



University of Montana Presents

The 18th Annual



UM

CUR

Conference on
Undergraduate Research

Program and Abstracts

April 17, 2019 ~ Missoula, Montana

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**Special thanks to all the mentors, reviewers, judges,
and volunteers who donated their time!**

UMCUR Welcome

It is with great enthusiasm that I welcome students, faculty, staff, alumni, and community members to the 2019 University of Montana Conference on Undergraduate Research (UMCUR). Each year, UMCUR is a highlight for the Davidson Honors College and University of Montana. This year, we have over 130 students from every school and college presenting their research and creative scholarship. UMCUR is a powerful example of what happens when our incredible students and faculty collaborate. What our community displays during UMCUR is undergraduate excellence at its finest.

Undergraduate research and creative scholarship experiences yield many practical benefits, setting our students up for success in future educational and career endeavors. Students who engage in the critical inquiry and creative problem-solving required to conduct undergraduate research and creative scholarship gain skills and confidence to be successful and prepared for life outside of the classroom and beyond their time at UM. Further, the working relationships established between students and faculty mentors are some of the most enduring bonds in a student's academic tenure.

Thank you to all of our dedicated faculty mentors who have helped our students get to this day. I would also like to thank Provost Harbor for his support of UMCUR 2019 and undergraduate research, more broadly. I am also grateful to President Bodnar for his prioritization of undergraduate research, creative scholarship, and for "placing student success in the center of all we do." Finally, support from our community of donors has made many UMCUR projects possible, and I would like to thank our generous donors for their belief in the power of opportunities for research, creative exploration, and global exploration to change students' lives.

An event as large as UMCUR takes months of planning and would not be possible without the support of the UMCUR Planning Committee, the Office of the Provost, the University of Montana Undergraduate Research Committee, and all the faculty members, staff, alumni, community members, graduate students, and undergraduates who have volunteered their time as facilitators and judges for the conference.

I'd like to also extend my heartfelt thanks to Michelle Eckert, without whom this event would not be possible. In collaboration with Victoria Bigelow, Michelle ensured that the event, down to the most minute detail, runs smoothly and displays the very best UM has to offer. We all hope you enjoy this day and learn something new!

Good luck today and have fun!

Katie Cordingley

Interim Director, Davidson Honors College



UMCUR Keynote Speaker

12:20 PM, University Center Theater ~ April 17, 2019



Adapting to Scholarly and Societal Changes While Researching LGBT Health Disparities

Bryan Cochran, Ph.D.

Professor of Psychology
University of Montana

Abstract

In a career as a clinical psychologist studying health disparities that lesbian, gay, bisexual, and transgender (LGBT) individuals face, I have had to adapt my research to a number of changes in both discipline-specific and societal perceptions of LGBT individuals. I will discuss how I have geared my research program to adapt to these changes, highlighting how the research process does not occur in a vacuum, regardless of topic area or discipline. Changing eras also represent burgeoning opportunities, as they have with my work, to study often under-researched populations and to help meet the needs of our diverse world.

About Bryan Cochran

Bryan Cochran received his undergraduate degree in Psychology from Furman University in Greenville, SC in 1996, and his Master's and Doctoral degrees in clinical psychology from the University of Washington in Seattle (2000 and 2003, respectively). He is both a researcher and a practitioner, having maintained research programs in LGBT psychology and in substance misuse while serving as a licensed psychologist and supervisor in the clinical Ph.D. program here at the University of Montana since 2003. He teaches undergraduate and graduate courses in the Department of Psychology and has a research lab of 5 current doctoral students and approximately ten undergraduate research assistants.

UMCUR Schedule Overview

Conference on Undergraduate Research (UMCUR)

University of Montana

April 17, 2019

University Center 3rd Floor

- | | |
|----------------------------|--|
| 7:30 AM | Information Desk & Poster Setup & Oral Uploading
- UC 3rd Floor, Grand Foyer & 300 rooms |
| 9:00 - 11:00 AM | Oral Sessions - UC 326-332 <ul style="list-style-type: none">• Social & Life Sciences, Humanities |
| 10:40 - 12:00 PM | Franke Global Leadership Initiative (GLI) Capstone
- UC North Ballroom |
| 11:00 AM - 12:00 PM | Poster Session #1 - UC South Ballroom |
| 12:20 AM - 1:30 PM | Keynote Lecture - UC Theater |
| 1:40 - 2:40 PM | Franke Global Leadership Initiative (GLI) Capstone
- UC North Ballroom |
| 1:40 - 3:00 PM | Oral Sessions - UC 326-330 <ul style="list-style-type: none">• Social & Life Sciences, Humanities |
| 3:00 - 4:00 PM | Poster Session #2 - UC South Ballroom |
| 4:00 - 5:00 PM | Oral Sessions - UC 326-333 <ul style="list-style-type: none">• Social, Life and Physical Sciences, Humanities and Visual/Performing Arts & Creative Writing |

UMCUR Awards Ceremony

Please join host Davidson Honors College in celebrating this year's UMCUR Awardees in the Davidson Honors College Lounge, Wednesday, April 24th, 2:00-3:30pm. Awards, cake and coffee will be provided.

Franke Global Leadership Initiative (GLI)

Capstone Presentation Session

These presentations feature Capstone Research from students in University of Montana's Franke Global Leadership Initiative (GLI). These Franke GLI students are in their fourth and final year of the Franke GLI fellowship. Throughout their four years they have been involved in unique and enriching academic learning that has combined practical experience with their classroom education. Franke GLI's distinctive program brings together students from different disciplines to tackle real-world problems with diverse ideas.

Franke GLI Capstone Presentation Sessions 10:40 AM - 2:40 PM UC North Ballroom

Franke GLI

10:40	Eating Insects: A Community Action Toolkit - Lily Chumrau; Charlotte Langner; Mary McCormick; Freya Sargent; Ellen Sears
11:00	Border Walls in Montana: Immigration and Integration in Missoula - Schrielle Standish; Natalie Hofstad; Jordan McCloney; Christa Street
11:20	Effects of Climate Change on Rocky Mountain Spotted Fever and Public Health Implications in Western Montana - Ella Baumgarten; Maxwell Enger; Sydney Qualls; Ronan Kennedy; Benjamin Hickey; Tiffany Matthews
11:40	Bug Bites: Eating Insects on Purpose! - Ellie Gluhosky; Lauren Clark; Kaitlyn Anderson; Spencer Lachman; Sarah Lutch; Dakota Vaccaro

12:00 - 1:30 PM Break

Franke GLI - Continued

1:40	Health and Wellness: Expanding Education for an Under-Addressed Issue - Grace Sievert; Olivia Adams; Crystal Chase; Grady Matter; Megan Sipes
2:00	Educate, Empower, Change: Strategies for Overcoming Stigmas Surrounding Menstrual Health - Monica Paul; Lea Graham; Madison Haynes; Shaylee Ragar; Kirsten Tucker
2:20	Get Out, Go Wild - Sully Magee; Andrew Matsushita; Joseph Carlson; Alexa Millward; Aubrey Mullins; Nani Murray; Sophia Deroo

Want to participate in the 2019 UMCUR? Make sure to visit the UMCUR
Website www.umt.edu/ugresearch/umcur/default.php
and/or Like us on Facebook www.facebook.com/UMCUR/
to keep up with current happenings.

UMCUR Schedule Breakdown

Concurrent Oral Sessions: 9:00 AM - 11:00 AM

(Listed by room, time, title of presentation, and name of primary author)

Complete list of Authors, Abstracts and Mentors are located after the schedules.

Social Sciences - Room 326

9:00-9:20am	The Role of Participatory GIS in Community-Centered Ecotourism Management in the Bossou Forest Reserve, Guinea - Sydney Qualls
9:20-9:40am	Two tightly linked loci produce flower color polymorphisms in both the UV and visible spectra in yellow-and-white monkeyflower (<i>Mimulus bicolor</i>) - Brooke Kern
9:40-10:00am	Climate Change and Groundwater Access Provisions in Native American Water Rights Settlements - Naatosi Fish - Marea Kuehl
10:00-10:20am	The Consolidation of Corn: A Case Study to Inspire Design for the Wicked Problems of Our Time - Sophie Moon
10:20-10:40am	Utilizing Data and Technology in Social Work as Catalysts for Effective Community Change - Haley Eakin
10:40-11:00am	How Epidemiological Transitions Affect Mortuary Ritual: A study of infant burials in the Missoula City Cemetery - Hannah Pepprock

Life/Social Sciences- Room 327

9:00-9:20am	OPEN
9:20-9:40am	OPEN
9:40-10:00am	Infection with bacteriophage impacts the evolution of antibiotic resistance in <i>Pseudomonas aeruginosa</i> - Jake Cohe
10:00-10:20am	The Causes and Conduct of the Conflict between Iran and Israel and Its Effects on Palestine and Syria - Allison Pennell
10:20-10:40am	An Old Man's Eulogy, A Young Republic's Hymn: Weimar Patriotism and the Murder of Walther Rathenau - Ronan Kennedy
10:40-11:00am	Prevalence of Extreme Discrimination Against LGBTQ+ High School Students in Rural Communities - Cara Grewell

Life Sciences - Room 330

9:00-9:20am	The Role of PF Phage in Pseudomonas aeruginosa Cheater Populations - Autumn Robinson
9:20-9:40am	Effect of expression level and amino acid sequence on HCMV glycoprotein complexes - Charlotte Langner
9:40-10:00am	Genetics of Floral Divergence in Monkeyflower - Mathew Samuli
10:00-10:20am	The Effects of the Goat Creek Fire Complex on Water Quality and Macroinvertebrate Communities in First-Order Streams within the Rock Creek Drainage. - Leif Howard
10:20-10:40am	The Early Bird Gets the Worm: Comparing Early Post-fire Avifaunal Species Assemblages in Montana Subalpine Forests - Allison Hendryx
10:40-11:00am	Song Structures in the Asian Rhinoceros Beetle - Cole Sander

Humanities - Room 331

9:00-9:20am	Masques and Luggage: Sociocultural Anxieties Manifested Through Material Goods in Shakespeare's The Tempest and Bowles' The Sheltering Sky - Dusty Keim
9:20-9:40am	Knowledge and Power: Weaponizing Women's Experiences - Bailey Durnell
9:40-10:00am	Clara Moore Sherley Tower: Forgotten Montana Suffragist - Emmett Ball
10:00-10:20am	The Poetics of Political Exile: Bolaño and Literary Complicity in Augusto Pinochet's Regime - Erin Goudreau
10:20-10:40am	From Australian Activists to Philosophy: the Role of Engaged Consumption in Radical Drug Policy and Education Reform - Glen Woodworth
10:40-11:00am	Hate Speech as Political Speech - Alex Butler

Poster Session #1: 11:00 AM -12:00 PM

UC South Ballroom

(Listed by category, poster number, and name of primary author)

Humanities

1	The Effect of Perception Biases on Associated Value of Stimuli - Jordan Broussard	3	"They love God even though they deny Him": Dorothy Day on Revolution in Nicaragua and Cuba, 1927-1970 - Tess Gallagher Clancy
7	The Effects of Social Isolation and Loneliness on Aging - Nelson Weaver	71	"Ikuzo Nihongo" - Learning Japanese through reading Manga (Japanese Cartoons) - Ryan Koski

Posters Continued

Life Sciences

8	Investigating the Underlying Mechanisms Responsible for the Effectiveness of Behavioral Cough Therapy - Sarah Popp	10	Investigating the role of inorganic phosphate in the survival of the bacteria that cause Lyme Disease. - Bonnie Long
12	Tracking Forest Fire Impacts on Stream Temperatures & Ensuing Shifts in the Salmonid Community - Christopher Rotar	14	Understanding The Function of Ancient Conserved Non-Coding DNA Elements - Jeremiah Gaiser
16	Validation of the Actical Accelerometer for Individuals with Locomotor Dysfunction - Selene Tobin	18	Physician Suicide: Healers Unable to Heal Themselves - Paighton Noel
20	The scaffolding protein PAG1 regulates Src family kinase activity in neuroblastoma cells - Makenzie Mayfield	22	Beetle Ballads - Ty Morgan
24	Fire on the Mountain: Impacts of Burned Habitat on Wildlife Occupancy - Dakota Vaccaro	26	Use of GPS collar point distributions to infer cause of mortality in mule deer - Kylie Brunette
28	Rates of Water Loss and Metabolism in Stick Insect Eggs - Garret Jolma	30	Finding Evidence for Competition Between Moose, Deer, and Cougars in Washington using Space to Event Model - Sierra McMurry
32	Controlling gene function with dual-coding exons: exploring patterns of conservation and expression - Sarah Walling	34	Measurement of epigenetic alterations from patients' tissues in myoma, adenomyoma, and endometriosis - Min sun Koo
36	Gut-Brain Communication in Aggression in Male Drosophila Melanogaster - Ashley Bielawski	38	Altering Cough Reflex Sensitivity with Aerosolized Capsaicin Paired with Behavioral Cough Suppression - Claire Malany
40	Estimating Recruitment in Elk Using an Occupancy Framework - Mateen Hessami		

Physical Sciences

41	Establishing Groundwater Nitrate/Nitrite Levels at Hamilton, Montana & Surrounding Area - Qwinn Lulis	43	Mapping Fluvial Geomorphic Change: The Clark Fork River at the Former Milltown Dam Site - Matthew Blassic
45	Focused Ultrasonication-Assisted Preparation of Aqueous Nanodispersions for Selected Novel C-type Lectin Receptor Ligands - Alexander Riffey	47	Laboratory Characterization of Toxic Air Emission from Fire Retardant Used in Wildfires - Emi Okitsu
49	The smell of attraction; cuticular hydrocarbon (CHC) profiles in a horned beetle - Chelsey Caldwell	51	Comparing Ocean Tidal Models - Bodhi Landry-Stahl
53	Size and shape of multi-walled carbon nanotubes influences exposure-induced airway inflammation and tissue fibrosis in a mouse model - Shannon Bolten		

Poster Session #1: 11:00 AM - 12:00 PM - Continued
UC South Ballroom
(Listed by category, poster number, and name of primary author)

Social Sciences

56	Exploring Evidence-Based Practice (EBP) in Curriculum-Based Language Interventions (CBLI) - Caitlin Gillespie	59	Quantity of Contact and Impact on Attitudes Towards Disabled Populations in Doctor of Physical Therapy Students - Carly Knudson
61	Using Emotional Framing to Manipulate Anchoring Effect: How Affect Influences Judgment and Perception - Elizabeth Waterman	63	Does Major Predict MCAT Success? - Megan Branson
65	Analyzing the Impact of Protective Factors on the Resilience of Middle School Students - Ruth Minix	67	A Comparative Study of Phonological Processes Between Canadian-French-Speaking and American-English-Speaking Children with Speech Sound Disorders. - Carley Stone
69	Differential Object Marking: How Do Spanish-Speaking Children Learn Their Language? - Laura Cornelisse		

Keynote Lecture 12:20 - 1:30 PM

UM Professor, Bryan Cochran, Ph.D. - UC Theater

“Adapting to Scholarly and Societal Changes While Researching LGBT Health Disparities”

Pizza Provided in the UC Foyer

Oral Sessions - Continued: 1:40 PM - 3:00 PM

(Listed by room, time, title of presentation, and name of primary author)

Social Sciences - Room 326

1:40-2:00pm	Do I Belong Here? (In)Visibility caused by microaggressions on campus - Jazzie Johnson
2:00-2:20pm	Do I Belong Here? (In)Visibility of Students on Campus - Emily Gillispie
2:20-2:40pm	Do I Belong Here? (In)Visibility in the Curriculum - Stephen Thompson
2:40-3:00pm	Stories from High School: The Components of an Alternative Education - Anna Costain

Life/Social Sciences - Room 327

1:40-2:00pm	Evidence of Arthritis in a 92-year-old Female Cadaveric Specimen - Sydney Ladas
2:00-2:20pm	Looking Past, Looking Forward: America's National Parks, Archaeology, and Climate Change - Rachel Blumhardt
2:20-2:40pm	Accountability in Education: Investigating Student Retention One-year-post Environmental Education Program - Bridget Creel
2:40-3:00pm	How are First Grade Children Learning to Spell? - Sarah Floyd

Life Sciences - Room 330

1:40-2:00pm	Whitebark pine and prescribed fire: suitable habitat created for seedlings at the cost of mature trees - Adrienne Chenette
2:00-2:20pm	Assessing the Efficacy of a Qualitative Approach for Monitoring Vegetation Responses After Floodplain Restoration - Dylan Branscum
2:20-2:40pm	Limitations to Plant Growth in Ecosystems Contaminated by Smelter Fallout - Guillermo Barillas
2:40-3:00pm	Revegetating Steep, Severely Eroded Hillslopes: The Importance of Site Characteristics - Carly Andlauer

Life Sciences - Room 331

1:40-2:00pm	Assessing the Effects of Culling as a Management Tool for Urban Mule Deer - Hamilton Platt
2:00-2:20pm	Characteristics of Grizzly Bear Attacks on Humans: A review of grizzly bear and human interactions resulting in injury or fatality in the lower 48 states - Megan Robbins
2:20-2:40pm	The importance of integrating theory and application when estimating survival of wildlife populations - Alexis Beagle
2:40-3:00pm	Behavioral Plasticity to Reduce Camouflage Mismatch in Snowshoe Hares - Lindsey Barnard

Humanities - Room 332

1:40-2:00pm	"We the People": Montanan Suffragist Belle Fligelman Winestine and the Progressive Era - Becca Warwick
2:00-2:20pm	Nina Graves Huston Darroch and Small-Town Suffragism in Montana - Henry Curtis
2:20-2:40pm	Mrs. Abbie C. French: Doctor and Suffragist - Madeline Hagan
2:40-3:00pm	Are Machiavelli and Plato more similar than once understood? - Marley Clark

Poster Session #2: 3:00 PM - 4:00 PM
UC South Ballroom
(Listed by category and last name of author)

Humanities

2	Proportional Reasoning Through Gears Investigation - Colt Davidson	4	Language Contributions to Early Literacy Success - Kelsey Johnson
6	Wets, Dries, and Hypocrites: Women and the Repeal of Prohibition - Kathleen Resch		

Life Sciences

11	Movement patterns of resident Westslope cutthroat trout (<i>Oncorhynchus clarkii lewisi</i>) populations in isolated headwater streams of central Montana - Michael Krummel	13	Phyllium Flight Analysis - Lexi Klawitter
15	Identifying causes of unregulated cell proliferation and changes body length in <i>Caenorhabditis elegans</i> . - Mikaya Terzo	19	<i>Canis Lupus</i> (Gray Wolf) Pup Survival Rates in Yellowstone National Park - Anne Jehle
21	Investigating Whether Oxidative Stress Mediates Stroke-Induced Internalization and Degradation of AMPA Receptors - Isabella Sturgeon	23	Temperature-Sensitive <i>fbf-1</i> and <i>rrf-1</i> Mutations in <i>Caenorhabditis elegans</i> - Ella Baumgarten
25	A Deep Convolutional Neural Network to Trim Sequence Alignment Overextension - Jack Roddy	27	Cardiovascular Responses to Woodsmoke Inhalation During Exercise - Kesley Wood
29	A Software Pipeline for Analyzing Viral Sequences in Bacterial Genomes - Conner Copeland	31	Tracking Rodent Social Interactions Using Machine Learning - Isaac Egan
33	Effects of water availability on the germination of native and exotic forbs - Beau Jennings	35	Familiarity affects interaction: social behavior differences in pairs of stranger and cagemate degus - Stephen Cooke
37	Behavioral Impacts of Octopamine Release on a Global vs. Local Scale - Thomas Bisom	39	The Effect of Vented Helmets on Heat Stress During Wildland Firefighter Simulation - Skyler Hilden

Physical Sciences

42	Dependence of Photosystem II Water Oxidation on Hydrogen Bond Stabilization of the Substrate: a Proposed Computational Experiment - Christopher King	46	Modeling Surface Mass Load Displacements in the Western US - Cody Norberg
48	Riparian Monitoring For the Ninemile Creek - Klemensas Krasaitis	50	Using Community Science to Remove and Monitor Noxious Weeds at the Rock Creek Confluence - Ira Moll

Physical Sciences - Continued

52	The Impact of Terrain and Other Factors on Wild Fires - Matthew Kingston	54	A Comparative Analysis between HYSPLIT and WRF-Chem to Estimate Downwind Wildland Fire Smoke for Public Health Applications - Maxwell Enger
55	Viewing the Chromosphere of the Sun in the Near Infrared Spectrum - Joseph Kelly		

Social Sciences

57	The Impact of an Intensive Comprehensive Aphasia Program on Verbal Discourse in Stroke Survivors with Chronic Aphasia - Alyssa Kozlowski	58	The Impact of Participation in an Intensive Comprehensive Aphasia Program (ICAP) on Depression in Patients with Aphasia. - Harley Kincheloe
60	Quality of Life in Stroke Survivors with Aphasia who Participate in an Intensive Comprehensive Aphasia Program (ICAP). - Abigail LeClair	62	Caregivers: Lost in the Rehabilitation Rush - Zoa Phillips
64	Do young children treat a robot as having intentions and being culpable for its actions? - Rachele Barker	66	Factors Influencing Infant and Child Vaccination Rates in Uganda - Aubrey Mullins
68	Quest: Zero Waste by 2050 - Trevor Finney	70	Spatial Variation in Faunal Remains at 48PA551, a Middle Plains Archaic Period Archaeological Site in the Sunlight Basin, Wyoming - Kaylen Gehrke

Oral Sessions - Continued: 4:00 PM - 5:00 PM

(Listed by room, time, title of presentation, and name of primary author)

Social Sciences - Room 326

4:00-4:20pm	Repurposing Wasted Food in Missoula - Lia Volpa
4:20-4:40pm	Context Matters in Children's Reasoning about Confident and Hesitant Individuals - Kali Taylor
4:40-5:00pm	Adopting a Military Strategy for SMB Cyber Security Incident Response - John Williams

Physical/Life Sciences - Room 327

4:00-4:20pm	Research on Farey Recursion - Denise LaFontaine
4:20-4:40pm	Effectiveness of Lure in Capturing Northern Bog Lemmings on Trail Cameras - Keely Benson
4:40-5:00pm	Biotic and Abiotic Associations with Westslope Cutthroat Trout (<i>Oncorhynchus clarkii lewisi</i>) occurrences in the North Fork Flathead River in British Columbia, CA and northern Montana, USA under current and future climate scenarios. - Kadie Heinle

Oral Sessions - Continued: 4:00 PM - 5:00 PM
(Listed by room, time, title of presentation, and name of primary author)

Humanities - Room 330

4:00-4:20pm	Suffrage Sketch: Hattie Lloyd - Jared Gibbs
4:20-4:40pm	May Murphy: The Life of a Montana Suffragist - Natalie Mongeau
4:40-5:00pm	Delia Peets and Women's Clubs in Montana 1890-1930 - Anyssa Queen

Humanities - Room 331

4:00-4:20pm	The Israeli Occupation of the West Bank from 1993 to 2018 - Kelcie Murphy
4:20-4:40pm	The Hands of Death: Public Space and the Street in Gilded Age America - Henry Curtis
4:40-5:00pm	Social Isolation and Loneliness in Older Adults and the Experience of Gratitude and Affection - Elizabeth Sholey

Visual/ Performing Arts & Creative Writing: 4:00 PM - 5:00 PM
(Listed by room, time, title of presentation, and primary author)

Room 332

4:00-4:20pm	Flipped-The Lives of Those with Mental Disorders - Teresa Hoskins
4:20-4:40pm	A Critical Analysis of Tsutomu Ohashi's Score for Akira - Molly Trindle
4:40-5:00pm	The Construction of a Graphic Novel - Emma Thorp

Room 333

4:00-4:20pm	"How Easily Broken": An Accumulating Work about Memory through Theatrical Dance Practices - Kaylee Osentowski
4:20-4:40pm	Genus Miscere: The Discovery of Skin - Katie Conrad
4:40-5:00pm	Frieda Fligelman: Feminist Academic - Marias Blundell

ABSTRACTS (listed by title of presentation)

The following are the complete list of abstracts including author, co-author, & mentor.

A Comparative Analysis between HYSPLIT and WRF-Chem to Estimate Downwind Wildland Fire Smoke for Public Health Applications

Author(s): Maxwell Enger; Deborah Ross

Category: Physical Sciences

Presentation Type: Poster Presentation

Abstract / Artist Statement: Every summer, Montana is faced with wildfires, capable of generating large amounts of pollutants. As fires burn, their smoke plumes produce visible pollution. Environmental variables such as the topography, wind speed, moisture conditions, and amount of fuel contribute to the wildfire conditions and may potentially affect smoke production and dispersal. A variety of models exist to simulate the dispersal of wildfire smoke. The Weather Research and Forecasting - Chemistry (WRF-Chem) model and the Hybrid Single-Particle Lagrangian Integrated Trajectory (HYSPLIT) model are both powerful and widely used models that produce a spatially explicit pollution transport simulation. This analysis compares the results produced by HYSPLIT model and WRF-Chem models, examining the advantages and disadvantages of each model using readily available satellite datasets and ground-based data for evaluation to aid city and country managers that are concerned with the public health effects of wildfire smoke. Both models will be used to calculate smoke trajectory and concentration from the Lolo Peak fire between August 18, 2017 and August 19, 2017. The two simulation outputs will be compared to the MODIS satellite's Aerosol Optical Depth (AOD) data and ground data from a movable ground-observation station deployed for this incident. An assessment of the differences in hourly PM_{2.5} concentrations measured by the MODIS AOD and the ground station to both model estimates will be made. How well each model depicted the location, timing, and emission of the wildfire smoke emitted from the Lolo Peak Fire will be quantified and examined for public health applications.

Mentor Name: Anna Klene, Geography

A Comparative Study of Phonological Processes Between Canadian-French-Speaking and American-English-Speaking Children with Speech Sound Disorders.

Author(s): Carley Stone; Margot Diffendaffer

Category: Social Sciences

Presentation Type: Poster Presentation

Abstract / Artist Statement: Children with speech sound disorders (SSD) produce incorrect speech sounds in observable patterns known as phonological processes. Previous research by MacLeod and Glaspey (2018) showed that children's phonological processes differed based on the child's native language. In their research, MacLeod and Glaspey compared the phonological process inventories of French- and English-speaking children. They found that English-speaking children produce a significantly larger inventory of phonological processes than French-speaking children. The purpose of the current study is to find more specific developmental data for both of the languages by comparing the frequency of phonological processes produced by French-speaking children with speech sound disorders and English-speaking children with speech sound disorders.

The methods for this study included a cross sectional design of French and English-speaking children aged three to six years old. Speech samples were collected from all children using a list of single-word productions during a picture-naming task. Samples were analyzed by tallying the frequency of all phonological processes produced. Comparing the frequency of phonological processes between the two languages provides insight into the phonological similarities of French and English-speaking children with speech sound disorders.

The significance of this study, is that these data can be used by speech-language pathologists to create more accurate, as well as more individualized, assessment and treatment plans for children with speech sound disorders. This data could also reveal universal trends in all language learners and go beyond monolingual children to have implications with bilingual children as well. As the number of bilingual children increase in the United States, it will become increasingly important for speech-language pathologists to understand the phonological processes of languages other than English. Ultimately, additional data on speech sound disorders in multiple languages will improve assessment and treatment for children of all linguistic backgrounds.

Mentor Name: Amy Glaspey, Communication Sciences and Disorders

A Critical Analysis of Tsutomu Ohashi's Score for Akira

Author(s): Molly Trindle

Category: Visual and Performing Arts (includes Creative Writing)

Abstract / Artist Statement: The 1988 film Akira was a groundbreaking work in the history of Japanese animated film. As one of the first Japanese films that became both critically and popularly successful outside of Japan, it has held a unique place in the history of Japanese animated films' rise to mainstream success in the West. Critics and scholars have examined its plot, characters, and structure, but less has been written about its music, which remains one of its most innovative features. The nature of Akira's plot is purposefully shrouded in mysticism, and is consequently very difficult to define. Additionally, it is an adaptation of a much longer manga, so the plot of the film varies significantly from that of the manga. However, the important themes, character arcs, moods, and questions are all present in the film. I argue that the music is largely responsible for carrying these elements in the film. My analysis of musical styles, orchestration, and melodic motives shows that the music is a critical element of the film. The music conveys moods, themes, and other extratextual ideas that couldn't be explored directly in the narrative. The score to Akira carries the audience through the exploratory and thematically complex plot and perhaps most significantly is able to include elements from the manga which were not included in the film itself.

Mentor Name: James Randall, College of Music

A Deep Convolutional Neural Network to Trim Sequence Alignment Overextension

Author(s): Jack Roddy

Category: Life Sciences

Presentation Type: Poster Presentation

Abstract / Artist Statement: Sequence alignment is fundamental to modern molecular biology. Our work addresses an important aspect of sequence alignment – avoidance of incorrect sequence annotation due to alignment overextension. This occurs when software correctly identifies that a substring of one sequence is related (aligns to) to a substring of another sequence, but incorrectly claims that flanking regions of the two sequences are also related. The impact of overextension is substantial - for example, in the annotation of transposable elements in the human genome, we have estimated that 2% of the annotated genome is the result of overextension. Current methods used to combat overextension are only somewhat effective, and can have the unintended consequence of reducing search sensitivity and over-trimming the alignment. We developed a deep convolutional neural network which identifies and trims overextended regions in sequence alignments. We benchmark the trimming using an artificial sequence dataset that mimics transposable elements inserted into simulated genomic sequence. Our results provide a dramatic decrease in overextension with a minimal amount of over-trimming.

Mentor Name: Travis Wheeler, Computer Science

A Software Pipeline for Analyzing Viral Sequences in Bacterial Genomes

Author(s): Conner Copeland; Patrick Secor

Category: Life Sciences

Presentation Type: Poster Presentation

Abstract / Artist Statement: *Pseudomonas aeruginosa* is an opportunistic bacterial pathogen that causes serious infections in individuals with compromised immune systems or conditions such as cystic fibrosis. We discovered that a group of prophages, a type of virus that inserts its genetic sequence into the bacterial chromosome, increases the virulence potential of *Pseudomonas*. To understand why these viral sequences have this effect on *Pseudomonas*, we have developed a software pipeline that identifies and analyzes viral insertions into bacterial chromosomes. This pipeline searches *Pseudomonas* genomes against the sequences of 50 phages known to target the bacterium, recording the length of a match, its location in its host's genome, and which strand it occurs on. In addition to gathering summary statistics, our software generates plots showing which portions of each virus are most often found inserted into *Pseudomonas* genomes; in these graphs, each viral genome is labeled with known protein families and domains. These gathered data will support understanding of prophage insertion patterns and correlation with bacterial virulence, possibly aiding in developing treatment regimes.

Mentor Name: Travis Wheeler, Computer Science

Accountability in Education: Investigating Student Retention One-year-post Environmental Education Program

Author(s): Bridget Creel; Dalit Guscio

Category: Social Sciences

Presentation Type: Oral Presentation

Abstract / Artist Statement: The Clark Fork Watershed Education Program's Restoration Education Program (REP) is a place-based science education curriculum that reaches 5th-8th grade students in the Clark Fork Watershed. The program is 1-week long, consisting of 4 classroom sessions and a daylong field trip and is individualized to classrooms throughout the watershed. The program has two main goals: (1) to help students become lifelong environmental stewards and (2) to help students gain a better understanding of the scientific process and the unique ecology of their watershed after a century of unregulated mining at its headwaters.

Historically, the program has tracked its success through pre-test/post-test evaluation. Students show significant improvements in knowledge of the ecological impacts of historic mining damage within their watershed and favorable shifts in attitude towards science and environmental stewardship.

Now, to investigate the long term impacts of REP we are assessing how Missoula County Public Schools (MCPS) 6th grade students retain the knowledge gains and attitude shifts they showed in 5th grade post-tests. Retention research is key to keeping education programs accountable to their long-term goals and unfortunately, is rarely practiced. We will show the trend in knowledge and opinion shifts from 5th grade pre-tests to 5th grade post-tests to 6th grade retention tests. Additionally, to control for student development and general knowledge gains from 5th to 6th grade, we will compare the performance of MCPS 6th-graders with the performance of 6th grade students within the Clark Fork Watershed who did not receive REP in 5th grade.

Through this research, we will achieve two main goals specific to the program: (1) a tangible measure of the efficacy of REP on a long-term basis and (2) an opportunity to gain insight on how REP could be improved to increase knowledge retention. On a larger scale, through this retention research, we hope to provide insight into the long-term impacts of place-based environmental education.

Mentor Name: Dalit Guscio, Division of Biological Sciences

Adopting a Military Strategy for Small and Midsize Business Cyber Security Incident Response

Author(s): John Williams; Austin Martinez; Sam Bartsch

Category: Social Sciences

Presentation Type: Oral Presentation

Abstract / Artist Statement: Responding to data breach incidents are a significant concern for businesses of all sizes and industry sectors. Recovering from these incidents is particularly challenging for small to midsize businesses (SMB) due to the limited support staff and institutional knowledge of incident response strategies for cyber attacks. Incident response is an

organized approach to addressing and managing the aftermath of cybersecurity data breach attacks by information technology (IT) professionals. Military strategies present a unique opportunity for improving cybersecurity incident response. This case study examines incident response documentation of data breaches occurring at SMBs using the lens of military strategy. Industry best practices and the military strategies of Observe, Orient, Decide, and Act (OODA, Boyd, 1978) and The Art of War (Tzu, 5 BC) are used as frameworks for the analysis of cybersecurity incident response. The study seeks to answer the central research question of whether incident response for SMBs can be improved when a military strategy is employed.

Mentor Name: Tom Gallagher, Applied Computing and Engineering

Altering Cough Reflex Sensitivity with Aerosolized Capsaicin Paired with Behavioral Cough Suppression

Author(s): Claire Malany; Sarah Popp; Sarah Campbell; Emma Bozarth; Serena Haller; Jane Reynolds

Category: Life Sciences

Presentation Type: Oral Presentation

Abstract / Artist Statement: The feasibility of treating patients with cough hypersensitivity with a progressive desensitization model was suggested to be effective through our preliminary study conducted last year. We exposed five healthy participants to progressive doses of aerosolized capsaicin, a known cough stimulant, while implementing cough suppression strategies. All five participants achieved a reduction in cough sensitivity following treatment. We will now use the same research model with patients with chronic refractory cough (CRC). The study will commence in three phases. The baseline phase will consist of the following measures: (1) cough sensitivity testing using increasing concentrations of pharmaceutical-grade aerosolized capsaicin, delivered via a Koko digidoser with nebulizer. We will determine the capsaicin concentration that causes two coughs (C2) and five coughs (C5); (2) cough-related quality of life with the Leicester Cough Questionnaire (LCQ); and (3) 24-hour cough frequency measured with surface electromyography of the abdominal muscles. Participants will then be randomly assigned to treatment or placebo group. The Treatment phase will consist of 5-6 treatment sessions, during which participants will be exposed to increasing concentrations of aerosolized capsaicin (treatment) or aerosolized saline (placebo). Participants will implement behavioral cough suppression techniques after each exposure. In the post-treatment phase, the same outcomes measured used in the baseline phase will be measured at one and three-weeks post-treatment. We hypothesize, participants in the treatment group will have higher C2 and C5 scores (i.e., less cough sensitivity), and higher LCQ scores, following treatment.

Mentor Name: Laurie Slovarp, Communicative Sciences and Disorders

An Old Man's Eulogy, A Young Republic's Hymn: Weimar Patriotism and the Murder of Walther Rathenau

Author(s): Ronan Kennedy

Category: Humanities

Presentation Type: Oral Presentation

Abstract / Artist Statement: On June 27, 1922, the state funeral procession of Walther Rathenau, the German foreign minister, made its way through the Brandenburg Gate down Unter Den Linden, the famous Berlin avenue that Berlin's sympathetic crowds now filled. Three days earlier, anti-semitic terrorists had publicly murdered Rathenau in an attempt to derail the Weimar Republic, the democratic government that succeeded the fallen German empire. In numerous local newspapers, writers eulogized Rathenau, but also expressed their support for the democratic, worldly values the republic embodied. Germans expected the Berlin press to voice its support, but they were surprised by the coverage the provincial press organs afforded Rathenau's death. Before his death, Baden, a Catholic, Alemannic speaking region in the southwest, had only covered the fallout of the First World War and local news; after Rathenau's death, the Baden press's stories, coverage, and writing now reflected political identification with the republican system. Therefore, Rathenau's death marked a distinct turning-point in the manner in which Baden newspapers covered political and cultural life in Germany and the world. Through research in German of Baden's Weimar-era newspapers and of secondary literature, this paper explores the turning point or "Wendepunkt" and the birth of "Weimar Patriotism," that is, political identification with the Weimar Republic and embrace of its cosmopolitan, classically liberal values. Through analyzing the fallout of Rathenau's death on a micro-historical level, this paper posits that Rathenau's death created social traction for Weimar Patriotism in all of Germany and brought the country to mobilize in favor of the

republic, reconciling democracy and “Germanness” and therefore legitimizing the republic. It also addresses the ultimate lesson that Weimar’s fall does not reflect lack of support or an unfeasible system; rather Weimar’s fall exhibits a haunting lesson regarding the consequences of a growing belief in inevitability.

Mentor Name: Robert Greene, History

Analyzing the Impact of Protective Factors on the Resilience of Middle School Students

Author(s): Ruth Minix

Category: Social Sciences

Presentation Type: Poster Presentation

Abstract / Artist Statement: When discussing risk and protective factors affecting children, the topic of resilience is brought up extensively. One of the programs targeting various factors relating to resilience is the Kaleidoscope Connect Program. Among the seven factors targeted by Kaleidoscope Connect are protective factors, which relate to beliefs, values, and behaviors, such as empathy and self-regulation (identified as yellow phactors), number of supportive adults (identified as red phactors), as well as risk factors such as negative peers or a lack of supervision (identified as blue phactors). The goal of this research project is to assess the efficacy of the Kaleidoscope Connect program with middle school students. The data has been gathered from a longitudinal study conducted with students from Western Montana. I will use and analyze data from self-report rating scales, including the Resiliency Scales for Children and Adolescents (RSCA) and the Student Support Card. I will examine Student Support Card data (blue and yellow phactors) and compare their RSCA resilience scores with students who are low in yellow resilience “phactors” and high in blue risk “phactors.” In addition, I will also examine the number of supportive adults in their lives (red phactors) and compare this to their RSCA scores. I will utilize the data collected from students who have completed at least two full years in the program. Since the incidence of teen suicide in Montana is very high relative to the national incidence of suicide, it is pivotal to intervene with and support students as early as possible. Kaleidoscope Connect aims to help professionals in the school setting to provide students with key assets of resilience to effectively deal with crises when they occur.

Mentor Name: Jacqueline Brown, School Psychology

Are Machiavelli and Plato more similar than once understood?

Author(s): Marley Clark

Category: Humanities

Presentation Type: Oral Presentation

Abstract / Artist Statement: Initially, many would consider Machiavelli to be a cold realist and Plato, a starry eyed idealist. In *The Prince*, Machiavelli describes the expectations for the ideal ruler in ways that have typically been considered cunning and even ruthless. In the simplest of terms, Machiavellian theory can be described as advocating for “whatever means necessary to maintain political power.” Realism is deeply rooted within Machiavellian prose, at least on a superficial level. In stark contrast to the cynical, self-interested teachings within *The Prince*, in *The Republic*, Plato promotes an idealist interpretation of political theory which focuses on how society ought to be. Plato presents definitive explanations for justice, the ideal society and the ‘just’ individual. Plato’s high expectations for the human spirit and society is easily considered idealistic, even fanciful. The crux of Plato’s *Republic* involves Socrates describing his “ideal city state” which is a utopian society that is ruled by the philosophers of the community. Plato’s critics find his argument are whimsical, bordering on absurd. While Plato’s idealism is everywhere in evidence, his ‘realist’ observations about human nature are pertinent to his political theory. In my research paper, I will argue that both political theorists are more complicated and, consequently, more similar than many commentators acknowledge. By analyzing Plato’s *The Republic* and Machiavelli’s *The Prince* and *The Discourses*, I hope to show how Machiavelli and Plato share some similarities despite their major differences. I will be arguing that Machiavelli is more idealistic and Plato more realistic than frequently regarded, and indeed the two political theorists are more similar than commonly believed.

Mentor Name: Ramona Grey, Political Science

Assessing the Effects of Culling as a Management Tool for Urban Mule Deer

Author(s): Hamilton Platt

Category: Life Sciences

Presentation Type: Oral Presentation

Abstract / Artist Statement: Cities and towns are expanding across the western United States into areas of historic wildlife habitat. Many species such as white-tailed deer, mule deer, and even elk are adapting to effectively live alongside humans in urban areas. However, animals and humans living in close proximity often creates problems with public safety as animals can become aggressive to people or damage property. Our study looks at how the City of Helena, Montana is managing a population of overabundant urban mule deer (*Odocoileus hemionus*) using culling in order to reduce population density. We used distance sampling data to determine that the population density of mule deer in Helena has fallen significantly since the culling program was implemented. We also found that the amount of deer-human conflict that was reported to the Helena Police Department was directly correlated with mule deer population density. This supports the conclusion that culling is an effective tool for reducing population density of, and therefore conflict associated with, overabundant urban ungulates. However, we also found that the effort and cost required to remove each deer was quite variable year-to-year, but tended to increase over time as the deer became trap-wise. This suggests that while culling may be an effective tool to reduce these populations initially, cities may want to look into a combination of immunocontraceptives and targeted culling for long-term population management.

Mentor Name: Chad Bishop, Wildlife Biology

Assessing the Efficacy of a Qualitative Approach for Monitoring Vegetation Responses After Floodplain Restoration

Author(s): Dylan Branscum; Laura Long; Abigail Zenner

Category: Life Sciences

Presentation Type: Oral Presentation

Abstract / Artist Statement: The United States spends over one billion dollars annually on riparian ecosystem restoration. Given this large investment, there is a need to understand whether or not restoration projects are successful. Towards that end, some projects and programs invest in effectiveness monitoring, as way to determine if the project goals are being met, but the extent to which it is actually useful depends on the adequacy of the sampling design. Despite this, little work has been done to assess the adequacy of sampling designs for even the most common monitoring programs, and there is little information about the costs and benefits of intensive quantitative versus rapid qualitative approaches. To improve understanding of effective sampling designs for monitoring, we 1) assessed observer error associated with a qualitative monitoring protocol (the Qualitative Rapid Assessment (QRA) and 2) compared observer error between the QRA and a quantitative design. Both methods used had high observer error, however we found that the qualitative approach had slightly less variation among observers than the quantitative approach. The modified QRA had a mean observer error of 72.80% and the quantitative method had a mean observer error of 92.30%. The QRA protocol could be altered to reduce observer error by adding a category for zero, creating uniformly sized and distinguished categories, and providing more in depth instructions, training and calibration of all data collectors.

Mentor Name: Cara Nelson, Ecosystem and Conservation Sciences

Beetle Ballads

Author(s): Ty Morgan; Cole Sander; Chelsey Caldwell

Category: Life Sciences

Presentation Type: Poster Presentation

Abstract / Artist Statement: Purpose: Field studies of Asian rhinoceros beetles have uncovered a potentially uncommon mating mechanism. Despite engaging in intense combat to access females, males still require winning female favor through intense courtship. Courtship consists of intense, concentrated movements and stridulations performed both before and after physical

contact. The crafted “songs” for potential mates seem to consist of 2 distinct song elements directly related to specific abdominal motions and have yet to be analyzed. By quantifying the elements of these songs and courtship behavior itself, and relating courtship to relative male condition, I aim to identify the deciding factors in beetle mating.

Methods: High quality video and audio recordings were taken between potential mating pairs of male and female Asian rhinoceros beetles in a confined, soundproof environment. Using sound analysis software, I analyzed these recordings to identify distinct song elements and characteristics of sounds produced like frequency. I then related the performances to measurements taken of beetle weight, size, and horn length, to ascertain proper relationships and identification of the “attractive” elements enticing females to mate.

Significance: Via observations using sound analysis software, courtship songs seem to contain a male preferred, energetically favorable element and an uncommon, female preferred energetically taxing element. This suggests that females may be selecting male mates based on condition related traits, and reveals the true complexity of what is considered a traditional resource defense mating system.

Mentor Name: Jillian DelSol, Division of Biological Sciences

Behavioral Impacts of Octopamine Release on a Global vs. Local Scale

Author(s): Thomas Bisom

Category: Life Sciences

Presentation Type: Poster Presentation

Abstract / Artist Statement: Out-of-context aggression is being recognized more in disease and injury states. In the Certel Lab, we are using *Drosophila melanogaster* as a model organism to understand the cellular mechanisms that regulate aggression, and we are particularly interested in the roles of neuromodulators, such as monoamines, in regulating aggression. Monoamines are released at synaptic sites via synaptic vesicles, but they are also released at extrasynaptic sites, such as the cell body, via large dense-core vesicles (LDCVs). In *Drosophila*, the monoamine octopamine (OA) is similar in structure and function to norepinephrine, and it is required for male aggression. In the current study, the relevance of OA release at the synapse in promoting *Drosophila* male aggression was tested, with the hypothesis that shifting release of OA away from the synapse to release on a widespread, global scale would impact aggression. To achieve this shift, OA was primarily released from LDCVs instead of synaptic vesicles, and this was accomplished through expression of a mutant *Drosophila* vesicular monoamine transporter (dVMAT), which involved a substitution of tyrosine 600 of dVMAT for alanine (Y600A dVMAT). Y600A dVMAT was expressed in OA neurons using the GAL4/UAS system, and aggressive behaviors measured were lunges and wing threats. Latency to lunge, which at large values can indicate decreased aggression, was also measured. Courtship, measured as a wing extension coupled to a secondary courting behavior, was also scored. No significant differences in courtship were observed between control and experimental flies, but compared to controls, experimental flies exhibited significant decreases in all of the measured aggressive behaviors. Also, latency to lunge was significantly increased in experimental flies. These results demonstrate that synaptic release of OA is required for male aggression, but synaptic release of OA from OA neurons is not required for courtship behaviors, suggesting important functional considerations for OA release sites.

Mentor Name: Sarah Certel, Biological Sciences

Behavioral Plasticity to Reduce Camouflage Mismatch in Snowshoe Hares

Author(s): Lindsey Barnard

Category: Life Sciences

Presentation Type: Oral Presentation

Abstract / Artist Statement: Individual behaviors in wild animals play an important role in how they respond to environmental changes. Behavioral plasticity can allow species to adapt to changes quicker than they would be able to do genetically. Snowshoe hares seasonally molt from a brown pelage in the summer to a white pelage in the winter. This coat color change allows them to maintain camouflage needed for survival. Climate change threatens snowshoe hares by increasing the number of days

individuals are white on a brown background, and thereby increasing the likelihood of predation. It is unknown whether or not snowshoe hares can genetically adapt as quickly as climate change is occurring. Behavioral plasticity is a possible mechanism for this species to quickly adapt to fewer days of snowpack. I tested whether or not snowshoe hares can recognize their own camouflage mismatch and select ground cover that matches their coat color. Treatments included the presence and absence of a simulated predator. I placed individual snowshoe hares in 8x8 foot pens with 50% brown ground cover and 50% white ground cover. Using surveillance cameras, the hares were monitored for 48 hours to determine which color background they chose. I then placed a domestic cat (contained in a kennel) in the pen for five minutes to simulate a stress response. From this data, I tested if snowshoe hares are able to select backgrounds and behave in ways that would increase their likelihood of survival in the face of climate change.

Mentor Name: Scott Mills, Research and Creative Scholarship

Biotic and Abiotic Associations with Westslope Cutthroat Trout (*Oncorhynchus clarkii lewisi*) occurrences in the North Fork Flathead River in British Columbia, CA and northern Montana, USA under current and future climate scenarios.

Author(s): Kadie Heinle; Clint Muhlfeld; Vincent D'Angelo; Amber Steed; Mark Hebblewhite

Category: Life Sciences

Presentation Type: Oral Presentation

Abstract / Artist Statement: Westslope Cutthroat Trout (*Oncorhynchus clarkii lewisi*; hereafter WCT) are an economically and ecologically important trout subspecies in western North America. WCT populations are declining across much of their native range due to threats such as habitat degradation and climate change. Understanding how habitat characteristics impact distributions of WCT populations throughout relatively pristine ecosystems is needed to inform management and conservation efforts. We analyzed field habitat data, fish presence/absence data, and temperature predictions from Jones et al. (2017)'s stream temperature model in a logistic regression analysis of WCT presence throughout tributaries of the North Fork Flathead River in northern Montana and southern British Columbia, CA. We analyzed a host of biotic (Bull Trout – *Salvelinus confluentus*, BT) and abiotic (average gradient, pool density, large woody debris density, and mean August stream temperature predictions) factors to assess their effect on WCT presence throughout the study system. We compared models using Akaike Information Criterion (AIC), Area Under the Receiver Operating Curve (AUC), misclassification rates, and classification and regression tree models. WCT were widespread throughout the 291 reaches analyzed (present in 203 of 291 reaches). BT presence and average gradient were negatively associated with WCT presence in the best performing model. To predict future presences, we removed potential habitat for BT and WCT if mean August temperatures exceeded 14°C and 18°C, respectively. Given our negative reach scale associations of BT and WCT, we assumed that if BT were extirpated WCT would move into the reach if it did not exceed WCT thermal tolerances. Under the moderate emissions future scenario (RCP4.5 in Jones et al. 2017), WCT presence is predicted to increase by 5.5% in 2035 and 8.0% in 2075 from base predictions. Under the more extreme scenario (RCP8.5 in Jones et al. 2017), WCT presence is predicted to increase by 6.5% in 2035 and 12.3% in 2075 from base predictions.

Mentor Name: Lisa Eby, W.A. Franke College of Forestry and Conservation

Border Walls in Montana: Immigration and Integration in Missoula

Author(s): Schrielle Standish

Category: Global Leadership Initiative (GLI)

Presentation Type: Oral Presentation

Abstract / Artist Statement: The global refugee crises and migration movements polarize domestic and international politics. Our research analyzes the meaning, history, current examples and comparative differences between assimilation and integration in Japan, America, Morocco and France. We examined various sources and conducted interviews with experts on migration and politics in addition to immigrants living in the Missoula community. Based on this research, we wished to explore and highlight further the difference between integration and assimilation. To share this research with the larger Missoula community, we will

take and display photographs of local refugees, international students, and other immigrants in their daily lives and present the interviews we previously conducted at an art exhibit downtown during the First Friday celebration in April. Montana's geographical isolation fosters an isolationist mentality which can inhibit understanding the implications of immigration and refugee crises. Because daily experience with other cultures in Montana is relatively limited when compared with larger cities in the US, we hope to open the eyes of those who may not have ever come in contact with a person from a foreign country. We wish to provide our audience with visual images so they may draw their own conclusions through their individual interpretation. And we hope to foster positive discussion around what is today a contentious subject. By displaying photographs and presenting the interviews of immigrants here in Missoula, we hope to humanize their struggles, celebrate in their successes, and enhance the understanding of immigration in our community.

Mentor Name: Ramona Grey, Political Science

Bug Bites: Eating Insects on Purpose!

Author(s): Ellie Gluhosky; Lauren Clark; Kaitlyn Anderson; Spencer Lachman; Sarah Lutch; Dakota Vaccaro

Category: Global Leadership Initiative (GLI)

Presentation Type: Oral Presentation

Abstract / Artist Statement: Entomophagy, the human consumption of bugs, is widely practiced around the world. The United States remains one of the few places where entomophagy is relatively unknown and unpracticed. This may be due to the fact that many Americans are taught that eating insects is not safe and even disgusting. However, several studies have shown that eating insects is not only safe, but is in many ways a more sustainable food source than other forms of animal protein and has the potential to play a role in preventing food security concerns. So why do Americans continue to be repulsed by the concept of eating bugs and how can we encourage the general public to embrace an entomophagous diet? To address this socially misconstrued concept, we developed entomophagy-based lesson plans to educate youth by exposing students to the concept of entomophagy, its benefits, and its world prevalence.

We first conducted a literature review and interviewed educational experts from UM's education program, the Missoula Insectarium, and the Natural History Center. With their help, we developed lesson plans for 3rd - 5th graders, complete with pre- and post-tests to gauge students' attitudes toward entomophagy and determine lesson plan efficacy. After testing and editing, we will share the lesson plans with Missoula area educational programs that will give the plans a "home" and be put to use. Our group's end goal is to build upon the limited volume of entomophagy curricula while inspiring students to consider the environmental impact of their food sources.

Mentor Name: Eva Rocke, UM Sustainability

Canis Lupus (Gray Wolf) Pup Survival Rates in Yellowstone National Park

Author(s): Anne Jehle

Category: Life Sciences

Presentation Type: Poster Presentation

Abstract / Artist Statement: The aim of this study is to describe *Canis lupus* (gray wolf) pup survival rates throughout the summer months in Yellowstone National Park. Understanding pup survival has implications for trends in pack and population age structure, cooperative breeding ecology and other breeding tendencies, social hierarchies, and population fitness, among other elements of species-specific population ecology. A general understanding of trends in pup survival is also relevant to state and federal land that allow grey wolf harvest. Understanding such trends and survival ecology give managers and biologists the opportunity to evaluate gray wolf populations at a more comprehensive level and implement more effective management strategies. This study will analyze how pup survival rates vary temporally and spatially primarily throughout Yellowstone's Northern Range. Data is quantified using field notes from Yellowstone's Wolf Project staff, focusing on the months May through September, and years 2009 and 2010. The data was originally collected and recorded from direct observation of wolves by Wolf Project staff and other diligent citizen scientists. Using this data, the study quantifies number of breeding wolf packs observed,

annual counts of recruited pups, and pup survival rates specific to each pack and population-wide. The report will also provide spatial information specific to Yellowstone regarding temporal trends in pup survival by pack affiliation, resulting in a variety of visual maps.

Mentor Name: Mark Hebblewhite, Wildlife Biology

Cardiovascular Responses to Woodsmoke Inhalation During Exercise

Author(s): Kesley Wood; Toria Woodin; Selene Tobin

Category: Life Sciences

Presentation Type: Poster Presentation

Abstract / Artist Statement: Summers in the Rocky Mountain West are notorious for wildfires. By virtue of event frequency, inhalation of woodsmoke particulate matter (PM) may potentially impact cardiovascular health. While field based studies have provided some insights, well controlled lab studies that quantify cardiovascular function before and after smoke inhalation are the next step. In order to better understand the physiological effects, we examined autonomic-sensitive cardiovascular responses to exogenous particulate during exercise using lab simulated exposure to filtered woodsmoke (Western Larch dried to 15% water content). High heart rate variability (time difference between cardiac cycles in an ECG) and low pulse wave velocity (“PWV”, the speed at which a cardiac impulse is transmitted through arteries) are two metrics of cardiovascular autonomic control that are indicative of good health. Two exercise trials at 70% VO₂max cycling for 45-minutes, with smoke (PM 2.5 μ m, “WS” at 250 μ g/m³) or without smoke (PM 2.5 μ m, “CON” at 0 μ g/m³) were performed with a randomized, cross-over design (n=5). WS and CON trials were separated by one week with significance occurring at p a priori. Exercise bouts were confirmed identical for each trial (Watts, HR, and RPE). Key dependent outcomes measured pre-exercise (“PE”), immediately post exercise (“IP”), and 90-min post-exercise (“90-P”) include Heart Rate Variability (low/high frequency, “L/F”), and PWV. We found an increase in L/F (IP CON=2.42 \pm 0.855, IP WS=5.26 \pm 1.67; p=0.030), and increased PWV (IP CON=5.51 \pm 0.70m/s, IP WS=7.45 \pm 2.26m/s; p=0.030). These findings demonstrate that smoke exposure influences autonomic tone to alter HRV and PWV measures. Study outcomes suggest implications for long term cardiovascular health, but further examination is required. Funded by USDA Forest Service 18-CR-11138100-023 (JQ).

Mentor Name: John Quindry, Health & Human Performance

Caregivers: Lost in the Rehabilitation Rush

Author(s): Zoa Phillips

Category: Social Sciences

Presentation Type: Poster Presentation

Abstract / Artist Statement: Title: Caregivers: Lost in the Rehabilitation Rush

Purpose: The purpose of this retrospective analysis was to investigate the effect of counseling intervention on psychosocial well-being for caregivers of people with aphasia (PWA) in the context of an intensive comprehensive aphasia program (ICAP).

Methods: Participants include eight patients with aphasia and their family caregivers who participated in the summer 2018 intensive comprehensive aphasia program (ICAP) at the University of Montana. Prior to and immediately following treatment, all participants underwent comprehensive cognitive-linguistic and psychosocial evaluation. The ICAP included 4.5 hours of treatment per day, 4 days per week, for 4 weeks. ICAP treatment included individual, group, and technology-based speech and language therapy sessions for PWAs. Family caregiver education sessions were provided once per week by speech-language pathologists, and family caregiver group counseling sessions occurred twice weekly by a licensed family counselor. Caregiver outcomes were measured by the Beck Depression Index, Second Edition (BBDI-2) and the Beck Hopeless Scale (BHS). Results and implications of these measures will be discussed.

Significance: The significance of this project is multifaceted. The ICAP treatment model is relatively unexamined, and the ICAP at the University of Montana is the only ICAP with an interdisciplinary collaboration between speech-language pathology and

licensed family counseling to address caregiver outcomes. Caregivers need professional counseling to help them cope with the burdens of caregiving and to improve the communication between the caregiver and the PWA. Evidence suggests that caregivers who have peer support have improved psychosocial well-being and feel less socially isolated. By including the caregiver in the recovery process, professional counseling can help aid in the communication of the family cohort, creating an improved environment in which the person with aphasia can recover. Researching counseling outcomes will allow healthcare professionals to provide the highest quality of care for the family unit.

Mentor Name: Catherine Off, Communicative Sciences and Disorders

Characteristics of Grizzly Bear Attacks on Humans: A review of grizzly bear and human interactions resulting in injury or fatality in the lower 48 states

Author(s): Megan Robbins

Category: Life Sciences

Presentation Type: Oral Presentation

Abstract / Artist Statement: Grizzly bears have been a major topic in the U.S. this year with the overruling of their delisting from the Endangered Species Act (ESA). Public concern and imminent management decisions require a clear understanding of human-bear conflicts. It is important to understand the factors of grizzly-caused human injuries and fatalities so that wildlife managers can mitigate public risk and better determine appropriate population sizes. This information will also be valuable in educating the public on situations that might increase the likelihood of grizzly bear conflict. At this time reports about grizzly attacks on humans in the lower 48 states are not compiled and there has been no recent analysis of the characteristics of these conflicts. I will review newspaper reports for information on grizzly bear attacks on humans in the lower 48 states, specifically Montana, Wyoming, Idaho and Washington. I will use a combination of online newspaper databases and indexed periodicals to collect data back to 1975. I will also contact government agencies in the study area to gather further information. Each human-bear conflict will be categorized as having one of four encounter outcomes; attack (injury), attack (mortality), bear deterred or bear mortality. I will also gather information on variables surrounding the attack, like habitat type, time of day and human group size. To analyze these data, I will first summarize data with simple frequencies and proportions. I will use linear regression analysis to investigate change in number of attacks overtime compared to change in human and grizzly populations. Then I will complete a logistic regression analysis to assess the importance of covariates in explaining the difference in attack outcomes.

Mentor Name: Joshua Millsaugh, Wildlife Biology

Clara Moore Sherley Tower: Forgotten Montana Suffragist

Author(s): Emmett Ball

Category: Humanities

Presentation Type: Oral Presentation

Abstract / Artist Statement: The story of American Suffragists is often condensed to a short list of notable figures, glazing over the tireless efforts of women advocating for voting rights in their communities. Within Montana, there is a rich history of women's activism beyond our beloved Jeanette Rankin. My research project is designed to contribute to an online suffrage database overseen by The Center for the Historical Study of Women and Gender. I have conducted research on Mrs. Clara Sherley Tower, president of The Montana Woman's Suffrage Association from 1903 to 1909. I conducted my research through combing online genealogy databases, census records, and consulting historical written records such as local newspapers. I have compiled a comprehensive narrative of the life of Mrs. Tower, and her significant contributions to the plight of both Montanan and national women's suffrage. Her activism showcases the significance of local organizers, as well as the close ties between suffrage and twentieth century progressivism.

Mentor Name: Anya Jabour, History

Climate Change and Groundwater Access Provisions in Native American Water Rights Settlements

Author(s): Marea Kuehl

Category: Social Sciences

Presentation Type: Oral Presentation

Abstract / Artist Statement: In the United States, access to use water comes in the form of legally allocated rights to specific quantities from specific sources. On Native American reservations, this legal process has often been absent. Through tribal water rights negotiations and settlements, the United States government has attempted to determine the access rights and quantities available to tribes on and around their reservation lands. Over the past 50 years, many Native American tribes formally settled outstanding water rights claims through a combination of state court adjudications and congressional legislation. This paper explores provisions built into settlements that address the rapidly changing water supplies available to Native American tribes considering climatic changes and groundwater allocations. Climate change, specifically across U.S. tribal lands, threatens to significantly alter the timing and availability of surface and groundwater supplies. How tribal water rights settlements provide flexibility to deal with this is unknown, as they generally lock in water use at a specific flow rate and purpose for the foreseeable future. I employed a policy analysis approach to this question, first exploring Native American water rights settlements enacted between 1977 - 2017 to identify language in each settlement pertaining to climate change and/or groundwater. Next, I looked at this language and language in associated administrative documents and asked how a focus on climate change and groundwater supplies varied in settlements between these years. I hypothesize that through time, awareness of the impacts of climate change increase in settlement language and provisions, but are moderated by factors including water right size and the location of the tribe or reservation. By engaging in a comprehensive analysis of Native American water rights settlements, we take a step toward better understanding the role of these agreements in helping or hindering tribes as they prepare for an uncertain water future.

Mentor Name: Brian Chaffin, Society and Conservation

Comparing Ocean Tidal Models

Author(s): Bodhi Landry-Stahl

Category: Physical Sciences

Presentation Type: Poster Presentation

Abstract / Artist Statement: Two factors govern Earth's elastic response to the periodic redistribution of ocean tides: properties of the crust and upper mantle and the weight of the ocean water loading the surface. Using models for Earth structure and the ocean tides, it is possible to predict surface displacements caused by the tides. I hypothesize that the world's ocean-tide models agree well with one another in the open ocean but disagree at locations with complex coastlines and bathymetry. Tidal models for the open ocean generally have better empirical constraints from satellite altimetry compared to a coastal environment. To test my hypothesis, different ocean tidal models were compared to determine where in the world ocean-tide models differ the most. This was done to identify locations where Global Position System (GPS) observations might be used as an additional dataset to improve the tidal models. Utilizing comparisons between the predicted surface displacement and GPS measurements, it may be possible to put tighter constraints on the ocean-tide models. The tidal models provide estimates of the phase and amplitude of the ocean tide globally. Models with different resolutions have inherent discrepancies because lower resolution models do not have as many data points compared to higher resolution models to sample regions with changing coastlines and bathymetry. Before calculating differences between models I converted amplitude and phase into real and imaginary components and 'rescaled' the higher resolution model to match the scaling of the lower resolution model. After calculating the difference, I converted the real and imaginary differences back into amplitude and phase. I plotted the amplitude onto an interactive global map so I could zoom in on particular regions and visually determine where the models are the most discrepant. I found the models to be most discrepant in coastal regions.

Mentor Name: Hilary Martens, Geoscience

Context Matters in Children's Reasoning about Confident and Hesitant Individuals

Author(s): Kali Taylor; Allison Beall; Caitlin Ryan; Shailee Woodard

Category: Social Sciences

Presentation Type: Oral Presentation

Abstract / Artist Statement: Children often treat confident individuals as credible sources of information. Yet, confidence may differentially signify credibility depending upon the domain of knowledge. When dealing with factual information, confident responses indicate greater credibility. However, when deliberating about moral issues, hesitancy may reflect a deeper level of thoughtfulness, and therefore credibility. This study investigated children's judgments of and reasoning about individuals who differed in the level of confidence (confident, hesitant) in two domains of knowledge (factual, moral).

In a between-subjects design, children 3-8 years (N=96) listened to confident and hesitant models make either novel factual (e.g., which animal has an omentum inside?) or moral claims (e.g., which animal should get the last piece of fish?). Across eight trials (4 confident, 4 hesitant), children rated the models on a 4-point scale (0=not at all, 3=a lot) in terms of confidence level, likeability, smartness, and agreement with answer. We further questioned participants regarding the reasoning underlying their judgments on the smartness and agreement with answer questions.

Preliminary analyses indicate children preferred the confident individual when learning factual information, but not when deliberating about moral claims. The reasoning data is the focus of the current work. An official coder is currently coding the full data set. An independent coder is re-coding 30% (randomly selected) of the data to establish reliability of the coding scheme. We will analyze the types of reasoning children use based on model's level of confidence (confident, hesitant) and the domain of knowledge (factual, moral).

This research will shed light on children's ability to evaluate an informant's credibility depending upon the context, and the reasoning underlying those judgments. This research will advance knowledge in how and why children use confidence cues about individuals' credibility when determining who is a trustworthy source of new information.

Mentor Name: Rachel Severson, Psychology

Controlling gene function with dual-coding exons: exploring patterns of conservation and expression

Author(s): Sarah Walling

Category: Life Sciences

Presentation Type: Poster Presentation

Abstract / Artist Statement: Genes are encoded in our chromosomes by DNA, and are typically made up of multiple segments called exons. A single gene can encode different protein products through a mechanism called alternative splicing, in which each protein product is constructed using a different subset of those exons. These alternatively spliced proteins are produced in different tissues or developmental stages, and changes to an exon can cause errors in a subset of these proteins, resulting in genetic diseases or cancer. The research here investigates a largely unrecognized form of alternative splicing in which a single exon encodes two alternative protein products. (The change in protein is usually the result of shifting the exon boundary by one or two nucleotides, which results in different protein sequence because protein amino acids are encoded using DNA triples called codons; a shift by one or two positions causes all subsequent amino acids to change). Previously thought to be a rare phenomenon in the human genome, recent work in our lab has found that ~13% of human genes show evidence of this dual-coding function. We investigated the conservation of the dual-coding nature of these exons, finding that they are highly conserved in mammals. To understand tissue-specific expression levels of the variant exons, we used a combination of preexisting tools and custom scripts to analyze a dataset of RNA sequences sampled from 13 tissue types across 714 individuals, and found that both protein variants were present at high levels in various tissues. We further investigated the relative abundance of the variants. Analysis of tissue-specific expression will support deeper understanding of relationship between dual coding exon expression and specific diseases.

Mentor Name: Travis Wheeler, Computer Science

Delia Peets and Women's Clubs in Montana 1890-1930

Author(s): Anyssa Queen

Category: Humanities

Presentation Type: Oral Presentation

Abstract / Artist Statement: I will explore the role of Delia Peets, a resident of Butte, Montana, in women's organizations in the area from the 1890's to 1930. I conducted research in federal census records, Montana city directories, Silver Bow County marriage records, records from the Montana State Historical Society, local newspapers, books, journals of the Grand Army of the Republic, journals from the National Convention of the Women's Relief Corps, and Archives and Special Collections at Mansfield Library. My research on Delia Peets focuses on her extensive involvement in various women's clubs in Montana and their effect on the suffrage movement, particularly until Montana women were given the right to vote in 1914. These include prominent organizations such as the Women's Relief Corps and the Consumer's League, both of which had connections to the movement nationally. This brings attention to not only Delia Peets herself, but to the women involved in these Montana organizations and their influence overall in the state. A focus on lesser know Montana activists is essential for a deeper understanding of the suffrage movement in the state, and women's history as a whole.

Mentor Name: Anya Jabour, History

Dependence of Photosystem II Water Oxidation on Hydrogen Bond Stabilization of the Substrate: a Proposed Computational Experiment

Author(s): Christopher King

Category: Physical Sciences

Presentation Type: Poster Presentation

Abstract / Artist Statement: The ability of plants to take in water and release oxygen into the atmosphere is crucial to the survival of life on Earth. During photosynthesis, water is oxidized to O₂ (dioxygen) at the Oxygen Evolving Complex (OEC) of Photosystem II. Since this process is the epitome of environmentally sound energy production (its only by-product is O₂), a major focus of bioinorganic chemistry research is on the development of an efficient artificial water oxidation catalyst. Unfortunately, the exact chemical mechanism by which the oxidation proceeds is not well understood, greatly complicating the process of designing such a catalyst. I believe I have come across a previously overlooked feature of the OEC which could be necessary for efficient water oxidation. Specifically, the oxygen atoms between each metal atom in the complex appear perfectly positioned to hydrogen-bond to the H atoms of a water molecule, holding the water molecule in place while it is being oxidized. Currently, a review of existing proposed mechanisms is being conducted to determine which fits best within the principles of physical inorganic chemistry. In the second phase of the study, a computational experiment will be designed to probe the effect of hydrogen-bonding stabilization on the efficiency of the OEC.

If this hypothesis is correct, it could have great implications for the development of renewable energy technology. Any biomimetic catalyst should include the most important structural features of the enzyme that inspired it. If hydrogen bonding at the oxo bridges of the OEC greatly lowers the energy barrier for water oxidation, then oxo bridges should be incorporated into newly designed synthetic catalysts as well. This modification could bring us one step closer to designing an efficient renewable energy technology whose only output is molecular oxygen.

Mentor Name: Dong Wang, Chemistry & Biochemistry

Differential Object Marking: How Do Spanish-Speaking Children Learn Their Language?

Author(s): Laura Cornelisse

Category: Social Sciences

Presentation Type: Poster Presentation

Abstract / Artist Statement: Variation is universal to language. For example, Spanish marks animate and specific direct objects with “a” (as in: Vi a un niño ‘I saw a boy’ vs. Vi un carro ‘I saw a car’), a phenomenon known as Differential Object Marking (DOM). DOM has been shown to be probabilistically constrained by a number of linguistic factors in the speech of Spanish-speaking adults. The only study on first language acquisition of DOM to date, however, has concentrated only on contexts considered categorical (i.e., using “a” where it is ‘required’ and zero marking where DOM is ‘prohibited’) and its results are commonly used to suggest very early and errorless acquisition of DOM, albeit in categorical contexts. This study investigates how monolingual Spanish-speaking children arrive at adult-like use of DOM including –and specifically- in contexts where it is probabilistically conditioned. All utterances containing transitive verbs were manually extracted from two spoken corpora of child-caregiver speech (one corpus from Argentina and one from Mexico) available in the online Child Language Data Exchange System database. Children were ages 1-3 years in the recorded sessions. Data were further coded for a number of predictor variables known to impact DOM use (such as presence of clitic doubling, direct object animacy, direct object definiteness, DO specificity). Preliminary analyses revealed that DOM use by both children and caregivers does not follow categorical rules, revealing a number of datapoints not considered in past research. Analysis of all tokens produced by the children indicates that children may not be as adult-like in DOM use at age two as suggested in the previous literature. Instead, analysis of the tokens suggests that they are acquiring DOM in a piecemeal fashion.

Mentor Name: Pablo Requena, Department of Modern and Classical Languages and Literatures

Do I Belong Here? (In)Visibility caused by microaggressions on campus

Author(s): Jazzie Johnson

Category: Social Sciences

Presentation Type: Oral Presentation

Abstract / Artist Statement: I am reminded of my racial identity multiple times each day. Sometimes, these experiences can be positive, like support from other people of color or when I go to Black Student Union meetings. However, these reminders come from someone refusing to acknowledge me, grabbing my hair or someone acting surprised that I am “so articulate.” These subtle jabs, called microaggressions may be based on race, class, sexual orientation, gender identity, ability or religion. They may seem harmless, but they add up quickly and take an emotional toll on students, implying that we do not belong in these spaces. This work’s purpose is to give a glimpse into the lives of UM students who are outside the “norm” on campus. Students filled out a survey with questions about how many times they became aware of their identity in negative and positive ways. They described the context of the interaction, how it made them feel and if there were any short- or long-term repercussions. From responses so far, some students say they feel invisible as a result of some of the microaggressions they face on campus. Some even wish that they could leave UM. My results so far highlight the additional burdens many students have to bear in order to complete their education. They also highlight the reality of how far UM has to go in order to become a truly inclusive institution as part of its mission states.

Mentor Name: Eliot Graham, Davidson Honors College

Do I Belong Here? (In)Visibility in the Curriculum

Author(s): Stephen Thompson

Category: Social Sciences

Presentation Type: Oral Presentation

Abstract / Artist Statement: The curriculum is fundamental in teaching students whose knowledge and perspectives are valid and important, and whose are not. University students from all backgrounds should see themselves represented in their education. To what extent does the University of Montana reflect the true diversity of students’ experiences and identities in the classroom? My research examines how well the university is doing this within the curriculum by analyzing the available syllabi for each course listed in the Cultural and International Diversity group under the General Education requirements. The sections of the syllabi that I focused on were the course descriptions and objectives, instructor(s), course materials and authorship, and

course offering frequency. With this information, I have found that the scope of diversity education at the University of Montana is limited and the General Education requirements do not guarantee any student receives a constructive understanding of the heterogeneity of people across the world. Beyond offering several courses that achieve sub-par expectancies for diversity education, the requisite minimum for enrollment for this particular course catalogue is just three credits. This amounts to only one class in diversity education over the course of four years for every student attending the University of Montana. Not one course offered for diversity requirements discuss topics concerning LGBTQ communities or people with disabilities. Furthermore, only about one-fifth of the courses offered for diversity requirements discuss issues of inequality among marginalized groups, and a small fraction of courses are related to people living in North America. The underrepresentation or exclusion of certain identity groups, including students of color, LGBTQ students, students with disabilities, etc., suggests that their experiences are considered irrelevant to the official academic curriculum. Whomever is emphasized in the curriculum speaks to who the university sees as valued, leaving those unspoken for feeling invisible and insignificant.

Mentor Name: Eliot Graham, Davidson Honors College

Do I Belong Here? (In) Visibility of Students on Campus

Author(s): Emily Gillispie

Category: Social Sciences

Presentation Type: Oral Presentation

Abstract / Artist Statement: The University of Montana has a diverse student body, consisting of individuals from a variety of different religious backgrounds, abilities, ethnic identities, gender identities and sexual orientations. Despite the diverse populations at the University, the value the school has placed on them is questionable. Providing proper support for members of marginalized communities not only helps individuals have access to resources, but it also is beneficial to the university itself. In this research, I evaluate interview data to understand how the university has been both successful and unsuccessful in reflecting a specific stance toward, responsibility for, and engagement with issues of diversity. Continuing research that began in the Fall semester of 2017, I evaluated fifty interviews from students ranging in their personal backgrounds and identities. These interviews were used to better understand the experiences that students have had, by coding for experiences both negative and positive. I found that students who are members of marginalized communities have had negative experiences during their time at the university. These negative experiences that occurred across campus ranged from harassment on campus and in campus housing, tokenism in the classroom, lack of representation in the curriculum in classes, and the feeling that they as a member of a marginalized community did not belong. What all of these occurrences have in common is that they all stem from lack of proper education on diversity, and the limited resources that are available to members of marginalized communities. The experiences that these students are having reflect that diversity is not properly supported at the university. Knowing of this lack of support is essential to understanding the experiences of marginalized students and is key to understanding how our diverse populations can be supported properly.

Mentor Name: Eliot Graham, Davidson Honors College

Do young children treat a robot as having intentions and being culpable for its actions?

Author(s): Rachele Barker; Allie Beall; Caitlin Ryan; Shelby Rosston; Dennis Schuster

Category: Social Sciences

Presentation Type: Poster Presentation

Abstract / Artist Statement: Previous research has found that infants view people, but not mechanical devices, as having intentions (Meltzoff, 1995). Yet, new technologies, such as smart speakers and social robots, are capable of projecting personas and mimicking human interactions, which may cause children to view them more as social agents rather than mere technological devices. Indeed, recent research suggests children treat robots as social others (Meltzoff et al., 2010), but only when robots interact in a socially-contingent manner. The current study examines whether children will view a social robot as having intentions and, in turn, hold it morally culpable.

Three- and 5-year-olds (N = 128 planned) were randomly assigned to one of four conditions that differed by agent: socially-contingent robot, non-contingent robot, human, and control (no agent). The procedure included two ordered tasks. In the Dumbbell Task (Meltzoff, 1995), participants observed a video of the agent attempting (but failing) to pull apart a dumbbell, such that their hand slipped off the end. The participant was then given the dumbbell. If children understood the agent as intentional (i.e., agent was trying to pull the dumbbell apart), they should imitate the intended action (pulling the dumbbell apart). The Tower Task sought to assess participants' judgments of the agent's culpability. Participants viewed a video of the agent observing a person building a block tower, after which the agent knocked over the tower (without clear intent). Participants judged whether it was alright to knock over the tower, whether the agent should get in trouble, and if the action was done intentionally.

The proposed study will contribute to an emerging body of research on whether children conceive of personified robots as pieces of technology, as social others, or as somewhere in-between (e.g., New Ontological Category hypothesis; Severson & Carlson, 2010), and the moral consequences of doing so.

Mentor Name: Rachel Severson, Psychology

Does Major Predict MCAT Success?

Author(s): Megan Branson

Category: Social Sciences

Presentation Type: Poster Presentation

Abstract / Artist Statement: One of the first questions prospective students ask the premedical sciences department is what major they should choose. Medical schools have no preference for major but students want to prepare as best they can for the Medical College Admissions Test (MCAT) because it is one of the most important aspects of their application. Using official data on MCAT scores and majors from the previous 6 years, I examined the possibility of correlation between major and MCAT score.

The MCAT is broken into 4 sections: Biological and Biochemical Foundations, Physical and Chemical Foundations, Comprehensive Analysis and Reasoning Skills and Psychological, Social and Behavioral Foundations of Biology. Each section test contributes to a comprehensive exam that every student who finished a premedical track in their undergrad should have ample knowledge to perform well on. Comparing the relative success of different majors at each section test allows us to analyze the best possible recommendation to the overarching question of what major is most effective in preparing students for medical school. This allows the entire university to give the best possible recommendation and increases the robust knowledge of our premedicine advisors.

Mentor Name: Mark Pershouse, Department of Biomedical and Pharmaceutical Sciences and Director of Premedical Sciences

Eating Insects: A Community Action Toolkit

Author(s): Lily Chumrau; Charlotte Langner; Mary McCormick; Freya Sargent; Ellen Sears

Category: Global Leadership Initiative (GLI)

Presentation Type: Oral Presentation

Abstract / Artist Statement: The world's human population has risen exponentially over the last 100 years and is expected to reach nine billion by 2050. Ensuring food security and resource sustainability is of global concern. The United Nations Food and Agriculture Organization endorses insect farming as an alternative to cattle, pork, sheep, and poultry industries because of their higher food conversion rate. Insect farming requires less arable land, less water, and produces less greenhouse gases than traditional livestock. The practice of eating insects, known as entomophagy, is not a new idea as two billion people around the world include insects in their diets. Unfortunately, insects are not typically considered food in the United States, which means health and safety regulations for insect farming, distribution, and consumption are limited, if not nonexistent. There is a need for the redefinition of insects as a legitimate food in the United States through education, media, and policy. To address this need, we have compiled a toolkit for individuals to promote entomophagy in their own communities. The toolkit includes a resolution,

food safety regulation templates, two recipe videos, one promotional video on entomophagy in Montana, two educational videos on environmental and nutritional benefits of eating insects, recipes, and a compilation of infographics. Our target audience is environmentally concerned citizens, as they are the most likely group in the country to be early adopters of entomophagy. Interested citizens can use our toolkit to learn about entomophagy, experiment with recipes, host their own insect tasting event, lobby their local governments to adopt a resolution about integrating entomophagy into their climate actions plans, or work with their local health and safety agencies to adopt regulations legitimizing insects as food. We are in final negotiations with the North American Coalition on Insect Agriculture to host our toolkit online in the public domain.

Mentor Name: Tobin Shearer, History

Educate, Empower, Change: Strategies for Overcoming Stigmas Surrounding Menstrual Health

Author(s): Monica Paul; Lea Graham; Madison Haynes; Shaylee Ragar; Kirsten Tucker

Category: Global Leadership Initiative (GLI)

Presentation Type: Oral Presentation

Abstract / Artist Statement: Menstruation is often misrepresented, stigmatized, and ignored. A lack of education and distorted view of menstruation in society greatly impacts young menstruators as they begin to have periods and can have long-term negative effects on their physical, mental, and emotional well-being. In order to design a project that effectively addresses this global problem, we used the Human Centered Design method. This method involves three steps: inspiration, ideation, and implementation. During the inspiration phase, we conducted expert interviews with professionals in the field of menstrual health and completed a literature review in order to further our understanding of the issues facing menstruators and explore different possible solutions. On the basis of our findings, we developed a website and a social media campaign to educate, empower, and change attitudes towards menstruation. During the ideation stage, we worked with a consultant and applied strategies from different fields to develop (1) a website that included educational materials, podcasts, games, etc., and (2) a social media campaign that allowed us to reach our target audience efficiently and effectively. During the implementation phase, we conducted a survey, interviews, and focus group discussions with a sample of the target audience, our partner organizations, and menstrual health experts to obtain input for improving our website. In addition, we applied evidence-based strategies to launch a social media campaign. To evaluate our project we performed the following: (1) assessed the outcomes by collecting quantitative data from our social media followings and website interactions and (2) assessed the impact by conducting a content analysis of shared stories and discussions through brand-based hashtags and social media posts. Our goal being to create a sustainable, wide-reaching social campaign that empowers girls to take control of their bodies, educate everyone, and break the cycle of silence through increasing and normalizing conversations surrounding menstruation.

Mentor Name: Phyllis Ngai, GLI/Communications

Effect of expression level and amino acid sequence on HCMV glycoprotein complexes

Author(s): Charlotte Langner

Category: Life Sciences

Presentation Type: Oral Presentation

Abstract / Artist Statement: Human cytomegalovirus (HCMV) infection is asymptomatic in healthy individuals, but can cause severe disease in immunocompromised people. On the virus envelope, glycoproteins gH/gL form a trimer with gO or a pentamer with UL128-131. These glycoprotein complexes interact with receptors on the host cells to initiate viral fusion and thus are promising sites for vaccine development. The levels of trimer and pentamer significantly influence the infectivity of the virions. Clinical strains of HCMV differ in the relative amounts of trimer and pentamer in the virus particles, however, the mechanism controlling the level of trimer and pentamer is still not clear. My previous research showed that overexpressing UL128-131 results in increased pentamer and decreased trimer levels, suggesting that gO and UL128-131 compete in binding to gH/gL, and that the relative amounts of trimer and pentamer are driven by the expression levels of gO and UL128-131 proteins. The amino acid sequence of gH/gL are highly conserved, whereas gO shows substantial diversity across strains. To elucidate how the diversity of gO affects the formation of trimer and pentamer, we have prepared a library of mutants with gOs from different

HCMV strains swapped into one strain, TR. We noted that swapping gO from strain TN into TR results in slow viral replication suggesting incompatibility between gH/gL and gO from different strains. I am conducting an experiment to test whether expressing TNgO in the cell during TR replication will affect the levels of trimer and pentamer as well as the infectivity of the progeny virions. Fibroblasts were infected with TR (with a GFP reporter gene) and subsequently infected with non-replicating adenovirus delivering genes for either TRgO, TNgO, or a control, and analysis is in progress. Progeny virions will be characterized by glycoprotein composition and infectivity using Western blots, qPCR, and flow cytometry.

Mentor Name: Brent Ryckman, Division of Biological Sciences

Effectiveness of Lure in Capturing Northern Bog Lemmings on Trail Cameras

Author(s): Keely Benson; Michael Mitchell; Kristi DuBois

Category: Physical Sciences

Presentation Type: Oral Presentation

Abstract / Artist Statement: The Northern Bog Lemming (*Synaptomys borealis*) is a species being considered for listing under the Endangered Species Act, so determining their presence is helpful for management. Northern bog lemmings are difficult to trap and when they are caught, experience high mortality rates; because of this it is difficult to determine presence/absence of this species. We used a non-invasive, trail camera method to look at the attractiveness of different lures for bog lemming surveys. Twelve cameras were placed in two different fens in western Montana. Under each trail camera we placed small, square 6 by 6-inch pieces of plywood with a metric ruler on the sides of the board for size reference of small mammals. We tested 6 different types of lure/scent (including muskrat) to see which lures have better detection rates. The 6 lures were; muskrat lure (control), almond extract, vanilla extract, strawberry extract, clove oil, and lemongrass oil. Cameras were placed in each fen site for approximately three weeks and were checked every week. Our One-way ANOVA confirmed that there was a significant difference between lure types on bog lemming counts ($F_{6,64} = 2.465, p = 0.033$), such that almond extract had the highest detection rates (0.42 detections/night), which Tukey HSD post-hoc multiple comparisons revealed were significantly different than lemon grass and vanilla (0 detections/ night). Northern bog lemmings were confirmed in 7 different picture series in Finley Fen, five of which were on almond extract boards. No bog lemmings were detected in Meadow Creek Fen, although it was a known bog lemming site. The small detection rate for northern bog lemmings indicated that a larger sample size may be needed, or other lure types tested to definitively detect northern bog lemmings using trail cameras.

Mentor Name: Mark Hebblewhite, Wildlife Biology

Effects of Climate Change on Rocky Mountain Spotted Fever and Public Health Implications in Western Montana

Author(s): Ella Baumgarten; Maxwell Enger; Sydney Qualls; Ronan Kennedy; Benjamin Hickey; Tiffany Matthews

Category: Global Leadership Initiative (GLI)

Presentation Type: Oral Presentation

Abstract / Artist Statement: As climate change progresses, vector-borne diseases will spatially spread to novel environmental niches. Among those vector-borne diseases is Rocky Mountain Spotted Fever (RMSF), a tick-borne disease (TBD) that is caused by the bacteria *Rickettsia Rickettsii*. To predict the spread of RMSF, we modeled future climate scenarios using environmental variables from western Montana. Using this model, we have designed a protocol to enable and promote public awareness of vector-borne diseases. These interventional measures aim to anticipate and decrease disease prevalence through distribution of information about risk factors, symptoms, and treatment options. Our health promotion strategy encompasses two crucial aspects in outreach: first to reinforce healthcare providers and facilitators, and secondly to educate and enable the public to take initiative in regards to their health. Healthcare providers and facilitators will be reinforced through seminars we will design that discuss the interventional methods described above. Public outreach that promotes self-prevention of RMSF will include creating fliers, informational pieces such as articles on the possible spread of RMSF, and educational programs that target students in at-risk areas for RMSF. RMSF in Montana represents a microcosm of a greater climate-driven global threat to human health. This project has global implications because it provides a framework for predicting the spread of vector-borne diseases due to climate

change in any country where this issue is applicable. This combined methodology tackles the imminent threat of vector-borne disease to humankind.

Mentor Name: Peter McDonough, Climate Change Studies

Effects of water availability on the germination of native and exotic forbs

Author(s): Beau Jennings; Mandy Slate; Dean Pearson

Category: Life Sciences

Presentation Type: Poster Presentation

Abstract / Artist Statement: In dryland ecosystems, seed germination ushers in a period of acute vulnerability for young seedlings which over a short time period will face multiple impediments to survival. To minimize these risks, seeds rely on environmental cues like water availability to synchronize their germination timing with favorable environmental conditions more likely to increase their chances of survival. The shifting climate of semi-arid grasslands in the Intermountain west is expected to continue to generate decreases in annual rainfall, and prolong rain-free windows of time into time periods where rainfall has been previously abundant. Understanding how differences in water availability influence the phenology of seed germination will allow us to better gauge how plant species will persist and how plant populations will recover in response to restoration efforts. Additionally, differences in the response of native and exotic plant species will further guide land management and restoration efforts.

We conducted an experiment under controlled conditions to compare the germination phenology of twelve native and exotic forbs under three levels of decreasing water availability. We will present a comparison across species of germination synchrony, seed germinability, time to germination (mean and range), and germination t50 and discuss the implication of this research for semi-arid grasslands in the Intermountain west.

Mentor Name: Mandy Slate, Organismal Biology, Ecology, And Evolution

Establishing Groundwater Nitrate/Nitrite Levels at Hamilton, Montana & Surrounding Area

Author(s): Qwinn Lulis; Amber Harbin; Maria Goman; Steven Christensen; Alis Auch; April Anglea; Paul Gabriel; India Hite; Rosalie Carter; Riley Carter; Riley Clairmont; Barbara Brown; Kendall Moody; Aldo Rodriguez; Makayla Gandara; Andrea Pollin; Desi Zito; Ryan Mott; Arthur Reyes; Kade Hudgins; Alli Borgan; Austin Hicks

Category: Physical Sciences

Presentation Type: Poster Presentation

Abstract / Artist Statement: Water resources are often impacted by nitrate (NO₃) and nitrite (NO₂) from agricultural feed lots, over fertilized soils, septic leach fields, leaky sewer lines, and municipal wastewater treatment plants. Bitterroot College has been investigating nitrogen in groundwater the past five years. We discovered (1) that inflowing surface water from wilderness areas, public lands, and the Bitterroot River is pristine with respect to nitrogen but that, (2) some wells used for drinking water in our valley test above the standard of 10 parts per million (ppm) and can be dangerous. The health concern of high nitrate/nitrite levels in drinking water is methemoglobinemia. As a community awareness project we sampled 18 randomly selected wells and 8 springflow surface water sites in the Hamilton area, and the Bitterroot River and had the water samples analyzed for nitrate/nitrite at Energy Labs, Helena, Montana. All of our springflow samples and the river samples were collected on March 20, 2019 and all of the wells were sampled the following two days. We used standardized collection methodology. Three of our samples (ten percent) were duplicates or blank distilled water for quality assurance and quality control.

Our 8 springflow samples were repeat locations situated on the down-gradient, west and north edge of Hamilton that indicated a nitrate/nitrite load of about 8 pounds per day in March 2018. Results indicate we successfully verified the nitrate/nitrite loading discovered in 2018. Trends this year are neither increasing nor decreasing in concentration. Nitrate (NO₃) and nitrite (NO₂) background levels in natural groundwater systems should be less than 1 ppm (U.S. Geological Survey). Seventeen of our well

water samples were under 2 ppm and safe. One well was 23.8 ppm, far above the standard for human health. We notified the landowner.

Mentor Name: George Furniss, Bitterroot College

Estimating Recruitment in Elk Using an Occupancy Framework

Author(s): Mateen Hessami

Category: Life Sciences

Presentation Type: Poster Presentation

Abstract / Artist Statement: Juvenile recruitment is a key parameter in understanding ungulate population dynamics. Traditional methods in herd composition surveys can be precluded by cost, safety, and feasibility. The use of remote cameras is at the forefront of conservation biology and is a cutting-edge tool of modern wildlife sampling techniques. While the prevalence of remote cameras in ungulate studies has increased, few studies use cameras to estimate vital rates, such as recruitment or survival. We demonstrated the power of remote cameras in estimating calf:cow ratios and calf survival using the Royle-Nichols occupancy model. Data collected from cameras on unmarked individuals can be used to estimate detection probability, occupancy, and abundance. We compared camera-based estimates to extensive long-term monitoring records where traditional means of herd composition data collection have been conducted (e.g., radio-telemetry). We illustrated this approach in a partially migratory elk population at the Ya Ha Tinda (YHT), Alberta, Canada. We deployed cameras across the YHT (n=44), which is a working horse ranch and important elk winter range. We created an occupancy model for female and young-of-year elk, estimating abundance of respective age classes. We estimated calf survival by comparing the abundance estimates of calves between primary sampling periods and determined the effect of abiotic, biotic and anthropogenic covariates on detection probability and occupancy. We then compared the estimates of calf survival and herd composition to those of traditional field estimates collected in the same time period. Our results demonstrated the utility of using remote cameras to derive important parameters for understanding ungulate population dynamics.

Mentor Name: Mark Hebblewhite, College of Forestry and Conservation

Evidence of Arthritis in a 92-year-old Female Cadaveric Specimen

Author(s): Sydney Ladas

Category: Life Sciences

Presentation Type: Oral Presentation

Abstract / Artist Statement: Arthritis describes a group of chronic diseases that includes over 100 separate diagnoses, the pathologies of which affect primarily joints and surrounding joint tissue. The Center for Disease Control and Prevention estimates that as soon as the year 2040, the number of U.S. adults diagnosed with arthritis will reach 78 million. Osteoarthritis, gout, and rheumatoid arthritis are the most common forms of arthritis; each can lead to permanent and debilitating joint damage, especially within aging populations. It is possible to find evidence of arthritic pathogenesis within the joints of living and cadaveric specimens alike. Here the joint health of a 92-year-old female cadaver is discussed. Several synovial joints of the cadaveric specimen were carefully dissected using both sharp and blunt dissection techniques. Joint cavities at various locations of the hands and feet were opened, and articular surfaces were examined and assessed for evidence of arthritic pathology. Unsurprisingly, signs of osteoarthritis were present in several joints; indications of gouty arthritis were evident in the foot. General loss of articular cartilage, hardening of articular surfaces, and osteophyte formation were noted. Approval to conduct this study was given by the Montana Body Donation Program at Montana State University, and University of Montana IRB approval was not required, as cadavers are not considered human subjects for research purposes. With the size of the aging population in the United States reaching an all-time high, diseases that affect this populace will come to the forefront of healthcare. It is projected that arthritis will affect 26% of American adults by the year 2040. Studying arthritis and its associated pathologies may help guide health care professionals in practical and effective treatment of the debilitating disease.

Mentor Name: Laurie Minns, Department of Biological Sciences

Exploring Evidence-Based Practice (EBP) in Curriculum-Based Language Interventions (CBLI)

Author(s): Caitlin Gillespie; Lindsey Lannes; Sully Magee

Category: Social Sciences

Presentation Type: Poster Presentation

Abstract / Artist Statement: Speech-language pathologists (SLPs) provide intervention services to 30% of individuals with language and literacy deficits in the school setting (Hoffman, Ireland, Hall-Mills, & Flynn, 2013). According to the evidence-based practice (EBP) triad, school-based SLPs use clinical expertise, client/patient/caregiver perspectives, and external scientific evidence to achieve successful treatment outcomes (“Evidence-Based Practice”, n.d.). Curriculum-based language interventions (CBLIs) make use of the student’s curriculum to provide context for language and literacy interventions. However, not many school-based SLPs use CBLIs due to several barriers (e.g., lack of availability to EBP, few trainings on implementation). The purpose of this survey is to explore Montana (MT) school-based SLPs’ knowledge of EBP, their use of EBP when designing CBLIs, and identify barriers to implementing CBLIs. A Qualtrics survey consisting of 43 questions was shared with MT school-based SLPs and SLPAs via email and Facebook shared posts; 68 responses were gathered during over the course of three weeks. Preliminary results indicate between 32-58% of respondents identified are knowledgeable about the areas of EBP. Thirty-nine percent of MT school-based SLPs use EBP when implementing CBLIs. Furthermore, most SLPs stated that the greatest barrier to implementing CBLIs was lack of time to research EBPs. Additional analyses are forthcoming and will be shared. Providing CBLIs is paramount as a means of assuring academic readiness and academic success for individuals with language and literacy deficits.

References Evidence-based practice (EBP). Retrieved from <https://www.asha.org/Research/EBP/Evidence-Based-Practice/>
Hoffman, L. M., Ireland, M., Hall-Mills, S., & Flynn, P. (2013). Evidence-based speech-language pathology practices in schools: Findings from a national survey. *Language, Speech, and Hearing Services in Schools, 44*(3), 266-280. Retrieved from <https://search-proquest-com.weblib.lib.umt.edu:2443/psycinfo/docview/1442397206/7DAD48E207FB4EC7PQ/10?accountid=14593>

Mentor Name: Ashley Meaux and Ginger Collins, Communicative Sciences and Disorders

Factors Influencing Infant and Child Vaccination Rates in Uganda

Author(s): Aubrey Mullins

Category: Social Sciences

Presentation Type: Poster Presentation

Abstract / Artist Statement: According to the most recent available research, just under half of all Ugandan children are fully vaccinated. Every year more than 1 million child mortalities in developing countries are due to vaccine preventable diseases. Drawing on available studies and health reports, this paper examines the factors that contribute to low vaccination rates of Ugandan infants and children. It will also explore the current qualitative observations and experiences of Ugandan physicians in Iganga, Uganda regarding barriers that influence infant and child vaccination rates. Reviewing factors like maternal education, socioeconomic considerations, maternal health care utilization and availability, vaccination availability, and other cultural and public health related factors, this paper highlights the primary factors contributing to these low vaccination rates. Identifying the most significant factors contributing to low vaccination rates, this paper will present useful data for future public health strategies and research to increase Ugandan children vaccination rates, ultimately helping to decrease the number of infant and child mortalities.

Mentor Name: Kimber McKay, Department of Anthropology and School of Public and Community Health Sciences

Familiarity affects interaction: social behavior differences in pairs of stranger and cagemate degus

Author(s): Stephen Cooke; Janelle Shamp; Kinsey Webb; Hannah Spadafora; Kendall Butler; Bridget Stickels; Amber Thatcher

Category: Life Sciences

Presentation Type: Poster Presentation

Abstract / Artist Statement: The brains of social animals are adapted to form new relationships. Studying this has been difficult because we lack measures for relationship learning. To address this, we studied pairs of stranger degus, a rodent native to Chile, to see how their behaviors changed while learning about each other. Degus are a valuable animal model with sophisticated social behavior and organization. In this experiment we monitored behavior in same sex dyads of degus (male and female) to identify interaction patterns as they learn about one-another. Degus were separated for 24 hours prior to 20 minute pairing sessions. Dyads were paired 5 times with strangers and 5 times with cagemates over 20-30 days. After this, the degus were paired with a different stranger for 3 sessions to control for non-specific behavioral changes over time. Sessions were then coded for agonistic, investigative, and affiliative social behaviors. Preliminary data shows that females interact more with strangers than cagemates, with this difference increasing after the first session. Specifically, females showed more agonistic and investigative behaviors with strangers than cagemates. These results may indicate that female degus interact more with strangers as a means of social learning. Unexpectedly, we did not see a significant difference between cagemate and stranger interaction in males; however, there appeared to be differences in agonistic behavior intensity, as stranger sessions led to more separations due to fighting. An apparent sex difference was observed, with male degus showing overall more interactions than females. This result might indicate more motivation for males to establish or re-establish relationships with each other. These results offer new insights about how degus interact with each-other when familiar or unfamiliar, as well as give us the opportunity to study the link between these behaviors and the underlying neural processes.

Mentor Name: Nathan Insel, Psychology

Finding Evidence for Competition Between Moose, Deer, and Cougars in Washington using Space to Event Model

Author(s): Sierra McMurry

Category: Life Sciences

Presentation Type: Poster Presentation

Abstract / Artist Statement: Predator prey interactions are essential relationships to understand in order to best manage communities for natural and healthy population abundances. I will be studying predator prey relationships between moose, deer, and cougars in North East Washington using camera trap data. To study predator prey dynamics within communities requires significant radio collar data and aerial surveillance. These methods can be expensive, time inefficient, and tend to be more difficult for elusive species. A new method for determining density estimates for predator and prey species called the Space to Event model (Moeller et al 2018) could eliminate the need for aerial surveys and collar data on ungulate and predator populations. I am using this novel method to quantify the density of moose, deer, and cougars in that study area to determine whether there is evidence for indirect or apparent competition between these species. The model uses time-lapse imagery and a calculated area of the camera viewshed to determine the population densities from the space to first detection. Once I have calculated the densities for these species I will use a linear regression to compare the densities and determine whether there's evidence for competition. We would see evidence for interference competition between the ungulate species if there was a negative correlation between their densities with no correlation to cougar density. We would see evidence for apparent competition between all three species if the prey species densities were again inversely correlated but the cougar density would be positively correlated to a single high prey density. The significance of this data can help us understand complex predator prey dynamics happening within communities and how to manage them to maximize natural population abundance and growth. Additionally, there is significance in using new models to aid in studying these species and their relationships more effectively and effectively.

Mentor Name: Hugh Robinson, Wildlife Biology

Fire on the Mountain: Impacts of Burned Habitat on Wildlife Occupancy

Author(s): Dakota Vaccaro

Category: Life Sciences

Presentation Type: Poster Presentation

Abstract / Artist Statement: Wildfires occur on a worldwide scale in a range of different environments and with varying levels of severity. Currently, wildfires are occurring on a higher frequency than in the past partly due to climate change. Fire ecology studies provide valuable management information that can be used to inform decisions. However, very few of these studies have been conducted on the impacts fire has on wildlife the year following a burn. Wildlife play an important role in keeping ecosystems healthy and functioning, therefore it is important to understand how they will react with increasing fire prevalence. This study focuses on wildlife occupancy and vegetation growth in first year post burn and corresponding unburned areas in high mountain habitat, in order to determine if there is a significant difference between the study sites. Research collection occurred from May 15th to August 15th on areas burned by the Alice Creek fire (summer 2017) and unburned areas on an adjacent privately-owned ranch. In order to determine and compare wildlife occupancy in the two areas, wildlife cameras were placed throughout each study site. To determine vegetation cover and density, I used 20-meter vegetation transects. Along each transect I recorded information on vegetation species, density, height, cover and overlap. I am currently analyzing data by using the Program R package “Unmarked” to evaluate a set of competing models that reflect my hypotheses regarding variation in wildlife occupancy in burned and unburned areas. I will use Akaike’s Information Criterion corrected for small sample size (AICc) in Program R to select the model(s) that best explain observed variation in wildlife occupancy. Overall, this study will contribute important data to a relatively small pool of scientific knowledge regarding the near-term effects of fire on wildlife distribution in a high elevation pine forests.

Mentor Name: Chad Bishop, Wildlife Biology

Flipped-The Lives of Those with Mental Disorders

Author(s): Teresa Hoskins

Category: Visual and Performing Arts (includes Creative Writing)

Abstract / Artist Statement: This collection of four short stories focus on how society perceives those with mental disorders, the stigma associated with those disorders, and how both of these affect the people who have mental disorders. The stories are designed to give a general audience insight into the lives of those with various mental disorders. In everyday settings, these stories revolve around ordinary actions of the characters, with and without mental disorders. Each story will contain two parts, the first part is a record of the incident from the perspective of a person without a mental health diagnosis and who is unrelated to the person with the diagnosis. The second part is a retelling of the same scene from the perspective of the character with the mental health disorder.

These stories revolve around the four main characters with mental disorders. The process started with the creation of the main characters, ensuring the characters are characters who have a mental disorder, not characters designed around a mental disorder. After the main characters were developed, the events, setting, and secondary character for each scene were designed to best showcase the difficulties those with mental disorders face and highlight the differences in mental functioning.

Concepts and materials from the abnormal psychology, along with the DSM-V was the starting point for the symptoms and presentations of various disorders. Multiple case studies and some anecdotal stories from those with the disorders portrayed was used to craft the stories and ensure realism.

Many people do not understand what those with mental illness go through, and more importantly, they don’t understand that they are really just people in the end. The main goals of these stories is to give the general public insight into this, in an easy and relatable manner.

Mentor Name: Bryan Cochran, Psychology

Focused Ultrasonication-Assisted Preparation of Aqueous Nanodispersions for Selected Novel C-type Lectin Receptor Ligands

Author(s): Alexander Riffey; Walid Abdelwahab; Cassie Buhl; Craig Johnson; George Ettenger; Kendal Ryter; Jay Evans

Category: Physical Sciences

Presentation Type: Poster Presentation

Abstract / Artist Statement: Purpose: Mycobacterium tuberculosis (Mtb), the causative pathogen of tuberculosis (TB), is a global pathogenic threat. In 2017, 10 million people were affected by TB infections, resulting in 1.6 million deaths worldwide. With about one-quarter of the global population infected with latent TB, tuberculosis remains one of the top ten causes of death worldwide according to a 2018 World Health Organization report. Despite the availability of a TB vaccine, new cases of multidrug-resistant TB arise yearly, threatening the efficacy of traditional treatments used to combat this disease.

Recent evidence has suggested Th17 response may be protective, but no Th17 adjuvants are clinically approved. Adjuvants, substances which boost immune response to an antigen, are added to vaccines to enhance immune cross-protection, induce humoral or cell-mediated immunity, reduce reactogenicity and toxicity, reduce antigen dosing, and ameliorate side effects of vaccination for at-risk populations. Most approved vaccine adjuvants drive a Th2 or Th1 mediated immune response, which have not proven protective against Mtb. C-type lectin receptors (CLRs) show promise as targets able to drive a Th17-response upon stimulation. Agonists of this family include many glycolipids derived from trehalose 6,6'-dimycolate (TDM), the main immunostimulatory component of the Mtb cell wall. TDM is a potent Mincle agonist, but remains too toxic. Therefore, we have been developing novel synthetic analogues of TDM with equivalent immunostimulatory activity but diminished toxicity and assessed their ability to modulate innate immunity in several innovative aqueous formulations.

Methods: A focused ultrasonication technique was utilized to prepare nanodispersions of the studied CLR ligands. These aqueous formulations were characterized via dynamic light scattering, transmission electron cryomicroscopy, and high-performance liquid chromatography before in vitro and in vivo testing.

Significance: In this study, immune responses were tested for an array of CLR-based adjuvant formulations to identify lead CLR adjuvant candidates for use in next-generation TB vaccines.

Mentor Name: David Burkhart, Department of Biomedical and Pharmaceutical Sciences

Frieda Fligelman: Feminist Academic

Author(s): Marias Blundell

Category: Humanities

Presentation Type: Visual and Performing Arts (includes Creative Writing)

Abstract / Artist Statement: In this sketch, the life and accomplishments of Frieda Fligelman will be explored in depth. Frieda Fligelman was a suffragist based out of Helena, Montana who made great strides for women in higher education and scholarly work. Frieda Fligelman comes from a family of feminist activists with her sister Belle Fligelman Winestine working on Jeanette Rankin's campaign and working as her secretary. Frieda was the first woman ever admitted to the Ph.D. program of Columbia's Political Science field. She worked with renowned anthropologist Franz Boas, as well as breaking major ground in the field of Linguistic Anthropology with her work on the West African Language of Fulani. Sadly, not recognized for her genius at the time she continued to publish many works on West African culture and language, even without the backing of Columbia. Through an examination of archival sources and her published writings including a book of her poems called Notes for a Novel, I hope to highlight the incredible contributions of Frieda Fligelman, as well as shine a much-deserved light on the struggles she faced as a woman in her pursuit of higher education and scholarly work.

Mentor Name: Anya Jabour, History

From Australian Activists to Philosophy: the Role of Engaged Consumption in Radical Drug Policy and Education Reform

Author(s): Glen Woodworth

Category: Humanities

Presentation Type: Oral Presentation

Abstract / Artist Statement: I spent much of my late youth using various drugs, mostly illicit ones. My sister did similarly. I am about to graduate from college, whereas she is homeless, and my parents are foster parents for her two children. This tension is at the heart of this research: people are successful or unsuccessful both because and in spite of drug consumption. We'll call this the drug dilemma. I spent six weeks in Australia last summer inquiring into this dilemma from different perspectives. Most of the ideas in this research come from Melbourne, Victoria, but I interviewed people in Sydney, Perth, and Hobart as well. People involved in the official Australian drug and alcohol sector, as well as drug policy reformers were approached for interviews. I found the reformers to be most enlightening because of their radical, but oddly practical ideas. Many recognized the importance of taking global injustice and climate change into account when discussing any change at the societal level. The base of their philosophy is that the best life should not be prescriptive about consumption, but educative, especially when it comes to drugs. By applying UM philosopher Albert Borgmann's discourse on focal practices from his (2006) *Real American Ethics* to the drug dilemma and taking Michael Pollan's food consumption theory from his (2008) *In Defense of Food* as a guide, a theory of engaged consumption emerges from the ideals of Australian drug policy reform activists. This research challenges folk conceptions of the relationship between humans and psychoactive substances. By avoiding scientism, respecting tradition, and using activism and philosophy as guides, coherent arguments for the radical reform of drug policy and education emerges. The main concern of this presentation is the discussion of engaged consumption and its role in these arguments.

Mentor Name: Bridget Clarke, Philosophy

Genetics of Floral Divergence in Monkeyflower

Author(s): Matthew Samuli

Category: Life Sciences

Presentation Type: Oral Presentation

Abstract / Artist Statement: Pollination is key for the survival and reproduction of plants. Subsequently, floral traits often diversify by natural selection to match specific pollinators or to be efficient at self-pollination within a flower. Uncovering what genetic factors are required for different pollination syndromes will help to understand how and why pollination ecology exists as we see it. To investigate this, I grew second generation (F2) crosses between two species of Monkeyflower, *Mimulus cardinalis* (large, red, hummingbird pollinated flower) and *Mimulus parishii* (small, purple, self-pollinating flower) and measured 11 floral, vegetative, and reproductive traits. In addition to analyses of phenotypic and genetic correlations among traits, I propose to use RadSeq (a method of genome sequencing) to genotype the hybrids and map the genetic loci underlying each trait.

Mentor Name: Lila Fishman, Division of Biological Sciences

Genus Miscere: The Discovery of Skin

Author(s): Katie Conrad

Category: Visual and Performing Arts (includes Creative Writing)

Abstract / Artist Statement: Genus Miscere: The Discovery of Skin uses the framework of interracial pairing within dance to study the ideologies of race and the history of racial categorization. Tsiambwom Akuchu and I will use Contact Improvisation to embody the processes early scientists used to create a taxonomy of race. Contact Improvisation, founded in 1972 by Steve Paxton, attempted to create a non-hierarchical dance form based on a platform of equality that invited all humans to participate. This partner based dance is informed through constant yet shifting touch between bodies. This shared point of contact is achieved through physical touch, shared weight, and momentum. Together we will use Contact Improvisation as a platform to

study the application of interracial touch before, during, and post slavery as well as into the 20th and 21st century. We will translate these “instances of touch,” into movement. Part of our research into touch investigates the discredited theories of the early 18th century scientist, Carl Linnaeus, who believed races could be biologically distinguished based on measurements of the skull. To physically explore Linnaeus’ research on race, Akuchu and I will use tactile investigation to discover every surface of our own and each other’s skulls. The performance piece generated by this research will be performed in front of an audience at the Colby FRINGE Festival this upcoming April. Akuchu and I are curious about what questions are provoked for our audiences as they witness our two bodies moving together in this duet while navigating different social, cultural, and personal perspectives.

Mentor Name: Michele Antonioli, Dance

Get Out, Go Wild

Author(s): Sully Magee; Andrew Matsushita; Joseph Carlson; Alexa Millward; Aubrey Mullins; Nani Murray; Sophia Deroo

Category: Global Leadership Initiative (GLI)

Presentation Type: Oral Presentation

Abstract / Artist Statement: The goal of our capstone project is to encourage children to adopt hobbies that frequently encourage them to get outside. We will present a video contest in which children record a short video of themselves doing any outdoor activity they love. The goal is to encourage students to get outside and give them the opportunity to be creative, collaborate, and innovative. We want to promote the qualities of nature and its substantial benefits to mental health. In addition, encouraging students to participate will secure outdoor recreation and potentially lead to students discovering new hobbies. It will also give them the chance to share hobbies they love with their friends and family.

The video contest: “Go Out, Get Wild!” will open in January through Facebook, Instagram, and Flipgrid, a website that allows contestants to upload short videos, following a specific criteria. In order for videos to be eligible in the contest the submission must be between 30 seconds and 90 seconds long, include the introduction “My name is ____, and this is how I go out and get wild!”. Participants must be under the age of 18, and provide parental consent. The consent will provide us with the rights to publish the videos to social media, as well as present them at the University of Montana Conference of Undergraduate Research.

Our purpose is to target the development of mental health disorders related to the disconnect between children and the outdoors. Encouraging kids to be outside in whatever “green space” they prefer, which does not occur under a roof nor is technology-focused, addresses these coping and habit forming mechanisms for mental health disorder mitigation.

Mentor Name: Joe Eaton, School of Journalism

Gut-Brain Communication in Aggression in Male *Drosophila Melanogaster*

Author(s): Ashley Bielawski

Category: Life Sciences

Presentation Type: Poster Presentation

Abstract / Artist Statement: Many recent studies suggest that changes in the gut microbiome might lead to long-term behavioral changes including increased aggression. The gut of an organism is home to a complex community of bacteria, fungi and viruses that collectively make up the gut microbiome. The prevailing hypothesis is that changes in the microbiome are communicated to the brain and subsequently impact behavior. Work in the Certel lab focuses on the role of octopamine in the model system *Drosophila Melanogaster*. Octopamine (OA) is a neurotransmitter and neuromodulator expressed in the nervous system of invertebrates. We recently determined that a separate subset of OA neurons also innervate the gut and the crop (a food storage sack similar to the stomach). We have started experiments to examine the brain-gut octopamine circuitry and determine how the activity of this circuit is altered by the bacteria that compromise the insect microbiome. I will present results on aggression changes in germ-free and antibiotic-fed males.

Mentor Name: Sarah Certel, Division of Biological Sciences

Hate Speech as Political Speech

Author(s): Alex Butler

Category: Humanities

Presentation Type: Oral Presentation

Abstract / Artist Statement: In the United States the Constitution protects controversial speech such as libel toward public figures, flag burning, and hate speech. A common argument for protecting such speech is that it is political and contributes to the greater public debate. Restricting such speech would be restricting political dissent which could have dangerous effects for our democracy. However, hate speech, I argue, does not always constitute political dissent when it is directed towards private individuals and could thus warrant restriction. For this project I have entered a debate between several notable philosophers to include Ronald Dworkin, James Weinstein, Frederick Schauer, Thomas Scanlon, and Jeremy Waldron who disagree about whether there should be hate speech bans and to what affect they would have on society. Their argument relies on a distinction which I want to call into question: 'downstream' laws are antidiscrimination and violence laws that protect people from ideologies like sexism and racism; 'upstream' laws that the ones that target hate speech and dissent against downstream laws. Opponents of hate speech bans, like Dworkin, are worried that these bans will restrict a person's ability to politically dissent. I argue that this distinction is incorrect and that hate speech bans should also be considered downstream laws that protect people in a similar manner that antidiscrimination laws do. Further, I argue that there is no concern that a person's political speech would be restricted if this distinction can be proven incorrect. Along the way I have examined the various articles and books by the interlocutors, Supreme Court cases, and recent developments in free speech cases. After reading a more recent debate between several philosophers, political scientists, and legal theorist, I feel that I could contribute significantly to what has been said because it would undermine a keep assumption made by all.

Mentor Name: Soazig Le Bihan, Philosophy

Health and Wellness: Expanding Education for an Under-Addressed Issue

Author(s): Grace Sievert; Olivia Adams; Crystal Chase; Grady Matter; Megan Sipes

Category: Global Leadership Initiative (GLI)

Presentation Type: Oral Presentation

Abstract / Artist Statement: Research shows a fundamental lack of well-rounded education for adolescents in three key areas: healthy relationships, mental health, and nutrition and exercise. This problem exists on a global spectrum from non-comprehensive sex education to general misconceptions about mental health; insufficient wellness education is a problem that affects not only youth but entire countries and populations.

We have identified that the problem impacts two key local demographics: rural Montana school districts and homeschooling Montana families. There is a high number of very small, low income school districts in Montana. These school districts with limited funding often resort to having one teacher who instructs multiple subjects out of financial necessity. This can often lead to curriculums not being fully taught and important topics left unaddressed, most frequently in regards to wellness education. Additionally, Montana has a high number of homeschooled students, over 4500 in 2018, whose parents need information regarding wellness education for their children.

Our group has created an online resource guide to provide wellness information that is available to the public. We created this guide using resources that matched the best practices identified by current research in wellness education. It has two main sections: children and educators. The "children" section consists of fun educational resources, such as games, videos, and apps. The "educators" section contains teaching tools on wellness subjects catered to teachers, parents, and associated organizations. After meeting with wellness professionals and working with the Boys and Girls Club, we promoted this website on social media and reached out to Montana educators and homeschool organizations.

Mentor Name: James Randall, Music History

How are First Grade Children Learning to Spell?

Author(s): Sarah Floyd

Category: Social Sciences

Presentation Type: Oral Presentation

Abstract / Artist Statement: Morphological awareness, the metalinguistic ability to understand, think about, and manipulate the parts of words that bear meaning, is important to literacy success for school-age children. Many professionals working in school settings subscribe to the stage theory of language development. In the stage theory, children develop language by mastering skills before using new skills. These professionals use the stage theory to justify waiting until third grade before introducing morphological awareness. Recent evidence suggests that morphological awareness facilitates reading and writing skills in children as early as first grade with and without typical language development. This evidence does not align with the stage theory, but with the repertoire theory of language development, in which children develop language by applying multiple linguistic skills at once. This project seeks to determine if first graders are using morphological awareness by examining the relationship between morphological awareness and spelling success in early school-age children. 78 children with typical language development abilities were provided an experimental morphological awareness assessment as well as spelling measures. A linguistic analysis of spelling, a tool to identify which skills children are using, was conducted. Currently, statistical analysis is underway and will include looking at correlations between spelling and morphological awareness skills. It is hypothesized that morphological awareness will significantly contribute to spelling, which would be in line with findings from other studies. Additionally, it is hypothesized that first grade children will use morphological awareness to spell, providing further support for the repertoire theory. Discussion will be presented regarding how language underpinnings help facilitate literacy success, specifically spelling, for young children.

Mentor Name: Julie Wolter, Speech, Language, and Hearing Sciences

"How Easily Broken": An Accumulating Work about Memory through Theatrical Dance Practices

Author(s): Kaylee Osentowski;

Category: Visual and Performing Arts (includes Creative Writing)

Abstract / Artist Statement: I examined *The Glass Menagerie* by Tennessee Williams, a play that first premiered in 1944, to develop a movement piece that was within the genre of "memory play" to create a theatrical dance movement piece. This research was presented through a dance piece in UM Theatre and Dance's production of *Dance Up Close 2018* entitled "How Easily Broken". I explored the development of text and movement complimenting each other, how internal emotions can be expressed through the universal language of movement, and how a classical play can be condensed, into its deepest meaning, within ten minutes. With my focus on the script of *The Glass Menagerie*, I was able to place many themes involving family dynamics, memory, and anxiety and obsessive-compulsive disorder into the movement piece I presented.

Beginning in September 2018, I attended auditions, choreographed rehearsals, participated in design and production meetings, and developed theatrical technical elements for my work. I worked with four other artists who are the performers featured in the movement piece. By working with other artists, in varying disciplines surrounding theatre and dance, the cross collaboration of the art forms further developed the quality of the work presented.

This research is relevant because cross collaboration between artistic disciplines is important to developing unique and new ideas. By addressing themes, such as memory, in text and movement practices the audience viewing the work can have a deeper understanding of what is being presented to them. Finally, by building on classical art, such as the script of *The Glass Menagerie*, artists in the present can explain significance in theme and artistic value to a new generation.

Mentor Name: Nicole Bradley-Browning, Dance

How Epidemiological Transitions Affect Mortuary Ritual: A study of infant burials in the Missoula City Cemetery

Author(s): Hannah Pepprock

Category: Social Sciences

Presentation Type: Oral Presentation

Abstract / Artist Statement: Mortuary populations are often replete with two types of individuals: the very old and the very young. Our interpretation of the archaeological record has the tendency to disregard these two populations, perhaps because we assume their positions in society are of little value in death, or simply because we do not understand the mortuary ritual afforded to them. The purpose of this paper is to examine the mortuary ritual afforded to a select cohort of individuals interred at the Missoula City Cemetery and to interpret their burials in comparison to epidemiological shifts in Missoula, Montana during a select time frame. By conducting an initial ground survey, and further data collection via the cemetery's interment records, I have compiled a data set of 72 infants (aged stillborn to five years) interred in the Missoula City Cemetery between 1914 and 1930. These 72 burials were then evaluated based upon several criteria, identified through research, that possess meaningful significance in the interpretation of mortuary ritual. I hypothesize that the mortuary ritual afforded to infants will display lower levels of investment in times of epidemiological transition in which mortality rates among this age group are high. In contrast, I expect to note higher levels of investment in mortuary ritual in times when life expectancy of young infants is raised, and mortality rates are lowered. Infant burials are a complex and often misunderstood component of mortuary archaeology. This paper will attempt to provide a greater understanding of the unique mortuary ritual afforded to infants, as well as illustrate how an interdisciplinary approach between Public Health and Anthropology can provide invaluable insights into the lives of societies who have long disappeared.

Mentor Name: Kirsten Green Mink, Anthropology

Identifying causes of unregulated cell proliferation and changes body length in *Caenorhabditis elegans*.

Author(s): Mikaya Terzo

Category: Life Sciences

Presentation Type: Poster Presentation

Abstract / Artist Statement: The regulation of cell divisions is an essential biological process that contributes to the normal growth during development as well as to the prevention of malignant tumor formation. The decision to enter mitosis is mediated by a network of genes that regulate activation of the cyclin B-Cdk1 complex. In *C. elegans* there are 4 different cyclin B genes that partner with Cdk1: *cyb-1*, *cyb-2.1*, *cyb-2.2*, and *cyb-3*. Although all are required for completion of embryonic cell divisions, the detailed functions of some of these cyclins are still unknown. After noticing a potential increase in length of *fbf-2;cyb-2.1(h)* worms, we started to investigate the relationship between abnormal somatic cell proliferation and hyperactive *cyb-2.1*. Similar findings in research on *C. elegans* transcription factor, *rnt-1*, (Nimmo, Antebi, and Woolard 2005), lead to the hypothesis that in contrast to the loss of *rnt-1*, over-production of CYB-2.1 could overstimulate the regulated rate of cell entry into mitosis leading to extra cell divisions and lateral seam cell hyperplasia (unregulated cell proliferation). This hypothesis will be tested on multiple strains including a negative control wild-type N2 worms, *fbf-2;cyb-2.1* worms, and *fbf-2;cyb-2.1(h)* worms. Using these different strains, we can identify if a mutation to the *cyb-2.1* gene affects overall body size and thus controls seam cell proliferation in some form. First, well fed wild-type N2 worms and *fbf-2;cyb-2.1(h)* worms will be synchronized to the same developmental stage via bleaching then hatched in a 15°C incubator overnight. Hatched larvae will then be plated on agarose food plates and allowed to grow unhindered at 15°C. Approximately 10 worms per strain will be imaged daily for 9 days by mounting on slides containing anaesthetic and measuring the length of each worm. Comparing the data from each strain will allow us to score significant length differences.

Mentor Name: Ekaterina Voronina, Biological Sciences

"Ikuzo Nihongo" -- Learning Japanese through reading Manga (Japanese Cartoons)

Author(s): Ryan Koski

Category: Humanities

Presentation Type: Poster Presentation

Abstract / Artist Statement: The project I'll be presenting at UMCUR is a comic book that teaches people how to speak Japanese. This combines my academic interests of foreign language learning with my hobby of drawing cartoons. It'll still be a work-in-progress by time April rolls around, but I'm hoping to at least have three chapters done (as of mid-February, I'm on Chapter 2).

In my book, I've focused on what I believe to be the most important parts of learning a language: the phonetics of the language (i.e. the sounds that are made in the language, pronunciation), vocabulary, and grammar. I also created a "Chapter 0.5", which, though it's not overly extensive, gives the reader a basis of how to read basic Japanese. The chapters after 0.5 are set up in a way that there is a comic setting the scenario, then an aside section where the character breaks the 4th wall and teaches the reader about the Japanese that's applicable to their scenario. This includes vocabulary and simply explained grammar sections. After the lesson content, I've included practice sections for the reader to get more familiarized with the words and structures presented. There will be an answers section to these practice sections in the back of the book. The chapter then ends with the comic being continued and the characters in the scene using the Japanese that was just taught to the reader. This way, the reader sees the Japanese in context.

This book is based on my experiences abroad in Tokyo last year. The characters and scenarios that I present are based on the friends that I made and the places I went with them. I hope with this project to be able to make a fun resource for people interested in learning Japanese, while also preserving my memories abroad.

Mentor Name: Michihiro Ama, Japanese

Infection with bacteriophage impacts the evolution of antibiotic resistance in *Pseudomonas aeruginosa*

Author(s): Jake Cohen

Category: Life Sciences

Presentation Type: Oral Presentation

Abstract / Artist Statement: *Pseudomonas aeruginosa* is a pathogenic bacterium commonly found in hospital acquired infections. *P. aeruginosa* infections often evolve antibiotic resistance. It is known that clinical isolates from *P. aeruginosa* infections contain high concentrations of filamentous Pf bacteriophage. We hypothesize that *P. aeruginosa* infections that are infected with Pf phage will have greater resistance to antibiotics. This is because Pf phage are known to be negatively charged, while commonly used aminoglycoside antibiotics such as tobramycin are positively charged. Thus, the negatively charged phage attracts the positively charged antibiotics and draws the antibiotic away from the bacteria, allowing them to survive. To test this hypothesis, we will grow *P. aeruginosa* in a vertical container holding layered LB, each with a tenfold increase in Tobramycin concentration. We will compare the ability of cultures with and without phage infections to evolve antibiotic resistance and grow into the regions of the tube with antibiotics. We expect the cultures containing Pf phage to grow into antibiotic layers at a greater speed due to the shielding effects of the Tobramycin. Understanding the interactions between infectious phage and antibiotics will allow more effective use of antibiotics as a treatment against *P. aeruginosa* infections in patients.

Mentor Name: Patrick Secor, Division of Biological Sciences

Investigating the role of inorganic phosphate in the survival of the bacteria that cause Lyme Disease.

Author(s): Bonnie Long

Category: Life Sciences

Presentation Type: Poster Presentation

Abstract / Artist Statement: Lyme disease, a bacterial infection transmitted by ticks, affects approximately 300,000 individuals in the United States each year. *Borrelia burgdorferi*, the disease causing bacteria, survive by alternating between a tick vector and mammalian host. *B. burgdorferi* can detect changes in environmental conditions and subsequently regulate the expression of its genes in order to survive in these two different host environments. Research is being conducted to determine the mechanisms in which *B. burgdorferi* imports essential phosphate, as well as how changes in environmental phosphate levels affect gene expression. One of the genes involved in the uptake of phosphate is called *pstB*. The objective of this project is to investigate how different phosphate levels affect expression of the *pstB* gene and in turn, import of phosphate. The methodology for this project has involved genetically modifying genes and regulatory DNA sequences in *E. coli*, which will eventually be introduced into *B. burgdorferi*. Once the DNA has been successfully transformed into *B. burgdorferi*, the bacteria will be exposed to an environment with limited phosphate. Research into the molecular mechanisms that *B. burgdorferi* uses to survive in its different host environments, may ultimately provide additional understanding of the mechanism of transmission of Lyme disease.

Mentor Name: Scott Samuels, Division of Biological Sciences

Investigating the Underlying Mechanisms Responsible for the Effectiveness of Behavioral Cough Therapy

Author(s): Sarah Popp; Claire Malany; Serena Haller; Emma Bozarth; Jane Reynolds; Sarah Campbell; Sarjubhai Patel

Category: Life Sciences

Presentation Type: Poster Presentation

Abstract / Artist Statement: Chronic cough (CC), a cough that lasts more than eight weeks, is the number one complaint of adults seeking non-emergent medical care. An estimated 20% of patients with CC do not respond to medical treatment, and are said to have refractory chronic cough (RCC). Several studies provide evidence that RCC is caused by hypersensitivity of sensory protein receptors in the airway epithelium known to regulate cough. The primary sensory receptor is the transient receptor potential vanilloid (TRPV). These receptors can be found in the epithelial layer of the bronchus, larynx and nose. These receptors are very plastic; in other words they are easily influenced by endogenous and exogenous stimulants. Behavioral cough therapy (BCT), which is provided by speech-language pathologists, has been shown to result in reduced cough sensitivity. However, the underlying mechanism that results in reduced cough sensitivity is unknown. We hypothesize the change is due to down-modulation of TRPV receptors through a neuroplastic mechanism. To test this hypothesis, we will use Western Blot analysis and quantitative polymerase chain reaction (qPCR) to estimate TRPV expression in biopsies of epithelial tissue obtained from the nose and larynx of patients pre and post-BCT. Examining the expression of TRPV before and after BCT will potentially explain the mechanism of the effect of BCT, which may increase its application in the clinic as well as open doors to other potential treatments for RCC.

Mentor Name: Laurie Slovarp, Communicative Sciences and Disorders

Investigating Whether Oxidative Stress Mediates Stroke-Induced Internalization and Degradation of AMPA Receptors

Author(s): Isabella Sturgeon; Moira Shea

Category: Life Sciences

Presentation Type: Poster Presentation

Abstract / Artist Statement: Stroke is the fifth leading cause of death annually in the United States, resulting in nearly 130,000 deaths per year. Ischemic stroke is the most common form of stroke and occurs when a blood vessel leading to the brain is blocked. This blockage leads to deprivation of oxygen and nutrients to brain tissue, resulting in a phenomenon known as delayed neuronal death (DND). In the hippocampus, a region susceptible to DND, there is high expression of glutamatergic AMPA receptors (AMPA receptors). The majority of AMPARs expressed in the hippocampus contain an edited form of the GluA2 (Q607R) subunit, and therefore are Ca²⁺-impermeable. Following oxygen-glucose deprivation/reperfusion (OGD/R), the GluA2 AMPAR subunit is internalized and subsequently degraded, leading to an increase in GluA2-lacking AMPARs that are Ca²⁺-permeable. The subsequent increase in intracellular calcium, mediated by Ca²⁺-permeable AMPARs following OGD/R, plays a key role in DND. Following OGD/R, there is an increase in the production of superoxide radicals. We hypothesize that OGD/R-induced

internalization of GluA1 and GluA2 AMPAR subunits is mediated through a superoxide mechanism. SNB-19, a human astrogloma cell line, and SH-SY5Y, a human neuroblastoma cell line, were transiently transfected with GluA1/2 and different Rab proteins (Rab5, Rab7, or Rab11) to investigate the role of superoxide radicals in mediating OGD/R-induced GluA1 and GluA2 AMPAR subunit internalization and degradation. Following OGD/R-5 mins, there is a significant increase in the colocalization of the GluA1 and GluA2 subunits with Rab5, indicating they are undergoing internalization. GluA2 is also observed colocalizing with Rab7 following OGD/R-15 minutes, indicating that this subunit is being targeted for degradation. Treatment with MnTMPyP, a superoxide scavenger, ameliorated the internalization of GluA1/GluA2, and the degradation of the GluA2 subunit following OGD/R. Our findings have shown that superoxide radicals are involved in the internalization of GluA1 and GluA2 subunits, and the degradation of GluA2.

Mentor Name: Darrell Jackson, Biomedical and Pharmaceutical Sciences

Knowledge and Power: Weaponizing Women's Experiences

Author(s): Bailey Durnell

Category: Humanities

Presentation Type: Oral Presentation

Abstract / Artist Statement: Power is often understood in terms of “having the power to do something” (‘power-to’) and “having power over someone” (‘power-over’), and these two conceptual understandings of power are reflected in feminist political theory. ‘Power-to’ is a positive expression of power, and reclaiming or extending this form of power is often the goal of feminist movements. Historical examples of women reclaiming positive power include women’s suffrage, or the Equal Pay Act. ‘Power-over’ represents negative expression of power, and is often the type of power attributed to oppressors and the dominant narrative. Due to the characterization and uses of these two types of power, ‘power-to’ can be viewed as normatively good, while ‘power-over’ can be viewed as normatively bad. To understand how feminist theorists define power, my research will review theorists from Liberal, Radical, Marxist, and Post Structural schools of feminist thought. I will compare their analyses with the dichotomy of power described above, and then provide contemporary examples of withholding or sharing a privileged knowledge or experience to generate power and sociopolitical changes. My research will analyze the concepts of power and knowledge; I will explore power as women’s knowledge of their unique experiences, which can be weaponized to further empower feminist movements. Specifically, I aim to address the following questions: In instances where society values the unique experiences of women, can their knowledge of this experience be an instrument of power? And once this value has been assigned, can the freedom to share or withhold their knowledge of a unique experience be employed to create sociopolitical changes for women? If women were to employ this type of power, would it manifest as positive expression of power or negative expression of power? This paper will also provide a normative framework within which to understand power through knowledge and move forward.

Mentor Name: Ramona Grey, Political Science

Laboratory Characterization of Toxic Air Emission from Fire Retardant Used in Wildfires

Author(s): Emi Okitsu

Category: Physical Sciences

Presentation Type: Poster Presentation

Abstract / Artist Statement: Air pollutants from forest fires, including particulate matter and volatile organic compounds (VOCs), are harmful to humans and vegetation. Fire retardant mixtures are widely used to extinguish forest fires by aerial application, which may in turn affect the chemical component of fire smoke. Forest fire retardant includes a viscous solution of diammonium phosphate and color agents; once heated, it is expected to emit various toxic gases including ammonia and VOCs, precursors of particulate matter and ground-level ozone. This study examines the chemical components in toxic air emitted by fire retardant in controlled conditions to estimate their impact on air quality. I conducted laboratory experiments by burning three sets of materials: 1) the widely-used fire retardant only, 2) ponderosa pine needles only, and 3) fire retardant and pine needles combined. I examined the difference in the chemicals from the smoke of each burn, and I detected and analyzed VOCs

and carbon dioxide (CO₂) using a Proton Transfer Reaction – Mass Spectrometer and LI-COR CO₂ analyzer. I calculated emission factors (g/kg) for each compound to estimate the mass of compound emitted per mass of dry fuel burned. I found most VOC compounds from burning both fire retardant and pine needles show an increase in the emission factor compared with burning pine needles alone. Significant amount of ammonia is also emitted when fire retardant is burned. Emission factors determined from the burn experiments are extrapolated to estimate the quantity of VOC and ammonia emissions from the Bitterroot-Lolo National Forest fire in 2016 to understand how fire retardant contributes to air pollution emissions.

Mentor Name: Lu Hu, Department of Chemistry and Biochemistry

Language Contributions to Early Literacy Success

Author(s): Kelsey Johnson; Janis Nelson

Category: Humanities

Presentation Type: Poster Presentation

Abstract / Artist Statement: Literacy success depends on various language components such as, morphological awareness, phonological awareness, and orthographic knowledge. Morphological awareness is the ability to recognize and manipulate morphemes, the smallest meaningful parts of language. Phonological awareness is the ability to identify and manipulate speech sounds and sound patterns. Orthographic knowledge is the ability to store and recall written forms of words. Currently, morphological awareness is not taught until later elementary and middle school years despite emerging evidence that morphological awareness develops before the onset of formal reading instruction. Evidence also suggests that morphological awareness intervention may boost literacy skills for children with typical and disordered reading abilities, such as dyslexia. In this study, we will examine independent contributions of various language components, such as morphological awareness, to word-reading abilities in young school-age children. We hypothesize that morphological awareness, phonological awareness, and orthographic knowledge independently contribute to word-reading skills in early elementary school children. Additionally, we expect to find a potential facilitation effect of phonological awareness through morphological awareness on learning new words. In our study, 78 typically developing first-grade children completed a dynamic assessment of morphological awareness and were administered a battery of language and literacy assessments. We will examine the results for correlations or mediating factors.

Mentor Name: Crystle Alonzo, Communicative Sciences and Disorders

Limitations to Plant Growth in Ecosystems Contaminated by Smelter Fallout

Author(s): Guillermo Barillas

Category: Life Sciences

Presentation Type: Oral Presentation

Abstract / Artist Statement: Limitations to Plant Growth in Ecosystems Contaminated by Smelter Fallout
Copper smelting, the process of heating ore to produce industrial copper, can severely impact local plant communities because of continual environmental deposition of heavy metals from emissions. This deposition of heavy metals is toxic to plants and causes a significant loss of organic matter. With the loss of organic matter, soils become deficient in the nutrients required for growth and reproduction. For example, the effects of copper smelting in Anaconda, Montana, an area in which smelting stopped over 35 years ago, can still be seen on its ecosystem today. To contribute to the understanding of ecosystem repair in smelter fallout areas, we assessed the effects of nutrient addition treatments on plant growth. The treatments including addition of nitrogen (N), phosphorus (P), potassium and micronutrients (K μ), an organic amendment (Sustane), and an untreated control (Control) as single amendments, as well as combinations (NP, NK μ , PK μ , NPK μ) to allow assessment of co-limitation (n=10 treatments). All treatments were applied to plots and were seeded in May. I measured plant growth response by collecting biomass samples and percent cover in July and September. I found significant differences in both biomass and percent cover among nutrient addition treatments. Plants in the plots treated with Sustane had 10x more biomass (1.88g) and 10% more cover (12.8%) than the control (0.13g and 2.53%). Plants in the NPK μ , which was the only other treatment which had a significant effect, averaged 11.61% total cover. These findings suggest that it is critical to add organic amendments in restoration treatments in ecosystems impacted by

smelter fallout and that the type of amendment is important.

Mentor Name: Ben Colman, Ecosystem Science and Restoration

Looking Past, Looking Forward: America's National Parks, Archaeology, and Climate Change

Author(s): Rachel Blumhardt

Category: Social Sciences

Presentation Type: Oral Presentation

Abstract / Artist Statement: America's National Parks are rich with cultural history, flora, fauna and some of nature's most impressive landscapes. As climate change continues to accelerate, these parks and their cultural and natural resources are being threatened. In this project, I will complete a colorful, informational booklet that concentrates on 4 specific parks: Yellowstone National Park, Glacier Bay National Park, National Park of American Samoa, and Mesa Verde National Park. I will focus on the archaeology and cultural significance of these parks, while also examining the ways that climate change is putting these, and other associated assets of the parks, at risk. I will tie the past and present together, while also exploring the future, and discussing possible climate-induced implications and the risks they pose to the cultural heritage of these parks. The goal of this project is to be an educational resource for national park staff, and other concerned citizens. While there are currently resources on many of the aspects I will discuss in this booklet, they are not comprehensive and most do not connect the archaeologically and culturally significant features of the parks with the threats of climate change. This project draws upon information from various articles, books and personal experiences and seeks to connect these two interesting, relevant topics in a new, thought-provoking way.

Mentor Name: Nicky Phear, Climate Change Studies

Mapping Fluvial Geomorphic Change: The Clark Fork River at the Former Milltown Dam Site

Author(s): Matthew Blassic

Category: Physical Sciences

Presentation Type: Poster Presentation

Abstract / Artist Statement: Remote sensing offers important tools which can be utilized to study fluvial geomorphic change among other applications. In this study, the goal was to map changes in the main and secondary channels of the Clark Fork River at the former Milltown Dam. Due to decades of human modification, large amounts of sediment are being transported, eroded, and deposited in this "restored" reach of the Clark Fork. Using Landsat imagery available in the USGS Earth Explorer archive, the research goal was to analyze changes between when the dam was first removed (2011) and present (2017). Imagery were from the same time of year and approximately the same rate of flow. ArcGIS and TerrSet software were utilized to prepare and analyze the images. Vegetation indices were used to identify the channel changes and predict where new channels may develop. This research successfully mapped change within this study area and could be utilized in other watersheds.

Mentor Name: Anna Klene, Geography

Masques and Luggage: Sociocultural Anxieties as Manifested in "Empty Spaces" in The Tempest and The Sheltering Sky

Author(s): Dusty Keim

Category: Humanities

Presentation Type: Oral Presentation

Abstract / Artist Statement: When the world is in chaos, where do we go to rediscover ourselves and make sense of it all? In this paper, I posit that the locales of the desert and the ocean are conceptualized as "blank" or "empty" in the Western imagination, and serve as sites to stage and assess the existential angst caused by sociocultural upheaval. Both *The Tempest* (1610) by William Shakespeare and *The Sheltering Sky* (1949) by Paul Bowles use the ocean and the desert, respectively, as spaces in which to stage

and assess the angst borne of the massive sociocultural and national upheavals the authors experienced in their respective time periods. Both pieces also place Western material culture, specifically clothing, at the center of these explorations, imposing Western material goods on these otherwise consumer-less spaces. A pivotal scene in *The Sheltering Sky* comes when American “travelers” Port and Kit Moresby, are on the very edge of “Western” civilization in a hotel in Bou N-arou, and Port is “amused to watch [Kit] building her pathetic little fortress of Western culture in the middle of the wilderness.” The *Tempest*’s subtle obsession with clothing is also indicative of the desire to cling to Western material culture while attempting to remake one’s self in a space that is perceived in the Western imagination as having no history or culture of its own. I will consider specifically postmodern and Marxist critiques of these texts to explore the meaning of Western material culture. In addition, I will consider the Romantic conception of the sublime to understand why the desert and the ocean are sites of self-actualization, and thus draw parallels between the disillusionment and anxieties facing both Shakespeare and Bowles.

Mentor Name: Eric Reimer, English

May Murphy: The Life of a Montana Suffragist

Author(s): Natalie Mongeau

Category: Humanities

Presentation Type: Oral Presentation

Abstract / Artist Statement: I will explore the life of May Murphy, a Montana suffragist who studied at the University of Montana, was a leader in women’s multiple organizations, and worked as a nurse in Missoula. I conducted research in census records, city directories, newspapers such as *The Missoulian*, and UM yearbooks to highlight the daily life of a previously unknown Montana suffragist. Through her involvement in school and the community, May Murphy’s life offers a perspective on the local women who were a part of the suffrage movement. By studying lesser-known suffragists we gain a better understanding of what these women were fighting for and why average women made sacrifices for the women’s rights movement.

Mentor Name: Anya Jabour, History

Measurement of epigenetic alterations from patients’ tissues in myoma, adenomyoma, and endometriosis

Author(s): Min sun Koo; Elizabeth Cole; Caroline Maughan; Young ah Kim

Category: Life Sciences

Presentation Type: Poster Presentation

Abstract / Artist Statement: Background: Myoma, adenomyoma, and endometriosis are estrogen-dependent gynecologic diseases and result in reproductive dysfunction and pelvic pain in women. However, these gynecologic diseases have a complex and poorly understood etiology, involving both genetic and environmental factors. Epigenetic alterations, heritable changes that can modify gene expression without affecting genetic sequence, are associated with the development and progression of numerous pathological states and diseases. Therefore, there is great potential for the use of epigenetics as biomarkers to better understand the early-stage biological responses and molecular mechanisms of gynecologic diseases. We aimed to examine levels of global DNA and gene-specific methylation, which are epigenetic alterations that could be associated with development of gynecologic diseases, including myoma, adenomyoma, and endometriosis.

Methods: We measured global DNA methylation (LINE-1) as well as disease relevant gene-specific methylation (i.e. ER, PR, and aromatase) using pyrosequencing assay. For this measurement, gene-specific primers for the selected genes were designed using the Pyro-Mark assay design software. Genomic DNAs from each tissue were extracted, and underwent bisulfite modification to convert unmethylated cytosine residues to uracil. A Pyromark Q96 MD was used for all subsequent pyrosequencing. Samples were processed in duplicates on plates with water controls. Percent methylation of a sample was calculated by averaging all of the interrogated CpG sites.

Results: Different methylation levels of selected genes were measured from myoma, adenomyoma, and endometriosis tissues. Our obtained results suggest that epigenetic changes are involved in development of different types of gynecologic diseases.

Mentor Name: Yoon hee Cho, Department of Biomedical & Pharmaceutical Sciences

Modeling Surface Mass Load Displacements in the Western US

Author(s): Cody Norberg

Category: Physical Sciences

Presentation Type: Poster Presentation

Abstract / Artist Statement: The surface of the Earth is under constant stress from a variety of mass loads. Surface mass loads, such as oceans, atmosphere, glaciers, seasonal snowpack, and ground water reservoirs, exert forces on the surface of the Earth, causing elastic crustal deformation. Surface mass loads migrate across the Earth's surface on a range of time scales from daily to several thousand years. Horizontal and vertical displacement responses of the Earth can be recorded using Global Positioning System (GPS) receivers. Modeling and removing surface-mass loading signals, which are present in all GPS time series, can reduce variance in these time series. My research project focuses on using the python-based software program LoadDef to accurately compute displacement responses of the Earth's surface to surface mass loads. The modeled mass load responses are compared to observed GPS displacement responses measured by the Plate Boundary Observatory (PBO), and then removed to determine the relative contributions of each loading source at each station in the PBO network throughout the Western US. These contributions are mapped and colored based on value contribution.

Currently, we have already shown that atmospheric mass loading (ATML) contributes a large portion to GPS time series in the western US. Contributions vary spatially with distance from the ocean, with over 25% RMS reduction for stations 1000km inland from the coast versus about 12% contribution within 100km of the coast. We are collaborating with NASA's Jet Propulsion Laboratory to better constrain snow and water storage in the western US from GPS using our daily estimates of ATML. GPS data is also important in understanding plate motions at subduction zones. Subduction zones are capable of causing some of the most destructive earthquakes on Earth. By improving the ability to characterize loading deformation in GPS time series, we can improve the ability to monitor tectonic deformation.

Mentor Name: Hilary Martens, Geosciences

Movement patterns of resident Westslope cutthroat trout (*Oncorhynchus clarkii lewisi*) populations in isolated headwater streams of central Montana

Author(s): Michael Krummel; Donovan Bell

Category: Life Sciences

Presentation Type: Poster Presentation

Abstract / Artist Statement: A central tenet regarding stream-resident salmonid populations is that most fish are sedentary, termed the restricted movement paradigm. Salmonid movement studies have assessed whether populations of fish are mainly mobile and undergo long-range movements, or are sedentary and remain in small (20-50 m) reaches of the stream. The restricted movement paradigm has been examined for larger, more connected stream networks, however, limited studies exist on the restricted movement paradigm with respect to small, isolated headwater stream salmonid populations. We analyzed movement patterns in four isolated Westslope cutthroat trout *Oncorhynchus clarkii lewisi* populations on the eastside of the continental divide in Montana in the summers of 2017 and 2018. We conducted a mark/recapture study using electrofishing and recorded the stream segment fish were captured, using a 40-m resolution per stream reach. We will calculate the movement distributions for our sampled populations, and report these results. Movement distributions will be compared for short-term (seasonal) and long-term (annual) movement. Additionally, we will examine how individual fish length, fish density, and inhabitable stream length influence movement using generalized linear models. This study will give us a detailed understanding of the movement patterns of Westslope cutthroat trout in our four isolated headwater systems, something that has not been well-studied for stream systems of this nature. As our study streams are fragmented and fish are restricted to available habitat, notable movement patterns within the isolated habitat could provide further implications to the persistence of these valuable populations, and potentially advise future management practices.

Mentor Name: Andrew Whiteley, Fisheries and Conservation Genomics

Mrs. Abbie C. French: Doctor and Suffragist

Author(s): Madeline Hagan

Category: Humanities

Presentation Type: Oral Presentation

Abstract / Artist Statement: A trailblazing female figure, Mrs. Abbie C. French of Portland, Oregon was the treasurer of the Oregon Women's Suffrage Association and the director of home economics for the Portland Women's Research Club. While there is little detailing the extent of her work with suffrage, we do know that she worked with nationally recognized suffragist Abigail Scott Duniway and participated in women's groups up until her death in 1917. Mrs. French was also a doctor, one of very few women at the time, and practiced "magnetic massage" on female clientele. Her work as a doctor was highly publicized in local papers and city directories, even advertising that she had traveled "East" to study, and was extremely well educated in her profession. In researching Mrs. French, I studied national census records, Oregon public records, city directories, and local and national newspapers. Additionally, I researched scholarly articles on the Oregon suffrage movement and read books about the history of women in medicine. Her work as a suffragist was not well documented, but she is present in a few newspaper articles detailing Oregon suffragist activity, such as the welcoming of President and First Lady Roosevelt to Oregon in 1903, and the writing of a letter to President Roosevelt on the dignity of women. Regardless of her relative obscurity, I was able to infer her thoughts on suffrage from the sentiments of the Oregon Suffrage Association during Mrs. French's participation. Additionally, her work as a doctor, while heavily advertised, is not entirely detailed, so I relied heavily on the historical information of women in the practice of medicine. Mrs. Abbie C. French is a woman of historical significance in the ways she defied the status-quo, and is an excellent example of the new age of women at the turn of the 19th century.

Mentor Name: Anya Jabour, History

Nina Graves Huston Darroch and Small-Town Suffragism in Montana

Author(s): Henry Curtis

Category: Humanities

Presentation Type: Oral Presentation

Abstract / Artist Statement: I intend to investigate, document, and explore the life of Nina Graves Huston Darroch, a Missouri-born housewife who became involved with local- and state-level efforts for women's suffrage in twentieth-century Montana. Upon marrying her second husband, state senator and Livingston area sheep rancher J.M. Darroch, Nina gradually became involved in the suffrage movement, eventually speaking at meetings of the Park County Women's Suffrage Association and participating in parades. Though she appears to have held no major leadership positions or positions of statewide prominence, by examining her life we can gain further understanding of the rank-and-file small-town Western suffragist.

To do Mrs. Darroch justice, I am conducting research in census records, local newspapers, contemporary publications, and suffragist material from Missouri and Oklahoma to Idaho and Montana. By examining the life of this seemingly ordinary woman, I hope to provide further insight into her life and the grassroots nature of the suffrage movement. In so doing, I will also be examining the organization, recruitment, and methods of the Park County Women's Suffrage Association and its statewide umbrella organization, to place her into a broader context in her community.

My research on Nina Graves Huston Darroch will broaden understanding of the suffragist movement's most rural and localized branches, and help scholarship move beyond limiting itself to the upper echelon of national and statewide leaders. Her story gives further depth to the study of women's history in Montana and the Rocky Mountain West, which heretofore has largely concentrated on state-level movements and statewide figures, rather than the women who did much of the legwork for the advancement of equal rights. I hope to demonstrate the impact of Mrs. Darroch and her Park County comrades in advancing the cause of female suffrage.

Mentor Name: Anya Jabour, History

Phyllium Flight Analysis

Author(s): Lexi Klawitter

Category: Life Sciences

Presentation Type: Poster Presentation

Abstract / Artist Statement: In many insect groups, males display a smaller size than their respective females. While selection of larger sizes through fecundity benefits is rather well understood in females of such systems, selection for smaller sizes in males through increased mobility is often evoked but rarely tested empirically. I am studying the relationship between male body size and flight performance in males of the leaf insect *Phyllium philippinicum* to determine if larger males indeed display reduced mobility. With graduate student Romain Boisseau, we recorded videos of 17 individuals flying in ultra slow motion and used Matlab to mark the head and the tail tip in each frame and the wingtip at its crest and trough. Through these trajectories, we are able to measure speed and acceleration and other relevant parameters of flight performance using R (still in progress). The program ImageJ was used to measure body size. I will select a subset of relevant variables and analyze how they vary across the 17 individuals and run the statistical analyses in R.

Mentor Name: Romain Boisseau, Division of Biological Sciences

Physician Suicide: Healers Unable to Heal Themselves

Author(s): Paighton Noel

Category: Life Sciences

Presentation Type: Poster Presentation

Abstract / Artist Statement: Physicians die by suicide at over two times the rate of the general population. With national physician shortages and rates of suicide both on the rise within the United States, it is imperative to understand this tragic phenomenon and the multifaceted causes contributing to widespread physician depression and overall lack of wellbeing resulting in deaths of physicians meant to heal others. A comprehensive understanding of this complex problem is essential and is the primary step that must be taken in order to initiate evidence-based prevention strategies. Utilizing governmental reports, case studies, and various peer-reviewed studies and articles, this review focuses on the complex social, systematic, and biological factors that are contributing to the troubling rates of physician burnout, depression, and suicide with an emphasis on future directions for detection, treatment, and prevention at various stages throughout the medical training process.

Mentor Name: Mark Pershouse, Department of Biomedical and Pharmaceutical Sciences

Prevalence of Extreme Discrimination Against LGBTQ+ High School Students in Rural Communities

Author(s): Cara Grewell

Category: Social Sciences

Presentation Type: Oral Presentation

Abstract / Artist Statement: The purpose of this project will be to identify whether there are higher levels of extreme discrimination against LGBTQ+ youth in rural high schools based on sexual orientation and/or gender expression in comparison to urban high schools. Generally, as seen within the United States, smaller, rural communities tend to be comprised of primarily conservative families, so I want to see if there is a correlation between rural communities and discrimination against LGBTQ+ individuals.

I will carry out this project through my enrollment in SOCI 441 with Celia Winkler as the instructor. This course is an upper division Capstone Course with a concentration in Inequality and Social Justice within the Sociology Department. To complete this research project, I will be analyzing existing data regarding discrimination based on sexual orientation and/or gender expression in hopes that there is data specific to rural high school student experiences. However, this topic may lead me to finding a gap in the research that could inform a policy brief to be presented to education administrations.

This project will contribute to the field of Sociology by determining if more focus on rural high school anti-harassment policies can create a safer environment for all students or determine if the practices in place are sufficient. As a lesbian who grew up in South Central Montana and graduated from a class of 22 individuals, I am curious to see if my high school experience would have been more positive had I attended a school with over 250 students in my class or if it would have had little effect at all. My hope is to find evidence that rural high school administrators can be more proactive in providing safe environments for their students who belong to the LGBTQ+ community.

Mentor Name: Celia Winkler, Sociology

Proportional Reasoning Through Gears Investigation

Author(s): Colt Davidson

Category: Humanities

Presentation Type: Poster Presentation

Abstract / Artist Statement: The understanding of ratio and the ability to use proportional reasoning are essential to a middle school student's future success in mathematics. For a student to achieve proficiency in this domain, they must be exposed to a wide variety of interpretations of rational number concepts. It was my objective in this research to help understand if students can learn these concepts through the investigation of gears as a model for proportional relationships. This research attempted to answer two primary questions through an intervention. Does structured investigation of gear-pairs lead to students' ability to abstract ratio settings? Does unstructured investigation of gear-pairing possibilities show evidence supporting students' ability to analyze ratio settings in pursuit of a "best solution?" I used structured and unstructured activities in a real seventh-grade classroom to facilitate this investigation. During the initial investigation of gears, students used manipulatives to complete a guided worksheet exploring the interactive relationships between different gear pairs. Then the students were given an open-ended problem designed to test their understanding of ratio in a gear pair context. Students were asked to analyze a variety of different combinations of bicycle front chainrings and rear cassettes using tables, equations, and graphs. Based on their analysis, students were then asked to recommend a complete drivetrain using qualitative proportional reasoning while citing quantitative contextual factors. After the intervention, an analysis was made of the classroom artifacts created by students during both stages of the gears investigation. The students demonstrated a strong preference for tabular and arithmetic presentations of data, and an overwhelming lack of graphical representations of data. The results of this research show that with specific modifications to the original task, this proportional context can help inform future classroom instruction on ratio and proportion.

Mentor Name: Matt Roscoe, Mathematics

Quality of Life in Stroke Survivors with Aphasia who Participate in an Intensive Comprehensive Aphasia Program (ICAP).

Author(s): Abigail LeClair

Category: Social Sciences

Presentation Type: Poster Presentation

Abstract / Artist Statement: Purpose: The purpose of this retrospective quantitative study is to investigate the impact that participation in an ICAP has on quality of life for stroke survivors with aphasia, as measured by the Assessment of Living with Aphasia (ALA) and the Communicative Participation Item Bank (CPIB).

Methods: Participants include eight stroke survivors with aphasia and their family caregivers who participated in the summer 2018 intensive comprehensive aphasia program (ICAP) at the University of Montana. Prior to and immediately following treatment, all participants underwent comprehensive cognitive-linguistic and psychosocial evaluation. The ICAP included 4.5 hours of treatment per day, 4 days per week, for 4 weeks. The ICAP treatment included individual, group, and technology-based speech, language and cognitive therapy sessions, recreational outings, and home programming. Family caregiver education sessions were provided once per week, and family caregiver group counseling sessions occurred twice weekly. To assess the impact of the ICAP on quality of life, pre- and post-treatment scores of the ALA and CPIB are currently being analyzed.

Significance: The significance of this project is multifaceted. The ICAP treatment model is relatively unexamined, with approximately 12-15 ICAPS existing worldwide. This ICAP is unique as it is the only ICAP with an interdisciplinary collaboration between speech-language pathologists and family counselors. Understanding how the ICAP influences quality of life for the stroke survivor with aphasia has significant implications for long-term recovery and well-being.

Mentor Name: Catherine Off, Communicative Sciences and Disorders

Quantity of Contact and Impact on Attitudes Towards Disabled Populations in Doctor of Physical Therapy Students

Author(s): Carly Knudson

Category: Social Sciences

Presentation Type: Poster Presentation

Abstract / Artist Statement: Physical therapists typically work within the context of disability in order to prevent, reduce, or slow functional impairment throughout the lifespan. Hence, competence working with patients with disability is often one of the key outcomes of their professional training. Persons with disability have reported negative interactions and perceived maladaptive attitudes as one of the most significant barriers to successful rehabilitation. It is well-studied that one of the most effective interventions in facilitating more positive attitudes towards disabled populations is interpersonal contact, yet there is inconsistent literature within the field of physical therapy. It is unclear as to whether or not clinical contact alone is sufficient in addressing attitudinal changes. The present study utilized two main instruments, the Contact with Disabled Persons Scale (CDP) and the Interaction with Disabled Persons Scale (IDP), in order to examine the relationship between reported contact and attitudes towards persons of disability. It was hypothesized that there would be a positive correlation between the CDP and the IDP, and that positive attitudes would increase in relation to year in the PT program, considering that each year gains additional clinical experience with disability. . Further exploration of contact theory in clinical contexts is necessary, as well as continuous examinations and adaptations of physical therapy professional program disability curricula.

Mentor Name: James Laskin, Physical Therapy

Quest: Zero Waste by 2050

Author(s): Trevor Finney; Melody Hollar

Category: Social Sciences

Presentation Type: Poster Presentation

Abstract / Artist Statement: Missoula's waste stream is increasingly becoming a problem. Republic Services – the primary landfill for the city – estimates that it will reach maximum capacity in just 62 years if current trends continue (Kidston 2018). This, and other concerns regarding the environmental impacts of a linear extraction-based economy, underscore the importance of Missoula's efforts to reduce waste by 90% by 2050. Our research indicates several steps that may be taken to significantly reduce Missoula's contribution to landfills, increase diversion to recycling and composting facilities, and encourage a local transition away from a linear economy.

For the short term, we propose the following policies that demand minimal infrastructure in order to lay the groundwork for long term sustainability and waste reduction: 1.) A tax on paper and plastic bags to encourage consumers to consider the real cost of the waste, improve equity, and reduce the amount of trash and paper bags sent to the landfill, 2.) Communication between the city and businesses on practices to reduce waste and facilitate business transition to low-waste alternatives, and 3.) Incentivization of bulk food shopping in grocery stores around Missoula to reduce waste associated with individual packaging. For long term planning, we propose the following solutions that require a change in infrastructure: 4.) Implementation of a Pay-As-You-Throw trash collection system that charges users based on the weight of their garbage to incentivize and reward waste reduction, improve equity, and encourage consumers to consider the real cost of waste, 5.) Increase access to composting and recycling facilities to encourage landfill diversion, and 6.) Develop and publish a grading scale for businesses that assesses their

relative success with waste reduction to reward businesses for positive behaviors and give consumers a way to discern which businesses are behaving responsibly.

Mentor Name: Kaetlyn Cordingley, Davidson Honors College

Rates of Water Loss and Metabolism in Stick Insect Eggs

Author(s): Garret Jolma

Category: Life Sciences

Presentation Type: Poster Presentation

Abstract / Artist Statement: The thorny devil stick insect (*Eurycantha calcarata*) of New Guinea has eggs that take four months or more to develop—incredibly long for an insect. Long development times can be a challenge for eggs because of their finite resources, including nutrients, energy to support development, and water. I investigated the physiological mechanisms underlying long development times in stick insect eggs.

The first experiment examined rates of water loss and survival of eggs held in different experimental humidities (0, 75, or 100% RH). Eggs dried quickly in the 0% humidity “dry” container; and more slowly in the 75% humidity “intermediate” container. The eggs did not dry out in the 100% “saturated” container and maintained their original mass throughout the experiment. While none of the dry treatment eggs hatched, one of the intermediate treatment eggs did, and nearly all of the saturated eggs hatched. To see if the eggs could reabsorb water, they were dried until they reached 90% of their original mass. Then they were transferred into a 100% humidity or wet cotton treatment. In both cases, the eggs gained some mass, but never returned to their original mass. These experiments show that the eggs require a high humidity to survive, and that they cannot absorb water from their environment. For these eggs, water is a finite resource.

Finally, using flow-through respirometry, I measured metabolic rates of eggs during four months of development. Eggs were held in high humidity (100% RH) and their metabolic rates measured every 3 – 4 weeks. Metabolic rates were extraordinarily low early in development but increased near hatching. These data suggest that the eggs delay much of their metabolism until late in development. I speculate that this delay in development is a way to keep the eggshell’s conductance to gases low, allowing the eggs to better conserve water.

Mentor Name: Art Woods, Department of Biological Sciences

Repurposing Wasted Food in Missoula

Author(s): Lia Volpa; Sarah Griffin

Category: Social Sciences

Presentation Type: Oral Presentation

Abstract / Artist Statement: Studies show that wasted food alone accounts for approximately 15 percent of total municipal solid waste in the United States. With the addition of all other compostable and recyclable materials, the total amount of waste that can be salvaged, repurposed, and redirected from landfills reaches 86.9 percent. Missoula’s ZERO by FIFTY plan attempts to answer the question: How can the City of Missoula reduce waste production 90 percent by 2050?

We created a proposal that addresses wasted food through expanded food redistribution programs and the implementation of city-wide three-bin systems (compost, recycle, and landfill infrastructure). The proposal was informed by the United States Environmental Protection Agency’s (EPA) food recovery hierarchy and is supported by case studies, interviews, and a pilot project in the Davidson Honors College (DHC) at the University of Montana.

Both food redistribution and three-bin systems are practices that will help Missoula achieve the ZERO by FIFTY goal and build financial stability and social capital for fledgling businesses. With the proper policies, infrastructure, education, and access in place, these programs will yield noticeable changes in both advancing Missoula toward the waste-reduction goal and inspiring citizens to do the same.

Mentor Name: Kaetlyn Cordingley, Davidson Honors College

Research on Farey Recursion

Author(s): Denise LaFontaine; Ian Gonzales; Catherine Rigby; Kyra Glidewell; Kenton Ke; Andrew Bedunah

Category: Physical Sciences

Presentation Type: Oral Presentation

Abstract / Artist Statement: Linear recursion, think Fibonacci numbers, can be thought of as recursion along a line. Farey recursion is a way to describe a collection of polynomials which are recursive on a tree instead. This is useful in applications to geometry, topology, and number theory. This is based on a famous triangulation of the plane called the Farey Graph. Our research has been done alongside Professor Eric Chesebro and Professor Kelly McKinnie with background gained from Allen Hatcher's book Topology of Numbers. Our presentation will describe the Farey Graph and its close cousin, the Stern-Brocot Diagram, which we use to make the Farey recursion definition. Some patterns we have found using computer programs revolve around a family of polynomials $T(p/q)$, which are indexed by the rational numbers. We will describe these patterns and will prove they lead to a closed formula for the polynomials that correspond to numbers of the form $1/n$. Our presentation will finish with a discussion of the questions still being examined in our ongoing work. We hope to contribute to the field of topology with this research by connecting Farey Recursion to other known aspects of this field including Knot Theory and Jones polynomials.

Mentor Name: Eric Chesebro, Kelly McKinnie, Mathematics

Revegetating Steep, Severely Eroded Hillslopes: The Importance of Site Characteristics

Author(s): Carly Andlauer

Category: Life Sciences

Presentation Type: Oral Presentation

Abstract / Artist Statement: Contamination from metal mining and smelting operations causes large-scale damage to ecosystems. In Anaconda, Montana, copper smelting operations combined with logging for smelter fuel led to widespread loss of vegetation cover and resulted in erosion across many hillsides in Mt. Haggin and the surrounding area. The primary goal of restoration efforts in the area is to re-establish vegetation cover in order to decrease erosion. To test the effectiveness of various revegetation treatment options, we conducted an experiment on two steep, heavily eroded hillslopes. We applied an organic-matter fertilizer and a polymer-coated urea fertilizer alone and in conjunction with erosion control structures. Relative change in percent cover ranged from -7% to 58%. Site features had the strongest relationship with changes in percent cover but some significant differences were observed between organic-matter fertilizer treatments and controls.

Mentor Name: Cara Nelson, Ecosystem and Conservation Sciences

Riparian Monitoring For the Ninemile Creek

Author(s): Klemensas Krasaitis; Danielle Novotny; Eamon Peterson; Alyssum Ahler-mull

Category: Physical Sciences

Presentation Type: Poster Presentation

Abstract / Artist Statement: Like many streams in the northern Rocky Mountains, Ninemile Creek in Western Montana was degraded by placer mining. This type of gold mining leaves a legacy of physical transformation to the stream, characterized by a highly incised and straightened river channel and loss of the floodplain. These changes to the physical structure lead to hydrology characterized by low-flow during much of the year punctuated by large pulses of water during spring snowmelt. This combination renders it an unsuitable habitat for many invertebrates, fish species, and mammals including beaver. Recently, several phases of restoration in the Ninemile Creek watershed led by Trout Unlimited (TU) have reintroduced sinuosity into several reaches of the stream while increasing floodplain interaction with the river channel. To speed recovery of the biotic component of this newly constructed floodplain ecosystem, TU has planted willows and used a native seed mix. Following restoration, TU has also observed beaver moving into restored reaches and further enhancing ecosystem structure through dam building. To inform TU about the efficacy of their revegetation efforts in the restored areas of Ninemile Creek, we propose a

riparian monitoring plan. This plan focuses on monitoring: vegetation composition using transects; the presence of beaver lodges, dams, and canals; as well as hydraulic conductivity and bulk density of the fine sediments in the floodplain soils. The effort will help TU adaptively manage their current and future restoration activities on the Ninemile Creek and other similar restoration projects.

Mentor Name: Ben Colman, Ecosystem Science & Restoration

Size and shape of multi-walled carbon nanotubes influences exposure-induced airway inflammation and tissue fibrosis in a mouse model

Author(s): Shannon Bolten; Ray Hamilton; Andrij Holian; Elizabeth Cole; Pam Shaw

Category: Physical Sciences

Presentation Type: Poster Presentation

Abstract / Artist Statement: Center for Environmental Health Sciences, University of Montana, Missoula, MT Purpose: Multi-walled carbon nanotubes (MWCNTs) are nano-scale fibrous particles that are increasing in use for a variety of common consumer products. These materials have unique properties that offer major technological benefits, but can also pose an immense public health risk; especially in occupational settings. As new materials, the toxicological impacts of MWCNTs are still widely unknown, however, the nature of these materials has been identified as similar to asbestos in terms of respiratory harm potential. After particle-induced lung injury, a series of pro-inflammatory and fibrotic events occur in an attempt to heal damaged tissue, however, this exposure can lead to unrestrained fibrosis and development of lung disease. Excessive collagen accumulation around airways and interstitial tissue can be quantified to better understand these disease processes. The goal of this project was to identify how a single respiratory exposure to MWCNT of different sizes and shapes can affect the progression of lung disease (fibrosis) over time, at two different post-exposure intervals. Methods: Adult C57BL/6 mice in even sex ratio were exposed with oropharyngeal instillation to one dose (50 micrograms) of MWCNT of different lengths and diameter (“Wide Short”, WS, “Narrow Short”, NS, and “Narrow Long”, NL) suspended in dispersion media. Control mice were exposed only to dispersion media (DM). Lung tissue was collected from two different post-exposures: 7 days and 56 days. Laser scanning cytometry (iCys) was used to image Trichrome stained lung tissue and quantify airway thickness and interstitial collagen accumulation. Significance Results: Distinct differences in airway thickness and interstitial collagen accumulation were observed at both 7 and 56 day post-exposure intervals among MWCNT exposed groups and control. Conclusion: The differences in collagen burden at both post-exposure intervals suggests that MWCNT size and shape influence progression of airway and

Mentor Name: YoonHe Cho, Center for Environmental Health Sciences

Social Isolation and Loneliness in Older Adults and the Experience of Gratitude and Affection

Author(s): Elizabeth Sholey

Category: Humanities

Presentation Type: Oral Presentation

Abstract / Artist Statement: Communication Studies

The purpose of this study is to examine the experience of social isolation and loneliness among older adults living in Missoula, Montana, and the possibility that affection and gratitude may help ameliorate these negative states. The research questions for this study are: How do older adults perceive social isolation and loneliness? What experiences do elderly people associate with affection and gratitude? Do elderly individuals who are socially isolated see themselves as such? What experiences of affection and/or gratitude do elderly individuals typically remember receiving? Which persons do elderly individuals associate most strongly with feelings of affection and/or gratitude? How do elderly individuals typically handle situations where they feel socially isolated and/or lonely? To answer these questions, the researchers created interview questions that answered these queries. The researchers recruited approximately 13 older adults through Missoula Aging Services, and have so far conducted over 10 interviews for the study. The researchers expect to find that older adults do struggle with social and isolation, and that experiences of gratitude and affection are positive and uplifting for older adults, no matter the individual differences in

perceiving them. Expressing gratitude and affection is a low-cost and high benefit health practice, and both have been shown to help increase feelings of well-being and the potential to decrease the negative effects that accompany social isolation and loneliness. The researchers hope to contribute to the growing body of research about the positive effects of gratitude and affection with their findings. They also want to contribute to the field of studying older adults, since they are an under studied population.

Mentor Name: Stephen Yoshimura, Communication Studies

Song Structures in the Asian Rhinoceros Beetle

Author(s): Cole Sander; Ty Morgan; Chelsey Caldwell

Category: Life Sciences

Presentation Type: Oral Presentation

Abstract / Artist Statement: The Asian rhinoceros beetle *Trypoxylus dichotomus* exhibits a strong sexual dimorphism. Males have massive four-pronged horns and engage in fierce competition over resource-rich territory and mates. Recent studies have suggested that female *T. dichotomus* will not always mate with males that control territory, despite these dimorphic traits that suggest a classical resource-defense mating system. These patterns suggest that females may be selecting males based on traits other than their large weapons, despite the reliability of weapon size as an honest signal of quality. Among the possible traits that females might use to judge fitness are male courtship songs. Males of the *T. dichotomus* species were recently discovered to be capable of song production and can exhibit at least two song types. The structures that males use to produce these unusually complex songs have never been identified. My project involves isolating and examining possible stridulatory structures on the exoskeleton of *T. dichotomus*. I examined these structures with both a scanning electron and light microscope and am devising a method to characterize and differentiate these structures between individuals. I will relate characteristics of these structures to condition-dependent measures of male quality like body size or horn length. This study examines the structures that Asian rhinoceros beetles use to produce courtship songs and will help shed light on the factors that females use when selecting mates in the *T. dichotomus* mating system.

Mentor Name: Jillian del Sol, Division of Biological Sciences

Spatial Variation in Faunal Remains at 48PA551, a Middle Plains Archaic Period Archaeological Site in the Sunlight Basin, Wyoming

Author(s): Kaylen Gehrke

Category: Social Sciences

Presentation Type: Poster Presentation

Abstract / Artist Statement: The archaeological site, 48PA551, in the Sunlight Basin near Cody, Wyoming, dates to the Middle Plains Archaic Period (about 4000 years ago) and new research suggests that the site can shed light on people of the past and how they used their landscapes. The previous inhabitants of this site left behind many faunal remains (animal bones) from their subsistence practices. Faunal remains can provide important data about animal processing and consumption. In this project the faunal data will be analyzed to find spatial patterns and try to predict how certain areas of the site were used. I spent 3 weeks this summer at this site excavating artifacts and learning various archeological survey techniques. I also had the chance to work in the faunal lab learning zooarchaeological methods and analyzing the animal bones up close to identify element, taxa, cut marks, carnivore marks, and other taphonomic changes on the bone specimens. I will compile the faunal data to define activity areas reflecting animal processing across the site. I will consider the context of the various high-density activity areas to determine which type of activities were performed in these spaces by the previous inhabitants. This project demonstrates how faunal analysis can help to reconstruct variation in subsistence practices across the site landscape.

Mentor Name: Anna Prentiss, Anthropology

Stories from High School: The Components of an Alternative Education

Author(s): Anna Costain

Category: Social Sciences

Presentation Type: Oral Presentation

Abstract / Artist Statement: Willard Alternative High School is the only one of its kind in the Missoula School District. Part of its uniqueness comes from the students and faculty, and the old building that encapsulated it all until 2018. This audio project looks to further explore the idea of alternative education at Missoula's only alternative high school through the stories of the people that are a part of it.

This project was a part of an advanced audio class's effort to create a podcast. To do so, we brainstormed ideas together before going on to produce individual stories. Producing these pieces required conducting research and interviewing multiple students and faculty members, then putting together the information into complete stories. In my individual work, I examined how the teachers contributed to an alternative education setting. I also provided stories on the uniqueness of the building and heard from students about the stigmas of attending an alternative school. As a class, we worked to put together final episodes encapsulating all of our pieces. As a final product, this project provides a comprehensive view of alternative education that includes the students who choose to attend the school, the teachers who stray from conventional lesson plans, and the building that, until it was torn down, reflected its inhabitants with spray-painted walls, decorated doors, and student-made sculptures. It gives a better understanding of how young people learn and what education looks like beyond a traditional format.

Mentor Name: Jule Banville, School of Journalism

Suffrage Sketch: Hattie Lloyd

Author(s): Jared Gibbs

Category: Humanities

Presentation Type: Oral Presentation

Abstract / Artist Statement: This project is aimed at discovering information on the lives of lesser known individual members of the suffrage movement; the scope of the research includes both political activity and the general character of life for the rank and file of the movement. Specifically, I have gathered information about the life of Hattie Lloyd, a suffrage activist who lived in Plevna, Montana. She is credited as 'especially active' during the campaign for suffrage in Montana. The information was compiled from a variety of databases and primary sources both online and in print. Resources include Montana Memory Project, U.S. census records, and Montana Newspapers. Of particular use in investigating Mrs. Lloyd's background, was a newspaper called 'Fallon county times' and a volume titled O'Fallon Flashback. This project contributes to the study of U.S. women's history because it assembles information on individual suffrage activists with the intent of contextualizing the greater suffrage movement in the lives of those individuals. This research helps to sketch an outline of the typical suffrage activist and the kind of life they lead. It is beneficial because it grounds the movement in the ordinary people who comprised the organizations, committees, and institutions that kept the movement functioning and successful.

Mentor Name: Anya Jabour, History

Temperature-Sensitive fbf-1 and rrf-1 Mutations in Caenorhabditis elegans

Author(s): Ella Baumgarten

Category: Life Sciences

Presentation Type: Poster Presentation

Abstract / Artist Statement: The interaction between RNAs and RNA-binding proteins (RBPs) is an important topic in studies of gene expression. Our lab is interested in fbf-1, a gene that encodes an RBP that maintains stem cell proliferation and differentiation, and rrf-1, a gene that encodes an RNA-polymerase that generates small regulatory RNAs. These RNAs have been

proposed to contribute to the function of FBF genes, but this hypothesis remains controversial in the field. Through previous lab research, we suspected that at 24°C, a strain of *Caenorhabditis elegans* (*C. elegans*) with *rrf-1* and *fbf-1* mutations becomes sterile over the course of multiple generations. Due to this finding, we decided to investigate if the rate at which *rrf-1* and *fbf-1* mutant *C. elegans* become sterile at 24°C changes based on how the mutant is produced. We use the model organism *C. elegans* because many of the proteins present in *C. elegans* have mammalian orthologs. We will generate the mutant strain in two ways. The first method is to produce a strain that has a *fbf-1* deletion but maintains a wild type (WT) copy of *rrf-1* through the use of a genetic balancer, a genetic tool that stabilizes a WT gene copy in heterozygotes. We hypothesize that the *rrf-1* and *fbf-1* mutant progeny of this strain will become sterile over time at 24°C because the RRF-1-generated small RNAs they have inherited will be depleted each generation. The second method is to produce a strain that has an *rrf-1* deletion but maintains a WT copy of *fbf-1* using a genetic balancer. We hypothesize that the *rrf-1* and *fbf-1* mutant progeny will become sterile at 24°C immediately because they did not inherit RRF-1-generated small RNAs. Understanding the link between small regulatory RNAs and RBPs is important because their interaction is implicated in many human diseases, including cancer.

Mentor Name: Ekaterina Voronina, Division of Biological Sciences

The Causes and Conduct of the Conflict between Iran and Israel and Its Effects on Palestine and Syria

Author(s): Allison Pennell

Category: Social Sciences

Presentation Type: Oral Presentation

Abstract / Artist Statement: In this paper, I examine three main questions. First, why are Iran and Israel in conflict with one another over the existence of Israel and the independence of Palestine? Second, how and why has this conflict spread into Syria and grown to involve the United States and Russia. Third, how has the conflict affected the Palestinian and Syrian people? To answer these questions, I applied and used historical data and the policies of each state to test two theories in the field of international relations. The first theory, constructivism, argues that the conflict has arisen over religious and cultural differences between the peoples of Israel and Iran. While this is definitely a contributing factor, based on leader statements and other policies, I conclude that the second theory, and driving reason for this conflict is best explained by structural realism. Structural realism explains that because the international system is anarchic, a states' need to survive and prosper forces them into competition and conflict with those they view as the most dominant threat to their security. Moreover, it explains why Iran and Israel are vying for power in the region, and thus in conflict over the Palestinians and using Syria as a sort of proxy battleground, which leads to the involvement of their respective allies in the United States and Russia. This paper and research are important as both Iran and Israel are significant states in international politics and the outcome of this conflict would affect not only these two states and the international political climate, but a great number of people whose lives are at risk.

Mentor Name: Karen Adams, Political Science

The Consolidation of Corn: A Case Study to Inspire Design for the Wicked Problems of Our Time

Author(s): Sophie Moon

Category: Social Sciences

Presentation Type: Oral Presentation

Abstract / Artist Statement: This research project will address the issue of consolidation in the American food system through a case study of corn production. This project will identify multiple definitions of consolidation to fully articulate the complex nature of consolidation in the commodity corn industry. This research will describe the status quo of corn production in the United States, focusing particularly on the role of the federal government and producers in identifying the causes and influences leading to the consolidation of corn production. This project will also describe the effects of the consolidation of corn production on producers, consumers, citizens, and the environment. Beyond identifying the influences contributing to the consolidation of corn, and the impacts of consolidation on people and the environment, this research project will investigate the issue of consolidation through the "wicked problem" framework. While the wicked problem framework has frequently been applied to issues such as climate change and poverty, it has not been adequately applied to agricultural issues such as the consolidation of

corn production. By including the wicked problem framework, this project intends to not only educate readers with a holistic understanding of the consolidation of corn in America, but it aims to empower readers looking to take action on this issue or similar challenges. This research project has two main goals. The first intention of this research is to empower its reader with a holistic understanding of a wicked problem in America: the consolidation of corn production. The second, but equally important, goal of this project is to serve as a template for readers ready to take action. Intentionally designed to facilitate a dual understanding of corn consolidation and the concept of wicked problems, this project aims to make design theory more accessible for organizers and activists confronting structurally complex issues.

Mentor Name: William McLauchlan, Political Science

The Construction of a Graphic Novel

Author(s): Emma Thorp

Category: Visual and Performing Arts (includes Creative Writing)

Abstract / Artist Statement: A graphic novel is a book of any genre told through the medium of comic panels. Each picture drawn is literally worth a thousand words of the story. Comic books of the '50s were the beginning of this phenomenon, but their popularity really rose after the recession of 2008 as a unique form of storytelling. I have been studying graphic novels, comic theory, and the lives of comic artists since a young age. Over my studies, I have written many short comic strips and an eighteen-page comic book. My art has improved, my understanding of the comic medium has increased, and I have honed a critical eye for panel composition. I have tried to learn everything I can about comics, but there is one part of the medium that eludes me and that is the full writing process.

It is one thing to know that the artist starts with a script, moves to small sketches, then rough drawings, then final pages, and it is another to actually tread that path. To come to a truly complete understanding of this medium I am going to go through the process of following a single comic's story, and its characters to completion. And the crux of this process, the most time consuming and elusive, is that of thumbnailing – drawing panel sketches of each page of the graphic novel. I'll thumbnail a completed manuscript and actually experience the process of making every intricate and deliberate decision of panel number, dimensions, and layout. I will also complete the rough drawings and final drawings for the first few pages – acting as a teaser and exemplify the rest of the book. By April 17th, I will make a presentation about my process, the narrative, and decisions that went into the graphic novel visual experience.

Mentor Name: Erin Saldin, English/Davidson Honors College

The Early Bird Gets the Worm: Comparing Early Post-fire Avifaunal Species Assemblages in Montana Subalpine Forests

Author(s): Allison Hendryx

Category: Life Sciences

Presentation Type: Oral Presentation

Abstract / Artist Statement: As the frequency of wildfire increases throughout the Rocky Mountain West, it has become increasingly important to understand how wildfire may impact natural resources and wildlife habitat. Characterizing avifaunal communities is one method to determine how a habitat changes after disturbance. Research shows that different avifaunal communities assemble according to combinations of time-since-fire and fire severity due to differences in habitat structure and resource availability. However, data are lacking regarding how avian communities may change during the year of the fire. Yet, one can expect avian communities would change due to transitory differences in habitat and resources the year of the fire such as seed availability and insects. This study characterizes the differences between bird communities utilizing burned areas in the year of and one year after wildfires in order to elucidate how communities change throughout. Comparing two discrete Montana wildfires during the same sampling period in 2018, this study sampled 32 points within the Reynolds Lake Fire of 2018 and 34 within the Lolo Peak Fire of 2017. The points were sampled during the nonbreeding avian season for vegetation data such as species composition and canopy cover and point count data in order to characterize both habitat and avian community

information. Pending further analysis, preliminary results show significant differences in avian communities between the fires, such as significant increases in woodpecker activity the year of the fire as compared to increased species diversity the year after the fire. These findings lend support to the hypothesis that year of the fire has unique avifaunal assemblages compared to the year after fire. Understanding how avian species utilize their habitat the year of the fire can provide more information for managers making recommendations for actions often taken during this period such as salvage logging or other restoration activities.

Mentor Name: Phil Higuera, Department of Ecosystem and Conservation Sciences

The Effect of Perception Biases on Associated Value of Stimuli

Author(s): Jordan Broussard

Category: Humanities

Presentation Type: Poster Presentation

Abstract / Artist Statement: Negative and positive stimuli appear to have their own unique effects on mood, behavior, and even underlying perceptions. Previous experiments have shown that people have the tendency to focus more on negative stimuli than positive; this phenomenon is often explained through a lens of evolutionary psychology, as it appears that it was once more necessary for survival to focus on negative characteristics of the environment. This is referred to as the “negativity effect” (Peeters & Czapinski, 1990). The present study will examine this bias, as well as the level of truth that people associate with positive or negative stimuli. In this experiment, two groups of University of Montana students will be given either a “positive” or “negative” news article to read. After they are finished, they will be asked to write a short paragraph summarizing the article in order to ensure that they read and understood it. Lastly, they will be presented with two scenarios consisting of professors providing either “negative” or “positive” feedback to their students; the participants will then be asked to choose which option they believe to be the most truthful. It is predicted, since people appear to hold a “negativity bias”, that a greater percentage of the participants who are primed with the “negative” news story (versus those exposed to the “positive” news story) will choose the “negative” feedback as being more truthful. Previous experiments have studied the degree of significance that individuals attribute to varying degrees of stimuli, but none have examined the level of truth that people associate with positive or negative statements. Truth is an important characteristic to examine because what people believe to be “true” can significantly impact the type of information they focus on, as well as their behavior and way of thinking.

Mentor Name: Yoonhee Jang, Psychology

The Effect of Vented Helmets on Heat Stress During Wildland Firefighter Simulation

Author(s): Skyler Hilden

Category: Life Sciences

Presentation Type: Poster Presentation

Abstract / Artist Statement: Uncompensable heat from Wildland firefighter (WLFF) personal protective equipment decreases the physiological tolerance while exercising in the heat. Purpose: This study compares heat accumulation at simulated working conditions while wearing standard non-vented WLFF helmets (H) versus a vented helmet (VH). Method: Ten male subjects with VO_{2max} of 59.8 ± 3.6 ml/kg/min completed two trials. Following a 10 minute acclimation period, subjects walked 180 minutes (at 3.5 mph, 5% grade) in a heat chamber (35°C and 30% relative humidity) with three intervals of 50 minutes of exercise and 10 minutes rest followed by a work capacity test to exhaustion. Separated by two weeks, subjects randomly performed the opposing helmet trial. Each trial measured physiological strain index (PSI), visual analog scale (VAS), helmet temperature and relative humidity (Th, Rh), rating of perceived exertion (RPE) and heart rate (HR). Data was analyzed using a 2X6 repeated measures ANOVA. Results: All subjects finished all trials. Work capacity was significantly greater in VH (95.9 ± 10.3 KJ H vs. 109.3 ± 8.5 KJ VH). At the end of the 3 hour trial HR (146.8 ± 17.2 bpm H, 144.3 ± 17.9 bpm VH), PSI (6.08 ± 1.45 H, 5.89 ± 1.24 VH), RPE (14.2 ± 1.7 H, 13.3 ± 1.7 VH), Th ($35.52 \pm 0.47^\circ\text{C}$ H, $35.75 \pm 0.50^\circ\text{C}$ VH), and Rh ($45.6 \pm 5.1\%$ H, $41.0 \pm 5.9\%$ VH) showed a significant effect of time ($p < .05$) but were not significant between trials. Conclusion: Elevated work, and trends for RPE, helmet microenvironment, and VAS suggest greater heat dissipation and comfort with the vented helmet. This suggests the standard

unvented WLF helmet may contribute to accumulated heat over time, which may contribute to work output and safety in the field.

Mentor Name: Charles Dumke, Health and Human Performance

The Effects of Social Isolation and Loneliness on Aging

Author(s): Nelson Weaver

Category: Humanities

Presentation Type: Poster Presentation

Abstract / Artist Statement: Previous research has shown social isolation and loneliness contribute to decreased quality of life, as well as compromised psychological and physical health among older adults. This represents a public health crisis in the context of a growing aging population anticipated to cost the United States over 126 billion dollars. The purpose of this research review is to build the case for conducting an effectiveness study aimed to reduce feelings of loneliness and social isolation in the aging population. To achieve this aim, I review the various characteristics of the aging population, the social and financial ramifications associated with social isolation and loneliness, and various risk factors associated with social isolation and loneliness in the aging population. Furthermore, I analyzed the effectiveness of existing preventative programs that focus on mitigating feelings of loneliness and social isolation amongst the aging community. Finally, this paper includes results and input from a community stakeholder group who provided contextual background for identifying effective referral and delivery strategies. In addition, this group helped shape the intervention content based on personal experiences working with the target group. Together, this literature review and community stakeholder meeting will be used to develop a grant proposal aimed at the development and testing of a community-based intervention to effectively manage and reduce feelings of loneliness among the aging population. This research is significant as it will allow for further insight into effective ways of managing loneliness and social isolation in order to mitigate distress among the aging population.

Mentor Name: Catherine Ipsen, Rural Institute

The Effects of the Goat Creek Fire Complex on Water Quality and Macroinvertebrate Communities in First-Order Streams within the Rock Creek Drainage.

Author(s): Leif Howard

Category: Life Sciences

Presentation Type: Oral Presentation

Abstract / Artist Statement: The 2017 Montana fire season provides an excellent opportunity to study the wildfire impacts of wildfire on freshwater systems. Rocky Mountain streams experience fire as a natural part of their disturbance regime. Fire suppression and climate change have led to more frequent and intense burn events. Fire can affect taxonomic diversity of stream macroinvertebrates by reducing or enhancing habitat depending upon the needs of different taxa. The recovery time of a stream is likely to be affected by both the intensity of fire effects on important stream variables as well as the tolerance of each species to altered conditions. Strong reductions in populations can also put populations at risk of extirpation. Many studies have measured changes to macroinvertebrate communities and to water quality following wildfire events. Like previous research, this study is designed to measure the presence of an effect of wildfire on temp, pH, conductivity and dissolved oxygen and macroinvertebrate assemblages in first-order streams at both the community and family level. To further the collective knowledge on the effects of wildfire to water quality and macroinvertebrate assemblages, this study also aims to correlate measured effects to water quality to specific shifts in macroinvertebrate assemblages. To measure the effect of the fires, temperature, pH, DO, conductivity and macroinvertebrate samples were taken from three reaches each on six first-order streams within the Rock Creek drainage in Western Montana. Data was collected prior to the 2018 runoff and following the 2018 runoff period. Identification is currently ongoing and statistical analysis is forthcoming. Fire ecology research is particularly important in a time in which historical wildfire management policies are being debated. The results of this study will refine our resolution on the effects of wildfire on

freshwater systems and will either indicate resilience of, or changes to water quality and macroinvertebrate assemblages.

Mentor Name: Diana Six, Ecosystems and Conservation Sciences

The Hands of Death: Public Space and the Street in Gilded Age America

Author(s): Henry Curtis

Category: Humanities

Presentation Type: Oral Presentation

Abstract / Artist Statement: My topic of choice concerns the evolution of public space in American cities and towns as occasioned by the rise of the automobile and suburbanization in the late nineteenth and early twentieth centuries. It is an examination of the street's shift from public space to transportation corridor, and of the battle and discourse over this shift. Combined with increasing suburbanization, this shift led to a profound realignment of governmental policy regarding streets. My project deals with the impact of the growing presence of cars on the structure of early 20th century cities in the US, primarily focusing on Missoula, MT.

The American street's transition from public space to single-purpose transportation conduit is deeply reflective of broader currents in Gilded Age American society. As a result of suburbanization and the rise of the automobile, the streets' role in the eyes of the influential and powerful thus dramatically shifted from a common ground to a conduit of transportation. This evolution in the nature of the street had broad impacts on the structure and culture of cities and towns.

This shift was deeply impactful on American society. By examining Missoula, a far smaller city in a region previously largely unexplored by urban transportation history, much can be gained--what little study of this transition that exists has focused overwhelmingly on larger, primarily Eastern cities. Thus, I will contribute to the study of urbanization and transportation in twentieth century America.

I plan to complete this project by conducting original primary research, primarily in Missoula, on this topic. My sources span from governmental safety and transportation reports and municipal ordinances to discourse on the topic in local press. I am working with local and state archives, and am also incorporating prior research on the nationwide evolution into my work.

Mentor Name: Jeff Wiltse, History

The Impact of an Intensive Comprehensive Aphasia Program on Verbal Discourse in Stroke Survivors with Chronic Aphasia

Author(s): Alyssa Kozlowski

Category: Social Sciences

Presentation Type: Poster Presentation

Abstract / Artist Statement: Purpose: The purpose of this retrospective quantitative research study was to analyze the influence of participation in an intensive comprehensive aphasia program on verbal discourse production in stroke survivors with chronic aphasia.

Methods: Participants include eight patients with aphasia and their family caregivers who participated in the summer 2018 intensive comprehensive aphasia program (ICAP) at the University of Montana. Prior to and immediately following treatment, all participants underwent a comprehensive cognitive-linguistic and psychosocial evaluation. The ICAP treatment included individual, group, and technology-based speech, language, and cognitive therapy sessions, recreational outings, and home programming. Family caregiver education sessions were provided once per week, and family caregiver group counseling sessions were provided twice weekly. To assess the impact of the ICAP on verbal discourse outcomes, the Spontaneous Speech subtest of the Western Aphasia Battery-Revised and correct information units (CIUs) are currently being analyzed.

Significance: The ICAP treatment model is relatively unexamined, with approximately 12-15 ICAPs existing worldwide. Evidence suggests multilevel speech and language therapy that targets words, sentences, and connected speech improves verbal

discourse for functional communication/conversation. Multilevel therapy is more beneficial in improving the person with aphasia's overall language impairment compared to typical therapy that targets a single level of the client's impairments (e.g., single word finding). Verb retraining and semantic and syntactic therapy are beneficial in strengthening sentence output and the complexity of sentences. As sentences get more complex, conversational skills improve. This makes it easier for persons with aphasia to return to prior level of activity, therefore reducing their feelings of isolation.

Mentor Name: Catherine Off, Communication Sciences and Disorders

The Impact of Participation in an Intensive Comprehensive Aphasia Program (ICAP) on Depression in Patients with Aphasia.

Author(s): Harley Kincheloe

Category: Social Sciences

Presentation Type: Poster Presentation

Abstract / Artist Statement: Title - The Impact of Participation in an Intensive Comprehensive Aphasia Program (ICAP) on Depression in Patients with Aphasia.

Purpose - The purpose of this quantitative research study was to provide an objective, retrospective analysis of the impact of participating in an intensive comprehensive aphasia program (ICAP) on depression in persons with aphasia (PWA) as measured by one standardized measure, the Geriatric Depression Scale (GDS).

Methods - Participants included eight stroke survivors with aphasia and their family caregivers who participated in the summer 2018 ICAP at the University of Montana. Prior to and immediately following treatment, all participants underwent comprehensive cognitive-linguistic and psychosocial evaluation. The ICAP included 4.5 hours of treatment per day, 4 days per week, for 4 weeks. The ICAP treatment included individual, group, and technology-based speech, language, and cognitive therapy sessions, recreational outings, and home programming. Family caregiver education sessions were provided once per week, and family caregiver group counseling sessions occurred twice weekly. Results of pre and post-treatment administration of the GDS and implications of those results will be discussed.

Significance - The significance of this project is multifaceted. The ICAP treatment model is relatively unexamined, with approximately 12-15 ICAPs existing worldwide. This ICAP is unique as it is the only ICAP with an interdisciplinary collaboration between speech-language pathology and counseling to address participant psychosocial well-being. Neglecting to treat depression and psychosocial well-being in PWA's may slow recovery rates and hinder patient outcomes. Functional disabilities, such as depression, impact treatment outcomes and overall quality of life. The ICAP model encompasses the practice of treating the patient as a whole which may lessen the prevalence of depression and result in improved outcomes, both in rehabilitation and in PWA's quality of life.

Mentor Name: Catherine Off, Communicative Sciences and Disorders

The Impact of Terrain and Other Factors on Wild Fires

Author(s): Matthew Kingston

Category: Physical Sciences

Presentation Type: Poster Presentation

Abstract / Artist Statement: Wild fires have become an annual concern in the United States, and despite the vast amount of resources and manpower used to combat the spread of wild fires, the success rate tends to vary. With this in mind, a research project has commenced which is primarily aimed at discovering the relationship between environmental factors and wild fire growth, or lack of growth. This research analyzes data available in the Google Earth Engine and includes geographical features such as rivers, roads, and elevation, along with weather and other factors like humidity and wind. Using Google Earth Engine programs, the goal is to establish meaningful relationships between a fire's growth and various environmental elements. The investigation will be largely focused on individual fires as a means to establish a correlation between the environmental factors

and the development of wild fires. It is conceivable that a closer look at these different relationships will increase the understanding of how these factors can influence wild fires, and consequentially, lead to the use of improved strategies that will result in potentially higher success in the combatting of future wild fires.

Mentor Name: Jesse Johnson, Computer Science

The importance of integrating theory and application when estimating survival of wildlife populations

Author(s): Alexis Beagle

Category: Life Sciences

Presentation Type: Oral Presentation

Abstract / Artist Statement: The paradigm of population regulation is one of ecology's more controversial foundations, with arguments about the role of density dependence versus independence persisting throughout much of the 20th century. With time, the intensity of opposition has diminished, and ecologists acknowledge that both lend a hand in driving populations. There is less consensus about how to properly incorporate these ideas into population models. In practice, they are routinely included in models with an additive relationship. This means that density dependence and independence are both happening, but with no interaction. Although common, this method ignores the existence of a carrying capacity (K), which is a concept at the forefront of ecological theory. K determines the number of individuals able to persist in a given area and is driven by density-independent variables. Survival is then driven by the current density in relation to K, implying a sometimes complicated interaction between density and density-independent covariates. The purpose of this project is to quantify the importance of including this interaction (as in ecological theory) in estimates of survival in a wildlife population. I simulated data under a scenario with a time-varying carrying capacity and then used three models to estimate survival. Model one assumes survival was directly affected by an environmental covariate. Model two assumes an additive relationship between density and an environmental covariate. Model three matches ecological theory and assumes that survival is determined by an interaction between density and K driven by an environmental covariate. By comparing the survival estimates of each model, I can assess how far off the predictions are when the proper model is not used. The results of this study could have important implications for wildlife management by telling us how inaccurate current survival estimates could be. Utilizing this new method of survival estimation could help improve management of wildlife populations.

Mentor Name: Angela Luis, Wildlife Biology

The Israeli Occupation of the West Bank from 1993 to 2018

Author(s): Kelcie Murphy

Category: Humanities

Presentation Type: Oral Presentation

Abstract / Artist Statement: I hesitantly begin writing this, a research paper and memoir on one of the most notable controversies in contemporary historical debate: the Palestinian-Israeli conflict. I really don't know if that's even a subject, a concoction of both historical research and memoir, written in undergraduate, graduate, or even postgraduate theses. I want to be as honest to myself as I can in this documentation. What if I get it wrong? What if I miss something? As a Jew, an American, and a peace activist, I have examined what I could, I have lived where I could, and I have thought what I could. From the nightlife of Tel Aviv and gated community of Bat-Hefer to the hellish occupation and settlements of Hebron and inconceivable life in multitudes of UNRWA refugee camps, I know that I have done the best that I could. I don't know to what extent this fits in with professional academia, but I hope it does. It's to my belief that history is made of memoirs. History is made of the everyday interactions with one another, from purchasing pickled beets in the souk with the sympathetic Hamas or Fatah supporting Palestinians to war-talk with Israeli soldiers over fine wine. The expansion of Area C and closed military zones in the Palestinian West Bank by the Israeli military has in effect systemically concentrated the Palestinian population into larger cities and towns. This has vastly decreased the actual Palestinian-controlled portions of the West Bank. Maybe this conclusion will change, maybe it won't, but I want the broadest readership to know that I believe I truly took into consideration what is at stake

for every community in whatever this land extending from the eastern Mediterranean to the Jordan River is called.

Mentor Name: Mehrdad Kia, Central and Southwest Asian Studies

The Poetics of Political Exile: Bolaño and Literary Complicity in Augusto Pinochet's Regime

Author(s): Erin Goudreau

Category: Humanities

Presentation Type: Oral Presentation

Abstract / Artist Statement: In the three decades following Augusto Pinochet's 1973 coup of Chilean president Salvador Allende, a politically informed artistic response began to emerge from Chile's novelists, poets, and playwrights. Due, in part, to the diasporic nature of the Chilean literary community post-Pinochet, this response was certainly not uniform. The literature that this paper will examine has been selected based not only on its categorization as work that was informed by and reflective of the political crisis in Chile, but also its interest in the degree to which literature produced under authoritarian regimes can become complicit in those regimes' functioning. Short stories, novellas, and speeches by novelist and poet Roberto Bolaño will be used to consider the artist's understanding of the role of the writer within a repressive, authoritarian state. What was the relationship between Bolaño and the literary community at large under Pinochet? For whom, and to whom, was he speaking? What is the relationship between romantic literary notions of exile and the reality of both exile and complicity as experienced by artists during Pinochet's regime? This paper explores the politics of literary resistance and complicity, literary exile and literal exile, and ultimately uses an analysis of the function of literature under Pinochet to draw broader conclusions about the role of artists during times of political crisis and repression.

Mentor Name: Kathleen Kane, English Literature

The Role of Participatory GIS in Community-Centered Ecotourism Management in the Bossou Forest Reserve, Guinea

Author(s): Sydney Qualls

Category: Physical Sciences

Presentation Type: Oral Presentation

Abstract / Artist Statement: The Bossou Forest Reserve in south-eastern Guinea provides critical habitat for a semi-isolated and endangered population of chimpanzees (*Pan troglodytes verus*). This population, which is recognized as a critically endangered species under the International Union for Conservation of Nature (IUCN), has declined to only seven total chimpanzees. Major factors leading to the demise of this species includes human exploitation, deforestation, infrastructure development, and natural disasters. Interviews and community surveys conducted in surrounding communities demonstrate that local residents are exploring conservation strategies. One of the main focuses is assessing the role of ecotourism in generating awareness about the chimpanzees while simultaneously providing meaningful livelihood options for local residents. The purpose of this study is to support ongoing research efforts through GIS mapping and analysis. Specifically, this paper reports on an effort to utilize GIS to incorporate local perceptions and planning priorities into the design and implementation of a new ecotourism management plan. This process entailed assembling the data in the geoprocessing program ArcMap. The paper will conclude with the presentation and discussion of the perception and participatory maps for five of the study communities. Analysis of the maps will highlight the collective concept of where resources, threatened areas, and areas of value are located within the Bossou Forest Reserve. The hope is that this participatory map will be used to inform future ecotourism planning that will continue to involve the communities. Pending the outcome, this methodology of a community centered approach to sustainable ecotourism may be applied to comparable situations in similar places.

Mentor Name: Sarah Halvorson, Geography

The Role of PF Phage in Pseudomonas aeruginosa Cheater Populations

Author(s): Autumn Robinson; Lia Michaels

Category: Life Sciences

Presentation Type: Oral Presentation

Abstract / Artist Statement: *Pseudomonas aeruginosa* (Pa) is a bacterial pathogen that causes millions of hospital-acquired infections each year. Pa often forms a biofilm (bacteria encased in a self-produced protective matrix) at sites of infection. To build a biofilm, Pa uses a cell density-dependent mechanism called quorum sensing (QS) to coordinate gene expression. Many quorum-regulated products are secreted into the extracellular space and are considered public goods (products that can be used by any member of the microbial community). Some members of the biofilm community, however, cheat and do not produce public goods but, continue to consume them. These individuals are known as “cheaters”. High levels of cheaters in a microbial population can result in community collapse. Thus, the number of cheaters needs to be regulated in microbial communities. We have discovered that a bacteriophage (a virus that infects bacteria) is regulated by quorum sensing—when quorum sensing is disabled, the bacteriophage replicates and slows the growth of *P. aeruginosa*. Our previous work indicates that these bacteriophage play key roles in infection pathogenesis. We hypothesize that these bacteriophage introduce a selective pressure against cheaters. To test this hypothesis, we will measure the abundance of cheaters in bacterial populations that either do or do not contain bacteriophage. Cheaters will be identified using selective growth media and the abundance of cheaters will be measured over time. We predict that bacterial populations without bacteriophage will have a higher percentage of cheaters compared to bacterial populations with bacteriophage. Understanding how cheaters are regulated in bacterial populations may reveal new therapeutic strategies that promote cheating, promoting a tragedy of the commons within microbial communities that cause disease.

Mentor Name: Patrick Secor, Biological Sciences

The scaffolding protein PAG1 regulates Src family kinase activity in neuroblastoma cells

Author(s): Makenzie Mayfield

Category: Life Sciences

Presentation Type: Oral Presentation

Abstract / Artist Statement: The receptor tyrosine kinases (RTKs) are known to help regulate cell behaviors including differentiation, proliferation and migration during embryonic development of the neural crest. RTKs are believed to initiate signaling cascades in response to extracellular cues in part by controlling localization of Src-family kinases (SFKs). The scaffolding protein PAG1 binds SFKs and is believed to influence SFK activity and location within the cell by promoting interaction of SFKs with regulatory proteins and by drawing SFKs into different components of the endocytic pathway. We want to know what role PAG1 plays in regulating SFK signaling pathways and how this influences cell fate. By targeting the PAG1 gene in neural crest-derived cancer cells (neuroblastoma cells) with CRISPR plasmids, we created PAG1-mutant cell-lines in which a truncated, cytosolic form of PAG1 is expressed. Experiments measuring proliferation, migration, differentiation and tumor formation all showed more aggressive cancer phenotypes in PAG1 mutants. PAG1 mutants proliferate faster and form more tumors than wild-type cells. Furthermore PAG1 mutants lose the ability to differentiate in response to pro-differentiation signals including nerve growth factor and retinoic acid. Experiments measuring actively phosphorylated SFKs indicated that PAG1 mutants express higher levels of global pSFKs as well as higher levels of pSFKs sequestered in multivesicular bodies. PAG1 may play a role in deactivating SFKs by promoting SFK interaction with CSK, an inhibitory kinase that targets SFKs. Greater understanding of PAG1 and its role in SFK signaling may lead to better treatments for neuroblastoma, a difficult childhood cancer which is often metastatic upon diagnosis.

Mentor Name: Mark Grimes, Division of Biological Sciences

The smell of attraction; cuticular hydrocarbon (CHC) profiles in a horned beetle

Author(s): Chelsey Caldwell; Cole Sander; Ty Morgan

Category: Physical Sciences

Presentation Type: Poster Presentation

Abstract / Artist Statement: The Asian Rhino beetle, *Trypoxylus dichotomus*, is characterized by its large “pitchfork” horns on the heads of males. They use these horns to battle each other for access to limited females and are thought to only engage in male competition. However, recent field studies suggest that females may be choosy, selecting male mates based on traits other than the horns. In many insects, cuticular hydrocarbons are used by females to choose attractive, high quality males as mates. In particular, nutrition and stress are known to affect the blends of hydrocarbons found on the surface of the exoskeleton, and as a result females can use hydrocarbon profiles to pick good conditioned males. In order to test whether cuticular hydrocarbons might be functioning this way in Rhino beetles, I am conducting the first ever quantification of CHC profiles in this species. During Summer 2018, I collected CHC samples from 40 male beetles spanning a range of body sizes and conditions during their lives. Using the UM chemistry department facilities, I am testing for correlations between CHC profiles, static condition (body size), and dynamic condition (body weight) of male *T. dichotomus*. My results will help reveal a surprising aspect of the sexual behavior and mating system of this charismatic and widespread beetle.

Mentor Name: Jill Delsol, Organismal Biology, Ecology, & Evolution

"They love God even though they deny Him": Dorothy Day on Revolution in Nicaragua and Cuba, 1927-1970

Author(s): Tess Gallagher Clancy

Category: Humanities

Presentation Type: Poster Presentation

Abstract / Artist Statement: While many left-wing political radicals break with religion, Catholic activist Dorothy Day became more committed to its necessity and integrity. Active in socialist politics in the 1920s, Day converted to Catholicism in 1927, renounced ties to Communism, and became a driving figure in Catholic pacifist-anarchism. While Dorothy Day’s undertakings in the United States have been analyzed and well documented, her frequent contact with individuals, movements, and events in Latin America have been largely overlooked. Upon deeper examination, this contact shows a complex tension between pacifism and combatting structural violence; supporting authoritarian governments and practicing anarchism; and allying with the persecutors of the Church or allying with the poor. Known for her ardent and nuanced pacifism, Day supported the Cuban Revolution in 1959, and General Sandino and Sandinista resistance to the Somoza regime in Nicaragua throughout the twentieth century. She analyzed the Colombian guerrilla priest Father Camilo Torres Restrepo, and the Catholic Church's role in the Mexican Revolution from the early 1900s through the 1920s. These fascinating cases show one prominent Catholic's struggle between high ideals, and the real, concrete options to ally with poor people. With an eye to the United States’ exploits in Latin America, Dorothy Day developed a complex, Catholic ethos that pushed the boundaries of what a traditional Catholic faith looked like for peoples of the United States.

Mentor Name: Jody Pavilack, History

Tracking Forest Fire Impacts on Stream Temperatures & Ensuing Shifts in the Salmonid Community

Author(s): Christopher Rotar

Category: Life Sciences

Presentation Type: Poster Presentation

Abstract / Artist Statement: Understanding how salmonids respond to habitat changes associated with wildfire is necessary to predict the impacts of future increases in wildfire frequencies and severities on salmonid populations. This is important in headwater streams which serve as cold water refuge for the threatened bull trout (*Salvelinus confluentus*) during the summer months. Canopy cover losses after wildfire events can result in increased stream temperatures, leading to displacement of cold-

water fishes. In the summer of 2018 we evaluated habitat changes one year after the 2017 Meyers Fire of the Beaverhead-Deerlodge National Forest. We performed habitat surveys and installed temperature loggers at 28 study sites throughout Montana's upper Rock Creek and Flint Creek drainages, including 20 sites across 7 wildfire-affected streams and 8 sites across 2 control streams. We found decreased canopy cover at sites with higher burn severities. Across all sites 2018 mean August stream temperatures were higher on average than the baseline predicted stream temperatures (Norwest modeled August averages) and there was an increasing trend of higher differences between observed and predicted temperatures at sites with higher burn severity. We also assessed current native and non-native salmonid distributions by sampling the fish communities at 24 of these 28 sites throughout the study basin. Nonnative brown trout (*Salmo trutta*) were found at novel upstream locations relative to previous sampling events in both burned and unburned (control) watersheds. In 2018, bull trout and brown trout distributions were found to be overlapping in all locations where brown trout were observed. Nearly all sites with mean August stream temperatures above 10°C showed declines in the relative proportions of bull trout present. The relative proportions of community composition of native salmonids were found to have decreased and relative proportions of nonnative salmonids were found to have increased since the previous sampling events, likely irrespective of fire.

Mentor Name: Lisa Eby, Ecosystem Science & Restoration

Tracking Rodent Social Interactions Using Machine Learning

Author(s): Isaac Egan; Nathan Insel

Category: Life Sciences

Presentation Type: Poster Presentation

Abstract / Artist Statement: We have developed a video-annotation pipeline that can be used to automatically track the movement of particularly social rodents (*Degus*) during interactive behavior. Using open source software (DeepLabCut), our approach requires methodical training of DeepLabCut neural networks, along with custom post-processing scripts to ensure continuity of the annotation of individual *Degus*. This tracking work is the first phase in a larger effort to automatically classify and label behaviors observed in video recordings of *Degu* interactions. Such behavioral annotation will influence our understanding of social behavior in general, with possible long-term impacts on diagnosis and treatment of autism spectrum disorder and other mental health conditions.

Mentor Name: Travis Wheeler, Computer Science

Two tightly linked loci produce flower color polymorphisms in both the UV and visible spectra in yellow-and-white monkeyflower (*Mimulus bicolor*)

Author(s): Brooke Kern

Category: Life Sciences

Presentation Type: Oral Presentation

Abstract / Artist Statement: Flower color is often under strong selection in plants due to its importance in attracting appropriate pollinators. The bee-pollinated annual Sierra Nevada wildflower *Mimulus bicolor* (yellow-and-white monkeyflower) has two color morphs in both the visible spectrum (solid yellow or yellow and white) and the ultraviolet spectrum (entirely UV absorbent or UV absorbent only on the lower half). The yellow morph is usually half UV absorbent, and the bicolored morph entirely UV absorbent. I aligned whole genome pool sequence data from more than 150 individuals of each visible morph to identify the locus responsible for the polymorphism. I collected samples from well-mixed populations in Stanislaus National Forest, California and aligned the sequence data to the genome of *Mimulus cardinalis*, a close relative. Using this alignment, I identified a small candidate region which appears to contain the genes for both the UV and visible patterns. The putative UV gene is a MYB transcription factor and the putative gene controlling visible patterning encodes a small RNA. The close linkage of the two genes indicates that the UV and visible color patterns are under selection as a single unit, since recombination between

the two loci is rare. This suggests that tight linkage of pigment genes may play a major role in the evolution of floral patterns in *Mimulus*.

Mentor Name: Lila Fishman, Division of Biological Sciences

Understanding The Function of Ancient Conserved Non-Coding DNA Elements

Author(s): Jeremiah Gaiser

Category: Life Sciences

Presentation Type: Poster Presentation

Abstract / Artist Statement: DNA is the genetic material at the root of all life, and serves as the 'instructions' for biomolecular mechanisms to shape the bodies and synthesize the chemicals that make up an organism. DNA mutations and the forces of natural selection drive the evolution that has resulted in the tremendous diversity of life on earth today. However, despite life's staggering diversity, there still exist many sequences of DNA that share remarkable similarity between organisms, even between species as different as humans and bacteria. This is called conservation. Most conserved DNA encodes genes that produce proteins or RNA that are crucial to the survival of an organism. Here, we seek to understand DNA that remains highly conserved, perhaps over hundreds of millions of years, yet does not encode genes at all. The conservation of such DNA indicates some role that, while vital to species survival, remains to be understood. We employed open source computational tools and developed custom genomics analysis software to investigate these highly conserved non-coding sequences of DNA. Regions of the human genome known to encode proteins and RNA were masked, and the remaining genome was aligned with that of fugu fish (a species with which homo sapiens shares a common ancestor that lived over 400 million years ago) in order to shared reveal noncoding sequences. The collected sequences were then cross-correlated with numerous databases detailing genomic features, with the aim of clustering conserved elements tied to similar features and inferring underlying function.

Mentor Name: Travis Wheeler, Computer Science

Use of GPS collar point distributions to infer cause of mortality in mule deer

Author(s): Kylie Brunette

Category: Life Sciences

Presentation Type: Poster Presentation

Abstract / Artist Statement: Declining mule deer (*Odocoileus hemionus*) populations across much of western North America in the past 25 years have inspired many studies examining population dynamics and possible causes of this decline. Here I analyze data retrieved from GPS collars on does of the Piceance basin mule deer herd in northwestern Colorado to test if GPS collar point distributions can be used to infer specific causes of mortality. I hypothesize that spatial movements of a carcass post-mortality differ between different mortality causes. I predict that coyote-caused mortalities will show significantly more movement post-mortem than mountain lion or malnutrition-caused mortalities. I predict that mountain lion and malnutrition-caused mortalities will not differ much from each other due to a lack of movement post-mortem in both cases. To test this, I will analyze GPS data in ArcMap to calculate average distance moved over time pre- and post-mortem, as well as average area moved pre- and post-mortem. I will randomly select one-half of the known mortality dataset to develop a model for determining cause of mortality based on spatial array of point and total distance moved. I will also include habitat type, slope, and timing of mortality as additional covariates in the model. I will then use the other half of the mortality dataset to validate the model. If my hypothesis is correct, studies using GPS collars may be able to more accurately determine cause of death based on the GPS data collected. If, on the other hand, GPS data alone cannot differentiate between mortality causes, then this means any study desiring accurate data on cause of death needs to prioritize reaching mortalities as soon as possible.

Mentor Name: Chad Bishop, Wildlife Biology

Using Community Science to Remove and Monitor Noxious Weeds at the Rock Creek Confluence

Author(s): Ira Moll; Patrick Benson; Jordan Barnes; Michael Nonemacher; Katie Andrews

Category: Physical Sciences

Presentation Type: Poster Presentation

Abstract / Artist Statement: Disturbances such as fire, flooding, and landslides are important in determining and maintaining the diversity and composition of plant assemblages in ecosystems. While disturbance can thus be an important part of ecosystems, they can also open up niches that fast growing plants can exploit, including noxious weeds which can be harmful to the environment, animals, or crops. Controlling the abundance and spread of noxious weeds is a top priority of land managers, but can be challenging with limited resources. The rise of “community science” is one potential complementary resource that both engages the public in restoration and monitoring while also working to control noxious weeds. To examine the potential for members of the public to aid in removing and monitoring noxious weeds, we are partnering with Five Valleys Land Trust (FVLT) to start a community-science based noxious weed monitoring and removal project at their Rock Creek Confluence property. On-site volunteer days will be organized to do targeted hand-pulling of noxious weeds. The volunteer day will also allow us to test the efficiency and accuracy of having the volunteers measure plant assemblage composition. This approach should create a closer connection between the larger community and the Rock Creek Confluence property, to help with focused manual noxious weed removal, and to provide data on the efficacy of those weed removal efforts.

Mentor Name: Ben Colman, College of Forestry and Conservation

Using Emotional Framing to Manipulate Anchoring Effect: How Affect Influences Judgment and Perception

Author(s): Elizabeth Waterman

Category: Social Sciences

Presentation Type: Poster Presentation

Abstract / Artist Statement: The anchoring effect is a well-established phenomenon in psychology. It is a cognitive bias that causes an individual to rely too heavily on one piece of information, the anchor, when making decisions and forming judgments. Regardless of how arbitrary that piece of information is, an individual forms a bias that affects all following related information. The current study will investigate whether the anchoring effect can be reduced or even eliminated by using a novel manipulation, such as a frame of emotion. Participants will be recruited through Psychology subject pool. They will be asked to answer a series of simple math questions, followed by the framing questionnaire. The framing involves choices with negative or positive influences to statements probing individual’s characteristics and also what others perceive of those characteristics. The anchoring effect will then be assessed by asking a question with either a low or high anchor (for example, 17 and 63, for the correct answer of 40) to see whether the participant’s perception of their experience of the simple math questions is affected by the exposure to an emotional frame. Although it has not been determined through prior experiments exactly in what manner the framing will affect judgment, the expected results are to reflect an increased ability for accurate judgment, given the negative framing. This is because of the increased analytical thinking that is associated with negative affect and the increased systematic cortical attention to given to negatively emotional events. This will help further determine how emotion interacts with judgment and perception, while considering both the substance of the information and the emotional state of the individual engaging in memory formation.

Mentor Name: Yoonhee Jang, Psychology

Utilizing Data and Technology in Social Work as Catalysts for Effective Community Change

Author(s): Haley Eakin

Category: Social Sciences

Presentation Type: Oral Presentation

Abstract / Artist Statement: Montana communities are faced with complex social issues. It is imperative that data and technology be leveraged to understand where these issues stem from, how they connect, and possible solutions. Due to its low population density, Montana is a data desert. There is scarce data collected at the local level and only a small portion of the data collected is made publicly available. This often leaves social workers and other service providers without digestible and easily accessible data to use in their decision-making processes, grant proposals, and practices. In response to this, myself and a small team of social workers at the Center for Children, Families, and Workforce Development collected data on over a hundred community wellness indicators and used data visualization software to create a publicly accessible data portal now available on the Center for Children, Families, and Workforce Development's website. The Montana Data Dashboard provides policy-makers, service providers, and the everyday Montanan with information that is critical to understanding the assets and challenges present in their communities. Data is currently available on topics including health, economics, education, safety, families, and more. Short video tutorials are also available to quickly refresh busy minds on the concepts necessary to gain value from the data presented. Technology and data can be catalysts for effective community change if social workers incorporate the insights and capabilities offered into their agencies and daily practices. The Montana Data Dashboard is a stepping stone towards creating data-driven and technology-fueled social work practices in Montana.

Mentor Name: Kim Spurzem, School Social Work

Validation of the Actical Accelerometer for Individuals with Locomotor Dysfunction

Author(s): Selene Tobin

Category: Life Sciences

Presentation Type: Poster Presentation

Abstract / Artist Statement: Accelerometers are movement devices that have been proven to be great tools to assess physical activity levels, determine intensity of activities, and measure energy expenditure in the majority of the population. However, these devices may not accurately assess energy expenditure in individuals with altered gait patterns. In order to better understand this discrepancy we are measuring energy costs of low to vigorous Physical Activity (PA) in individuals with altered gait while monitoring omni-directional ambulatory movement using a Actical® Accelerometer (Philips Respironics, Bend, OR) monitoring system to develop a generalizable, useful equation that can better predict energy expenditure. Participants will be assessed and categorized through the 10-meter Walk Test, Timed Up and Go Test, Four-stage Balance Test, 30 second Sit-to-Stand Test, and the Functional Gait Assessment. The participants actual energy expenditure will be measured with an Oxycon Mobile Metabolic System through the following tests: Resting Metabolic Rate (RMR), five minutes of self paced walking, five minutes of brisk-paced treadmill walking, and the Six-Minute-Walk Test. We will then look for correlations between the established categories of participants and their actual energy expenditure which will provide a more accurate equation for estimating energy expenditure with the Actical® Accelerometer. We will be combining this new data with data previously collected in Actical® Accelerometer validity research to have a larger data set to analyze. The intention of this study is to offer a more suitable adapted energy expenditure prediction equation, which will benefit those with physical disabilities in the assessment of physical function in the future.

Mentor Name: James Laskin, School of Physical Therapy & Rehabilitation Science

Viewing the Chromosphere of the Sun in the Near Infrared Spectrum

Author(s): Joseph Kelly

Category: Physical Sciences

Presentation Type: Poster Presentation

Abstract / Artist Statement: The outermost layer of the sun, the chromosphere, cannot normally be seen due to the overwhelming brightness of the photosphere, the layer beneath it. However, in certain wavelengths of light, the chromosphere outshines the photosphere, meaning it can be seen when these wavelengths are selected for. One such wavelength of light is in the near infrared spectrum, centered around 670 nm. When the infrared filters are removed from regular cameras, they are able

to see far enough into the infrared spectrum to detect light of these wavelengths. Unfortunately, the atmosphere absorbs most incoming radiation in the near infrared spectrum, meaning that one cannot measure light coming from the chromosphere from the ground. Instead, I affixed two cameras to a balloon, which was flown to 60,000 feet in elevation, high enough that the atmosphere no longer absorbed significant amounts of near infrared light. One camera took images in the visible spectrum, while the other filter out all light except that in the near infrared spectrum. Consequently, one camera took “normal” pictures of the sun while the other took pictures of the chromosphere of the sun. By comparing the images, the most apparent difference between them was in a phenomenon known as “limb darkening,” which is the effect where the edges of a star look darker than the center. This is caused by the light seen emanating from the center of a star being emitted from deeper within the star, where it is hotter and consequently brighter. While the visible-spectrum images displayed this effect in full, the near infrared images did not, as they were only viewing one layer of the sun.

Mentor Name: Angela Des Jardins, Physics and Astronomy

"We the People": Montanan Suffragist Belle Fligelman Winestine and the Progressive Era

Author(s): Becca Warwick

Category: Humanities

Presentation Type: Oral Presentation

Abstract / Artist Statement: Molded by her education and galvanized to activism by her college environment and opportunities, Belle Fligelman became an ideal example of what historians regard as the “new woman” of the Progressive Era. The late 1800s and early 1900s was a time period of tremendous change in America due to the industrialization and urbanization of cities as well as the influx of immigrants and “progressive” socio-political activism. Research in census records, historical newspapers, and other sources indicates that Fligelman’s life story characterizes that of many reform-minded women of the early 1900s. Born into a family of Romanian Jewish immigrants in 1891, Fligelman was raised in Helena, Montana and later attended the University of Wisconsin. By virtue of her education and early suffragist activism, which turned into a lifelong pursuit of progressive causes, Fligelman reflected many attributes of the era’s many “new women.” She graduated after serving as President of the Women’s Student Government Association, editor for the student newspaper, and as a lobbyist at the Wisconsin legislature for women’s suffrage. Subsequently, Fligelman worked as the first female journalist for the Helena Independent, covering Jeannette Rankin’s campaign for election to the House of Representatives and eventually joining the Republican Women’s National Campaign Committee as Rankin’s campaign manager; later, she went to Washington D.C. as Rankin’s secretary from approximately 1916 to 1918. Fligelman married Norman Winestine and returned to Helena, Montana, where they wanted to raise their three children. She continued her activism largely from her home state—even running for Montana state senate in 1932. All in all, the life of Belle Fligelman Winestine demonstrates Montana women’s activism in the Progressive era, offering clues to how they navigated the political realm and changing societal realities during the First Wave of feminism, both outside and inside the home.

Mentor Name: Anya Jabour, History; Women's, Gender and Sexuality Studies

Wets, Drys, and Hypocrites: Women and the Repeal of Prohibition

Author(s): Kathleen Resch

Category: Humanities

Presentation Type: Poster Presentation

Abstract / Artist Statement: This project argues that the main concern for both sides of the prohibition debate was the safety and well-being of Americans, but both sides offered different solutions. The WONPR advocated for the repeal of Prohibition and the WCTU sought better enforcement of Prohibition. Women flocked to the repeal movement in the 1920s and 1930s because Prohibition failed to live up to the expectations set by temperance groups prior to the ratification of the 18th Amendment. The crime rates were not lowered, people did not quit drinking, and the speakeasies were substituted for saloons. The idea that all women must support temperance frustrated many women, and they sought to end Prohibition through their recently gained political rights along with adapting rhetoric from the temperance movement, resulting in the end of Prohibition. Women who

supported repeal were upset with the expectation to support one side of an issue just because it was expected of them as women. The repeal movement challenged the notion that all women supported prohibition and temperance.

Mentor Name: Kyle Volk, History

Whitebark pine and prescribed fire: intended to create suitable habitat for seedlings, but at the cost of mature trees

Author(s): Adrienne Chenette; Spencer Lachman; Sam Wilson

Category: Life Sciences

Presentation Type: Oral Presentation

Abstract / Artist Statement: Whitebark pine (*Pinus albicaulis*) is a native five-needle pine and a keystone species in sub-alpine ecosystems. Yet, across its range whitebark pine is in peril; facing low rates of seedling recruitment, damage from non-native pathogens, climate-change-driven outbreaks of a native insect, and competition from encroaching tree species. Over the past decade, prescribed fire has been promoted as a means to restore whitebark pine by removing competition, reducing woody fuels density, and creating open spaces for seedling establishment. Despite the widespread use of fire as a tool for restoration, little is known regarding the impacts of fire in whitebark pine habitat. To improve our understanding of the effects of fire we used a before-after-control-impact design to assess its impacts on existing stands four years after a prescribed burn. At burned and unburned sites we measured woody fuels density and distribution of a shrub and an herbaceous plant correlated with facilitating or inhibiting whitebark pine seedling establishment. We also measured the frequency and cause of mortality in mature whitebark pine trees. We found that the density of woody fuels at our treated site was consistent with pre-treatment values, while at our control site the density of woody fuels decreased in all size classes by roughly 0.5 kg m⁻². Whitebark pine proved to be highly susceptible to fire: four years after treatment, more than 90% of mature trees exposed to the fire had died. Prescribed fire can be used to modify the composition of fuels and understory plants across a large area, but poses a threat to mature trees which function as a seed source after disturbance. Without a seed source near a disturbed site, it is unlikely that regeneration will occur despite the presence of suitable habitat.

Mentor Name: Cara Nelson, Ecosystem and Conservation Sciences

Thank you for participating in this year's UMCUR, we hope to see you next year!

