Book of Abstracts

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2025 CSURF KEYNOTE ADDRESS

Dr. Murphy G. Brasuel
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Research:
A VW Microbus Mediated Journey into Inner Space, Art Authentication, Spicy Food, and the Chemical Genius of Plants

Abstract: Research is a technical term for the process of discovery. This talk will be a rapid trip through a variety of research projects that I have had the honor of being involved in. On this trip through discovery, covering everything from nanotechnology to spicy food, we will explore components of discovery that can be hidden by the technical tools, forms, and formality that shape our own research ecosystems.

21st Annual Colorado Springs Undergraduate Research Forum

hosted by: Colorado College

8:15-9:00 am	Coffee, Tea and Check-In - Armstrong Hall			
Rooms	**Room #230**	**Room #259a**	**Room #231**	**Room #259b**
Oral Session 1 9:00 - 10:20 am	**Human Experience & the Environment** Tillema Reidy Ryan Stewart	**Journalism, Photography, and Detective Fiction in Mexico** Lewis Alvarado Lugo	**Exploring the Natural World** Vanga Long (group) Kim, M. Stanley	**Open Room/No presentations**
9:15-10:15am	Poster Session 1 - 1st Floor Armstrong Hall			
10:30-11:15am	**Keynote Address - Cornerstone** **Dr. Murphy Brasuel**			
Rooms	**Room #230**	**Room #259a**	**Room #231**	**Room #259b**
Oral Session 2 11:30-12:50pm	**Government and Thought** Madden Newhall Parks Li	**Women, Religion & Culture** Levi Burrell Liu (Group) Fox	**Humanities Over Time** Varallo Ford Carrello	**Violence in Mexico's Society and in it's Literature** Arreola Ramirez Saldaña Baeza
11:45am-12:45pm	Poster Session 2 - 1st Floor Armstrong Hall			
1:00pm	Complimentary Lunch - Cornerstone			

Presenter Abstracts

Oral Session 1
9:00 – 10:20 am

Human Experience & the Environment

(Room #230)

Adaptation to Amazonia

Bree Tillema

Shannon Miller, Faculty Mentor

Pikes Peak State College

Looking at Central and South America, human adaptations can be observed by environmental analysis, which gives scientists a look into prehistoric human biology via natural documentation, such as dendrochronology, and temperature reconstructions Since the significant migration of Homo sapiens around 70,000 years ago, adaptation has appeared in several ways depending on several factors, like biotic (populations of organisms, species interactions, birth rates, etc.) and abiotic (elements like temperature, light, soil type, or water availability) components. When understanding adaptations that have taken place and continue to take place, it can be useful to draw parallels between the current state of human adaptation and that of which built its foundation. Climate change is the most apparent cause of trait evolution and can provide time periods to work within; for example, the Pleistocene and Holocene. The Anthropocene is a proposed term that encapsulates the understanding that humans have both direct and indirect impacts on their ecosystems, therefore impacting themselves. Research on these biological elements in specific regions can provide insight into how adaptation has taken place and how humans are currently in a new era of adaptation due to our direct contribution to climate change.

Wasians on TikTok: Shifting Mixed Race Subjecthood

Aiko Reidy
Sandi Wong and Leland Tabares, Faculty Mentors
Colorado College

Social media platforms like TikTok are often championed as fruitful spaces for expanding connectivity through increased awareness of different cultures and politics. For Asian Americans, social media provides a useful space to challenge and reimagine the bounds of Asian America and expand the meaning of Americanness. Recent trends on TikTok have grappled with Asian American creators' expressions of mixed-race Asian American identity. While Critical Mixed Race Studies and Asian American Studies have situated mixed-race Asian American identity formation materially, the ongoing influence of social media in contemporary popular culture calls for investigating the ways that social reality and mixed-race identity are constructed through digital cultures. TikTok provides insight into how structural ideologies are internalized and reproduced by social media users, reflecting the integral role of social media in the formation of Asian American subjecthood. This paper analyzes performances of mixed-race white and Asian creators ("Wasians") on TikTok, revealing how Wasians pathologize their racial identity and how ideologies about race manifest in these representations. These representations propagate model minority ideologies that reproduce white supremacy and racial hierarchies during a period of heightened ethnonationalism, rather than challenging them. Specifically, this paper analyzes a trend related to dating capital based on race (through the "how do you pull?" trend), and an additional trend that showcases the parents of Wasians as 'proof' of mixed-race identity and proximity to whiteness. This critique serves as a necessary call for mobilization and further development of the Wasian identity and community. In order to shift from Wasian identity serving white supremacy through complacency, a challenge to these normative views is necessary to imagine a Wasian identity that is invested in solidarity with other marginalized groups.

Good trips, bad trips, and those in between: An ethnographic study on psychedelic experiences in Colorado

Mckenna Ryan
Christina Leza, Faculty Advisor
Colorado College

Good trips, bad trips, and those in between: An ethnographic study on psychedelic experiences in Colorado Oral Colorado College Mckenna Ryan Christina Leza Abstract: While psychedelics continue to gain increased mainstream attention, ethnographic research that examines how and why they are being used remain limited. Using data collected from a group of sixteen informants in the Colorado area,

this study examines why people use psychedelic substances and what factors are most relevant to the quality of their experiences. I found that informants generally used psychedelics for fun, for healing, or for spiritual growth. Set, setting, and integration were the key factors associated with positive psychedelic experiences, and integration was identified as particularly useful for positively reframing bad trip experiences. This study worked to center the experiences of my interlocutors and includes recommendations that may be generalizable to the broader community of psychedelic drug users.

Silviculture and Sequestration: Site Selection and Carbon Valuation of Reforestation Projects in Western Colorado

Ethan Stewart

Dr. Michelan Wilson, Faculty Mentor

Colorado College

As a result of compounding climate change impacts, vulnerable forest ecosystems are experiencing high levels of degradation. This is particularly true of regions in the Western US such as Colorado, where the expansive forests of the Rocky Mountains are being devastated by wildfire outbreaks and bark beetle infestations. To identify sites for reforestation projects, six factors (erosion, land use and land cover [LULC], position in the watershed, soil taxonomy, slope, and precipitation) affecting forest generation were considered in a multi-criteria evaluation (MCE) analysis. A site suitability map was then generated in ArcGIS using weighted linear summation (WLS) of these attributes. Furthermore, to incentive policy outcomes, a valuation of future carbon sequestered through reforestation was estimated using the InVEST Carbon Storage and Sequestration model. Using the previous site suitability map three policy scenarios (business-as-usual, limited reforestation, and extensive reforestation) were proposed with their respective carbon sequestration benefits estimated from 2040-2100. LULC raster layers were generated for the present day and each policy scenario, and carbon pool data across four pools (aboveground biomass, belowground biomass, organic soil carbon, and dead matter) was assigned to each LULC classification. Carbon stock changes were therefore determined based on LULC classification alterations in the hypothetical future scenarios and valued according to several economic parameters set forth in the InVEST model. Eighteen different simulations were run in the model to test each policy scenario, three different market and social discount rates (7%, 3% and 1%), and two different annual carbon price changes (5% and 0%). Estimated benefits ranged from $820-$846 million for the limited scenario and $5.35-$5.53 billion for the extensive scenario based on avoided social cost of carbon. These results could promote more effective reforestation policy and encourage discussion of the numerous ecological and economic benefits of the ecosystem services provided by forests. Keywords: reforestation projects, geospatial analysis, economic valuation of ecosystem services, avoided social cost of carbon.

Journalism, Photography, and Detective Fiction in Mexico

Spanish Language Room

(Room #259a)

Understanding the US – Mexico Border Through Crime Stories in Baja California

Luis Lewis

Dr. Edgar Cota-Torres, Faculty Mentor

University of Colorado Colorado Springs

In this presentation, I will explore the evolution of crime literature in Mexico, focusing specifically on the uniqueness of it on the border region of Baja California. I analyze personal testimonies and fictional stories written from the late 1800s through the 1990s—before crime fiction became an established genre and leading up to the period when crime began to take on a distinct identity shaped by drug trafficking. These early narratives start from personal travel accounts and evolve into detective tales, they reveal how literature captures the realities of crime, violence, and corruption more deeply than journalism or cinema. They serve as a window into reality, reflecting the values, norms, and culture of the border society through the lens of crime.

El oficio del periodismo:
De la noticia y la justicia hacia la narrativa noir en México

Rulbe Alvarado
Dr. Edgar Cota, Faculty Mentor
University of Colorado Colorado Springs

Muchos periodistas especialmente en México cambian del periodismo hacia la literatura narrativa. La longevidad del periodismo caduca y se vence. Muchos periodistas hacen el cambio hacia la literatura narrativa por su seguridad y para poder dejar una impresión que durara más que en el sistema del periodismo. Periodismo en México - El papel del periodismo en México contra la corrupción y el Crimen Organizado - Los Riesgos del trabajo - Hablar sobre el sistema de policía en México - Las relaciones entre el periodismo y el gobierno y como se afectan uno al otro - Casos de desapariciones históricos y reciamente Estadísticas y eventos corrientes - Desapariciones por año de periodistas - Comparaciones de otros países en comparación a México - Porcentajes de crimen resuelvo - Enseñar cuales estados mexicanos son involucrados - Autores que empezaron en el periodismo e hicieron el cambio - Ex: Hilario peña, Bernardo Esquinca - Periodistas que se han convertido en autores - Los trabajos de los autores y sus inicios - Cuando hicieron el cambio - Los trabajos ficcionales y como son similar a hechos reales - Pensamientos finales - Mi opinión y conectar todo junto para terminar la presentación.

Cómo Metinides transformó la narrativa visual de la nota roja

Ytzel Lugo
Dr. Edgar Cota-Torres, Faculty Mentor
University of Colorado Colorado Springs

Esta presentación analiza el papel de la *nota roja* y la influencia del fotógrafo Enrique Metinides en la configuración de este subgénero dentro de la narrativa criminal en México. La *nota roja,* caracterizada por la representación gráfica de crímenes violentos y sucesos trágicos, ha sido un ingrediente clave en el desarrollo del periodismo sensacionalista y la crónica policial. Enrique Metinides, reconocido por documentar accidentes, asesinatos y desastres desde temprana edad, marcó un antes y un después en la manera de captar y presentar la violencia urbana. Su trabajo no solo aportó una mirada cruda y directa a las escenas del crimen, sino que también estableció un vínculo entre el fotoperiodismo y la narrativa literaria contemporánea que explora los aspectos más oscuros de la sociedad mexicana.

A través de sus imágenes, Metinides contribuyó a la creación de una estética particular en la *nota roja*, que ha inspirado tanto a escritores como a cineastas interesados en retratar la violencia y el dolor de manera realista y sin censura.

Exploring the Natural World

(Room #231)

Increasing the dynamic coupling in artificial spin ices through geometry design

Varun Vanga
Dr. Ezio Iacocca, Faculty Mentor
University of Colorado Colorado Springs

Artificial spin ice (ASI) is a magnetic system that involves a lattice of many magnetic elements of nanoscopic dimensions, i.e., nanomagnets. ASIs have potential applications as microwave devices and fundamental elements for unconventional computing. To be functional, ASI geometries must be optimized for stronger dynamic coupling between nanomagnets. In this talk, we discuss the impact of nanomagnet's shape on the ferromagnetic resonance of ASI. We find that the edge modes, which are the main modes driving dynamic coupling, can vary up to 5 GHz. This implies that ASI must be fabricated with high accuracy to host narrow spectral features that are critical for applications. To further increase the coupling through edge modes, we study a trilayer system where two nanoislands are stacked and then placed in an ASI arrangement. Because spin waves are directional, we find that the inclusion of a directional term called Dzyaloshinskii-Moriya interaction maximizes coupling when waves propagate in opposite directions in each layer. This means that in each trilayer, the spin waves propagate in a convective fashion. These results showcase that three-dimensional stacking on nanomagnets leads to a stronger dynamic coupling which can lead to the realization of functional devices for information technology.

Sustainability of Game Ranching & Complementary Land Uses

Grace Long & Kayla Thresher
Dr. Cerian Gibbes, Faculty Mentor
University of Colorado Springs Colorado

Exotic game ranching is an emerging land use practice with significant sustainability implications, balancing ecological, economic, and social dimensions. This research examines the sustainability of exotic game ranching in the United States—focusing on Colorado and Texas—and contrasts it with its long-established role in South Africa. Specifically, the study aims to: (1) assess the extent and characteristics of exotic game ranching in Colorado and Texas and (2) analyze the sustainability outcomes of this practice in South Africa, where it has influenced environmental conservation, economic development, and social change. By comparing these regions, this research will provide insights into how game ranching aligns with sustainability principles across different contexts. This study employs a mixed-methods approach, integrating document analysis, remote sensing, and interviews with land managers. Policy documents and sustainability frameworks will be analyzed to assess the regulatory landscape, while remote sensing and GIS techniques will evaluate biodiversity, ecosystem changes, and the ecological footprint of game ranching. Field observations in South Africa will validate remote sensing findings, and interviews with land managers will offer firsthand perspectives on the benefits, challenges, and sustainability of game ranching as it intersects with wildlife conservation and agricultural practices.

MBL-1 is a splicing factor required for sensory neuron morphogenesis in C. elegans

Meena Kim
Darrell Killian, Faculty Mentor
Colorado College

Neurons are cells of the nervous system that are responsible for the communication of sensory or synaptic information. Defects in neuron morphology impair neuronal function and are associated with neurological disorders. Therefore, an understanding of the genetic regulation of neuronal morphology is important. The *Caenorhabditis elegans* PVD neuron is an excellent study system due to its complex morphology in an organism that is amenable to genetic manipulation and live imaging. The *C. elegans mbl-1* gene encodes a Muscleblind family RNA-binding protein (RBP) that is predicted to regulate alternative RNA splicing. Loss of *mbl-1* produces a nervous system phenotype characterized by defects in dendrite patterning and synapse formation in sensory neurons. We found that *mbl-1* mutants exhibit reduced terminal branching of the *C. elegans* PVD sensory arbor, with terminal branching becoming progressively sparse with increasing distance from the cell body. We tested whether similar defects would be apparent for other types of *C. elegans* neurons and found that dendrites are truncated in several unbranched mechanosensory neurons: the PLMs, ALMs, PVM, and AVM. We also found that PLMs have longer axons, and the location of their synapse is shifted closer to the cell body in the *mbl-1* mutant. To learn

more about the molecular function of MBL-1 protein, we biochemically isolated RNAs bound by MBL-1 to use in a RIP-Seq analysis. Due to inconclusive results from the RIP-Seq, we are now pivoting to a new strategy called HyperTRIBE. This technique utilizes the catalytic domain of ADAR, an RNA editing enzyme. After confirming presence of our ADAR fusion proteins, we will be able to isolate RNA and identify MBL-1 target mRNAs through sequence analysis to detect edited bases. Forthcoming results will elucidate the mechanisms by which MBL-1 regulates neuron morphology and provide a novel method of identifying RBP interactions in *C. elegans*.

Sexual Crosses with the Mucoromycete Phycomyces blakesleeanus

Luke Stanley
Dr. Jesús Peña, Faculty Mentor
Colorado College

Phycomyces blakesleeanus, a filamentous fungus within the Mucoromycota phylum, is distinguished by its remarkable capacity for environmental perception and adaptive responses. While past work has shown that environmental stimuli, including gravity, light, moisture, and nutrient availability, influence its growth dynamics and reproductive strategies, the underlying mechanisms remain a focal area of research. Environmental cues trigger sexual or asexual reproduction. Sexual reproduction begins with pheromone signaling which triggers hyphal chemoattraction, eventually leading to serial morphological transitions culminating in the formation of a zygospore. In a laboratory setting, crosses of *P. blakesleeanus* result in complementary mycelia undergoing the sexual cycle at different stages. Our work aims to test if environmental cues can trigger the mating across the mycelia of *P. blakesleeanus*. Crosses of *P. blakesleeanu*s grown on nutrient-limited media will be subjected to nutrient limited agar to trigger a sexual response in accordance to nutrient depravation. Successful triggering of mating in *P. blakesleeanus* will facilitate future studies that require a large amount of sexually reproducing mycelia in specific stages. The outcome of this research will further enhance our understanding of how *P. blakesleeanus* reproductive mechanisms are influenced by environmental factors, contributing to the broader knowledge base on the sexual reproduction of filamentous fungi.

Presenter Abstracts

Poster Session 1
9:15 – 10:15 am

(Alpha Order by Presenter Last Name)

A Multispecies Ethnography: How visitor education about Western Lowland Gorilla (Gorilla gorilla gorilla) behavior could influence the viability of zoos in the conservation realm

Marie Baird & Kate Pulley

Krista Fish, Faculty Mentor
Colorado College

Not to exceed 300 words Abstract: My research aimed to focus on the actual and perceived welfare of the Western Lowland Gorillas (Gorilla gorilla gorilla) at the Cheyenne Mountain Zoo. By assessing the amount of time the troop spent engaging in typical and stereotypic behaviors, my goal was to determine whether it was properly enriched and showing healthy levels of the expected behaviors. In addition to the behavioral research I conducted on the gorillas, I also performed an ethnographic field study of the human visitors at Cheyenne Mountain Zoo, to see if visitor perceptions of gorilla welfare aligned with actual welfare, as suggested by the results of my research. My research methods for gorilla behavior consisted of instantaneous focal animal sampling, using 30 second intervals over a 10-minute observation period. To define and identify behaviors, my research partner (Kate Pulley) and I utilized an ethogram, which listed 11 behaviors to focus on in our data collection. In terms of ethnographic data collection, I focused on gathering overheard quotes from visitors to the zoo, both in Primate World and in the rest of the zoo. I then sorted these quotes into categories of positive, negative, and neutral to assess overall visitor perception of animal welfare at Cheyenne Mountain Zoo. My results showed that the gorillas spent the majority of their time resting, followed by feeding in second place. They also engaged in no stereotypic behavior over the 2-hours of data collection I conducted, which suggests a proper level of enrichment. Nevertheless, the ethnographic data I collected showed that visitors had an overall negative perception of the welfare of the animals in the zoo, showing a misalignment between actual and perceived welfare of the captive primates at Cheyenne Mountain Zoo.

The impact of environmental adversity on children's self-esteem: Assessing the protective effects of ethnic-racial identity

Karen Ahumada Villanueva

Kristen L. Rudd, Faculty Mentor
University of Colorado Colorado Springs

Environmental adversity—such as poverty, overcrowding, and homelessness—can negatively impact children's psychological outcomes, including self-esteem (Copeland-Linder et al 2010). In order to prevent negative outcomes and strengthen resilience, it is crucial to understand the individual factors that may shield children from harmful effects. Notably, minority children experience a disproportionate amount of adversity, and research indicates that ethnic-racial identity (ERI) may promote positive outcomes for these children (Rivas-Drake et al., 2014). However, there is limited understanding of how ERI (the identification of an individual with a particular ethnic or racial group) can mitigate the impact of adversity on children's self-esteem. This study examines how environmental adversity influences children's self-esteem and whether ERI moderates these relationships. Utilizing a sample of 150 ethnic and racial minority children (50% female) from an ongoing longitudinal study of child development, we evaluated parent reports of environmental adversity from birth to age six alongside children's self-reports of ERI at age eight and self-esteem at age 10. Early childhood exposure to environmental adversity did not significantly impact self-esteem, and this relationship was not influenced by ERI. Additionally, gender differences were not significant. These findings indicate that other factors may have a more critical role in shaping self-esteem in this context. Specifically, future work should evaluate multiple types of adverse exposures, such as relational adversities which may have more impact on self-esteem. Keywords: Environmental adversity, self-esteem, ethnic-racial identity, children, protective factors, psychological resilience.

Childhood Traumatic Events on Affective Processes, Interpersonal Functioning, and Interpersonal Aggression

Makenzie Baca

Colin Mahoney Ph.D., Faculty Mentor
University of Colorado Colorado Springs

Traumatic events have both acute and chronic effects on survivors, with mixed findings regarding their impact on interpersonal skills and prosocial behaviors like empathy. Lim et al. (2016) found a positive association between trauma and prosocial behaviors, such as empathy, while Zhang et al. (2023) reported a negative association. Additionally, trauma experienced in childhood has been linked to decreased affective processes and increased interpersonal aggression in adulthood (Renn, 2002; Yöyen & Bozacı, 2023). Ulloa and Hammett (2016) found that intimate partner violence (IPV) significantly decreased empathy in perpetrators. Although past research has been thorough, the role of interpersonal aggression as a moderator between trauma and prosocial behaviors remains understudied. These mixed findings led us to hypothesize that interpersonal aggression moderates the relationship between interpersonal functioning and affective processes. This study aims to investigate the effects of childhood trauma on interpersonal functioning, affective processes, and aggression. College-aged trauma survivors have completed surveys assessing these variables. In this Senior Honors Thesis, a cross-sectional design is being used, with future data being analyzed through hierarchical regression to explore moderation effects. Preliminary findings will focus on the demographic comparisons and correlations between the affective and interpersonal impacts of childhood trauma on college students.

Examining How Being Bilingual Benefits Executive Functioning

Sean Barrientos
Dr. Rachel Thayer, Faculty Mentor
University of Colorado Colorado Springs

Knowing more than one language is a skill that billions of people across the world possess. Being fluent in a language besides your mother tongue carries numerous social benefits, but research indicates that there may also be cognitive benefits to being bilingual. Broadly speaking, these theoretical benefits to being bilingual are known to researchers as the Bilingual Advantage Theory. In a study conducted by Pelham & Abrams (2014), evidence was found supporting the Bilingual Advantage Theory, with their findings suggesting that bilingual participants had superior executive functioning abilities compared to monolingual participants. The current study seeks to expand upon existing research by tapping into the patient database provided by the UCCS Aging Center, where patients who are generally over the age of 55 are referred for neuropsychological evaluations. After controlling for general cognitive abilities, the study will use a t-Test to compare the percentile of executive function abilities amongst the two participant groups: bilingual and monolingual. It is expected that the bilingual group will have stronger executive functioning scores compared to the monolingual group, while other areas are likely to remain the same.
Keywords: bilingual advantage theory, bilingual, cognitive function, executive function, language, monolingual

Comparative Analysis of Innate Immune Responses to Microsporidia Infection Between Two Caenorhabditis Nematode Species

Caroline Bay & Joselyn Campuzano
Spencer Gang, Faculty Mentor
Colorado College

Microsporidia are obligate intracellular fungal pathogens infecting numerous eukaryotic hosts, including Caenorhabditis nematodes. Among them, Nematocida parisii naturally infects Caenorhabditis elegans, inducing the host transcriptional Intracellular Pathogen Response (IPR). The IPR involves the upregulation of many genes, notably pals gene family members, involved in pathogen recognition and immune defense. The IPR is well-studied in C. elegans, but its conservation across related species is poorly understood. Caenorhabditis briggsae, biologically similar to C. elegans, provides a useful comparative model. While N. parisii infects both species, the degree of susceptibility to infection between the two hosts was unclear. We used quantitative fluorescence in situ hybridization (FISH) analysis to compare pathogen load and determined that C. elegans and C. briggsae are similarly susceptible to N. parisii. We next asked if C. briggsae pals genes are similarly induced during infection as observed in C. elegans. To test this, we infected C. briggsae with N.

parisii and performed qRT-PCR for 8 of the 11 pals genes identified in this species, revealing an upregulation of select genes. Existing research and our RT-qPCR data informed the selection of two highly induced pals genes, and we constructed transcriptional GFP reporters to visualize the C. briggsae immune response during N. parisii infection. With our development of C. briggsae transcriptional reporters, our next step will be to perform forward genetic screens to identify regulators of the C. briggsae immune program.

Optimization of boride reduction of 3,5-disubstituted isoxazoles

Nicole Beitle

Dr. Allen Schoffstall, Faculty Mentor
University of Colorado Colorado Springs

A one-pot synthesis of 3,5-disubstituted isoxazoles was achieved via the cycloaddition of hydroximinoyl chlorides with alkynes in the presence of a base. Using this method, two novel isoxazole compounds were successfully synthesized. Efforts to reduce these isoxazoles focused on a transfer hydrogenation method, which employed hydrazobenzene and a copper-on-iron catalyst. This approach aimed to achieve reductive ring opening to form enaminones. However, preliminary results showed that excess hydrazobenzene led to over-reduction of the ketone, forming an undesired alcohol rather than the target enaminone. Optimization of this reaction is ongoing, including adjustments to solvent choice, reagent ratios, and alternative hydrogenation systems. To date, reduction of 3-(5-substituted) isoxazoles has not yielded enaminones in significant amounts, either through transfer hydrogenation or iron-mediated ring opening. Continued efforts are focused on improving selectivity and yield of the desired enaminone products.

Creating an Artificial Intelligence Tool for Counting Bats in Thermal Videos

Ailea Blahm, Savannah Barrett, & Natalie Young

Dr. Aaron Corcoran, Faculty Mentor
University of Colorado Colorado Springs

Bats are small, fast, and nocturnal, making them difficult to observe in nature. Videobased tracking can be useful for a range of conservation needs, from movement patterns to population status and pest control. We aimed to develop and test the accuracy of an Artificial Intelligence (AI) program at counting how many bats are in videos of varying difficulty and style. The precision of the AI in detecting and tracking bats in videos serves as a gauge in determining the project's progress towards the final goal of counting the bats. To accomplish these objectives, we used MATLAB to manually draw square outlines around bats in over 20 videos that spanned from low to high densities of bats and from locations such as caves, bat boxes and flying across the sky. With this information, we programmed neural networks using Ultralytics You Only Look Once (YOLO) version 11 in Anaconda to create training models of each video that were

then tested for accuracy. Training networks will be compiled to create a universal model. Using a blinded study design, at least two people manually counted each video as a ground truth against which the AI models will be compared. The work is in progress, so results have not yet been found. The previous version of this program, ThruTracker, required several parameter adjustments for every video analyzed, whereas the goal of this program is a more streamlined process where bats are counted in videos with minimal user input or expertise. An additional goal of this work is determining what types and qualities of videos are required to provide accurate bat counts. In conclusion, although the project is still in progress, it strives to create an efficient and automated AI program that will aid in future conservation efforts.

Investigating the role of a male-derived, female-translated protein on fertilization in Drosophila arizonae

Adrianna Blickhan
Dr. Jeremy Bono, Faculty Mentor
University of Colorado Colorado Springs

The systems underlying successful reproduction are not well understood in most organisms, because research has been primarily centered around sperm-egg interactions. However, our lab has discovered that males transfer RNA through seminal fluid, which the females then translate into functional proteins. This leads to the investigation of the role of these male-derived, female-translated proteins (mdFTPs) in fertility. This research aimed to investigate the impact of these proteins by knocking out the ARI00758 gene in males. We compared the fertilization rates of eggs laid by wild-type females mated to either mutant or WT males.

Tracks in the Snow: The Growing Footprint of Backcountry Skiing

Jaimie Boese-Rhinesmith & Mae Faglier
Dr. James Baginski, Faculty Mentor
University of Colorado Colorado Springs

Backcountry skiing has grown significantly in popularity in recent years, becoming a favored winter activity for those looking to enjoy the outdoors while avoiding the crowds and costs of ski resorts. However, with this rise in interest come several environmental consequences that are often overlooked. Our research focuses on the ecological impacts of increased human presence in backcountry areas, particularly those related to habitat degradation and ecosystem disturbance. Frequent use of backcountry zones can lead to the trampling of native

vegetation and the disruption of wildlife habitats. Additionally, repeated travel over the same areas contributes to soil compaction, which interferes with natural water infiltration and drainage. The lack of designated trails in backcountry skiing means that heavily used routes, also known as skin tracks, can become compacted over time, affecting how snow melts in those areas. These seemingly minor changes can have broader implications for both the landscape and the species that depend on it. Another major aspect of the environmental impact associated with backcountry skiing is the increased risk of natural disasters, particularly avalanches. Avalanches can be triggered by human activity in steep terrain, especially following significant precipitation. These events occur when unstable layers within the snowpack shear off and slide downhill, often with destructive force. In addition, the sport contributes to a growing carbon footprint. Many popular backcountry skiing destinations are located in remote areas, requiring long drives to access them. This travel results in the release of substantial greenhouse gas emissions, further contributing to climate change. While the activity is seen as an escape into nature, it also carries a hidden environmental cost that shouldn't be overlooked. Our goal is to highlight the environmental impacts of backcountry skiing and encourage greater awareness among both participants and the public.

Creation of a tool designed to study the dietary habits of weightlifters: face and content validity

Kathryn Bond

Dr. Keston Lindsay, Faculty Mentor

University of Colorado Colorado Springs

Creation of a tool designed to study the dietary habits of weightlifters: face and content validity Bond, K. E. 1, 3., Roth-Broske, F. H. 1, 3, Harris, M. M. 1, 3., Hutchins, A. M. 1, 3., Kirby, J. B. 2, 3 ., & Lindsay, K. G. 1, 3.

This study seeks to validate a nutrition questionnaire using a sample of athletes across several weightlifting disciplines, including powerlifting, Olympic lifting, CrossFit, Strongman, and the Scottish Highland Games. Despite the physical demands of these sports, little research compares nutrition practices across these weightlifting communities. Previous studies have highlighted certain dietary trends for bodybuilders and powerlifters, yet data for other sports, such as Strongman or Highland Games, are largely anecdotal. To address this gap, we created a survey tool using face and content validation. We adapted the Mini-Eating Assessment Tool (Mini-EAT) to capture the dietary practices of weightlifting athletes. This tool measures intake across key food categories to provide a comprehensive nutritional profile. Data collection is ongoing at gyms and healthcare facilities, with the purpose of addressing construct validity. Keywords: weightlifting, diet, nutrition.

Environmental Impact of Highways

Nicole Box & Rory Nixon
Dr. James Baginski, Faculty Mentor
University of Colorado Colorado Springs

The highway system is a staple of American transportation, highways provide easy access through states and to recreational areas like ski resorts, campsites and beaches. Despite this convenient transportation method there are some long-term environmental impacts like soil erosion, loss of biodiversity, and pollution. (Hill) However, the most abundant impact being a danger to wildlife. There is a large loss of wildlife population, restriction of migration and the disruption of mating season. Wildlife movement in relation to highways is a topic of interest because as urban sprawl continues to move into rural areas habitat degradation increases as well. This growth and loss feels inevitable but there are solutions being implemented that will mitigate the danger to wildlife so people can still travel safely as desired. How have highways affected wildlife populations and how can this problem be managed to lower risk to wildlife? This topic is unique because it doesn't have headline attention but has great effects on the surrounding environment. The course this project is for is, "Recreational tourism and the Environment". Roadways bring great mortality rates to wildlife but it's also a dangerous obstacle for people. October has the highest number of accidents with wildlife involved and the highest human fatalities with 13% of the years traffic deaths occurring in the same month. This is tragic but wildlife has even worse cards. The U.S department of Transportation estimated one to two million vertebrates are killed every year just in the United States. Aproximating an animal is killed on the road every 26 seconds, this number continues to rise annually. (Frank) Solutions have already been implemented like fencing and wildlife crossings. They are evident to greatly decrease collisions, these simple solutions can save wildlife and human life. (Jackson) Although, new GPS technology is innovating infrastructure and road planning to reduce habitat destruction and wildlife mortality. (DOT)

The portrayal of women in media

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Gender stereotypes are flexible and can be corrected based on social changes in the environment. One example being the change in the stereotype surrounding womens intelligence. While women used to be stereotypically seen as being less intelligent than men, current trends indicate that the stereotype has changed to the belief that women are more intelligent than men (Santoniccolo et al., 2023). These changes are still very important as global media still majoritively features men, especially as expert voices, television, children's television, sports coverage, and in videogames. A lot of TV programs still advertise harmful gender stereotypes that perpetuate a culture that oppresses women. In accurate portrayals of women cause negative effects on women as well as men.

Global Feminism and Digital Media

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Digital media is so fundamentally important and significant that it changes the worldly views and local views of feminist activism. Different digital media platforms and social movements, like the #metoo movement has gained more traction since the rise of TikTok. This particular social movement exposed systemic sexual harassment and harsh gendered roles in industries and workplaces. The #metoo movement quickly became a globalized social movement, which allowed for high impact change, like workplace reforms and policy changes. Then the #withyou movement in Korea and the #yotambien movement in Latin America further highlight the global spread of the #metoo movement, and the global change needed for women working in male dominated industries. However, there are still challenges that women face in digital/social media movements and activism. Furthermore, one of the major challenges that women still face is online harassment and digital misogyny. Women getting cyberbullied, doxed, and women still getting major backlash for supporting social movements. These critics have heavily influenced the global impact of whether social digital movements ignite sustained real-world change. Furthermore, questioning whether these social movements are worth fighting for, if they are not enacting real-world change, then why fight for it? This also calls into question who has access to online activism and if this profoundly affects all people. Due to cultural and systemic barriers in different countries and regions, the accessibility to online activism can look different or not exist at all. This paper will argue the usage of digital media in feminist activism and movements, and the effects that social media has on the modern and future of feminism.

Confinement-Warped Behaviors: How a male Orangutan exposes the flaws of Zoo Culture and Capitalism

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This study examines the behavioral and cultural dynamics of orangutans in captivity, applying a multispecies ethnographic framework to interrogate the structural limitations of zoo culture under capitalism. Through direct behavioral observations, visitor conversation analysis, and a zookeeper interview, this research explores how confinement alters orangutan behavior and how human perceptions of these changes reflect broader societal issues. While zoos promote themselves as centers of conservation and education, financial constraints shape the lived experiences of captive animals, influencing both their well-being and the ethical narratives constructed around their care.

Observations conducted at the Cheyenne Mountain Zoo reveal stark shifts in captive orangutan activity patterns, including a steep reduction in foraging (3%) and an increase in resting (32%), alongside notable stereotypic behaviors (26%). Visitor discourse framed these behaviors as signs of distress, while a zookeeper testimony suggested that boredom, rather than systemic neglect, was the primary cause. These interpretations underscore how economic and institutional factors shape human-animal relationships in the zoo environment. Drawing from Hartigan's multispecies ethnography, this paper examines how orangutans, visitors, and zookeepers participate in the co-construction of zoo culture, while also situating this discussion within Marxist critiques of capitalist systems. The findings suggest that orangutan welfare in zoos is contingent on financial stability, public perception, and labor conditions, raising questions about whether ethical animal care is compatible with institutions in a capitalist society. By bridging behavioral analysis with socio-economic critique, this study challenges dominant narratives of zoo functionality and calls for a reassessment of how nonhuman primates are positioned within human economic systems.

Dynamite and Wine:
Whats Eating Tony's Grapes?

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Dr. Minette Church and Dr. Karin Larkin, Faculty Mentors

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This research, conducted as a partnership between UCCS and PCRG during their Chancellor Ranch survey, investigates the homestead of a historical figure known as Tony, located near the Purgatoire River, east of Trinidad, Colorado. According to oral histories, Tony, referred to as "Dynamite Tony," is linked to notorious bootlegging and the alleged murder of local youths. The study aims to uncover the life ways of Tony and his contemporaries through material culture analysis. Utilizing field surveys, artifact analysis, GIS mapping, and consultations with local communities, the site (5LA 14662) revealed unique, temporally diagnostic artifacts. Laboratory analysis identified a significant number of empty alcohol containers of the same type and innovative uses of repurposed materials, with notable absences of certain items. These findings enhance our understanding of the lifestyles and challenges faced by the historic settlers of the Purgatoire River region, contributing valuable insights into their social dynamics and material practices.

Empire and Ecology, a Cartography: Mapping the US Empire's Influence on Climate Change through the Lives of Native Women

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Through the continued activism of Indigenous women, it is clear that the Missing and Murdered Indigenous Women (MMIW) is a continuation of Empire-backed genocide. However, the full scope of how this genocide maintains settler-colonialism with respect to land stewardship and Native nations is unclear. My main research question is how do Indigenous women mediate the relationship between ecology, Empire, and tribal sovereignty? This project is a visual cartography situating MMIW in relation to the United States, the Očhéthi Šakówiŋ nation, Očhéthi Šakówiŋ women, and the traditional homelands of the Očhéthi Šakówiŋ Nation. The main area of study I focus on are sites of resource transfers in what is now known as the border between North and South Dakota. The qualitative data I analyze to create this visual cartography are secondary sources coming from existing research on resource extraction, articles by Indigenous women, and US legal documents. The importance of this project is to situate the MMIW crisis in relation to political power and control of land in order to address neoliberal feminism and environmentalism.

The Future of Colorado College's (CC) Skeletal Collection

Gracie Carello, Suvi Talvitie, & Alex Hooper
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Colorado College

The Department of Anthropology at Colorado College (CC) has historically had a lack of documentation regarding the acquisition of the human remains in their teaching collection. There have been past efforts to completely inventory and repatriate the remains according to the 1990 Native American Graves Protection and Repatriation Act (NAGPRA) regulations. However, in the wake of the 2024 NAGPRA regulations, the class of AN301 Human Osteology worked to inventory the entire teaching collection and establish provenance for as many remains as possible. Through experiential learning, we identified and sided bone fragments as well as estimated age and identified pathology, trauma, and taphonomy. Our class deeply considered the ethics of our collection during the entire inventory process. We realized that the human remains in our collection are all unethical to have and continue using according to the standards devised by the class in conjunction with our professor, bioarchaeologist Elizabeth Fellars. The remains in our collection violate the ethical standards

because they have no documentation regarding where they came from, who the individual was, or if the individual consented to having their remains donated and used for teaching. We recommend deaccessioning all remains without explicit documented consent from the individual, their next of kin, or their descendant community. Additionally, we recommend future classes involving the use of human remains to use only bone casts, also with written consent from the individual about the use of their bones for teaching, and faunal bones as these are only introductory courses and anyone going into the field will get experience with real human remains further along in their career.

Comparing Mammal Detection Methods: A Pilot Study of Census Surveys and Camera Traps at La Selva Biological Research Station

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This study investigates the effectiveness of two commonly used methods for monitoring mammal diversity—census surveys and camera traps—at La Selva Biological Research Station in Costa Rica. While census surveys require substantial time and personnel, camera traps are often assumed to be a more efficient alternative. However, few studies directly compare the two methods in tropical forest environments. In this pilot study conducted in January 2025, mammal detections were collected through ground-based census walks and a network of strategically placed camera traps. The resulting data were compared across four metrics: detection rate, species richness, daily activity patterns, and species overlap. A Chi-square test was used to assess statistical significance between the methods. Census surveys recorded nine unique mammal species and 29 individual detections, whereas camera traps recorded six species and 12 detections. Statistical analysis revealed no significant differences between methods for species richness, activity, or overlap. Only detection rate approached significance ($p = 0.055$), indicating a potential trend favoring census surveys. However, camera traps detected nocturnal species—such as *Puma concolor*—that census surveys missed, while census data were more effective for observing diurnal mammals. These findings suggest that although census surveys may yield more raw detections, both methods provide complementary insights. A combined approach may therefore offer the most comprehensive strategy for mammal biodiversity assessments, especially in conservation contexts where detecting species with varied activity patterns is essential.

Assessment of Immune Function in Miller Moths, Euxoa auxiliaris

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Miller moths (*Euxoa auxiliaris*) are vital pollinators in many of Colorado's ecosystem. Past work with miller moths has shown recent declines in the composition of lipids, which is an important signal of insect health. In this study, we tested if their immune function has decreased, which can be likely due to environmental stressors. To do so, we tested for variation in the enzyme known as phenoloxidase, which plays a key role in moth immune systems. The function of this enzyme is being compared between (1) male and female moths, (2) across study years (2021-2023), and (3) from different elevations. This will pinpoint possible sources of variation in the immune system of this moth.

Living on Display: How Zoo Enclosures Shape Gorilla Behavior and Guest Engagement

Evelyn Cunneen & Kando Lako

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Zoos have been the focal point for conservation, education, and ethical debates regarding captive animal welfare for decades. This study applies a multispecies ethnographic approach to examine the experiences of both gorillas and humans at the Cheyenne Mountain Zoo. By observing four Western lowland gorillas (Gorilla gorilla), we sought to determine enclosure preferences and behavior patterns. By analyzing their interactions with visitors and enclosure spaces, we determined that individual gorillas exhibit distinct preferences for both indoor and outdoor spaces, suggesting that enclosure design should remain flexible. Zoos should focus on creating enriching spaces for their animals, with a variety of activities they can take part in that help them mimic natural behaviors. Additionally, ethnographic observations of the zoo's layout revealed that the CMZ has a variety of accessibility challenges that impact both the visitor and animal experience. Overall, our study highlights the need for zoos to consider inclusive design strategies that enhance mobility for all species. Future research should further explore the intersection of human and non-human accessibility to foster more ethical and effective zoo environments.

A Wzx/Wzy Polysaccharide Export System is Essential for Motility in Nostoc punctiforme

Paul Dang, Grant Capen, Gracie Carello, & Khoa Nguyen

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Nostoc punctiforme is a type of nitrogen-fixing cyanobacterium that has the ability to differentiate into three different cell types: akinetes, heterocysts, and hormogonia. Hormogonia are specialized motile filaments that allow for movement across surfaces. This enables N. punctiforme to reach optimal light for photosynthesis and establish symbiotic relationships involving nitrogen-fixation. Motility in N. punctiforme requires the secretion of a polysaccharide, called hormogonia polysaccharide (HPS) and the type IV pilus system. In N. punctiforme, HPS is produced by glycosyltransferases which chain monosaccharides together to produce Hormogonia Polysaccharide (HPS). One of these monosaccharides is fucose which is synthesized by a putative sugar epimerase. Once the polysaccharide is complete, it is then exported from the cell into the surroundings via a Wzx/Wzy system of proteins. In a previous study, F0458, F0459, F3486, and R4342 were implicated to be involved in HPS production. F3486 is hypothesized to be a putative sugar epimerase that synthesizes fucose. R4342 is suspected of facilitating the incorporation of fucose into HPS. F0458 and F0459 are suspected to be part of the Wzx/Wzy polysaccharide export system, with F0458 being involved in the export of HPS form the periplasm to the cell's environment and F0459 regulating the length of the HPS chain. To confirm these genes' roles in N. punctiforme, deletion strains of Δ0458, Δ0459, Δ3486, and Δ4342 were created. Each strain produced non-motile hormogonium and showed little to no signs of HPS secretion. These results support the previous implications of their roles in HPS production in N. punctiforme.

Developing a Platform for Expressing and Studying Heterodimeric Myosin Heavy Chain Complexes

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Mutations in the β-myosin heavy chain (MYH7) gene are implicated in approximately 30-40% of genetic heart diseases, notably hypertrophic cardiomyopathy (HCM). These mutations can form dysfunctional myosin dimers, resulting in hypercontractility and subsequent cardiac hypertrophy. Understanding the biophysical properties of these mutant myosins is crucial for elucidating the pathophysiology of HCM. This research aims to develop an experimental platform to express and analyze novel heterodimeric β-myosin heavy chain complexes, facilitating a detailed study of MYH7 mutations. Utilizing PCR amplification with gene-specific primers, we

engineered constructs incorporating HTD-A and HTD-B dimerization domains. These constructs were inserted into plasmids via Gibson assembly and introduced into HEK 293 cells through transfection. The resulting heterodimeric myosin complexes were purified using affinity techniques and analyzed using non-denaturing gel electrophoresis. Successful heterodimer formation was confirmed by GFP fluorescence and characteristic electrophoretic band patterns. This platform enables the study of the biophysical effects of specific MYH7 mutations, providing insights into their role in HCM pathogenesis. By elucidating the functional consequences of these mutations, this research may contribute to the development of targeted therapeutic strategies for MYH7-related cardiac myopathies.

Western Fitness Culture Effects

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Since the 1970s and 1980s, Western media has promoted fitness culture, beginning with trends like Jazzercise, encouraging women to focus on their physique. This shift contributed to the rise of rigid beauty standards, often favoring Eurocentric features—fair skin, slim bodies, and pronounced curves—while negatively affecting non-white women (Sharma). With the rise of Hollywood, global brands, and social media, Western beauty ideals have spread worldwide, influencing cosmetic trends and fitness practices. In South Korea, the desire for Western-like features has contributed to high rates of double eyelid surgery (Smith). Similarly, despite their harmful effects, skin-whitening products remain popular in Asia, Africa, and the Caribbean due to pressure from Western beauty norms (UN Environment Programme). Beyond appearance, Western fitness trends—such as Pilates, weightlifting, and gym culture—have gained global popularity, driven by social media influencers and corporate wellness programs. In China and Brazil, 45–55% of consumers make wellness-related purchases based on influencer recommendations, compared to 10–15% in the U.S., Europe, and Japan (Callaghan et al.).

Numerical Approximation of the Area Under the Archimedean Spiral

Amara Demetrelis
Denis Silantyev, Faculty Mentor
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Numerical Approximation of the Area Under the Archimedean Spiral Amara Demetrelis1 and Fauculty Mentor: Denis Silantyev2 1Undergraduate Department of Mathematics, UCCS 2Assistant Professor, Department of Mathematics, UCCS April 2025 Abstract Numerical methods are used for integration when analytic integration is not possible or is too tedious. We compare three common

numerical methods (Trapezoidal rule, Simpson's rule, and the Romberg method) in terms of their accuracy and efficiency by using them to approximate the area enclosed by one loop of an Archimedean spiral, defined by the polar equation $r(\theta) = a + b(\theta)\ p\ ,\ 0 \leq \theta \leq 2\pi$. We analyze the accuracy of these methods by comparing their results to the analytically computed integral, which is known in this case, for various powers p. Additionally, we investigate the convergence behavior of each method by plotting error trends as the number of iterations increases. This comparative analysis provides insight into the efficiency and accuracy of each numerical integration technique.

The Impacts of Influencers on Tourism

Corinna Dozier & Payton Matthews

Dr. James Baginski, Faculty Mentor

University of Colorado Colorado Springs

The Impacts of Influencers on Tourism Corinna Dozier and Peyton Matthews Poster University of Colorado, Colorado Springs James Baginski We are exploring how social media has changed the way people travel and consume. Platforms like Instagram and TikTok have made certain destinations go viral, leading to huge increases in tourism, but not always in a good way. While some places benefit from the attention and economic boost, others struggle with overcrowding, environmental damage, and unsustainable habits driven by people trying to recreate what they see online. By exploring real-world examples and current trends, this project highlights both the upsides and the downsides of social media's role in modern tourism and overconsumption, and considers how we might move toward more mindful, responsible travel in the digital age. This topic is important because social media has a huge influence on tourism and overconsumption, often leading to environmental damage and cultural disruption. I use social media a lot, and I've noticed how platforms like Instagram and TikTok push certain destinations into the spotlight, sometimes causing overcrowding and putting a strain on local resources. This can lead to problems like pollution, habitat destruction, and even the displacement of local communities. It's interesting to think about how something as simple as sharing a photo or video can contribute to larger issues like unsustainable travel and overconsumption. This is connected to our course because we are exploring tourism and its impact on the environment.

Emotion Beliefs as a Possible Barrier to Seeking Mental Health Help

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Untreated mental health issues can negatively impact both peoples' physical health and financial well-being, with these effects worsening over time when individuals do not seek help. Therefore, understanding the barriers to seeking mental health treatment is crucial. The proposed study aims to explore whether individuals' beliefs about their own positive and negative emotions— specifically whether they are viewed as useful and controllable—predict their willingness to seek certain mental health services, using regression analysis. The study will be framed by Ajzen's Theory of Planned Behavior, which posits that intentions to engage in a behavior are strong predictors of that behavior (Ajzen, 1991). Participants will complete an online survey, selfreporting their responses on the Emotion Beliefs Questionnaire (Shulkin et al., 2024) and the Shortened Attitudes Toward Seeking Professional Psychological Help Scale (Fischer & Farina, 1995), along with information about their past and/or current use of certain mental health services and demographics. We hypothesize that believing emotions are controllable and useful will predict a greater willingness to seek certain mental health services, independent of previous and/or current mental health service usage.

Magnetization Records of Terrestrial Weathering in the Sericho Pallasite

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GP011 - Sophia Gaal1 , Ji-In Jung2 , Sonia M. Tikoo2,3 , Ethan Lopes2 , Olivia Ju4 , Dale Burns3 , 1Department of Physics, Colorado College, Colorado Springs, CO, 80904, USA 2Department of Geophysics, Stanford University, Stanford, CA 94305, USA 3Department of Earth and Planetary Sciences, Stanford University, Stanford, CA 94305, USA 4Department of Physics, Stanford University, Stanford, CA 94305, USA
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The origin of pallasites, rare stony-iron meteorites characterized by an iron-nickel metal matrix encasing silicate olivine crystals, is debated. Some studies suggest that pallasites form at the core-mantle boundary, while others propose a more shallow origin, resulting from impact events causing metal injection or through ferro volcanism. Recent paleomagnetic studies on main group (MG) pallasites—such as Brenham, Marjalahti, Springwater, Imilac, and Esquel—have retrieved paleointensity data from olivine grains and cloudy zones, providing insights into the dynamo activities of their parent bodies. Here, we conducted electron microscopy and paleomagnetic

investigations on the MG Sericho pallasite meteorite to assess its potential as a paleomagnetic recorder. Using Scanning Electron Microscopy (SEM) and Energy Dispersive X-ray Spectroscopy (EDS), we identified clusters of submicron magnetite grains (possibly framboids), confirmed by a weak Verwey transition at ~120K and a Curie temperature of 550-560°C, within iron oxide veins (possibly maghemite or goethite). This finding suggests potential aqueous alteration after the pallasite's arrival on Earth. For paleomagnetic investigation, we studied six 1-2 mm olivine grains with magnetization ranging from 9.65×10-4 to 4.07×10-2 Am2 /kg. Using chemical remanent magnetization calibration factors for magnetite, we obtained terrestrial-strength paleointensity values ranging from 15-213 μT using the anhysteretic remanent magnetization (ARM) method and 13.5- 164 μT using the isothermal remanent magnetization (IRM) method. We concluded that terrestrial alteration prevented accurate paleomagnetic records from the meteorite's parent body in our samples.

Chromatin Immunoprecipitation Sequencing Proposes Point Centromere Locations in Hanseniaspora osmophila and Evolutionary Origin

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Faithful chromosome segregation is crucial for cell reproduction. The centromere, which serves as the attachment site for the kinetochore, plays a key role in this successful cell division. Over time, centromere structure has evolved across different budding yeast clades. In yeast of the Saccharomycetaceae family, after the loss of typical eukaryotic heterochromatin machinery in an early ancestor, a shift from epigenetically defined regional centromeres to genetically defined point centromeres has been observed, and is thought to be the origin of point centromeres. However, new evidence suggests that the origin of point centromeres might be earlier phylogenetically. Here, we investigate the centromeric structure of Hanseniaspora osmophila, a member of the Saccharomycetaceae family, closely related to the Saccharomycetaceae, to determine if they contain point centromeres. Thus, by determining the structure of H. osmophila centromeres, we aim to investigate the evolutionary origin of point centromeres in budding yeast. We utilized ChIP-Seq data to analyze ratios of histone H3/H4—indicators of centromeric presence—and an assembled H. osmophila genome to identify centromeric motifs for analysis. However, limited centromeric interest points and poor sample quality of replicates ultimately led to challenges in identifying regions where point centromeres may be located. While motifs were identified, they were not statistically significant. Due to these inconclusive findings, we are unable to definitively identify centromeric regions in H. osmophila. However, by continuing this research, we not only expand our understanding of centromere evolution in yeast but also gain insights that could be applicable to broader biological processes in a wide range of eukaryotic organisms.

Understanding the Arbëreshë Minority in Sicily

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This project focuses on the unusual lack of assimilation of Arbëreshë culture in Italy. The Arbëreshë are an Italian-Albanian minority living in the south of Italy. The largest population lives in Piana degli Albanesi (the Plain of the Albanians), 25 km from Palermo, the capital of Sicily. The main focus of study is why Arbëreshë culture has stayed so distinct from the rest of Sicily. For context, Piana degli Albanesi started as a sanctuary for Albanians fleeing the Ottoman Empire in the 15th century (Mandalà and Knittlová, 2024). Six hundred years later, the Arbëreshë still have a distinct culture as evidenced through language, religion and food. In terms of language, Arbëreshë is not only spoken colloquially but also used on street signs and in local government (Liuzzi, 2016). In terms of religion, the Arbëreshë still largely follow Greek-Byzantine Christianity in an otherwise Catholic state (Sanfratello, 2016). Finally in terms of food, the Arbëreshë have maintained their own cuisine (Pastorelli, 2024). The most notable example of their food, often thought of as Italian (not Arbëreshë), is the Cannoli. The question I will examine is how these three aspects of Arbëreshë culture have endured and what lessons the answer provides for efforts to maintain diversity elsewhere. My findings were threefold. First, their remote location in the mountains created a physical barrier to outside influences. Second, the creation of their own government and education system allowed them to perpetuate their language and culture. Finally, there have been more recent migrations of Albanians to Piana degli Alabanesi since the initial settlement.

Four Sustainable Tourism Initiatives That Will Help Tokyo Achieve 2030 and 2050 Goals

Patrick Glover & Grace Calvin
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Tokyo, Japan has over 14 million residing in an area of one 847 square miles and has 36 million tourists annually. With such a high number of residents and tourists one might wonder how the city maintains its reputation (and reality) of being a very clean and pristine city with lower levels of air pollution? This poster will present the factors that influence the cleanliness of a large bustling and vibrant city, the initiatives and policies implemented by both the local government and the hospitality sector in order to minimize tourism's ecological impact. Examples of Tokyo's promotion of sustainable tourism are through initiatives such as the Zero Emissions Tokyo Strategy, encouraging sustainable practices in transportation, and accommodation, the use of technology in waste management. The most significant finding and most impactful influence on ensuring that Tokyo

remains a clean and pristine city lies in its approach to maintaining a high level of citizen engagement that leverages culture norms in everyone having pride in having an active role in sustainability and having a positive reputation.

Characterizing the landscape of histone post-translational modifications to genomes of Neurospora crassa translocation strains

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Large genome rearrangements (“translocations”) are where a DNA segment is moved from a donor chromosome into a different genomic location following improper repair of double-strand DNA break(s). Translocations often occur in human cancers, but their impact on genome function is unknown, including if translocations affect the chromatin composition, as a translocation could alter histone post-translational modi5ication (PTM) deposition. Previous work in the fungus Neurospora crassa showed that translocations alter the composition of facultative heterochromatin, as the enrichment of di- or tri-methylation of lysine 27 on histone H3 (H3K27me2/3) is altered. However, this work used the normal (wild type [WT]) genome synteny to assess the histone PTM deposition, which might have masked changes in histone PTM enrichment caused by these genome rearrangements. Here, we examined the Chromatin Immunoprecipitation-sequencing (ChIP-seq) enrichment of two additional histone PTMs in three distinct Neurospora translocation strains (AR16, OY329, and UK3-41), and mapped data to translocation strain reference genomes. We reanalyzed H3K27me2/3 enrichment and assessed deposition of tri-methylation of lysine 9 on histone H3 (H3K9me3), which is typically deposited over silent heterochromatic regions and tri-methylation of lysine 4 on histone H3 (H3K4me3), which is mainly enriched over actively transcribed genes. These histone PTMs from the AR16, UK3-41, and OY329 translocations show few changes in H3K9me3 enrichment, highlighting the improvement to ChIP-seq read mapping quality across silent loci within translocation reference genomes. Strikingly, several translocation breakpoints occur at H3K9me3-enriched loci, suggesting these silent loci are sensitive to DNA damage. Few changes in H3K4me3 enrichment are observed at genes 5lanking translocation breakpoints, suggesting translocations have minimal effect on euchromatic histone PTM enrichment. Lastly, changes to subtelomeric H3K27me2/3 are more evident in translocation reference genomes, which provides insight into the positional requirements for subtelomeric H3K27me2/3. Together, our histone PTM datasets have clari5ie.

Prosocial Behavior and Moral Identity Development: A Proposed Positive Feedback Loop Inspired by a Field Placement Experience at Concrete Couch

Jake Greenblatt
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Adolescent civic engagement through community-based organizations (CBOs) has positive outcomes for the community and individual development. These include long-term prosocial behavior and moral identity development. Based on a field placement at Concrete Couch, a community-art-based nonprofit, this field study proposes a hypothetical positive feedback loop model between prosocial behavior and moral identity development. A discussion and review of empirical work in these areas is followed by a discussion of ways empirical evidence might be reframed and applied to this community-based setting. Further research is necessary to explore the possible bidirectional relationship between prosocial behavior and moral identity development and its impact on developmental outcomes for adolescents. Keywords: moral identity development, prosocial behavior, community engagement, adolescent development.

No One Left to Call: Legal Failure, Colonial Violence, and Indigenous-Led Resistance in the MMIW Crisis

Angelica Guervara
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The crisis of Murdered and Missing Indigenous Women in the U.S. and Canada is a direct consequence of systemic legal failure and ongoing colonial violence. This project looks into how jurisdictional gaps, law enforcement negligence, and inadequate federal accountability have allowed violence against indigenous women, girls, and Two-Spirit people to persist with impunity. Despite recent legislation such as Savanna's Act and the Not Invisible Act, structural barriers remain, including poor enforcement and a lack of tribal authority. Drawing from Indigenous feminist scholarship and Department of Justice reports, this research argues that Indigenous-led resistance offers the most effective and culturally grounded response to the MMIW crisis. Through an analysis of grassroots initiatives,

the project will show how Indigenous knowledge and governance challenge the limits of settler-state legal reform. This work calls for a fundamental reimagining of justice that centers Indigenous sovereignty and responds to the demand for those most impacted.

Purine Salvage Enzymes are Regulators of Immunity in Caenorhabditis Nematodes

Mona Hamad

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Microsporidia are fungal intracellular parasites of many animals, including Caenorhabditis nematodes. Prior research in C. elegans has demonstrated that loss of Ce-pnp-1 (an ortholog of human purine nucleoside phosphorylase (PNP)) or Ce-adah-1 (an ortholog of adenosine deaminase (ADA)) will induce a host innate immune program coined the Intracellular Pathogen Response (IPR) that promotes resistance to microsporidia. Ce-pnp-1 and Ce-adah-1 function in the purine salvage pathway and convert purine nucleosides into free bases. Microsporidia lack mitochondria and thus are hypothesized to acquire purine nucleotides from their host to facilitate intracellular growth and development, thus suggesting a connection between host surveillance of purine concentrations and activation of the IPR. However, whether these purine salvage enzymes act as immune regulators in other nematode species is unknown. Here, we asked if orthologs of Ce-pnp-1 and Ce-adah-1 have conserved immune roles in C. briggsae, a sister species of C. elegans. To investigate Cbr-pnp-1 and Cbr-adah-1, we optimized RNA interference (RNAi) conditions in C. briggsae by first targeting the Cbr-unc-22, which induces a visible “twitching” motility phenotype. Next, we developed plasmid vectors for RNAi knock-down of Cbr-pnp-1 and Cbr-adah-1 and transformed them into HT115(DE3) E. coli. RNAi was induced by the feeding method and subsequent RT-qPCR revealed the upregulation of known immune genes also induced by microsporidia infection in C. briggsae, supporting our hypothesis. Next, we will perform microsporidia infection assays after RNAi treatment to determine if knock-down of Cbr-pnp-1 and Cbr-adah-1 promotes resistance, as observed when the C. elegans IPR is activated.

Small Town Tourism - The La Junta Tarantula Festival

Andrew Haworth & Justin Harris
Dr. James Baginski, Faculty Mentor
University of Colorado at Colorado Springs

La Junta, Colorado is a town with a lot of history and without a lot of excitement. In the last couple years, the town has found a unique draw. Every fall, thousands of tarantulas roam the land in a mating ritual. They are often seen crossing roads or on sidewalks. It is often incorrectly called a migration. This “migration” has pulled some tarantula fans to the area in decades past, but starting in 2022, La Junta founded the La Junta Tarantula Festival. This begs the question, how can a town reform its identity around tarantulas? The festival has many local sponsors, bus tours, booths, and educational talks about the arachnids. There has been an increase in the amount of public art in town, many of the new pieces being tarantula related. This year, the festival is collaborating with the movie theatre to show a spider themed movie and will also be home to a classic car show to draw more visitors. Our goal is to communicate with city officials, festival volunteers, and locals to document what kind of impact the new festival is having on the town. We will do this by conducting interviews of different individuals, documenting the new art in the town, and communicating with local businesses to see what kind of impact the festival has on them. How can a town reshape its identity to draw more tourism? How does the introduction of a festival like this impact a town economically?

Investigating the Function of Np_F3829 in Nostoc punctiforme Hormogonia and Motility

Ethan Heflen
Dr. Douglas Risser, Faculty Mentor
University of Colorado Colorado Springs

Investigating the Function of Np_F3829 in Nostoc punctiforme Hormogonia and Motility Cyanobacteria play a key role in global carbon and nitrogen cycles, and their metabolic versatility, along with their ease of genetic manipulation, make them promising candidates for applications in biomaterial and biofertilizer production. Nostoc punctiforme is a filamentous cyanobacterium capable of both oxygen photosynthesis and nitrogen fixation. N. punctiforme generates three distinct cell types: akinetes, heterocysts, and hormogonia. Hormogonia are motile filaments that allow the cyanobacteria to move along surfaces to seek light sources for photosynthesis or to find symbiotic plant partners for nitrogen fixation. Several factors are required for efficient motility in Hormogonia including cell morphology changes, production of hormogonium poly saccharide (HPS), and functioning Type IV pili. By transposon mutagenesis, Np_F3829 was

identified to be essential for motility in N. punctiforme. A protein BLAST search of Np_F3829 identified a response regulator domain (REC domain). The role of the remaining region of the protein was unknown. We present an in-frame deletion of the gene Np_F3829 to investigate its role in the motility of N. punctiforme. The deletion mutant, Δ3829, was non-motile, exhibited reduced HPS production, retained cell morphology of wild-type (WT) hormogonia, and lacked functional Type IV pili. These findings suggest that Np_F3829 either interacts directly with the Type IV pilus system or affects the expression of the genes responsible for it.

Burden, Stigma, and Support Among Family Caregivers of Persons with Schizophrenia

Theodor Hopfer
Kristi Erdal, PhD, Faculty Mentor
Colorado College

Familial caregivers of persons with schizophrenia are involved intimately with the long-term care of the mental illness. Persons with schizophrenia must often rely on family for financial and physical support, as well as accountability to medication adherence and family caregivers experience a burden related to caregiving. The relationship with stigma associated with schizophrenia, and numerous dimensions of support is investigated in the prediction of burden. Three scales, burden, stigma, and support were administered to 39 participants drawn from clinical, college community, and online recruiting. Support was negatively correlated with burden, and two subscales of support had stigma as a mediator of prediction of burden. The varied forms of recruitment frustrate generalizability to sub-samples, such as the clinical population. The findings have implications for schizophrenia outcomes, as caregiver burden and stigma may have negative effects on communication with the relative affected by schizophrenia and ability of the family to provide support.

Amyloid β and EGCG Interactions with a Model Cell Membrane

Kristina Hrbac
Dr. Crystal Vander Zanden, Faculty Mentor
University of Colorado Colorado Springs

Alzheimer's Disease is a neurodegenerative disease that affects millions worldwide. It is thought to have a connection to aggregation of peptide amyloid β (Aβ) on the outside of neurons. Aβ monomers are known to interact with the cell membrane, where they can form oligomers and act as a seed for fibril growth, which forms the hallmark amyloid plaques observed in Alzheimer’s brains. A compound

found in green tea, epigallocatechin gallate (EGCG), may help prevent the aggregation of Aβ. EGCG may bind to cell membranes and reduce Aβ interactions with the membrane. To further explore this concept, we wanted to determine whether the addition of EGCG to a model cell membrane would decrease Aβ binding. For these experiments, a lipid monolayer formed in a Langmuir trough was used as a model cell membrane, with 1μM Aβ injected into the subphase beneath the membrane. Protein binding was observed when the surface pressure of the membrane increased. To determine the impact of EGCG, 50μM or 250μM EGCG was also injected into the subphase, and the surface pressure changes caused by Aβ interactions were recorded. EGCG resulted in lowered surface pressures as well as faster binding; however, literature suggests that when a molecule binds to the lipid heads during Langmuir trough experiments (instead of embedding into the membrane), it can present as a lower surface pressure. This may be indicative of Aβ monomers binding to EGCG on the membrane, rather than preventing binding altogether. Overall, these results suggest high concentrations of EGCG may increase/alter Aβ binding, rather than prevent it. Future experiments will use a more physiologically relevant lipid composition to improve the biological relevance of this work. Furthermore, ThT assays, fluorescence-based assays to detect fibril growth, will be used to observe how EGCG impacts Aβ fibril formation on the membrane.

The Sociocultural Shaping of Depression Perception: Help-Seeking and Impulsivity

Huaixuan "Knox" Huang

Kristi Erdal, Ph.D., Faculty Mentor

Department of Psychology, Colorado College

Depression is a common mental disorder that affects approximately 3.8% of the population worldwide. Low treatment-seeking rates among ethnic minority groups might be due to sociocultural influences on their perception of depression and its treatment. The current study used vignettes of patients with serious distress symptoms which varied languages and names to assess if these variables impacted the perception of different ways an individual with such symptoms should seek help and the trait-like impulsive tendencies of such an individual. Behavioral acculturation and self-construal were covaried in the analyses. Participants who were bilingual in English and one of Japanese, Korean, or Mandarin (N = 124) were recruited via an online platform (https://www.prolific.com/). Results showed variations in endorsement of certain non-western help-seeking behaviors across vignette characters, and variations in impulsivity perception mostly across languages. Self-construal was associated with endorsement of certain western (e.g., psychotherapy) and non-western (e.g., traditional medicine) help-seeking behaviors. Findings suggested the importance of delineating constructs or processes that look similar but are different in the study of sociocultural influences on depression perception (e.g., perception of the tendencies to not think before acting vs. to give up upon difficulties for a depressed individual), establishing measurement invariance in cross-cultural research, re-evaluating norms that are taken for granted, as well as incorporating help-seek preferences and value systems of ethnic minority groups into research and clinical settings in relation to depression. *Keywords:* depression, help-seeking, impulsivity, language, name, self-

Impact of Inhibition of the Mediodorsal Thalamus to Medial Prefrontal Cortex Pathway Between Postnatal Days 20 and 35 on Attentional Set Shifting

Aine Kaminski
Marcela Fernadez-Peters, Faculty Mentor
Colorado College

Schizophrenia is a serious neurophysiological disorder with poorly understood and under-researched cognitive symptoms. Recent research in mice has shown that dysregulation of the thalamocortical pathway during adolescence can lead to cognitive deficits in adulthood. This study aimed to address whether a 15-day window of inhibition from postnatal day P20-P35 would elicit cognitive deficits and decrease in cognitive flexibility in younger mice (70 days old). The thalamocortical pathways of Gbx2CreERT mice were inhibited on postnatal days 0-13 by delivering Dual Viral AAV injections carrying a Cre-dependent inhibitory designer receptor hM4D into the thalamus. These experimental group (hM4D) mice then received the DREADD ligand clozapine-n-oxide (CNO) via intraperitoneal injections twice a day from postnatal 20 -35 to hyperpolarized thalamic neurons. Cognitive deficits, specifically cognitive flexibility, were assessed through attentional set-shifting tasks (ASST) on P70. Results showed no significant impairments in the number of trials to reach criterion or correct choice frequency in ASST between hM4D and control mice. Our findings suggest that a 15-day period of inhibition from P20-35 may have been premature in terms of thalamocortical development, indicating the pathway develops later in adolescents. Identifying the critical developmental window could inform potential preventative treatments for cognitive symptoms of schizophrenia in the future. Keywords: Thalamocortical pathway, Inhibition, Schizophrenia, Attentional Shifting Task, Mice.

The Effects of gene ARI00765 on fecundity and the insemination reaction mass in Drosophila arizonae

Kian Kazemi

Dr. Jeremy Bono, Dr. Toan Hoang, Faculty Mentors
University of Colorado Colorado Springs

Through previous research in Drosophila our lab has determined that, in addition to sperm and proteins, male seminal fluid contains RNA transcripts that are delivered from the male to the female. We have shown that females translate this RNA into protein, producing male-derived female-translated proteins, or mdFTPs. Seminal fluid RNA has been observed in other vertebrate and invertebrate organisms including humans, however it still remains unclear as to what effects mdFTPs have on the overall process of reproduction. Our research for this project focused on gene ARI00765 in D. arizonae, a species of desert fruit fly that consumes decomposing cactus flesh in the wild. We used CRISPR to generate a homozygous knockout (KO) mutant line for this gene. We used this line in two assays comparing reproductive outcomes in crosses between wild-type (WT) females and either WT or KO males. The fecundity assay involved counting the number of eggs laid by individual females over the course of a week in order to determine if there was a difference between females mated to WT or KO males. An insemination reaction assay was also conducted to determine if ARI00765 has an impact on the formation or degradation of the reaction mass that forms in the uterus of D. arizonae after mating.

Presenter Abstracts

Oral Session 2
11:50 am – 12:50 pm

Government and Thought

(Room #230)

Drop City as an Actualized Anarchist Utopia

Emily Newhall

Tip Ragan and Dennis McEnnerney, Faculty Mentors

Colorado College

After purchasing a six acre plot of goat pasture in rural Colorado, three former art students marked the beginnings would come to be recognized as the first rural hippie commune. At the intersection of radical creativity, emphasized freedom to express individuality, and active communal structures, Drop City served as an actualized experiment in anarchism. Drop City was not only one of the many communes that emerged amidst the 1960s communal explosion in America, but also a bold rebellion against American systems of governance and an exploration into new ways of being free. Through non-conformist ways of living such as the implementation of new names for each member, the freedom to experiment with creativity, and the practice of non-hierarchal collective decision making, Drop City offered an alternative way of life from the mainstream American norms perceived by many Droppers as reductionist and materialistic. Despite the eventual collapse and cessation of the Drop City commune, analyzing the community through an anarchist lens reveals the significance of the avant-garde imaginaries produced throughout the community's lifetime.

Although the chronology of Drop City can at first glance be understood as an explosion of impractical and idealistic visions leading to an ultimate failure, this teleological understanding of the community is reductionist. Instead, by utilizing anarchist philosophies to understand the historical implications of Drop City, we can see the possibilities of creativity, individuality, and communal harmony which arise in the community. Thus, despite a practical ending to Drop City, the anarchist commune proved to be a successful experiment because it revealed the potential for harmonious human relations and free creativity amidst an American capitalist system.

Music and the Third Reich

Siyi Li
Lidia Chang, Faculty Mentor
Colorado College

In my presentation, I plan on talking about how classical western music was viewed and used under the rule of Adolf Hitler, and how it parallels with the development of late romantic music to modern atonal / neo-classical music. This presentation is inspired by my class on Doctor Faustus, a novel by Thomas Mann which the author narrated a fictional story of a composer in the 19-20th century Germany, whose own intellectual development develops parallel with Nazi ideologies. I would like to explore how certain German artistic and philosophical ideals at that time lured it toward a fascist regime. More than that, I also want to show how such ideals may or may not be relevant to the popular music today, through the works by Adorno who is both a philosopher and musician and wrote passionately on critiques of popular music. This may link to concepts such as the commodification as music, and how music can be used as a tool of propaganda for either fascist or capitalistic ideologies.

Anchored in History:
The U.S. Marine Corps' Strategic Evolution in the First Island Chain

Ella Madden
Hayden Fox (President, The Colorado Historian), Professor Timothy B. Weston (Research Mentor)
CU Boulder Guest Presenter

This paper analyzes the U.S. Marine Corps' Force Design 2030 initiative in the historical context of American amphibious warfare strategy in East Asia, with a specific focus on Taiwan and China. Drawing connections between past and present, the research explores how the Marine Corps' modern shift toward Expeditionary Advanced Base Operations (EABO), stand-in forces, and distributed lethality reflects long-standing geographic and strategic concerns that shaped U.S. military planning during World War II, the Cold War, and post-9/11 counterinsurgency. Taiwan's geographic position in the First Island Chain has made it a consistent focus of U.S. amphibious doctrine, and this paper argues that Force Design 2030 represents a return to littoral and Indo-Pacific-centered thinking, rather than a dramatic departure from historical precedent. Using primary sources such as Department of Defense white papers, Marine Corps doctrinal publications, and strategic commentary, alongside secondary historical literature, the paper examines how evolving threats from the People's Liberation Army (PLA), especially in the form of anti-access/area denial (A2/AD) capabilities, are prompting a doctrinal recalibration rooted in earlier amphibious warfare traditions. Ultimately, this research highlights how history informs contemporary

strategy, and how the Marine Corps is reimagining its expeditionary role in light of a rising China and the strategic imperatives of the Western Pacific.

The Labor Question and the 1913-1914 Colorado Coalfield War: The Fight for Industrial Democracy

Jordan Parks

Tony Wood, Jen Triplett, John M. Willis, Faculty Mentors

CU Boulder Guest Presenter

At the beginning of the twentieth century American democracy was being renegotiated. During this time the United States witnessed unprecedented immigration, an increasing wealth gap, and waves of industrial violence which demanded that political, civil, and economic participation be reevaluated in light of the growing power of labor. During the Industrial Age, Colorado's labor movement was more radical and violent than that in the east, and workers in the American west fought not only for higher wages and workplace safety but to create a form of industrial democracy that represented their rights and values. This thesis outlines how the labor question reached its most desperate point during the 1913-1914 Colorado Coalfield War. By examining the Colorado Coalfield War, I argue that the American democratic and economic system assured miners and coal operators promises that were fundamentally incompatible with one another, and the commitment of each group to see its interests realized reached a splintering point during the 1913-1914 Colorado Coalfield War, resulting in industrial warfare over the labor question. In the aftermath of the war, John D. Rockefeller Jr. was forced to evaluate the realities of Industrial America. Rockefeller's company union plan was his solution to the labor question. The Rockefeller Plan became synonymous with industrial democracy, silencing the miner's struggle and vision. The 1913-1914 Colorado Coalfield War marks one of the most significant moments in the American labor movement and illustrates that the fundamental issue of the period was how labor and capital should be consolidated within the American democratic system, revealing the full tensions and meaning of the Industrial Age.

Women, Religion & Culture

(Room #259a)

Ecofeminism and Women Whitewater Kayaking on the Grand Canyon

Victoria Levi

Sylvan Goldberg and Regula Meyer Evitt, Faculty Mentors

Colorado College

My project, *Ecofeminism and Women Whitewater Kayaking on the Grand Canyon*, advised by Sylvan Golderberg and Regula Meyer Evitt, explores the intersection of Ecofeminism and self-supported kayaking down the Colorado River on the Grand Canyon from December 26, 2024, to January 8, 2025. Ecofeminist theory links the oppression of both women and nature, and I used it to redefine how women interact with wilderness, emphasizing collaboration over domination, and fostering empowerment through shared leadership roles. The methodology included group journaling among the participants, where prompts inspired reflection on how women experience and relate to nature in a male-dominated outdoor sport. These entries explored the mental, physical, and verbal spaces that shape women's engagement on the Grand Canyon. I analyzed how these experiences empower women, challenging patriarchal narratives in extreme sports and illustrating the extreme value of women-led trips in fostering supportive and inclusive environments, leading to a deeper connection to nature and oneself. Key findings show that self-support kayaking offers women a profound sense of empowerment, shifting traditional gender dynamics and promoting leadership in outdoor spaces. The project also emphasizes the importance of introducing more women to whitewater kayaking to further disrupt the male-dominated culture of extreme outdoor sports. By grounding the experience in Ecofeminist thought, the study highlights the significance of understanding women's relationships with nature and self, while advocating for greater representation and visibility of women in extreme outdoor sports. This project ultimately underscores the transformative potential of outdoor sports to inspire personal growth and social change.

Keeping Words:
Hardship, Women, and Western Expansion

Paetyn Burrell
Dr. Carole Woodall and Barbara Headle, Faculty Mentors
University of Colorado Colorado Springs

Much of what we know about the American West comes from masculine perspective and experience. However, as women migrated West with their husbands and families, they recorded their experiences in words, contradicting many concepts of the masculine West. In the 19th century, women faced strict gender roles that dictated who they could form social bonds with, rendering women's lives lived in the presence of other women. When women moved West, they lost the physical presence of their exclusively female social networks, reliable communication, and access to their loved ones. They turned to writing to process this loss. The records they left illustrate the depth of their grief, sometimes resulting in conflicting emotions as they battled loss and new opportunities. Despite the distance, women continued to uphold their networks in the East through writing. They penned diaries in lieu of letters, utilized personal effects to establish presence, and used words to express physical affection. Though they maintained these networks, woman also constructed new communities in the West that revolved around mutual reliance, trust, and cooperation. Sources analyzing these women often do not acknowledge their self-perception, which they defined based on their networks and relationships with other women. This study revolves around four works authored by Sarah White Smith, Abby Mansur, Edith White, and Jane Gould Tortillott. This paper argues that although women grieved loss due to death, they equally grieved the loss of their networks and took great lengths to engender new feminine spaces where they could exert agency.

Orphan of Taiwan:
The Importance of Identity and Upbringing in Mid-20th Century Taiwan

Hayden Fox
Tim Weston, Faculty Mentor
CU Boulder Guest Presenter

In a world stuck in the past, ruled by outsiders, and ignored by most we see a strong independent nation rise from the grip of authoritarianism. I looked to solve how a young person's identity and upbringing in Taiwan during the 1930s and 1940s were affected under foreign rule. Between Japanese and Chinese leadership, the island could never form an identity of its own. Through personal

interviews and print works on Taiwanese youth, I constructed a framework to answer how these youth were affected by authoritarian rule in Taiwan.

Three main sources served as the basis for my research. The first is *Orphan of Asia* by Wu Zhouoliu published in 1945. It follows Hu Taiming's journey through Japanese-controlled Taiwan in the early 20th century and its society's unacceptance of Taiwanese identity. I also utilized *The Boy From Clearwater: Part 1& 2* by Yu Pei-Yun and Zhou Jian-Xi published in 2023/2024. It's a graphic novel duet centered around a boy named Tshua Khun-lim, who was born in Japanese-controlled Taiwan in the 1930s. Tshua Khun-lim found that the easy-natured life under Japanese rule was replaced by the struggle of a war-torn world. I last found a well-respected economist and statistician to interview named Dr. Lin. He had also been born in Taiwan during the 1930s but had left for the United States once growing up and going to graduate school. To better understand the current situation of Taiwan and its history, it helps to remember why the Island's identity has not been straightforward. As the Cold War generation of survivors grew older their stories and memories became small windows into the period of White Terror.

Irish Catholic Identity in the Home of the Anglican Church

Jasmine Liu & Kaviya Chidambaram

Maria Sanchez, Faculty Mentor

Colorado College

This project investigates the evolving identity of Irish Roman Catholics in London, home of the Anglican Church, and the lasting influence of Irish Roman Catholic migration on the city's sociopolitical and religious landscape. Anchored historically from the 1534 Act of Supremacy through the 1829 Catholic Emancipation Act to modern secularization, this study explores how Irish Catholic identity was shaped by institutional exclusion, political activism, and cultural resilience. Focusing on critical moments like the Penal Laws, the Great Irish Famine, and post-Victorian assimilation, the research traces the transformation of Irish Catholic presence in London from persecution to prominence. This project employs discourse analysis to examine linguistic representations of Irish Catholics over time, situated within shifting sociopolitical contexts. Fieldwork includes site visits to key religious and historical landmarks, archival research, and interviews with journalist Joanna Margaret Bogle, DSG, archivist Father Stewart Foster, as well as community leader Paul Raymond. These interviews revealed the Catholic Church's enduring role in the Irish Catholic community as a source of solidarity and connection, particularly during the isolation of the COVID-19 pandemic—underscoring how this community continues to support one another in times of crisis. Interviewees also highlighted the historic and ongoing involvement of Irish Catholics in labor activism, rooted in Catholic social teaching and the emphasis on the dignity of work—an ethos that continues to shape London's social and political landscape today. They also unearthed continuing disproportionate incarceration of Irish Travellers. Despite assimilation, Irish Catholic identity retains a powerful presence. By engaging with historical texts, institutional records, and contemporary cultural spaces—from churches and archives to modern-day Irish cultural centers—this research seeks to understand how the legacy of 19th-century Irish Catholic migration continues to shape London. The project offers insight into questions of identity and cultural integration in a historically exclusionary context.

Humanities Over Time

(Room #231)

Sibling Relationships in the Antigone: Love, Blood, and the Reader

Gracie Carrello

Christina Leza, Sanjaya Thakur, Owen Cramer, Faculty Mentors

Colorado College

“In Sophokles every word is a universe,” claims renowned Classicist and translator Anne Carson. One can observe this complexity of language in the Antigone through the use of different words for brother and sister. This paper explores the contextual understanding a reader gains for specific passages due to the different connotations of each word, such as ξύναιμος "of common blood" versus κασίγνητος "from the same mother." Each one inspires different images in the reader's mind. Sophokles uses five words both for brother (ἀδελφός, κασίγνητος, ἀυτάδελφος, ὅμαιμος, and ξύναιμον) and sister (κασιγνήτη, αὐτάδελφον, φιλάδελφα, ἀδελφῆς, and ξύναιμος), with differing frequency levels. In my examination of Sophokles’ word choices, I combine philological theory, cognitive schema theory, and etymology from an Anthropological perspective. Through these analytical lenses, I argue their usage is meant to reflect and emphasize the perspective and/or motivation the character holds at that moment. Some examples of this include a sense of familiality, relation through blood, or shared parentage. In this vein, the brother/sister words exclusive to each gender (ὅμαιμος and φιλάδελφα, respectively) reveal that Eteokles and Polynikes are grouped together by blood, both shared and shed, whereas Antigone and Ismene are grouped together by mutual fondness. An example of this is seen when Kreon is talking about the honorability of Eteokles and Polynikes, the sons of Oedipus who killed each other fighting on opposite sides of the war. He introduces the former by name, while referring to the latter initially as τὸν…ξύναιμον τοῦδε (198). The usage of ξύναιμον here draws attention to the common blood between the brothers, while simultaneously placing them in a hierarchical relation to each other. This reflects Kreon’s way of thinking about familial relationships. My analysis of this play illuminates the nuance of Sophokles’ specific word choices in the characterization of sibling relationships.

Personal Falsity: A Gadamerian Critique of the Enlightenment

Kirstin Varallo
Willow Mindich, John Riker, Faculty Mentors
Colorado College

This paper attempts to develop a criterion for determining when one's own opinion is incorrect. I first establish a Gadamerian critique of Enlightenment objectivism, and continue by stating that neither radical objectivism nor radical relativism are applicable standards within epistemology. There must be both some valid and some invalid opinions. In dialogue with Georgia Warnke, the discussion of right and wrong perception is based on the minimums of immediate illegitimizing of certain prejudices: part-whole incongruity and dogmatic opinions. Further, in conjunction with María Lugones's theory of "world-traveling," I state that one is unable to adequately dismiss an individual's opinion on a phenomenon until they have "traveled" to the individual's "world" and experienced the phenomenon through that individual's personal epistemology. To get a proper and best-as-possible understanding of someone's stance, especially a stance that opposes one's own, one must address or interrogate the prejudices that are tied to the stance itself; and meaningfully investigating another person's prejudices/perceptions requires traveling to their world. As this is incredibly difficult to do and requires high amounts of time and epistemic/hermeneutic labor, it becomes more efficient to be reflexive for only oneself than for others. I develop a criterion to determine such personal falsity, where first, building off Vrinda Dalmiya and Linda Alcoff, one must determine either propositional/theoretical or practical/educational expertise in the individual with the opposing opinion to one's own. An expert's differing stance is merely a signal to continue on with research into the relevant inquiry. One must maintain the belief that opinions necessitate their own change, and expertise does not always stem from those with the most prestige behind their name. Humility is the crucial figure in the opinion-changing process that stands as the fountainhead of good knowledge.

Arts Rising Phoenix

JD Ford
Emily Forand, M.A., Faculty Mentor
Pikes Peak State College

The digital age has presented unique challenges to the worlds of art and literature. As we watch the death of the Post-Modern era, society mourns the loss of the familiar. Will art and literature burn in the pyre, lost to the flames of a new era, or will it rise from the ashes in a new form? Declining interest in literary reading and traditional arts would arguably have far-reaching consequences to our society at large, but does the death of an era necessarily mean the death of the arts? While social media platforms can be rife with

cyber addiction, bullying, misinformation, and unrealistic expectations, they can also be places where the arts thrive. Born again into a new renaissance. A phoenix rising from the ashes.

Violence in Mexico's Society and in it's Literature

Spanish Language Room

(Room #259b)

El Feminicidio en México

Catalina Arreola Ramírez

Dr. Edgar Cota-Torres, Faculty Mentor

University of Colorado Colorado Springs

La exposición se centra en el análisis de la temática del feminicidio en México y la representación de esta problemática social a través de los elementos de una literatura contemporánea. El feminicidio, es la expresión más extrema de la violencia de género, sigue siendo una crisis en el país. Hay cifras alarmantes que reflejan un incremento constante en los últimos años. Se presentan estadísticas que muestran el aumento de casos de feminicidio del 2015 al 2022 por las nuevas clasificaciones de feminicidios. Un símbolo destacado es el llamado “cementerio de zapatos” la cual es una imagen poderosa que evoca los restos de las mujeres desaparecidas y son representadas únicamente por sus zapatos abandonados. Este concepto se conecta directamente con la demuestra de los zapatos rojos utilizados en protestas y actos simbólicos para denunciar el feminicidio y honrar a las víctimas. Esta demuestra de los zapatos rojos se ve en países latinoamericanos, pero en los Estados Unidos también se ha empezado a ver el movimiento “Walk a Mile in Her Shoes”. En este evento los hombres caminan una milla en tacones para denunciar la diferencia entre géneros y la violencia hacia las mujeres.

Todo esto se profundiza con el análisis de la obra literaria “Hasta el viento puede cambiar de piel” de Javier Malpica por la narración de la violencia contra las mujeres. En la obra de Malpica, el realismo mágico se utiliza para explicar la desaparición de mujeres en un pueblo del norte de México donde las mujeres tienen dones supernaturales para protegerse de las tensiones de género. Todo es una llamada de atención para ponerle un alto a los feminicidios y desapariciones de las mujeres en México. Sobre todo, la presentación invita a reflexionar sobre la violencia de género y la posibilidad de cambio.

Narcos de México

Elsy Baeza

Dr. Edgar Cota-Torres, Faculty Mentor
University of Colorado Colorado Springs

La presentación explica el problema del narcotráfico en México y su impacto en la sociedad. Los cárteles de la droga controlan grandes redes de tráfico y generan violencia en el país. Se mencionan algunos de los narcotraficantes más conocidos y su influencia en el crimen organizado.

Miguel Ángel Félix Gallardo “ Jefe de Jefes” es uno de los primeros grandes capos y funda el Cártel de Guadalajara en los años 80. Él organizaba el tráfico de drogas en México y hace negocios con los narcos de Colombia. Fue arrestado en 1989 que provoco la división del cártel y la aparición de nuevos grupos criminales. Amado Carrillo Fuentes, conocido como "El Señor de los Cielos", se convierto en uno de los narcos más poderosos al usar aviones para transportar cocaína. Muere en 1997 mientras se sometía a una cirugía para cambiar su rostro.

Joaquín “El Chapo” Guzmán lidera el Cártel de Sinaloa y se convierte en una figura mundialmente famosa. Se fuga de prisión en 2001 y construye un enorme imperio criminal. Es capturado en 2016 y condenado en Estados Unidos. Otro narcotraficante importante es Pablo Acosta Villarreal, quien controla el tráfico en Chihuahua en los años 80. La policía lo mata en un operativo en 1987.

El narcotráfico causa violencia, corrupción y miles de muertes en México. Los cárteles luchan entre sí por el control del territorio y muchas personas desaparecen en este conflicto. También hay corrupción en el gobierno y la policía, lo que permite que el crimen organizado siga operando.

El gobierno combate el narcotráfico con operativos militares, pero la violencia no disminuye. Desde 2006, la guerra contra el narco provoca más enfrentamientos y muertes. A pesar de los esfuerzos, el problema sigue porque hay pobreza, corrupción y falta de oportunidades para los jóvenes.

El narcopolicial gore en la narcoliteratura (violencia en la literatura detectivesca o criminal)

Erik Saldana

Dr. Edgar Cota-Torres, Faculty Mentor
University of Colorado Colorado Springs

El tema para ser presentado trata el capitalismo gore, término propuesto por Sayak Valencia que nos explica el entorno de la violencia cotidiana en la frontera mexicana-estadounidense y por ende las cimientas de la literatura sobre el narco. Algunos aspectos para ser desarrollados incluyen la manera en que se forma una distinta economía y sociedad donde la violencia es la moneda (manifestadas en el capitalismo gore), el uso del gore en la literatura policiaca y detectivesca y las diferentes fases o épocas en las cuales se utiliza, y la impactante contribución del gore en la literatura sin importar la etapa (tanto para alimentar el contexto de la historia como para destacar un mensaje para el lector). En la narcoliteratura, el gore se utiliza para reflejar el capitalismo gore y la manera en que alguna persona puede realizar una movilidad social tras el proceso del necroempoderamiento; es decir, manera en que la gente se empodera tras la violencia contra otros. La dicotomía entre los endriagos (los que cometen la violencia para empoderarse) y los homo sacer (las víctimas de estas situaciones) contextualiza el porqué por el cual existe mucha violencia en las décadas actuales en la parte superior de México cerca de la frontera con Estados Unidos.

Presenter Abstracts

Poster Session 2
11:45 am – 12:45 pm

(Alpha Order by Presenter Last Name)

Non-Thermal Plasma Treatment: Breakdown of Polyfluoroalkyl Substances on Plant Surfaces

Hyungyu Kim, Henry Batson, & H. Kim
Dr. Adam Light, Faculty Mentor
Colorado College

Polyfluoroalkyl Substances (PFAS)—a class of synthetic organic compounds—are commonly referred to as “forever chemicals.” PFAS can negatively impact the environment and different living systems through processes like bioaccumulation. Thus, ongoing studies have been testing different techniques to remove PFAS from different material surfaces. Previous research determined non-thermal plasma treatment on Methylthioninium chloride dye solutions in vitro as an effective model for PFAS removal. The purpose of this study was to determine the feasibility of breaking down PFAS chemicals on the surface of living organisms via non-thermal plasma treatment. Food coloring was used to represent PFAS chemicals and other organic compounds. Chrysanthemums and dianthus caryophyllus flowers were used as the subjects. Trials were conducted to see how contact and non-contact plasma treatment of the petals impacted the results. Both treatments resulted in minimal color changes to the plants and significant damage on a cellular level. The findings of our experiment reveal that non-thermal plasma treatment is not an effective method of removing PFAS chemicals from the surface of living organisms.

The IMF Crisis on Women in the Republic of Korea

Lillian Kirk
Dr. ‘Ilaheva Tua’one, Faculty Mentor
University of Colorado Colorado Springs

My research aims to explore coerced relations between the International Monetary Fund (IMF) and the Republic of Korea (ROK). Catering to western capitalist interests, the International Monetary Fund has continuously funded export-oriented growth in East Asian lagger economies. My research question prompts: how has the IMP crisis in the Republic of Korea impacted women’s economic standing? I aim to focus on the gendered consequences of the crisis and explore trends in labor rights movements within the state. I will observe the state’s labor policies and feminist resistance to state-sponsored exploitation. Despite the region’s rapid economic growth resulting from the East Asian Miracle, the following financial crisis extenuated women’s already fragile economic standing. I aim to explore the gendered consequences observed during and after the IMF crisis, particularly among female employees and domestic laborers. I will survey the history of labor movements and resistance to exploitation, which often aimed to promote labor rights in female-dominant occupations. This includes labor movements conducted by employees, students, and union organizers. Broadly, this topic falls within the discussion

of globalization and the influence of global banks on developing East Asian economies. My research particularly offers a critical analysis of the East Asian Crisis from a gendered lens. The IMF's asymmetrical interdependence with East Asia remains a controversial topic in the field of political science. While globalization assisted in broad state economic growth, my research argues that the IMF ultimately exploits vulnerable female laborers for capitalist gain. As I continue to research my topic, I hope to gain an understanding of how the IMF influences the ROK's domestic labor policies.

The Quantum Hall effect and Massless Particles

Stew Kristiansen
Christopher Monahan, Faculty Mentor
Colorado College

In this work we extend a known U(1) lattice calculation of the Chern-Simons level to a non-Abelian SU(3) gauge theory by using a one-loop Feynman diagram with Wilson fermions. Through the Wilson propagator, we compute the topological coefficient governing massless edge states arising along an interface where lattice spacings change. This phenomenon is similar to the edge currents in the quantum Hall effect. The quantum Hall effect describes the electrical resistance of a 2D electron system that takes on quantized values under in the presence of strong magnetic fields and low temperatures. This phenomenon can be described by quantum field theory, which relates the topological properties of the system to the quantized values of the resistance.

Postcolonial feminism in Africa

Adwoa Kyeremeh
Dr. 'Ilaheva Tua'one, Faculty Mentor
University of Colorado Colorado Springs

African postcolonial feminism develops as a critical lens for examining the relationship between colonial history, gender, and race. Women's voices were ingrained in African communities before colonialism when they were the main participants in commercial activity and cultural values. While working as domestic and commercial servants for no pay, women fought with men in the bushes planned marches in towns and cities and generated money for liberation movements. Matriarchal hegemony was replaced by a new kind of male domination under the camouflage of racial oppression. Gender dynamics were influenced by patriarchy and colonialism, leading to inequality and social and economic impacts. Western norms still shape African women's status In the popular feminist discourses of the West, African women's struggles are frequently not sufficiently acknowledged. In addition to challenging local and colonial injustices,

postcolonial feminism elevates the voices of African women. Additionally, it broadens the scope of the global feminist agenda to include and represent African women.

Transforming Adversity into Resilience: A Personal Journey Through Childhood Trauma and Foster Care

Zara Laber

Dr. Krista Fish, Faculty Mentor

Colorado College

This thesis explores the nuanced journey of resilience through the personal narrative of my mother, a survivor of childhood trauma and foster care. It examines how adverse childhood experiences (ACEs), as defined by Felitti and Anda in 1998, correlate with lifelong mental and physical health challenges. The research highlights resilience as a multifaceted phenomenon, emphasizing personal definitions derived from individual experiences. Resilience, as articulated by my mother, involves moving forward despite pain, accepting alternative solutions, and not allowing the past to dictate one's future. Through storytelling, this thesis showcases resilience as a proactive, forward-looking process, focusing on adaptability and positive impact. It challenges conventional understandings by illustrating resilience as a complex journey marked by isolation and self-reliance. My mother's early life on a rural farm, marked by neglect and overwhelming responsibility, fostered profound self-reliance. Her resilience grew from solitude, transforming hardship into personal growth and emotional endurance. The research argues that while predicting outcomes based on ACEs is complex, understanding resilience offers insights into human potential. It advocates for integrating strength-based questions and resilience-focused interventions into trauma-informed care, moving beyond a predominant focus on negative experiences. This approach respects personal experiences and emphasizes resilience as a dynamic process influenced by cultural contexts and social support systems. By examining my mother's story, this work underscores the transformative power of resilience, showcasing how adversity can catalyze personal growth. It highlights the importance of supportive relationships and environments in fostering resilience and challenges traditional definitions of parenthood. Ultimately, this thesis advocates for a trauma-informed future that balances scientific insights with the complexities of human experiences, emphasizing empowerment and the dynamic nature of human potential.

Whose Story is the Zoo Telling?
Gorilla Behavior and the Representation of Culture in Captivity

Kando Lako & Evelyn Cunneen
Krista Fish, Faculty Mentor
Colorado College

Zoos are more than just places for wildlife conservation, they are cultural institutions that shape narratives about animals, humans and nature. This study takes a multispecies ethnographic approach to examine both gorilla behavior and the representation of culture at the Cheyenne Mountain Zoo. The first part of this research examines gorilla exhibits both indoor and outdoor shelters and what factors affect their preferences. The second part explores how cultural representations are displayed in zoo exhibits, with a focus on African textile patterns, thatched roofs and but also conservation messaging. Drawing on Luna's (2023) work on the racialized spectacle of conservation and Weaver's (2022) insights on multispecies justice, this study highlights how African exhibits are framed through narratives of crisis in Africa such as poaching and overpopulation, whereas Western exhibits emphasize human-led conservation efforts without attributing blame. These findings suggest that zoos not only structure animal experiences through enclosure design but also shape visitor perceptions through selective storytelling. By integrating behavioral research with ethnographic analysis, this study contributes to discussions on the politics of display in zoos, decolonization theory, and the ethics of conservation narratives.

Focused Attention Improves Social Media Engagement Experiences

Ben Leibowitz
Dr. Tomi-Ann Roberts, Faculty Mentor
Colorado College

When engaging with social media interfaces like Instagram, people prefer to rapidly switch or scroll through large quantities of content, and predict this selection agency will yield more positive experiences. However, studies show such digital switching actually causes more negative experiences, including boredom, engaging with social media. We hypothesized that engaging focused attention brings more positive experiences with social media and that scrolling through endless content inhibits this. In this study, we examined peoples' experiences viewing Instagram content under varying degrees of selection agency and focused attention. We found that participants had better experiences - less boredom, more interest and enjoyment, and better memory - when they employed high, versus low, focused attention, while their selection agency had little impact. Overall, our findings suggest that in a digital world of endless options, peoples' selection agency paradoxically places them in a state of choice overload. Instead, stopping the scroll and paying focused attention to

selected content makes for higher quality social media experiences, enabling people to feel in control as they navigate digital environments of infinite content. Keywords: focused attention, selection agency, scrolling, choice overload, digital content.

Validating Knockouts of Fatty Acid Oxidation in Drosophila

Linnea Lindell

Dr. Meredith M. Course, Faculty Mentor
Colorado College

Fatty acid oxidation disorders (FAODs) are recessively inherited metabolic diseases that impair the body's ability to break down fatty acids for energy, potentially leading to severe health issues, including sudden infant death syndrome (SIDS). Despite newborn screening programs, FAODs remain understudied, leaving significant gaps in understanding their pathology and treatment. This research focuses on developing Drosophila melanogaster models with CRISPR/Cas9-induced knockouts of proteins corresponding to human FAODs, including Arc42, Etf-QO, CG4860, CG7461, Mcad, and MTPα. The goal is to determine whether these genetically modified Drosophila exhibit metabolic disruption patterns similar to human cases by confirming protein knockouts. Western blotting confirmed Mcad knockout, while RT-PCR verified CG4860 knockout. Potential knockouts of MTPα, CG7461, and Arc42 require further analysis using optimized RT-PCR or suitable antibodies. Etf-QO knockout was determined to be homozygous lethal, with Sanger sequencing revealing heterozygous Etf-QO flies. Mcad knockout was confirmed by the absence of Mcad expression compared to a HeLa lysate control, with total protein staining validating protein presence and equal loading. RT-PCR demonstrated reduced CG4860 expression in knockout flies relative to Chromosome 3 controls, confirming successful knockout. These results support the use of Drosophila as a model for FAODs. A successful model could provide crucial insights into disease pathology and aid in the development of better treatments for these life-threatening conditions.

Enhancing Usability for the Pikes Peak Outdoor Recreation Alliance's Data Hub: A UX Research and Design Approach

Eden Love

Dr. Brandon Strubberg, Faculty Mentor
University of Colorado Colorado Springs

This poster will introduce the Pikes Peak Outdoor Recreation Alliance (PPORA) and the OPPI data hub and present a user experience (UX) research plan to guide the data hub's future design refinements.

Methods and Approach

PPORA is a collaborative organization uniting outdoor businesses, nonprofits, government entities, and individuals who value the Pikes Peak region's natural, recreational assets and community wellbeing. Its mission is to strengthen the region's outdoor recreational industry through leadership and collaboration.

Following the COVID-19 pandemic, PPORA implemented the Outdoor Pikes Peak Initiative (OPPI) to identify sustainable solutions to conserve recreational and natural assets and ensure Colorado remains an equitable outdoor recreation destination. This initiative established a data hub to communicate geographic information on the natural environment, recreation, and socioeconomic factors of the region, enabling community members to make informed decisions about the region's outdoor assets.

To improve the data hub's usability, PPORA stakeholders initiated a UX research project for the website's interface. My research objective is to determine user needs and identify existing pain points with the current design to inform improvements for the OPPI data hub.

My UX research strategy will employ the following methods to distinguish present usability issues:

- Initial stakeholder personas
- User interviews
- Micro usability tests
- User research personas
- User journey maps
- System usability scale

In addition, I will present two personas based on initial PPORA stakeholder conversations that represent key target audiences among the hub's various user groups: land managers, government officials, grant writers, and community members.

Investigating Optimal Quantum Mechanical Cluster Size for Drug Design Targeting TbGSK3 Enzyme

Katie Ly
Dr. Amanda Morgenstern, Faculty Mentor
University of Colorado Colorado Springs

Current treatment options for Human African Trypanosomiasis, a neglected tropical disease caused by the *Trypanosoma brucei* parasite, are limited and can have significant side effects. *T. brucei's* glycogen synthase kinase 3 (TbGSK3) enzyme is important in metabolism, lending itself to be a strong candidate for inhibition and development of more targeted pharmaceuticals.
Computational chemistry has increasingly become a primary tool in screening pharmaceutical candidates and designing drugs. Quantum mechanical (QM) modeling of active site clusters, as opposed to molecular modeling (MM) or combined QM/MM systems of full enzymes, is a relatively new technique in exploring ligand-enzyme interactions with the potential to more accurately predict experimental binding energies. The tradeoff between computational cost of increasing cluster size and accuracy is an issue impeding efficiency. This work utilizes TbGSK3 to explore the effects of radial cluster size on calculated binding energy and Gibbs free energy values, with the goal of correlating to experimental IC_{50} values of indirubin ligands. Density Functional Theory (DFT) calculations were performed on active site cluster models in one-Angstrom intervals from 3 Å to 6 Å. Binding energies converged around the 4 Å abbreviated amino acid size (276 and 220 atoms for the two ligands tested). Calculations were compared at varying levels of complexity. On average, optimizing geometry added 13 hours of computational time. Future work will examine additional ligands as well as compare calculated binding energies and Gibbs free energies to experimental IC_{50} values.

Behavior of Model Membranes Containing Lipid Compositions Found in Cancer Cells

Lily Lyons
Dr. Crystal Vander Zanden, Faculty Mentor
University of Colorado Colorado Springs

This project aims to investigate the differences in lipid order and diffusion in cancerous and noncancerous cells. Every cell has a membrane composed of a phospholipid bilayer with distinctly different lipid compositions in the external and internal leaflet. A typical cell has a higher concentration of phosphatidylcholine and sphingomyelin in its external leaflet compared to higher levels of phosphatidylserine

in its internal leaflet. Literature finds that polarity changes in cancerous cells compromises the distinct differences between the two leaflets. This can affect lipid lateral diffusion and protein interactions. Synthetic membranes constructed from each lipid composition (normal or cancerous) were fluorescently labeled and imaged with confocal microscopy. Lateral lipid diffusion was quantified with fluorescence recovery after photobleaching. Results indicated that the cancer-mimicking membrane lipid composition had larger domain formation, as well as a diffusion coefficient of 0.59+/-0.04μm2 /s compared to 0.42+/-0.03μm2 /s for the non-cancerous membrane. Overall, this project found that the lipids that form cancer cell membranes had a higher rate of lateral lipid diffusion than typical membranes, which could influence how transmembrane proteins are able to interact with coordinating proteins at the cell surface.

Centromere Evolution in Wickerhamomyces canadensis Budding Yeast Using Long Read Sequencing

Natalia Maahs

Sara Hanson, Faculty Mentor
Colorado College

Chromosome segregation is an essential step in the cell cycle to ensure that daughter cells receive the correct number of functional chromosomes. Accurate chromosome segregation relies on the region of genomic DNA called the centromere, where spindle microtubules attach to the chromosomes and pull them apart. Yeast is used as a model organism to study the evolution of centromeres from regional centromeres (not strictly defined by DNA sequence) to point centromeres (short and sequence defined). In this study, we investigate the centromere of Wickerhamomyces canadensis—a budding yeast species with a flip-flop mating-type mechanism in which a cell can switch its mating type by a chromosomal inversion and undergo diploid meiosis. The flip-flop mechanism relies on switching which mating-type locus is being silenced due to proximity to a heterochromatic region, such as the centromere. Previous genomic analysis of W. canadensis has used short-read sequencing, which is ineffective at sequence assembly of repetitive regions, such as those around the centromere and the mating-type loci. By using longread nanopore sequencing of genomic DNA to determine a more complete species genome, we hope to identify the location of the centromere on the chromosome in addition to the centromere length, repetitive sequence elements, and GC content. This information will provide insight into centromere evolution by adding to our inventory of centromere diversity in budding yeast.

Addressing the Treatment Gap: An Evolutionary Perspective on Addiction's Effect on Public Stigmatization of Substance Use Disorders

Robert Maher
Gregory J. Peters, Faculty Mentor
Colorado College

Stigma remains a critical factor in the widening treatment gap for substance use disorder (SUD), disincentivizing individuals from seeking and utilizing treatment, and contributing to the overdose epidemic. The Brain Disease Model of Addiction (BDMA) is the most widely accepted model of addiction, in part, because it is thought to reduce the stigma surrounding SUD's. Researchers have raised concerns about if the BDMA is truly effective in destigmatizing addiction. To address the destigmatization of SUD's, a survey was conducted to analyze the effect an Evolutionary Perspective on Addiction (EPA) and Brain Disease Model of Addiction (BDMA) have on public stigmatization of SUD's. No major effects on stigma were observed between the EPA, BDMA, and a control group. This study suggests that although neither the EPA and BDMA had effects on public stigma, future research should focus on altering the presentation of information about the EPA and the BDMA, analyzing the relationship between the BDMA and perceptions of criminality, and studying the effect of an individual's stigma toward SUD and their own drug consumption or relationship.

Morning White Light Exposure Shortens Sleep Latency and Morning Blue Light Exposure Improves Self-Reported Mood in College Students

Ana Martin
Lori Driscoll, Faculty Mentor
Colorado College

Sleep is a crucial aspect of maintaining our health and well-being. Sleep loss and insufficient sleep can cause short-term disturbances in mood and productivity, as well as impact long-term risk for mental illness, obesity, heart disease, and premature mortality. Previous findings suggest that bright light exposure in the morning may be one potential method of improving sleep, but as far as we are aware, no comparison between light containing different wavelengths has been made. Our team investigated morning white light exposure and morning blue light exposure as potential methods of improving sleep. We assessed sleep latency, mood, relationship health, and daytime sleepiness as measures of improved sleep and its benefits in college students. We found that the white light intervention significantly

reduced sleep latency and that the blue light intervention significantly improved self-reported mood. Given our current data, we were unable to determine whether one type of light intervention was more beneficial than the other. However, by connecting light exposure to improvements in mood and sleep, our study supports morning light exposure as a potential non-pharmacological solution for managing conditions such as anxiety, depression, and sleep disorders.

Understanding Cold Air Drainage in Mountainous Terrain

Michael McAninch, Brenna Krause & Brendan Malloy

Dr. Brandon Vogt, Faculty Mentor
University of Colorado Colorado Springs

Cold air drainage plays a crucial role in shaping microclimates within mountainous environments, influencing snowpack distribution, ecological zones, and local weather patterns. In this study, we present a proof of concept that explores the dynamics of cold air drainage through a multi-faceted analysis of atmospheric and environmental data collected in Silverton, Colorado. Our investigation begins with radiational cooling, where we examine the impact of nocturnal heat loss using snow profiles, snow depth measurements, and Tidbit temperature sensor data. Next, we analyze wind speed patterns to track the movement of dense, cold air as it drains into lower elevations. This process leads to the formation of heat inversions, which we characterize using vertical temperature gradients to demonstrate how cold air pools in valley bottoms. Finally, we illustrate the presence of a thermal belt—an elevation band where temperatures remain comparatively higher—through vegetation indices derived from remotely sensed data processed in TerrSet. By integrating field observations with geospatial analysis, our research highlights the complex interplay between cold air drainage, snowpack variability, and ecological zonation. These findings provide insights into mountain climatology and contribute to a broader understanding of atmospheric processes in high-altitude environments.

Synthesis of Chromene Isoxazoles Through INOC and Reduction to Enaminals

Sophia Mital & Mason Barone
Dr. Allen Schoffstall, Faculty Mentor
University of Colorado Colorado Springs

Isoxazoles were synthesized using intramolecular nitrile oxide cycloadditions to yield chromene isoxazoles from 2-hydroxybenzaldehyde in 3 steps. Isoxazoles have a weak N-O bond that can be reduced to form reactive enaminal species useful for the synthesis of important heterocycles. This work focuses on the synthesis and reduction of isoxazoles to yield the novel enaminal species.

The Role of Collateral Reports for Older Adults: Executive Dysfunction in Neurocognitive Disorders

Caleb Moyer
Rachel Thayer, PhD, Faculty Mentor
University of Colorado Colorado Springs

Clinical neuropsychological assessments are crucial for evaluating cognitive status and informing recommendations to enhance quality of life. This follow-up study builds on prior research investigating the relationship between collateral informant reports and neurocognitive disorders (NCDs), particularly in executive function (EF). The previous study found significant associations between discrepancies in collateral/patient reports and objectively tested EF impairments, as well as between NCD diagnosis and EF deficits. However, the findings were limited due to a small sample size (N = 21, M_{Age} = 64.33, SD = 15.18). The current study increases the sample size ($N \approx 40$) by incorporating additional data from the University of Colorado Colorado Springs Aging Center Neuropsychological Report Database. Chi-squared tests of independence will be conducted to analyze associations between collateral reports, NCD diagnoses, and EF impairments. With a larger sample, this study aims to enhance statistical power and provide a more comprehensive examination of these relationships. Preliminary expectations suggest that previously observed significant effects will be further substantiated, strengthening evidence that discrepancies in collateral reports correspond with objective EF impairments and higher rates of NCD diagnoses. By expanding the sample, this study aims to better understand the role of informant perspectives in clinical assessments and expand insight into diagnostic accuracy for NCDs. These findings could further affirm the value of collateral informants in neuropsychological evaluations and their potential impact on clinical decision-making.
Keywords: informant, collateral, executive function, neuropsychological assessment, neurocognitive disorder

Tiling the Collective- Socialist Remnants through Mosaics in Berlin and Potsdam

Isabella Nevin
Colorado College Political Science Department, Faculty Mentor
Colorado College

Berlin, in many ways, has served as a gateway between European political-economic paradigms. Its streets directly walk the line between the socialist and the capitalist, the developed and the "underdeveloped", the European internal and socialized "East," and the normative assumption of the "West." Though the wall has since fallen, traces of an East-West divide are both memorialized from this past, offering crucial glimpses into the cultural and political structures which governed the lives of everyday Berliners. This project seeks to examine works of art crafted before this incorporation into a capitalist West, in order to carve out a discourse of citizenship within a panorama of public space–mosaics created under the GDR. Mosaics themselves carry an array of connotations, particularly regarding antiquity and the constitution of religious or sacred space. The utilization of this historical medium for the creation and portrayal of something definitively modern and progressive, being a discourse of citizenship under the guidance of a modern nation-state, creates a particular tension which this project explores. Mosaics offer both a method of pictorial representation through the arranging of imagery, as well as a spatial element. Finally, the temporal element of the form of the mosaic and its imagery represents the goals of the GDR and the socialist ideal world it sought to portray– a utopia of past and present.

Analysis of Cognitive Function in Colorado College Students in Correlation with Carbon Dioxide Levels

Grace Nguyen
Sally Meyer, Faculty Mentor
Colorado College

Literature suggests that exposure to high levels of carbon dioxide affects cognitive function negatively through cognitive assessments. Previous studies were only conducted on office workers, pilots, students across all education levels, and astronauts in environments such as submarines, elementary and high school classrooms, and office buildings. These studies used the cognitive test software, SMS

(Strategic Management Simulation), to measure cognitive performance. For this study, we are localizing it to Colorado College students, measuring the carbon dioxide levels in their bedrooms. Students tested their cognitive function through the Stroop test, which measure interference with executive functioning, to see if decreased cognitive function correlated with high levels of carbon dioxide. The Stroop test is a quick and efficient way of measuring cognitive function, much more so than the SMS software test that is 1.5 hours long. The seven participants each did three trials of collecting carbon dioxide data through the Temtop monitors and taking different versions of the Stroop test for each trial with their windows closed. Using a 2-sample T-test, we determined that Stroop test scores – therefore, cognitive function - decreased with higher levels of carbon dioxide and with those living on Colorado College's campus, although these findings were not significant.

Impact of Highways on Wildlife Movement

Rory Nixon & Nicole Box

Dr. James Baginski, Faculty Mentor

University of Colorado Colorado Springs

The highway system is a staple of American transportation, highways provide easy access through states and to recreational areas like ski resorts, campsites and beaches. Despite this convenient transportation method there are some long-term environmental impacts like population decline, restriction of migration, and the disruption of mating season. Wildlife movement in relation to highways is a topic of interest because as urban sprawl continues to move into rural areas habitat degradation increases as well. This growth and loss feel inevitable but there are solutions being implemented that will mitigate the danger to wildlife so people can still travel as desired. The course this project is for is, "Recreational tourism and the Environment". This topic is kind of unique because it's an environmental impact that isn't a headline but has great effects on wildlife habitats. The research question that will be addressed for this project is: How have highways impacted wildlife movement, and how can we fix it? Roadways bring great mortality rates to wildlife but it's also a dangerous obstacle for people. October has the highest number of accidents with wildlife involved and the highest human fatalities with 13% of the years traffic deaths occurring in the same month. This is tragic but wildlife has even worse cards. The U.S department of Transportation estimated one to two million vertebrates are killed every year just in the United States. Approximating an animal is killed on the road every 26 seconds, this number continues to rise annually. (Frank) Fencing and wildlife crossings are evident to greatly decrease collisions, these simple solutions can save wildlife and human life.

Human and Orangutan Behavior at the Cheyenne mountain Zoo: An Ethical Assessment of Captivity

Hayan Oh
Dr. Krista Fish, Faculty Mentor
Colorado College

Research into primate behavior provides valuable insights into the diverse behaviors of orangutans, including their interactions with each other and with humans in zoo settings. By examining behavioral data, significant differences emerge between orangutans in the wild and those in captivity, often manifesting as stress-related behaviors or stereotypies. The hypothesis that zoo animals exhibit abnormal behavior compared to their wild counterparts is widely accepted. Understanding these behavioral differences is crucial for minimizing stress and creating a healthier environment for animals in zoos. While it may not be possible to entirely eliminate stress in confined spaces, there are strategies that can improve the well-being of captive orangutans and other species.

Effects of Aromatase Inhibition on Rapid Dendritic Spine Neuroplasticity in the Auditory Cortex of Songbirds

Nicole Peirson
Dr. Marcela Fernandez-Peters, Faculty Mentor
Colorado College

Zebra finch neural response to novel song exposure has been shown to upregulate dendritic spine density in auditory neurons. In addition, an increase in the neurohormone estradiol (E2) in these auditory regions has been shown to occur following novel song exposure. Previous studies have examined changes in the zebra finch auditory neurophysiology and hormone increase but few have examined the direct effect of neurohormones like E2, on neuromorphology and spine density following song exposure. This study aimed to determine if E2 is involved in the upregulation of dendritic spines in male zebra finches using an aromatase inhibiting drug, Fadrozole (FAD) to block the synthesis of E2. The brain regions of interest for this study include the caudomedial nidopallium (NCM) and the caudolateral nidopallium (NCL). Four groups were used in this experiment: song + VEH, song + FAD, silence + VEH, and silence + FAD. The song + VEH group was expected to have the highest spine density. For the experiment, each bird was orally administered FAD or vehicle and exposed to 30 m of novel songs or silence. Following an hour, the bird was euthanized, and the brain was perfused, extracted, and stained with a Rapid Golgi staining protocol. Once stained, the brain was sliced and mounted on slides. Neurons were then imaged at 60x (z-stack) and traced using the Neurolucida program. The results of this study did not show a significant effect of treatment in the NCM or NCL across a 10 – 120μm distance on the dendrites from the soma. However, further analysis demonstrated significant effects of

treatment on specific regions of each dendrite (proximal and distal) in both the NCM and NCL as well as significant results in the right hemisphere NCM at distal regions. *Keywords:* Estradiol, spine plasticity, song exposure, Fadrozole, NCM, NCL

An animal model of gender-affirming hormone therapy: the effects of testosterone or estrogen on sexual behavior in Long-Evans rats

Kole Petersen

Fay A. Guarraci, Faculty Mentor

Colorado College

Not much is known about how gender-affirming hormone therapy (GAHT) impacts reproductive health and sexual motivation, especially in adult humans. Current literature does not properly simulate GAHT prescribed to adult humans, thus our 4-week study was designed to test an animal model of gender-affirming hormone therapy (GAHT) on the factors above. We investigated how female rats treated with testosterone enanthate (TE) and male rats treated with estradiol benzoate (EB) impacted their physiology and their behaviors when interacting with sexually receptive stimulus rats in a partner preference test. We found TE-treated female rats failed to become sexually receptive during a 10-day observation period, spent less time with either stimulus animal than controls across both phases of the partner preference test, and displayed more rejection behaviors when physical contact was possible. Ovarian weights did not differ, but TE-treated rats weighed more than controls by the end of the exposure period. In contrast, EB-treated male rats did not differ from controls during the partner preference test, yet testes and body weights were significantly lower than controls. Ultimately, these findings expand our understanding of the effects of GAHT on reproductive health and sexual behavior using an animal model.

Applications of 2 amino benzaldehydes in the synthesis of heterocycles

Jacob Pintor & Nicholas Brancieri
Dr. Allen Schoffstall, Faculty Mentor
University of Colorado Colorado Springs

Enaminals are diverse heterocyclic precursors that can be utilized for the synthesis of pyridines, pyrroles, pyrimidines and pyrazoles. Due to the difficulty of synthesis of enaminals, 2-aminobenzaldehyde serves as a model compound for enaminal cyclization. These analogous functionalities allow for the optimization of heterocyclic synthesis without using hard to obtain enaminals and supports the diversity of possible enaminal cyclization.

Machismo

Alejandro Portillo
Dr. ‘Ilaheva Tua’one, Faculty Mentor
University of Colorado Colorado Springs

My working thesis is that machismo has many emotional and psychological effects on both men and women. Machismo may be perceived as a positive because women are taught to believe that men have power and can provide for them. Giraldo Octavio states, “While girls are shown affection and tenderness, boys must be hardened, and it is expected that they will soon become self-sufficient and virile.” My working thesis on where machismo stems from is that men who try to control women by asserting dominance need to compensate for things that they lacked growing up, whether emotional or physical needs.

Animal Enclosures Mirroring Societal Cages at the Cheyenne Mountain Zoo

Kate Pulley & Marie Baird

Krista Fish, Faculty Mentor
Colorado College

My main research throughout this paper explores the relationship or lack thereof between Western Lowland Gorillas (Gorilla, gorilla) in captivity at the Cheyenne Mountain Zoo and human observers. My partner (Marie Baird) and I observed the gorillas as well as their human observers for 2 hours using the instantaneous method. We simultaneously watched and took notes on one gorilla at a time while the other person watched observers and their behaviors. We found that the primates had low energy and low movement. They seemed familiar with the humans and fairly unbothered. This could be due to their ages or the specific day we observed. On the second day at the zoo, I observed other animal exhibits and how different and similar they were to the primate world. Observing these cages and enclosures immediately connected multiple theories that tell how society treats animals and certain humans similarly. These observations opened up many questions about zoos in general such as, is it ethical to keep animals away from their natural habitat? How many animals are too many for a certain size of enclosure? And how can marginalized groups of people relate to these animals?

Neutron Reflectivity Measurements of a Galectin Protein Binding Two Membranes

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Galectins are a family of proteins that bind to sugar-decorated molecules such as glycolipids and glycoproteins that are displayed on cell surfaces. Galectins bind to sugars using their carbohydrate recognition domains (CRDs). Galectin-4 (Gal-4) contains two CRDs that are connected by a flexible linker, suggesting that this protein has a role in tethering together two carbohydrate groups. Gal-4 is highly expressed in intestinal epithelial cells, but is also involved in cell signaling pathways in several tissues throughout the body, including the brain. Incorrect Gal-4 expression has been linked to changes in frequency of cancer development in the colon, pancreas, lung, and liver. The glycolipid ganglioside GM1 is one of the ligands Gal-4 binds to and is found on neuronal membranes. It has been hypothesized that Gal-4 can directly bind two separate membranes, helping to tether them together, yet this has yet to be experimentally observed. To address this question, neutron reflectivity experiments were performed on supported lipid bilayers containing GM1, and then a Gal-4 variant and liposomes were added to the system. A supported lipid bilayer with 20% GM1 acted as the initial membrane for the protein to

bind to. Once protein binding had been observed, liposomes containing GM1 were injected into the chamber to act as a second membrane for the Gal-4 variant to bind to. The results from co-refinement of each set of data indicate both the Gal-4 variant and liposomes attached to the supported lipid bilayer, suggesting that Gal-4 is able to tether together two membranes containing carbohydrate ligands. Future experiments will include more controls that are needed to determine if the Gal-4 or liposomes might be attaching to the bilayer through non-specific interactions. These findings will help inform further investigation into the role of galectins in disease progression and cancer metastasis.

Preliminary analysis of a tool designed to compare the health outcomes of weightlifters

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This study is meant to design a readily available tool to compare the health behaviors of weightlifters across several disciplines. These weightlifting disciplines include powerlifting, Olympic lifting, CrossFit, Strongman, and the Scottish Highland Games. Each discipline emphasizes specific exercises and competition structures: powerlifters focus on maximizing strength in the bench press, squat, and deadlift; Olympic lifters perform the clean and jerk and snatch; CrossFit athletes complete high-intensity, varied workouts; Strongman competitors undertake dynamic strength challenges; and Highland Games athletes engage in heavy throwing events. While weightlifting sports have grown in popularity, empirical research on training practices across these varied forms remains sparse. To address this gap, this study employed face and content validation to create a survey designed to compare health behaviors and outcomes of weightlifters of different types. The following step is the first in establishing construct validity, and data collection is ongoing at gyms and healthcare facilities using Pearson's correlation coefficients were used to establish relationships between the disciplines (n=501). The tool will be used to gather insight into optimizing performance and health for weightlifting athletes. Keywords: weightlifting, powerlifting, CrossFit, Strongman, Scottish Highland Games, health behaviors, health outcomes.

Use of Ultrasonic Energy for the Synthesis of bis-Triazoles

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Synthesis of ditriazoles using the CuAAC catalytic method may be done according to several different modes including microwave-assisted heating. We have found microwave heating to be less useful for preparing alkynyl carboxylic acids and have used ultrasonic energy to improve reaction rates leading to ditriazole derivatives. We have synthesized several additional ditriazoles using the ultrasonication method useful as intermediates working toward an end goal of preparing large rings.

Inhibition of Interferon-α and Complement Receptor 2 Binding

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Complement receptor 2 (CR2) mediates antigen activated signal cascades on a variety of immune cells, including dendritic cells. Interferon-α strongly interacts with CR2 but the role of this binding event in the immune response is largely unknown. It likely plays a role in targeted immune response from B and T cells, as well as crosstalk between the innate and adaptive system. CR2 antibody inhibitors restrict all ligands from interacting, leading to a global inhibition of CR2 function. Finding a peptide that selectively inhibits INF-α binding will allow further studies on the downstream effects of loss of interferon-mediated complement immunity. BLITZ assays with a variety of peptide inhibitors show changes in interferon-complement receptor binding at small concentrations. Successful inhibition will improve understanding of the immune response and inform clinical approaches to immunotherapy.

Investigating Centromere Evolution in the Budding Yeast Hanseniaspora osmophila

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Centromeres ensure accurate segregation of chromosomes during cell division and DNA replication by providing a site for assembly of the kinetochore. Investigations into different species of yeast have revealed that there is immense diversity when it comes to centromere structure and location. There has been a dramatic evolutionary shift from regional, epigenetically defined centromeres to short, genetically defined point centromeres, which is still not fully understood. These two types of centromeres differ in size and surrounding features. Hanseniaspera osmophila Y-1613 is a species of budding yeast that is a potential candidate for the point centromere model, which would suggest an earlier origin for point centromeres than what is currently understood. The genome has previously been assembled using short-read sequencing, but in order to further our understanding of centromere structure and function in this species, a better genome assembly is necessary. This will be achieved using long-read sequencing of H.osmophila, with the aim of improving the genome assembly and identifying the location and features of its centromeres. These findings can aid in piecing together the evolutionary history of centromeres in budding yeast.

Spatial Feedbacks and External Pressures in Rybník Rod: Understanding Alternative Stable States and Regime Shifts Between Macrophyte and Cyanobacteria Dominance

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Focusing on transitions between macrophyte-dominated and cyanobacteria-dominated states, this study investigates the temporal and spatial dynamics of alternative stable states in Rybník Rod. Weekly mapping of percent macrophyte ground cover, chlorophyll, and cyanobacteria distribution provides insights into the spatial heterogeneity and regime shifts within the lake. Macrophyte cover peaked on July 8 before declining sharply, while cyanobacteria and chlorophyll concentrations followed an inverse pattern. Spatial analysis revealed distinct patches influenced by various external pressures, such as inflow from the adjacent Rybník Naděje and a bog-fed bay. Correlation analysis of environmental variables (cyanobacteria, chlorophyll, pH, dissolved oxygen, turbidity, etc.) between stations investigates the

internal mechanisms of each station. The results demonstrate the role of spatial feedback and external disturbances in driving regime shifts. They suggest that Rybník Rod may be transitioning between alternative stable states under the influence of these ecological pressures.

The Impact of Religious Upbringing on Sexuality

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Research indicates an association between human sexuality and religious upbringing. However, whether this impact is positive or negative remains unclear. Negative implications are most commonly observed when individuals, specifically those who identify as LGBTQ+, are involved in religious organizations that do not support the LGBTQ+ community (non-affirming religions). While much of the existing research has focused on LGBTQ+ populations, sexual minority groups and heterosexual individuals remain underrepresented. This study, therefore, aimed to examine the impact of religious upbringing on the sexuality of college students, analyzing data from both heterosexual and non-heterosexual students. Sexuality in this study was measured by sexual awareness. We hypothesized that non-heterosexual students would report higher levels of sexual awareness compared to heterosexual students, regardless of religious affiliation. Additionally, we anticipated that non-heterosexual students who were or are members of non-affirming religious organizations would report lower levels of sexual awareness compared to heterosexual students. To explore these hypotheses, UCCS students completed an online survey. A Univariate ANOVA, along with two Independent Samples T-tests, were conducted to analyze the data. All three statistical analyses yielded non-significant results, indicating no relationship between sexual awareness and affirming vs. non-affirming religious upbringing, even when accounting for the sexual orientation of participants. Data collection for this project is ongoing, with 29 participants currently.
Keywords: human sexuality, religiosity, religious upbringing, LGBTQ+

Neofascism and Religion in Italy

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During the last spring semester, I conducted a research study in Salerno, Italy as a part of CC's Intermediate Italian curriculum. Using the linguistic skills I developed, I was able to interview local Italians about a topic of my choosing. I chose to explore the political and contractual relationship between Pope Pius XII and Mussolini during WWII. The aftermath of this unprecedented collaboration revolutionized constituents' understandings of politics, religion, and the two in tandem in Italy. Because of the mere physical proximity of the Vatican City to Italy, there is a rich history of Catholicism's cultural, social, and political influence on Italy. During WWII, the partnership of Mussolini and Pope Pius XII allowed for the highly structured moral guardrails and demands of the Catholic religion to become deeply entrenched in Italian culture, politics, and legislation. After gathering qualitative data about sentiments towards Catholicism, fascism, and the intertwining of the two from local Italians, I was provided the knowledge base to transition into a more contemporary study of Italian politics. This summer, I worked with Dr. Amanda Minervini to explore what factors have allowed for a resurgence of fascism (i.e. "neo-fascism") in Italy, and the role religion has played in facilitating this resurgence.

A Constitutive Heterochromatic Region Shapes Genome Organization and Impacts Gene Expression in Neurospora crassa

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Background:
Organization of the eukaryotic genome is essential for proper function, including gene expression. In metazoans, chromatin loops and Topologically Associated Domains (TADs) organize genes into transcription factories, while chromosomes occupy nuclear territories in which silent heterochromatin is compartmentalized at the nuclear periphery and active euchromatin localizes to the nucleus center. A similar hierarchical organization occurs in the fungus *Neurospora crassa* where its seven chromosomes form a Rabl conformation typified by heterochromatic centromeres and telomeres independently clustering at the nuclear membrane, while interspersed heterochromatic loci aggregate across Megabases of linear genomic distance to loop chromatin in TAD-like structures. However, the role of individual heterochromatic loci in normal genome organization and function is unknown.
Results:

We examined the genome organization of a Neurospora strain harboring a 110.6 kilobase permanently silent constitutive heterochromatic region on the second chromosome in the Neurospora genome (Linkage Group [LG] II), which is marked by the histone post-translational modification H3K9me3 (the trimethylation of lysine 9 on histone H3). We found that the constitutive heterochromatin deletion alters local chromatin structure, the predicted three-dimensional chromosome conformation, and the expression of some genes, which are qualitatively repositioned into the nucleus center, while increasing Hi-C variability.

Conclusions:

Our work elucidates how an individual constitutive heterochromatic region impacts genome organization and function. Specifically, one silent region indirectly assists in the hierarchical folding of the entire Neurospora genome by aggregating into the "typical" heterochromatin bundle normally observed in wild type nuclei, which may promote normal gene expression by positioning euchromatin in the nucleus center.

Absorbed Attention Enhances Aesthetic Experiences: Testing a New Measure

Xinran Wang

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Vernon Lee (1913) offered a theory of psychological aesthetics which centered empathy, arguing that aesthetic experiences emerge from embodied engagement with objects. We developed the Aesthetic Attention Scale (AAS), a reliable state measure of absorbed aesthetic attention to capture Lee's phenomenological description of collaboration between experiencing subjects and aesthetic objects "meeting each other halfway," and tested its predictive validity in two online studies of participants' observations of abstract art photography. In Study1, we established construct validity of the AAS, which showed convergent validity with Openness to Experience and divergent validity with Need for Closure. The AAS predicted more positive and fewer negative aesthetic emotions, more feelings of interest, fulfillment, appreciation and profundity, more self-expansion, more enjoyment and better memory of the artworks. . In Study 2, we established that AAS is correlated with, yet distinct from, perceived effort, and replicated the findings of Study 1 regarding positive aesthetic emotions, evaluations and memory. We also found that while viewing artwork with structured guidance and reflecting on methods of viewing can make art appreciation more enjoyable, Lee's (1913) absorbed immersive attention, as measured by the AAS, enriches aesthetic experiences beyond pleasure.

Framing the Divide: Affective Polarization in the U.S. Through the Moral Foundations and Relational Frame Theory

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Political polarization in the United States has intensified due to ideological divisions and affective hostility toward political outgroups. This study tested whether a perspective-taking intervention, based on Moral Foundations Theory (MFT) and Relational Frame Theory (RFT), could reduce implicit and explicit affective polarization. Participants (N = 177) were randomly assigned to one of three conditions: high perspective-taking (reading a vignette and adopting an opposing-partisan perspective), moderate perspective-taking (reading the vignette only), or control (speculating on an outgroup member's views without the vignette). Implicit and explicit polarization were assessed using an Implicit Association Test (IAT) and the Affective Polarization Scale (APS), respectively. Results showed no significant effect of the intervention on polarization. However, political orientation influenced APS scores, with liberal participants exhibiting stronger explicit biases than conservatives. Additionally, political extremism predicted greater polarization and exaggerated perceptions of ideological extremity in others. These findings support RFT's explanation of entrenched cognitive associations, suggesting that polarized individuals construct rigid relational networks reinforcing partisan hostility.

The Relationship Between Nationalism and Heterosexism – A Deconstruction of the Denigration of the Feminine in Modern Politics

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This research explores the intersection of heterosexism and nationalism, arguing that heterosexist ideologies underpin and perpetuate patriarchal hierarchies that shape social, political, and cultural structures. For my Capstone Project, I will study pervasive traditionalism through the experience of subordination created by constructed notions of gender roles as well as their delegated privileges, oppressions, and "obligations". My hypothesis is that hierarchical traditionalism (often created by religion) and heterosexism as nationalism are inextricably related to the results of the 2024 election. Furthermore, I intend on extending the frequently neglected notion of "rape as

genocide” against women and feminized men to conceptualize why a man who was held civilly liable for rape was recently elected as our latest president—President Donald J. Trump.

Exploring Liquid Metal Electrode Identity Impact of ec-LLS Crystal Growth of Germanium

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Electrochemical liquid-liquid-solid (ec-LLS) metal crystal growth is a novel method for semiconductor synthesis. This method is promising as a greener way to produce semiconductors such as germanium, silicon, and gallium arsenide due to the lack of high temperatures. In this research, germanium crystals were synthesized using ec-LLS and characterized to expand the understanding of how the liquid-metal electrode identity impacts the crystal structure using gallium, gallium-indium eutectic, and Galinstan (gallium, indium, and tin). The process includes reducing germanium salt and dissolving the germanium into a liquid-metal electrode; then, as the electrode becomes super-saturated with germanium, germanium crystals grow through the surface. Conducted at both the bulk and micro-scale, the bulk-scale proved to have a less consistent liquid-electrode contact, but it is hoped more bulk cell designs will be tested in the future. SEM, EDS, Raman spectroscopy, and XRD were conducted to analyze the products. The micro-scale experiment using a thin liquid metal layer over an n-type Si (111) wafer provided proof of concept by SEM and EDS, showing nanowires, crystals, and germanium(0). The crystal structures were analyzed through XRD but had inconclusive results. In the future, it is hoped that more research will be conducted to further investigate the impact of liquid-metal electrode identity of crystallization as well as the impact of electrode pool size.

Feminism and Witchcraft- Resistance, Spirituality, and Power

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This research will examine the intersection of feminism and witchcraft as a global movement of resistance against patriarchal, colonial, and religious oppression. Across history, women and marginalized groups have used spiritual practices and esoteric knowledge as tools for empowerment and subversion. Contemporary feminist movements are increasingly reclaiming witchcraft and indigenous spiritualities

as a means of personal and political resistance. This paper will compare Western portrayals of witchcraft, historically associated with persecution, subjugation, and control, with the feminist reclamation of Brujería, Hoodoo, and Vodou, spiritual traditions that have long served as sources of power for women, particularly in Latin American and African diasporic communities. By analyzing these distinct yet interwoven traditions, this research will highlight how different cultural understandings of magic and spirituality shape feminist resistance, decolonial efforts, and alternative healing practices.

Stress and Well-Being at Colorado College: The Interplay of Identity and Autonomy

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Due to an increasing prevalence of mental health difficulties, research around the well-being of college students is critical (Saleh et al., 2017). This is particularly true for marginalized students who face unique stressors and are often disproportionately affected by mental health struggles. The current study utilized data from Morales (2023) to assess stress and the contributing factors of identity and autonomy. Stress and autonomy (i.e., attribution styles and sense of control) were assessed across levels of marginalization (i.e., non-marginalized, one marginalized identity, & multiple marginalized identities) as determined by self-reported demographic characteristics related to race/ethnicity, gender, and sexual orientation. Statistical analysis revealed that individuals with multiple marginalized identities reported significantly higher stress than both comparison groups. Multiply marginalized individuals also had a marginally more external attribution style for negative events compared to the other two levels of marginalization. No differences were found across levels of marginalization for positive event attribution styles and sense of control. Further analyses on demographic characteristics (i.e., race/ethnicity, gender, sexual orientation) were conducted to identify more specific identity differences in stress, attribution styles, and sense of control. Across all levels and types of marginalization, combined autonomy measures, particularly sense of control, significantly predicted stress levels. Overall, these findings reveal that both identity and autonomy are related to college stress levels, but autonomy does not appear to account for identity differences in stress at Colorado College.
Keywords: identity, marginalization, autonomy, stress, well-being

UCCS University of Colorado Colorado Springs

Undergraduate Research Academy

The Undergraduate Research Academy encourages students to expand their education beyond the classroom through participation in research and creative projects mentored by UCCS faculty. The Academy objective is to support collaborative efforts between the student and faculty member, where both members benefit from the experience. Academy students act as research assistants on meaningful projects identified by their faculty mentor. The faculty member is responsible for providing significant and meaningful guidance and mentorship. Through this opportunity, the student gains valuable experience, while being paid, and the faculty member's research program goals are furthered. Students may identify faculty mentors or vice versa.

As a high-impact practice, undergraduate research is an opportunity for students to explore their fields hands-on with the guidance of experienced faculty. Data from UCCS indicates that **students participating in the URA are four times as likely to attend graduate school and are 120% more likely to reach graduation**. It is evident that taking part in mentored undergraduate research experiences is valuable piece in enhancing student experience, retention, and success. The Center for Student Research encourages applications from interdisciplinary teams and diverse student and/or faculty mentors from all disciplines.

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