kairomone responses, wing beat responses and a combination of the two at close range. Our preliminary results are as follows.

## **Regional Mental Health and Attitudes Toward Mental Illness**

Carly Watkins – Psychology

Faculty Mentor: Cynthia Erickson and Jovan Hernandez

*Oral Presentation, Session II 11:15 – 11:30 am, NC Room 1402*

Treatment for mental illness is effective for many people; however, some may not seek treatment due to stigma (Eisenberg et. al., 2009). This study evaluated the relationships between regional differences in mental health stigma and outcomes. 569 (Mage = 38 years) adult U.S. residents participated in this study. Participants were recruited through MTurk (n=550) and Reddit.com (n=19). After agreeing to participate, individuals were asked about their region of residence, stigma toward people with mental illness, mental health, and help-seeking attitudes. Measures included the Social Distance Scale, Depression Anxiety and Stress Scales-21 [DASS-21], and Mental Help Seeking Attitudes Scale [MHSAS]. Stigma was measured by having participants read vignettes describing people with mental illnesses and then answer questions such as, “Do you think you would be willing to have this person as a neighbor on your street?” Geographic regions within the United States were broken into four areas; Northeast, Midwest, South, and West. There was no difference between regions in desired social distance, nor was there a difference in the prevalence of mental illness. There was a small difference in help-seeking attitudes. Individuals in the West had lower scores on the help-seeking scale. More positive help-seeking attitudes were associated with fewer symptoms of psychological distress ( $r = -.31$ ,  $p < .01$ ). The lack of regional differences in desired social distance has potential implications for future programs that seek to reduce stigma toward mental illness. It is possible that such programs need not be specialized based on geographic region. A negative association between help-seeking attitudes and symptoms of psychological distress may indicate that positive attitudes toward help-seeking alleviate symptoms of psychological distress. However, given these results are correlational, other explanations are possible. Findings like these may provide guidance for future mental health policy.

## **Bat Dominance and Diversity: A Study into Urban Bat Populations in Washington Park, Denver, Colorado**

Travis West – Biology

Faculty Mentor: Christopher Cooley and Sarah Schliemann

*Oral Presentation, Session I 10:00 – 10:15 am, NC Room 1408*

There are more than 1,200 species of bats worldwide and each species plays an integral role in the ecosystem they occupy. Many species of bats (if not all) are considered keystone species that benefit their environment and the creatures that live within it. Bats pollinate important agricultural fruits as well as transport seeds to facilitate rainforest growth while playing a critical role as a global biological pest control system. This primary research focuses on the dominance, the diversity, and the impacts of abiotic pressures of urban bat populations within Washington Park, Denver, CO. Seven sites were chosen based on geographical location: open-space, tree cover, flower gardens, manmade structures and near-water spaces. Abiotic recording per location include: time, date, temperature (°C), windspeed (meters/second), weather and moon phase. All recordings were performed from June 5th – 27th between the hours of 8:30 – 11:30 pm. Direct observations were made to examine behavior into the hunting tactics used by bats at each study site. The research gathered concludes that *Eptesicus fuscus* (the big brown bat) was the dominant species and no abiotic pressures had significant influence on the behavior of bat populations within the park (Corcoran & Conner, 2014). Future research would expand sampling times through crepuscular hours and all seasons, utilize mist-netting for species ID and capture prey items to determine species diet.

## **Stigma Against Women with PTSD**

Anastasia Wills – Psychology

Faculty Mentor: Cynthia Erickson

*Oral Presentation, Session II 11:30 – 11:45 am, NC Room 1402*

Post-Traumatic Stress Disorder (PTSD) is a mental illness that can occur following any kind of traumatic event. Most

research about stigma and PTSD is either dedicated to seeing how stigma affects military veterans seeking treatment or to seeing how stigmatized PTSD is in relation to other disorders. This research studied if the event that caused a woman's PTSD affected the stigma people felt towards her. Women were studied specifically because women are more likely to develop PTSD than men (Kessler et al., 2005). A survey was created, featuring five vignettes, two controls and three featuring women with PTSD, and the participants answered questions about their personal prejudice, the prejudice they believed other people would feel against the woman in the vignette (perceived prejudice), and to what extent would they let the woman in the vignette into their lives (social distance). 60 participants completed the survey. Neither social distance,  $F(4,210) = .249$ ,  $p > .05$ , nor perceived prejudice,  $F(4,262) = 2.235$ ,  $p > .05$ , were statistically significant, however personal prejudice was statistically significant at  $F(4,262) = 9.249$ ,  $p < .001$ . All three PTSD vignettes were different from the neutral control. These results are hopeful for women with PTSD, as greater stigma is related to a person having more PTSD symptoms, as well as having severer PTSD symptoms.

### **Psychology Special Earn and Learn Session**

Neyva Hernandez, Alyssa Lozano, Jennifer Mar, Kaila Terrell – Psychology

Faculty Mentor: Randi Smith

*Oral Presentation, Session I 9:00 – 10:00 am, NC Room 1603*

MSU Denver students studying Psychology were given the opportunity this semester to secure an unpaid internship off campus, where the C2 Hub then paid them an hourly wage. This was part of a study to see if securing funding would impact the ability for students to participate in experiential learning outside the classroom. The students presenting found internship placements in the non-profit sector and worked in a variety of settings with numerous populations. Come see how they were able to impact the Denver community through their work!

A special thanks to the University of Colorado Denver for letting us use their facilities



University of Colorado **Denver**

