Saturday

April 25, 2026

9:00 am - 1:00 pm

*Over **100** talk and poster presentations*

The Colorado Springs Undergraduate Research Forum

22ND ANNUAL

CSURF

PIKES PEAK STATE COLLEGE

UCCS University of Colorado Colorado Springs

COLORADO COLLEGE

Hosted by Pikes Peak State College
Downtown Campus

The annual **Colorado Springs Undergraduate Research Forum (CSURF)** is a collaborative venture designed to highlight the accomplishments of undergraduate students in all academic disciplines from **Colorado College**, the **Pikes Peak State College,** and the **University of Colorado Colorado Springs.**
CSURF is always free and open to the public.

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Welcome to the Colorado Springs Undergraduate Research Forum
(CSURF)

CSURF is a collaborative venture designed to highlight the research and creative works of undergraduates from Colorado College (CC), Pikes Peak State College (PPSC), and the University of Colorado Colorado Springs (UCCS). Each year the conference rotates between these institutions.

We hope you find this book of abstracts helpful in planning your day.

2026 CSURF Planing Committee

Pikes Peak State College - *2026 Host Campus*

Glenn Rohlfing - Assoc. Professor, Arts Humanities and Social Studies Division
Chair of the History, Humanities, and Political Science Departments

Justin Burnette - Assoc. Professor, Arts Humanities and Social Studies Division
Co-Chair of the History, Humanities, and Political Science Departments

Colorado College

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University of Colorado Colorado Springs

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Michaela Steen - Director Visual Resource Center

Margie Oldham - Director Community Relations, College of Letters, Arts & Sciences

2026 Colorado Springs Undergraduate Research Forum (CSURF)

April 25, 2026

Host - Pikes Peak State College *(Downtown-100 W Pikes Peak Ave)*

8:15-9:00 am	**Check-In and Set Up - 1st Floor (Pikes Peak Ave. entrance)**			
Oral Presentations Rooms	**Room # s215**	**Room # s228**	**Room # s232**	**Room # s116**
Faculty Session Chairs	**TBD**	**TBD**	**TBD**	
Oral Session 1 9:00 - 10:20 am	**Plant-Fungal Symbiosis and Environmental Adaptation**	**Electrochemical Crystal Growth and Materials Science**	**Indigenous & Marginalized Cultural Identity**	**Poster Staging Room**
	Katzen, M.	**Bost, E**	**Axel, J.**	Drop off your poster HERE until your session begins
	Ollier, T.	**Willner, R.**	**Nagel, H.**	
	Hall, N. *(2)*	**Johnson, M.** *(Group)*	**Schramm, M.**	
	Hams, J.	**Snelling, J.**	**Vasquez, S.**	
9:15-10:15am	**Poster Session 1 - The Learning Commons**			
Oral Presentation Rooms	**Room # s215**	**Room # s228**	**Room # s232**	**Room s116**
Faculty Session Chairs	**TBD**	**TBD**	**TBD**	
Oral Session 2 10:30-11:50pm	**Neurological Systems, Addiction, and Modern Behavior**	**Gender, Power, and Systemic Control**	**Stress, Physiological Response, and Policy Impact**	**Poster Staging Room**
	Chapman, T.	**Ford, JD**	**Gonzalez Paris, V.**	Drop off your poster HERE until your session begins
	Hutchison, S.	**Hall, N.** *(1)*	**Wang, P.**	
	Davis, J.	**Schauer, T.**	**Griffin, L.**	
	Powell, L.	**Venzor, R.**		
11:45am-12:45pm	**Poster Session 2 - The Learning Commons**			

Oral Session 1
9:00 - 10:20 am

Plant-Fungal Symbiosis and Environmental Adaptation

Room s215

Electrochemical Crystal Growth and Materials Science

Room s228

Indigenous & Marginalized Cultural Identity

Room s232

REvaluating Horizontal Transmission of Endophytes During Plant Invasion in Tamarisk (Tamarix ramosissima) and Cottonwood (Populus deltoides)

Miles Katzen
Jesus Pena, Faculty Mentor
Colorado College

Fungal endophytes are a paraphyletic group broadly classified as living within plants and not producing negative symptoms in their plant hosts. To date, all plants which have been assayed have displayed some endophytic associations, and some plant species can have up to 100 unique endophyte species. These endophytes are crucial to host plant fitness; fungal production of secondary metabolites has been shown to help host plants with functions such as growth promotion, environmental stress mitigation, protection from bacteria, insects, other fungi, nematodes, and even larger herbivores. In some plant invasions, the invader can give and receive endophytes both horizontally – from conspecific and heterospecific leaf litter – and vertically – from parent plants. My thesis investigates horizontal transmission of endophytes in the invasion of Tamarix ramosissima into riparian ecosystems in the American southwest. Over the last ~200 years, T. ramosissima has replaced cottonwoods (Populus) and willows (Salix) as the dominant species in these southwestern riparian zones. While the relationships of root-associated fungi of Populus deltoides and T. ramosissima have been documented, their relationships with foliar endophytes remained a gap in the literature. Through culture-based isolation of foliar endophyte communities in T. ramosissima and P. deltoides in the Colorado Springs area, we sequenced 62 fungal isolates, representing 29 unique fungal species, two of which – Aureobasidium pullulans and Teunia korlaensis – appear in both T. ramosissima and P. deltoides. Both A. pullulans and T. korlaensis have been linked to increased drought tolerance in host plant species, though T. korlaensis has shown limited halophyticity in culture-based studies. Further, Naganishia albida, isolated in P. deltoides, has also been isolated in the native range of T. ramosissima, and has demonstrated halophyticity in culture-based studies. This could indicate a potential horizontal transfer of endophytes between P. deltoides and T. ramosissima.

Testing the Drought Tolerance Capabilities of Fungal Endophytes in Corn

Theodore Ollier
Jesus Pena, Faculty Mentor
Colorado College

Fungal endophytes are an understudied group of fungi that exist in all land plants, primarily as mutualists. Though endophytes have not gotten anywhere near the recognition that mycorrhizal fungi have for their symbiotic capabilities, they have significant potential in agriculture and medicine. Endophytes have a plethora of effects on their host plants, with the ability to reduce fungal pathogen infection, promote plant growth, and reduce the effects of abiotic stressors. As many parts of the world are experiencing reduced water availability, reducing the water needs of agricultural crops will be crucial. We hope to test the capacity of arid-adapted endophytes to convey drought stress resistance in a maize, a model crop. First, this study characterizes the above and below-ground endophytic communities of three desert-adapted, native Colorado plants: C. imbricatus, O. polyacantha, and Y. glauca. DNA sequences were obtained from the plants sampled in June 2025 using the internal transcribed spacer region (ITS) and large subunit (LSU) of fungal ribosomal DNA (rDNA) with fungal-specific primers. After identifying the plants' endophytic counterparts, a fungal inoculant was created to test ability of the endophytes to confer drought tolerance to Zea mays. The effect of drought on chlorophyll content depended on endophyte status, but there were no significant morphological differences between drought-affected plants with and without endophytes.

Medical and Ritualistic uses of Ethnobotany

Natalie Hall
Sandi Harvey, Faculty Mentor
Pikes Peak State College

Ethnobotany and ethnomedicine have been an important part of different cultures for centuries. In multiple cultures, plants play a significant role in daily life. (Turner 1988) This essay explores the different ways that western society has created taboos and bias's around traditional ethnobotany. The opposing viewpoints included in this essay are, the importance of classifying traditional plants in order to obtain a better understanding of their important aspects, and explore the dangers that western societies view on traditional medicine and ethnobotany poses for these cultures. Not only has western society created a taboo effect around ethnomedicine in different cultures, but they have also disregarded the importance of these plants in other realms of use.

Rodingites as Recorders of Fluid–Rock Interaction: Mineral Geochemistry and Titanite U–Pb Ages from the Dun Mountain Ophiolite, New Zealand

Jake Hams
Michelle Gevedon, Faculty Mentor
Colorado College

Rodingites represent metasomatic interaction of mafic protoliths with high-pH, Ca-rich fluids occurring alongside serpentinization, and contain petrogenetic indicator minerals useful for determining the conditions and timing of metasomatism. The Dun Mountain Ophiolite (DMO) of Aotearoa/ New Zealand is hypothesized to represent forearc lithosphere within a supra-subduction zone formed between ca. 278 to 268 Ma [1]. In the Whakatū/ Nelson region, rodingite dikes cross-cut the serpentinized peridotites of the DMO lower crustal and mantle sections and provide opportunity to constrain the timing, fluid sources, and tectonic setting of rodingite formation, and by proxy, serpentinization. Petrography, whole rock and mineral geochemistry, LA-ICP-MS U-Pb ages of rodingite-hosted titanite, and rodingite mineral geochemistry (EMPA) determine (1) stages of progressive rodingitization, (2) sources and fluid-rock ratios of metasomatizing fluids, and (3) the timing of metasomatism in the DMO and associated mélanges. Petrographic and in-situ EPMA analyses show dominant mineralogies vary from early-stage grossular and pyroxene to late-stage vesuvianite, suggesting varying degrees of rodingitization across the region. In-situ titanite U-Pb analyses yield complex ages with individual samples seemingly preserving multiple stages of titanite formation, with general age populations of ca. 270 Ma, ca. 244 Ma, and ca. 217 Ma emerging. These data may indicate multiple metasomatic events that post-date the DMO's interpreted Permian formation and pre-date the ca. 173 Ma minimum age of obduction determined to the south [2], and are consistent with tectonic models that propose oblique obduction initiated in the northern DMO and continued southward [3]. [1] Jugum, D., et al. (2019) Geological Society London, Memoirs 49, 75-92. [2] Palmer, M.C. et al. (2023), Earth and Planetary Science Letters 614, 1-11. [3] Robertson, A.H.F., et al. (2019) Geological Society London, Memoirs 49, 331–372 .

Bipolar Electrochemical Liquid-Liquid-Solid Crystal (BP-ec-LLS) Growth of Crystalline Germanium

Ethan Bost
Eli Fahrenkrug, Faculty Mentor
Colorado College

Semiconductor synthesis methods are often costly and energy-intensive Electrochemical liquid-liquid-solid crystal growth (ec-LLS) is an alternative semiconductor synthesis method developed through a combination of electrodeposition and metallic solution growth. ec-LLS provides a low temperature, more energy efficient method for the production of single crystal semiconductors, however it is limited in scalability due to the need for electrical contact during synthesis. This research presents the novel combination of ec-LLS with bipolar electrochemistry (BPE), in which a liquid metal bipolar electrode is subject to an electric field that drives the electrochemical component of the process without the need for electrical contact. This method provides a pathway for scaling the ec-LLS synthesis process, allowing for greater exploration of the technique at bulk scales as well as more flexible reactions setups for alternative solutions.

Bipolar Adaptation of Electrochemical Liquid-Liquid-Solid Crystal Growth

Rebecca Willner
Eli Fahrenkrug, Faculty Mentor
Colorado College

Electrochemical liquid-liquid-solid (ec-LLS) crystal growth is a novel low-temperature method for the synthesis of covalent Group IV and III-V semiconductor materials. The process starts with the electrochemical reduction of fully oxidized aqueous precursors like GeO2 at the surface of a low-melting-temperature liquid metal like gallium (Ga). The reduced Ge0 dissolves into the Ga(l) electrode until reaching supersaturation, which triggers the continuous extrusion of Ge crystals from the electrode surface. The target of this work was to systematically probe ec-LLS with a bipolar electrochemistry (BPE) setup to explore the impacts of surface energy, diffusion field geometry, and bipolar polarization on crystal structure, nucleation, and extrusion pathways. This presentation will highlight the determination of appropriate electrolyte concentrations, sacrificial reductant, and electrochemical potential for BP-ec-LLS to take place. It will then present structural, morphological, and compositional characterization of Ge crystals synthesized by BPE ec-LLS using Raman spectroscopy, electron microscopy, energy dispersive spectroscopy, and powder X-ray diffraction. Finally, the adaptation to micro-scale electrode droplets will be described for the continuation of this research to provide further understanding of liquid metal solvent electrode capabilities for large-scale volumetric production of covalent semiconductor crystals.

Improving Library-Loading Performance with RTLD-Audit

Madeleine Johnson and Kylie Bogar
Danielle Ellsworth, Faculty Mentor
Colorado College

Spindle allows supercomputers, such as Lawrence Livermore National Laboratory's El Capitan, to more efficiently load libraries by distributing library pathways to computer nodes from a singular process afterwards rather than each node individually searching for the pathway by using the RTLD-AuditAPI to inject the proper path. Because RTLD-Audit can be difficult to use and has many known bugs, we created our library API, LibAudacious, to make it more user-friendly and to eventually help organize the Spindle structure. In our API, we wanted to have the ability to wrap functions, block/allow libraries etc. We hope our work will be implemented intoSpindle. For this project, we tested different uses of the RTLD-Audit and the problems that can arise from its use. This included finding uses of the RTLD-Audit library in Spindle as well as creating an API that allowed us to explore the usability of different RTLD-Audit capabilities in our own user-friendly library.

Rank Drops of Third Order Recurrence Matrices

Julia Snelling
Jane McDougall, Faculty Mentor
Colorado College

Our work focuses on the discovery of the seed rank drops of third order recurrence matrices. Previous work has been done on the ranks of recurrence matrices, with the work on seed rank drops of second order recurrence matrices being our main inspiration. There are several ways in which rank drops can arise, including width rank drops and seed rank drops. We present a new method (or one that seems to be previously unexplored), from which we can describe seed rank drops and how they arise for order three recurrence matrices. Using the second order recurrence rank drop method and applying it to third order recurrences, we found that given a particular recurrence, relationships between chosen seed values would provide a rank drop from rank 3 to rank 2. By rewriting the terms of the recurrence sequence using their seeds, certain coefficient combinations, and row reducing, we find that there exist seeds for each unique recurrence that create a rank of 2 regardless of matrix size (greater than or the same as a 3 by 3). The implications of this research add to past papers and provide exceptions to their work regarding other characteristics of the recurrence matrix.

Cultural Narratives and Remembered Histories: Nineteenth- and Twentieth-Century Kiowa Horse Art

Jo Axel
Thomas Andrews, Faculty Mentor
CU Boulder

A careful examination of Kiowa horse art from the nineteenth and twentieth centuries reveals the cultural dialogue between generations of Kiowa people and the continuous negotiation of Kiowa identity subject to the constraints of a dominant American society. After establishing the significant role of horses in traditional Kiowa society, a comparative analysis is made of yearly calendars, ledger art, and twentieth-century professional art to trace the horse as a subject through one hundred years of Indigenous resistance and forced acculturation. Multiple examples of each art type as well as commentary from Kiowa individuals and secondary sources are taken together to create a comprehensive picture. The chronological approach to horse art joins together several existing avenues of study, including the anthropological assessment of Kiowa art, the historical assessment of horses' cultural relevance, and the art historical assessment of Kiowa art from specific time periods. This research demonstrates both the utility of art as a primary source and the possibilities of comparative chronological analysis for outlining cultural shifts and identity negotiation of marginalized groups.

Freedom or a Gilded Cage:
Women's Personal Autonomy in Relation to The Nationhood of Ireland

Hailey Nagel
Andrew Detch, Faculty Mentor
CU Boulder

This presentation seeks to examine the symbolic fabrication of Irish womanhood through the lens of the patriotic song Roisin Dubh and explore how women from the eighteenth century through the late twentieth century confronted and were pressured by these metaphorical ideals. By analyzing Eilis Kiely's sociological study of pre-baby boom Irish women and second wave feminism, Laura Lyon's analysis of 1980 Armagh Prison protest, and Eibhear Cullingford's exploration of Sinead O'Connor work, this presentation exhibits how the figurative woman of Roisin Dubh directly contrasts the true lived experiences of Irish women. The song highlights Ireland as a beautiful yet floundering woman who is voiceless and in need of a male savior, which is a clear reference to Catholic ideologies of domesticity, silence and purity. The song additionally shows a subtle form of resistance by preserving Irish identity, language, and nationalist attitude under British colonial coercion. Through incorporating religious, cultural and historical contexts, this presentation asserts that unregulated gender imbalances have historically restricted women's personal autonomy and altered Irish national identity, displaying that the vulnerabilities of the Irish state are entangled in the structural marginalization of women.

Church Control over Denmark and the Northern Crusades: The Chronicle of Roskilde

Mitchell Schramm
Glenn Rolfing, Faculty Mentor
Pikes Peak State College

Beginning in the 11th century, the Catholic Church Needed to get a better hold over itself and to control Catholic kingdoms. This was especially true from the perspectives of the Lay-Investiture controversy, whereby the king or nobles would have more influence over the church than the Church itself. Denmark was the most interesting of these cases, because of their Viking heritage. Danish culture was much more common-man oriented, meaning that when the church was integrated into their culture, the local people would be allowed to elect the clergy. The Church didn't like this and demonized any of their kings who would not follow their dogma. My Paper argues that The Chronicle of Roskilde is therefore one of the most important documents in the relationship between the Church and Denmark, because it is the first written historical account of Denmark in Latin, the language of the Church. It speaks of the most important aspects of the Danish civil war and how the church influenced it by influencing the local population to go against a king when he stepped out of line. Three kings, throughout the Chronicle, are killed by peasants. The Chronicle is most certainly describing its soft power by alluding to the soft power of the Catholic clergy, as being men of God who are responsible for the influence of the moral character of the kingdom. While the Chronicle stops at the civil war, the story continues with the Wendish Crusades right after. The Catholic Church, being the main driving force, encouraged the Danes to remember their Viking heritage to fight a holy war against the Pagan Wends. The Church could make this direction, by guilting the Danish, using their Pagan past against the Christians to right wrongs, and also because the Wends raided the Danes during their civil war. The Same case can be said of the Livonian Crusade.

El Análisis del Ensayo: "La Representación de la Dimensión Fronteriza en Mezquite Road" de José Juan Zárate Campos

Savannah Vasquez
Edgar Cota-Torres, Faculty Mentor
University of Colorado Colorado Springs

This study investigates the representation of the Baja Californian crime genre in Mezquite Road by Gabriel Trujillo Muñoz. The emotional impact, corruption, and polarization within the system of oppression beyond Mexico's border showcases grief and loss. Difficult themes of colonization and historical differences that continually impact the Mexican nation create ties to an intelligent plotline with inquisitive clues, drug trafficking, and unsolved mysteries. Miguel Ángel Morgado, the protagonist, and Atanasio, his brother, carry perceptions to support the challenges they face in their community. This presentation is entirely in Spanish, while there is a conversation surrounding multicultural identities and challenges in struggling communities along the border. Aspects of the environment, income levels, and the government downfall create problems found in the investigation of essential characters. This remarkable tale shows stories not of struggle alone, but of strength and resilience.

Poster Session 1
9:15-10:15 am

The Learning Commons
1st Floor

Topographic Influence on Wind and Temperature Patterns: A Comparative Study of Molas Pass and the Animas Valley

Lina Arista
Brandon Vogt, Faculty Mentor
University of Colorado Colorado Springs

Understanding microscale variations in wind and temperature regimes benefits the forecasting of avalanche cycles, mountain weather, and temperature inversions. This study investigates the influence of local topography on microclimates through a comparative analysis of two types of landforms: a high mountain pass (Molas Pass) and an open valley floor (Animas Valley) in the San Juan Mountains of Southwest Colorado.

From January 13 3:00 PM MST to January 16 12:30 PM MST 2026, wind and temperature data were continuously collected from anemometers and temperature data loggers placed at Molas Pass (10,920 ft), a high-altitude pass largely disconnected from the influence of topographic features, and the Animas Valley (9,670 ft), a broad valley bound by mountains and heavily influenced by diurnal thermal cycles and mechanical forcing of air from surrounding terrain features. A direct comparison of time-series data was conducted to identify and evaluate differences in wind direction, gusts, average speed, and temperature.

The results reveal key differences between the locations. Molas Pass consistently experienced temperatures of 0 °C, significantly higher speeds and more extreme gusts of 40 mph from the opposite direction, a characteristic of wind turbulence induced from the friction of the surrounding mountainous terrain. Animas Valley experienced wind speeds of under 15 mph with much weaker gusts and dramatic temperature changes. These differences are due to geographic variations: strong topographic acceleration, increasing wind speeds at the exposed pass, significant sheltering provided by the valley terrain, and eddies induced by very small terrain features.

In summary, analyzing data from different landform types is essential for better understanding micro scale meteorological processes in complex terrain. By comparing wind and temperature regimes at Molas Pass and the Animas Valley, we confirm that topography dictates wind and temperature.

Assessment of Dynamic Light Scattering for Detecting Galectin-3 Interactions with GM1-Enriched Liposomes

Elizabeth Beal
Crystal Vander Zanden, Faculty Mentor
University of Colorado Colorado Springs

Galectin-3 (Gal-3) is a protein that is a part of the β-galactoside binding lectin family. Gal-3 is a chimera type of galectin that allows it to form oligomers which is essential for adhesion and many other cellular processes, including membrane organization and signaling. This study aimed to develop a dynamic light scattering (DLS)-based assay to distinguish the binding behavior of Gal-3 to specific glycolipid ligands. The focus for this study was on liposomes containing GM1, which is a key glycosphingolipid in the outer membrane of cells that allows gal-3 to bind and start to cluster. Liposomes were prepared with and without GM1 to measure whether Gal-3 binding would induce measurable changes in particle size, reflecting crosslinking or aggregation. DLS was employed to monitor changes in liposome hydrodynamic diameter following the addition of Gal-3. Two types of DLS measurements were performed, measuring the light scattering in front of the beam to better detect larger particles. Side scatter intensity measurements revealed a broader range of liposome sizes present after addition of Gal-3, which may suggest Gal-3 binding to the liposome surface. Forward scatter measurements indicated an increase in particle size, which may align with Gal-3 clustering multiple liposomes together. Future experiments will include additional control measurements, and a range of Gal-3 and ligand concentrations to develop a better understanding of the system. These findings highlight the importance of robust controls and suggest that complementary techniques and assay optimization will be helpful to reliably detect Gal-3 glycolipid interactions. Overall, this work is helping to build tools to understand galectin interactions with glycosylated molecules that are important for cell signaling events.

Optimization of boride reduction of 3,5-disubstituted isoxazoles

Nicole Beitle
Allen Schoffstall, Faculty Mentor
University of Colorado Colorado Springs

A one-pot procedure for the preparation of 3,5-disubstituted isoxazoles was utilized. This reaction involved cycloaddition of hydroximinoyl chlorides with acetylenes in the presence of base to form isoxazoles. Two novel isoxazoles were synthesized by this method. The reduction of simple isoxazoles was tested through a transfer hydrogenation method. Transfer hydrogenation utilized hydrazobenzene in the presence of a copper on iron catalyst. This reaction is being optimized to perform the reductive ring opening of isoxazoles to enaminones. Experimentation showed that the excess hydrazobenzene over reduced the ketone to an alcohol instead of the desired enaminone. This reaction is being optimized with different solvents, molar equivalents, and transfer hydrogenation reagents. The research finds the reduction of 3-(5-subsituted) isoxazole(s)has not produced good yields of enaminones by transfer hydrogenation, or iron-mediated ring opening.

Elucidating Effects of Directed Evolution on Catalytic Ability of Kemp Eliminase Enzymes

Nick Brancieri
Amanda Morgenstern, Faculty Mentor
University of Colorado Colorado Springs

Nature has provided enzymes that act as extremely efficient catalysts to reactions occurring every second in our own bodies. Humans have attempted to create new enzymes or modify existing enzymes using computational methods. However, synthesized enzymes are typically much less efficient than naturally occurring enzymes. Today, directed evolution (DE) assisted by computational methods is the standard for the development of novel enzymes. However, DE is an extremely time-consuming process and the size of enzymatic systems limit the usefulness of current quantum mechanical computational methods, which are the most accurate. The goal of this project is to understand what is occurring during DE to improve catalytic activity. Specifically, we strive to understand how DE alters the enzyme active site's electrostatic environment in Kemp Eliminase. Kemp Eliminase is a novel enzyme that has been extensively studied, making it the perfect system to examine. Kemp Eliminase has been subjected to DE by other research groups and the novel enzymes created through this process have been computationally modeled using classical molecular dynamics (MD) simulations. We aim to apply quantum mechanical methods to create more accurate models of the active sites from these MD simulations. The quantum mechanical data obtained can then be studied to determine how molecular orbital energy, system energy, and electron charge density change throughout the iterations of DE. In the future, these methods can be applied to other enzymatic systems and used to improve the process of enzyme design.

Developing a Nonlinear Minimizer for Artificial Spin Ice

Hayden Braun
Ezio Iacocca, Faculty Mentor
University of Colorado Colorado Springs

Developing a Nonlinear Minimizer for Artificial Spin Ice Artificial spin ices (ASIs) are arrays of nanoscale magnets whose collective behavior models frustrated systems, making them useful for understanding emergent phenomena such as magnetic monopole-like excitations and for potential applications in information storage and computation. Predicting their magnetization configurations requires solving the Landau-Lifshitz equation, which governs the evolution of the magnetization vector under effective magnetic fields. This project develops GæniceN a nonlinear minimizer, to compute self-consistent magnetization states. Using MATLAB, the project implements local interactions, including exchange, anisotropy, external fields, and long-range dipolar couplings. Periodic boundary conditions emulate infinite lattices, allowing the study of both finite and repeating structures. Preliminary results demonstrate the construction of 2D lattices, initialization of their magnetization, and integration to the original Gænice eigenvalue solver. This approach lays the foundation for fully nonlinear solvers in ASIs that can help in the development of information, communications, and microwave devices.

Investigating the Multifactorial Localization of Np_F3829

Grant Capen
Doug Risser, Faculty Mentor
University of Colorado Colorado Springs

Nostoc punctiforme is a filamentous cyanobacterium capable of nitrogen-fixation with the ability to differentiate into specialized filaments, called hormogonia, which allow for motility across surfaces. This enables N. punctiforme to reach optimal light for photosynthesis and establish symbiotic relationships with plants involving nitrogen-fixation. Motility is powered by type IV pili (T4P) and the activity of the motors is regulated by HmpF, which associates with and activates the T4P motors on one side of the cell to establish directional motility. Unipolar localization of HmpF is regulated by the Hmp bacterial chemotaxis-like system, but the exact mechanism of this control is currently undefined. Previous studies posited that Np_F3829 was essential for T4P pilus extension which consequently hindered motility in N. punctiforme. Initial protein-protein interaction and localization studies indicated that Np_F3829 interacts directly with T4P motors and has a direct effect on the localization of HmpF. These results lead us to the hypothesis that Np_F3829 is part of the Hmp chemotaxis system with localization being stabilized by interactions with motor-associated proteins. To support this hypothesis, deletion strains of various motor and Hmp system genes were created in an Np_F3829-GFP fusion background to determine how the loss of these proteins might affect the localization of Np_F3829. The results of these experiments imply that the localization of Np_F3829 is not stabilized by any single protein and is likely to instead be stabilized by interactions with multiple proteins in the T4P motors and the Hmp complex.

The Development of Resilience in Young Children: Evaluating the Role of Early Self-Concept and Emotional Regulation

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

Resilience (i.e., the processes that promote and protect positive adaptation in the face of adversity), is a particularly important factor for understanding early developmental trajectories (Zolkoski et al., 2012). In particular, resilience has been shown to protect against negative outcomes such as psychopathology (Fredrickson et al., 2003), and high resilience is associated with emotional recovery following adverse experiences (Waugh et al., 2008). At the same time, one's self-concept (i.e., perceptions of self and competence in activities), shows similar protective effects (Coplan, 2004; Martins, 2016). Rutter (1987) proposed the challenge model of resilience, which explains that when exposed to mild adversity, individuals are better able to overcome subsequent exposure to adversity. Conversely, adversity exposure has been shown to undermine self-concept development, though most examinations have only examined associations between high versus no adversity exposure in older children. Therefore, the exact relationship between the severity of adversity exposure, self-concept, and resilience is not well understood, especially in young children. Further, children's emotion regulation abilities, or their ability to manage and control their emotions, may also be important in understanding the development of resilience and self-concept in early childhood, particularly in the context of adversity (Collie et al., 2024; Liem, 2022). Therefore, the current study will harness an ongoing sample of young children to evaluate whether children's adversity and emotion regulation independently and interactively predict self-concept and resilience. Our proposed project will utilize an ongoing longitudinal study of 200 parent-child dyads to examine the associations between children's adversity exposure, self-concept, emotion regulation, and resilience. To evaluate our primary question, we will conduct moderation analyses to explore the direct and interactive effects of adversity and their emotion regulation on their self-concept and resilience outcomes.

Examining MicroRNA miR-184 and the Role of Ion Binding in Cancers

Torah Delaney
Neena Grover, Faculty Mentor
Colorado College

MicroRNAs (miRNA) are non-coding RNA that regulate gene expression via binding to the mRNA. miRNA-184 is a microRNA linked to cancer suppression and regulation. Induction of miR-184 has been linked to calcium-dependent pathways in skin cancer. Mutations in the miR-184 gene are also connected to the syndrome of epithelial dystrophy, iris hypoplasia, congenital cataract, and stromal lining (EDCIT) and various forms of epithelial dysregulation in the eye. Here, we investigate the thermodynamics of miR-184 binding to its target mRNA in the presence of calcium or magnesium ions. DNA and RNA constructs that mimic miR-184 binding to mRNA were designed and examined in 10 mM MgCl2 or 10 mM CaCl2 in pH 5 and pH 7 buffers. Modifications in miR-184 or mRNA were also designed and compared to the native constructs. Thermodynamic parameters were measured using Isothermal Titration Calorimetry (ITC) and thermal denaturation. Circular dichroism experiments show double helical signatures in all conditions tested. Thermodynamic parameters will be compared for native and modified constructs in both DNA and RNA constructs. DNA and RNA containing modifications show differences in different ionic conditions, this data will be presented.

Quantitation of Benzoic Acid in Shilajit via High Performance Liquid Chromatography

Steve Duncan and Nick Brancieri
Shelby Noland, Faculty Mentor
University of Colorado Colorado Springs

Shilajit is a resin found primarily in Himalayan rocks formed over centuries by decomposing plant matter. It is a complex mixture of phenolic compounds that is believed to have rejuvenating properties in Eastern medicine. This project aims to separate the compounds in shilajit using high performance liquid chromatography (HPLC) with a gradient elution, identify the peak that corresponds to benzoic acid, and quantitate the amount of benzoic acid present using a standard addition method.

Aesthetics and Athletics: An Arts Intervention for Female Youth Volleyball Players

Nyah Flores
Tomi-Ann Roberts, Faculty Mentor
Colorado College

For female athletes today, who participate in aesthetic sports social media engagement has been shown to have detrimental effects on their body image. This study implemented a quasi-experimental, pre-post, and mixed methods designed to assess the impact of participation in creative activities that reframe aesthetic attention on young female athletes' perception of their performance and themselves. 37 female identifying participants completed online surveys, prior to and after attending college volleyball prospect camps. Notably, 31 of the participants reported posting on social media such as instagram regularly for the purpose of being recruited by colleges. The intervention group at Colorado College (n=20) experienced workshops in Mark Making, Visual Thinking Strategies, and Body Mapping between sessions of the volleyball camp, while the control group at University of California Santa Cruz (n=17) experienced volleyball camp without the creativity activities intervention. We found a significant decrease in sports-related performance anxiety over the course of the volleyball sessions for the intervention group compared to the control group. As well, we found a significant interaction between camp groups and changes in Creative self-perception from Time 1 to Time 2, with girls in the intervention group showing significant increases versus significant decreases for the control group. Girls at both camps showed a decrease in body surveillance from pre to post, with a greater reduction in body surveillance for the intervention group. Participants in the intervention group reported enjoying the creative aesthetic activities and perceived them as helpful to their athletic experience. Qualitative data revealed many participants experienced a change in perspective or learned a new strategy to manage struggles in their athletic journeys through the activities. Overall, this study provides support for the implementation of arts and aesthetics based activities to help improve athletic experiences for girls and young women.

Omar Gomez Rodriguez Extraction of Insecticidal Phytochemicals from Silphium Integrifolium

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Silphium integrifolium, a perennial plant native to North America with known ties to traditional medicine, has been a plant of interest due to its insecticidal potential. Working with The Land Institute (Salina, Kansas), this study aims to confirm and isolate bioactive compounds previously identified, A-pinene, D-limonene, Germacrene D, Neophytadiene, and Phytol, while optimizing the pressure parameters of supercritical CO2 extraction. Due to plant material limitations, white sage (Salvia apiana) was used to test extraction conditions, as it also contains insecticidal compounds. The pressure ranges for extractions were from 1500 to 4000 PSI. GC-MS analysis revealed that the best extraction of bioactive compounds was in the 1500 to 1950 PSI range, as this yielded small molecular weight bioactive compounds and less of the large molecular weight waxy compounds. In aged S. integrifolium samples, there were some bioactive compounds like Germacrene D, Neophytadiene, and Phytol, but they revealed losses likely due to volatilization over time. Findings suggest that supercritical CO2 extraction is a successful non-degradative method for extracting insecticidal compounds in both S. integrifolium and white sage. Cold Ethanol extraction also proved to extract similar compounds. Both methods of extractions, alongside different controls and treatment efficacies, were tested against Spodoptera frugiperda (fall armyworms). The bioassay showed that up to day 6, our extracts were competitive with the market available neem product.

The Narrative of [Sailor Name Here]: A South Sea Tragedy

River Hampton
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This poster investigates the historical document, The Narrative of the Honourable John Byron, and analyzes its influence on travel fiction and explores the subsequent effects of imperialism and tourism in the South Pacific Islands.

Gait and Force Production Changes After Fatigue in Elite Endurance Athletes

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Force production patterns, such as modified reactive strength index (mRSI) and lower-limb stiffness (LLS), are used to monitor fatigue in athletes. Fatigue monitoring is crucial for endurance athletes, but this technology has been sparsely explored in distance runners. Biomechanical differences between sexes in response to fatigue such as gait and force production patterns are not well understood.
PURPOSE: To compare gait and force production patterns due to fatigue between sexes.
METHODS: Participants ran six 3-minute repetitions at 5km race pace with 90 seconds of rest between repetitions, completing a maximum jump on the force plate between repetitions. Force metrics (mRSI and LLS) were calculated as percent change pre- to post-fatigue. The last 15-seconds of gait for each interval were analyzed using 2-D motion analysis. Unpaired t-tests were used to compare changes from pre- to post-fatigue between sexes.
RESULTS: There were no significant differences between sexes due to fatigue in mRSI (9.33 ± 9.40% and 12.97 ± 8.28, male and female respectively, p=0.425; n=7) or LLS (-4.95 ± 10.47% and -3.91 ± 13.08%, male and female respectively, p=0.842; n=7). Males demonstrated a significant increase in max hip flexion angle post-fatigue compared to females (4.06 ± 2.14% and -8.69 ± 3.55%, male and female respectively, p-0.0046:n=6). Males also trended towards a greater decrease in knee stance angle compared to females, but results were not significant (-3.45 ± 3.04%, and 1.47 ± 3.90%, male and female respectively, p=0.12; n=7).
CONCLUSION: Increased max hip flexion angle and trends toward decreased knee stance angle may indicate more overstriding in males after fatigue. Force plates may be better suited for assessing chronic fatigue patterns in distance athletes.

Kinetics and rate law analysis of malachite green with hydroxide compounds at various temperatures

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Malachite green is (1) a versatile dye for materials such as silk, leather, and paper, (2) pervasive in the production of printing inks, paints, and toners, and (3) used to treat fish infections. The textile industry is responsible for approximately 20% of global industrial water pollution. Manufacturing plants for paper, printing, and leather release significant amounts of malachite green. Although banned in the United States and other regions due to its carcinogenic and mutagenic properties, its affordability keeps it in use among private international farmers. This results in contaminated fish entering domestic markets through shipping cross-contamination, which ultimately introduces the toxin into American waterways.
Studying the kinetics of malachite green with different hydroxide compounds at various temperatures provides essential insight into the most efficient ways to destabilize its structure for water remediation, which can lead to cleaning the contaminated waterways. In this study, thirty-six reactions were performed using varying concentrations of malachite green, sodium hydroxide, and potassium hydroxide at multiple temperatures to establish a comprehensive range of rate laws and rate constants. Six rate laws were determined via the pseudo-rate law method by maintaining constant hydroxide concentrations. Determination of the malachite green reaction order facilitated a reverse analysis to calculate the true rate constants and the reaction orders for the hydroxide compounds.

Motor Control Asymmetry During Dynamic Knee Valgus in Female Athletes with Unilateral ACL Reconstruction

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BACKGROUND: Dynamic knee valgus during landing is an ACL injury risk factor, particularly in female athletes. ACL injury disrupts proprioceptive input and may drive central nervous system adaptations that impair neuromuscular control, increasing risk of re-injury. Despite return-to-sport criteria typically being met upon return to play post-reconstruction, deficits in landing mechanics often persist well beyond this window.
PURPOSE: To examine interlimb asymmetries in knee valgus angle and valgus excursion during single-leg drop landing in female athletes following unilateral ACL reconstruction.
METHODS: Eight female athletes with unilateral ACL reconstruction, ≥6 months post-operative, performed single-leg drop landings from a 40 cm box on both limbs. Frontal plane video was analyzed using 2D motion analysis to measure knee valgus at initial contact (IC) and maximum knee flexion (MKF). IC and MKF were used to determine knee valgus excursion (difference between IC to MKF) which was used for subsequent analysis. Paired t-tests were used to compare limbs, and Spearman rho correlations examined relationships between post-operative time and valgus excursion.
RESULTS: No significant differences in knee excursion were found between injured and uninjured limbs in valgus excursion (3.14±6.0 degrees and 1.7±10.90 degrees respectively, p=0.80). Correlations between post-operative time and valgus excursion were non-significant for both the injured (rho=0.26, p=0.53) and uninjured (rho=–0.62, p=0.10) limbs.
CONCLUSION: These findings suggest minimal interlimb asymmetry in landing mechanics following ACL reconstruction in this cohort. A moderate negative correlation between post-operative time and valgus excursion in the uninjured limb warrants further investigation. These preliminary findings establish a foundation for future research examining post-operative time as a factor in landing symmetry restoration. Future studies incorporating larger samples and 3D motion analysis may further elucidate interlimb differences following ACL reconstruction.

High Versus Low Experience: Foot Placement and Power Production in Rock Climbing

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Rock climbing is a complex full body sport that requires the transfer of force across joints through dynamic multi-planar movements. PURPOSE. The purpose of this study is to understand how foot placement affects power output in high (HX) and low (LX) experienced climbers.
METHODS. Climbers aged 18-24 were recruited for this study. Participants performed a powerslap move and completed three trials under two conditions: high-foot (HF) and low-foot (LF) placement.
RESULTS. In HF, HX produced significantly more absolute average power (AP) than LX (987.43±66.49 W, 737.77±43.17 W, HX and LX respectively, p=0.004). In LF, there was no significant difference in AP between HX and LX (896.11±63.56 W, 795.8±53.83 W, HX and LX respectively, p=0.239). In HF, HX produced significantly more AP than in LF, (987.43±66.49 W, 896.11±63.56 W, HF and LF respectively, p=0.005). There was no significant difference in AP in LX between conditions (737.77±43.17 W, 795.8±53.83 W, HF and LF respectively, p=0.069).
CONCLUSION. Patterns of absolute power production vary between high-experience and low-experience climbers. For low-experience climbers, foot
placement is not a necessary consideration.

Chemical Characterization and Fragrance Blending of Essential Oils from Monarda fistulosa, Salvia apiana, and Picea pungens for Cosmetic Applications

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This study focuses on identifying natural fragrances sources that have not been commercially available with a focus on the materials that are environmentally friendly and possess health benefits. Compared to synthetic odor compounds, plants that are extracted naturally to make their own odor are considered more environmentally sustainable, biodegradable, and appealing to consumers today who seek environmentally conscious alternatives (1). Monarda fistulosa (wild bergamot), Salvia apiana (white sage), and Picea pungens (blue spruce) represent three prominent species in the Southwest of the U.S. Many indigenous and ecologically significant plants from this region remain underexplored, however show potential as sustainable sources of natural fragrance (2,6). Characterizing their volatile compounds will allow identification of each plant's aromas for commercial applications (6). This study analyzes each plant's essential oil compositions using GC-MS to identify major volatile compounds for potential environmentally friendly and sustainable odor products (3,4). Furthermore, the formulated natural blend was incorporated into a moisturizer containing Silphium integrifolium (rosinweed) oil to evaluate its potential for use in cosmetic and personal care products.

Sleep Quality and Cognitive Function in Midlife and Older Adults in the ARC Study

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Sleep disturbances are highly prevalent in midlife, particularly among women navigating the menopausal transition, and have been linked to difficulties in attention, processing speed, and executive functioning. However, relatively few studies have examined these relationships in community-based samples including participants from multiple racial and ethnic groups. The present study draws from the Aging, Resilience, and Cognition (ARC) study to examine whether self-reported sleep quality is associated with cognitive performance among midlife and older adults. Sleep quality will be assessed using the Pittsburgh Sleep Quality Index (PSQI), and cognitive functioning will be measured online using TestMyBrain tasks assessing executive function, processing speed, and attention. Guided by prior work showing poorer sleep among midlife women than midlife men, we hypothesize that midlife women will report poorer sleep quality than midlife men and will perform more poorly on executive function and processing speed tasks. An exploratory aim will examine whether older women show relatively better cognitive performance than midlife women, consistent with possible stabilization of sleep patterns in later adulthood. Planned analyses include descriptive statistics, correlations, and group comparisons. A 2×2 analysis of variance will examine the effects of sex and age group on PSQI global scores, and independent-samples t tests will compare midlife women and midlife men on selected cognitive outcomes. Exploratory analyses will compare midlife and older women and examine associations between sleep quality and cognition. Findings may clarify how sleep quality relates to cognitive functioning across adulthood and inform future research on women's cognitive aging.

Assessment of Biofilm Inhibition by Andrographis paniculata Extracts by Using Green Tea as a Positive Control

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Biofilm formation plays a key role in developing oral cavities, making natural biofilm inhibition extract an important topic in dental research. In this study, the antibiofilm activity of Andrographis paniculata (A. paniculata) extract was evaluated by using a GFP from Acinetobacter baylyi model under succinate biofilm condition. Green tea extracts, which is known as an inhibitor of oral biofilms, showed strong and dose-dependent inhibition; high concentrations reduced ΔGFP to near zero while maintaining normal ABS600 growth, which confirmed the suppression of biofilms. In contrast, A. paniculata extract displayed inhibition only at the highest concentrations. Methanolic extract reduced ΔGFP to near zero (Sample A: 1; Sample B: -1) at 47 mg/mL while all lower concentrations produced ΔGFP value comparable to or higher than control. ANS600 increased normally across all concentrations over time, demonstrating normal cell growth. Post-wash GFP data further supported that only the highest concentrations reduced attached biofilm. Together, these findings show that while green tea extracts function as strong positive controls, A. paniculata demonstrated only limited antibiofilm ability limited to its highest concentration.

Developmental Synthesis of Fluorinated Amodiaquine Analog

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Recent data suggests that the fluorination of drugs offers significant benefits including improved drug efficacy, increased efficacy and enhanced metabolic stability. Fluorinated amodiaquine analogs offer a possible alternative antimalarial option to combat drug resistance. This study focuses on the developing synthesis of “CF2H” analogs of amodiaquine, beginning with the manipulation of ortho-para nitrobenzene starting materials, followed by the addition of the Mannich sidechain component. The methodology encompasses a multi-step synthesis process that includes the reduction of nitrobenzene, succeeded by a nucleophilic substitution reaction (SNAr). Furthermore, a multicomponent synthesis approach was investigated for the Mannich sidechain addition reaction. Synthesized analogs were subjected to purification and subsequent assessment of purity through column chromatography, nuclear magnetic resonance (NMR) spectroscopy, and liquid chromatography-mass spectrometry (LC-MS). Microwave-Assisted Organic Synthesis (MAOS) was employed to optimize product formation. One analog exhibiting 98% purity was successfully synthesized and is slated for rigorous testing to evaluate its antimalarial properties. Although the proposed synthetic routes necessitate further optimization, they have demonstrated success with specific starting materials and hold promise for the development of alternative malaria treatments.

Optimizing Lipid Bilayer Formation to Study Protein Interactions with Model Cell Membranes

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Cells are surrounded by a plasma membrane that filters cellular imports/exports and protects their contents. It is made of a phospholipid bilayer, which is organized into regions of condensed lipids (ordered domains) and fluid lipids (disordered domains). These domains are contingent on lipid properties such as melting temperature, tail length, and headgroup charge, and they are important in protein interactions at the cell surface. Supported lipid bilayers (SLB's) are phospholipid bilayers made from unilamellar vesicles and allow scientists to study protein interactions with a phospholipid bilayer mimicking different cell types. SLB's formation is also contingent on lipid properties. This project focuses on optimizing supported lipid bilayer formation for confocal microscopy. SLB's composed of 35% cholesterol, 25% 1,2-dioleoyl-sn-glycero-3-phosphocholine (DOPC), 20% 1-palmitoyl-2-oleoyl-sn-glycero-3-phosphocholine (POPC), and 20% sphingomyelin (SM) were visually evaluated with different lipid concentrations and temperatures. This lipid composition was chosen to mimic the outer layer of the phospholipid bilayer. Several fluorescently labeled lipid dyes were used to image the SLBs to assess the membrane quality as conditions were varied. Findings show that 30µL of 3mM lipid solution added to 70µL of a 10X concentrated saline solution, and an SLB incubation temperature of 55°C minimized unfused vesicles in images. With newly optimized SLB parameters, this project sets the foundation for studying surface protein interactions in a model membrane under different cell conditions.

Evaluation of Priorities: A Novel Eating Disorder Prevention Program to Reduce the Overevaluation of Weight and Shape in College Women

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Eating disorders are common and often go untreated, so there is value in prevention programs that can reach people before symptoms become severe. This pilot study evaluated Priorities, a workshop designed to reduce overvaluation of weight and shape by helping participants build a broader sense of self-worth beyond appearance. Twenty undergraduates (ages 18-23) at a liberal arts college completed a pre-post waitlist-controlled design (intervention n = 10; control n = 10). The intervention consisted of four one-hour sessions over two weeks plus reflection homework after each session. Participants completed self-report measures at baseline and after the final session, with the waitlist group assessed on the same timeline. Across measures, internal consistency was good to excellent. Mixed ANOVAs showed significant time x group interactions for three outcomes. Anorexia/dieting symptoms decreased in both groups, with a larger decrease in the intervention group. Negative emotions decreased in the intervention group but increased in the control group. Binge-eating scores increased in both groups, with a larger increase in the intervention group. No significant time x group interactions were found for shape/appearance concerns, self-perceived happiness, anxiety, depression, negative effects of social media, or basis of self-worth. Overall, the results show short-term shifts, but not always in the expected direction, underscoring the need for larger samples and follow-up assessments.

The Love Between You and Your Pet: Is it Mutual?

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This study examines whether individuals' beliefs about pets' capacity for affection, love, and emotional bonding are associated with perceived relationship quality with their own pet. Prior research suggests that many people demonstrate strong emotional investment in their pets, sometimes exceeding that of human relationships. Pets often occupy a central emotional role in their owners' lives, influencing personal priorities and decisions through the perceived reciprocity, emotional support, and fulfillment these relationships provide. This study will use a survey to explore how beliefs about pet capacity for reciprocal love relate to perceived pet-relationship quality. Specifically, the survey will begin with broadly worded questions assessing beliefs about domestic pets' emotional capacity for reciprocal love, followed by items that prompt participants to consider their personal pets. The primary measure will be the 5-item Belief About the Capability of Pets Loving Owners Back scale, which assesses human-animal reciprocal love. This scale will be compared to the scores of the eight-item Brief Lexington Attachment to Pets Scale (Brief-LAPS), which assesses human-animal attachment and perceptions of pets' emotional complexity. The study will survey 200 self-identified current pet owners. We hypothesize a positive correlation between attachment levels and beliefs about pets' emotional capacity. Findings from this study will be presented at the Colorado Springs Undergraduate Research Forum. This research contributes to the growing literature on lay beliefs about animal emotions, advancing understanding of how human perceptions of animal emotionality shape behavior, relationships, and attitudes toward animal welfare.

Reactions of Pentafluoropyridine Leading to the Synthesis of Triazoles

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Nucleophilic aromatic substitution reactions of pentafluoropyridine occur readily at the C4 position, resulting in the introduction of functional groups, such as azides. The reactivity of these functional groups can be utilized in the formation of various derivatives, including triazoles produced by click chemistry. Such molecules have pharmaceutical relevance, with the potential to undergo further substitutions for testing as P-38α inhibitors.

Exploring the role of male-derived, female-translated proteins (mdFTPs) on reproductive success in Drosophila arizonae.

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Successful reproduction in requires precise molecular interactions between males and females following copulation. To investigate the role of male-derived RNA transcripts that are translated by Drosophila arizonae females after mating (mdFTPs), we used CRISPR to generate knockout mutants lacking specific mdFTPs. This study focuses on a homozygous knockout line targeting the ARI26005 gene, which produces a non-functional protein. To explore the functional role of ARI26005, we will compare wild-type and knockout females and males through assays measuring insemination reaction mass size at 0 and 6 hours post-copulation, fecundity, and offspring viability. Together, these experiments aim to clarify how mdFTPs contribute to post-copulatory reproductive processes.

Investigating the Role of Np_F3829 in the Hmp Chemotaxis System

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Previous work indicated that Np_F3829 was essential for type IV pilus extension in hormogonia, and preliminary protein-protein interaction and localization studies implied that Np_F3829 interacts directly with type IV pilus motors. These results lead us to the hypothesis that Np_F3829 is part of the Hmp chemotaxis system, and that the phosphorylation state of Np_F3829 is responsible for the unipolar recruitment of HmpF to the type IV pilus motors. In this study, a series of bacterial two-hybrid assays were performed to identify protein-protein interactions between Np_F3829, T4P, and Hmp system proteins. Subsequently, GFP-fusion proteins were utilized to determine how Np_F3829 influences the localization of several T4P and Hmp proteins. The results of these experiments strongly support the hypothesis that Np_F3829 is responsible for the unipolar recruitment of HmpF to T4P motors on one side of the cell to facilitate directional movement.

QTAIM Analysis of Kemp Eliminase Active Site Cluster in Externally Applied Electric Fields

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Enzymes exhibit extraordinary catalytic efficiency, yet the fundamental origins of this proficiency remain incompletely understood. One prominent hypothesis attributes this behavior to the strength and orientation of electric fields within the enzyme active site. In this context, quantum mechanical methods provide a powerful framework for simulating enzymatic electric fields and probing both reactant and transition states in simplified, truncated models of enzyme active sites. In this study, a Kemp eliminase enzyme was investigated using an active site cluster model comprising the acetate moiety of the catalytically relevant aspartic acid residue and the substrate, benzisoxazole. Prior work suggests that optimal catalytic enhancement occurs when the enzyme-induced electric field is aligned along the hydrogen transfer coordinate. Accordingly, a uniform external electric field was applied along this axis at varying magnitudes to evaluate its effect on the reaction activation barrier. For each field strength, full transition state optimizations and intrinsic reaction coordinate calculations were performed. Subsequent analysis using the Quantum Theory of Atoms in Molecules (QTAIM) revealed key mechanistic insights. In QTAIM, for a ring opening reaction to occur, the ring critical point and bond critical point corresponding to the breaking bond must collide and annihilate each other. Based on this framework, it was hypothesized that the distance and charge density difference between these critical points could serve as predictors of activation energy. The results demonstrate positive linear correlations between both distance and charge density difference with activation energy, as well as with the applied electric field strength. Future work will account for enzymatic vibrational motion with vector tracking and expansion into other enzymatic systems looking for similar trends.

On the relationship between troubled sleep and its psychological sequelae in children and adolescents

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Successful reproduction requires complex protein interactions between males and females within the female reproductive tract, an environment that can impose significant stress and oxidative damage. Reproductive proteins must withstand this hazardous environment while maintaining their physiological function, a dynamic often driven by the sexual coevolution of cooperation and conflict. Previous research in our lab revealed that Drosophila arizonae males deliver RNA alongside ejaculate components to the female during mating. Subsequently, females translate these male-derived RNA into proteins, termed male-derived, female-translated proteins (mdFTPs). To characterize the 166 previously identified mdFTPs, we are utilizing CRISPR-Cas9 to generate germline knockouts and establish homozygous mutant lines. We hypothesize that mdFTPs are critical for reproduction and that their functional knockouts will reduce reproductive success. This study focuses on the gene ARI\00758, which encodes an mdFTP containing a conserved trypsin domain and is computationally predicted to function as a serine protease. To characterize the phenotypic impact of its loss of function, we conducted fecundity assays using two experimental crosses: knockout males mated with wild-type females, wild-type males mated with knockout females. Data from these assays demonstrates that both the male and female knockout crosses result in significantly lowered fecundity compared to wild-type cohorts.

Who benefits from marriage?
Gender differences in associations between marriage and well-being

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A well-established relationship exists between being married and higher levels of psychological well-being. Research regarding gender as a moderator in this relationship has mixed findings, but several studies suggest greater benefits of marriage for men than women. This study examined the relationship between marital status and well-being and the potential moderating effects of gender, marital beliefs, and marital risk using wave 3 of the Midlife in the United States survey. Participants (N = 3,294; 55% women; 67% married) ranged from ages 39 to 93 years (M = 63.6, SD = 11.4) and reported on their marital risk (i.e., perceptions that their marriage was at risk of ending) and marital beliefs (i.e., belief that people can be happy without marriage). Regression analyses found a significant moderating effect for gender but not for marital risk or beliefs after controlling for covariates. Individuals who were married ($b = 5.47$, $p < .001$) and identified as women ($b = 1.05$, $p = .008$) showed higher levels of well-being regardless of marital status while unmarried men reported lower well-being than married men. Findings support existing research on the moderating effect of gender and suggest the well-being benefits of marriage are greater for men than women.

Divine and Dangerous:
Women's Connection to Nature as Voice, Power, and Resistance

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Women writers portrayed nature as a source of voice and resistance, and this relationship historically led to punishment, silencing, or accusations of deviance such as witchcraft. Considering texts from multiple historical periods, this research will explore women's relation to nature and how it has functioned as a voice of authority, then turned into a perceived threat within patriarchal societies. This idea paved the way to historical moments such as the Salem witch trials. Women's relationship to earth and nature has been both empowering and criminalized. Many practices connected to healing, spirituality, intuition, and the natural world have historically been associated with femininity. However, they are also viewed as strange or dangerous and even threatening. This begs the question of whether women possessed forms of power and knowledge that did not fit the male dominated systems of control, not because they lacked power. Women were never silent, but restricted, therefore they found nature as a way to express authority. This research will explore if the witchcraft accusations, like in the Salem witch trials, were truly rooted in fear of women with power, knowledge or confidence as well as the connection to nature that was not easily understood. It is possible that this connection was reframed as dangerous to silence women as punishment. By examining these patterns and connections, this research argues that women's connection to nature has consistently functioned as a source of power, while also being interpreted as dangerous in order to control and silence women.

Reduction of pyrazine-containing heterocycles using NaBH4

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A series of substituted pyrazines and oxadiazolopyrazines was synthesized and reduced using sodium borohydride in ethanol. A similar series of novel 6,7-disubstituted quinoxalines was synthesized and reduced stereoselectively; however, this required a harsher reagent. conveniently, pyrazines were found to reduce only to their respective dihydropyrazine when using more than one equivalent of sodium borohydride.

How To Weaken the Arc Crust: Characterizing Fluid Sources and Budgets Using Triple Oxygen Isotopes in Tourmaline Across the Exhumed Brittle-Plastic Transition in the Atacama Fault System, Northern Chile

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Subduction zones provide opportunities to study the intersection of several different geologic processes and their impacts on one another. The sinistral intra-arc Atacama Fault System (AFS) in Northern Chile is a prime example of this phenomenon, where Mesozoic oblique subduction is responsible for extensive brittle and crystal-plastic deformation and metamorphism. This deformation is represented by ductile, mylonitic fabrics overprinted by brittle, cataclastic regimes and is preferentially located within the arc, accommodating the trench-parallel component of the oblique subduction. The fault system position raises the question of why motion is accommodated within the arc itself – why isn't this deformation located elsewhere in the continental margin framework? Previous studies hypothesize that as magmatic activity increases the arc's geothermal profile, it also weakens the arc crust. However, arc magmatism increases the contribution of crustal fluids, which may also preferentially weaken the crust allowing for localization of deformation and fluid flow. Tourmaline, known for its tremendous stability as a hydrous mineral, is extremely widespread throughout the region in both brittlely and ductiley deformed AFS rocks and is interpreted to formed during coeval fluid flux and deformation, and thus has likely captured the evolution and sources of regional crustal fluids. To identify fluid sources and fluid-rock ratios within the AFS, I will analyze triple oxygen and hydrogen isotope ratios within tourmaline samples from different crustal depths as exposed by the AFS. Triple oxygen isotope space will provide a delineation of fluid source compositions relative to protolith compositions, allowing the fluid-rock ratios of deformed samples to be identified. More traditional hydrogen isotope ratio analysis will provide additional verification of our fluid source results, accounting for the potential contribution of basinal brines. A comparison between fluid-rock ratios and the amount and style of deformation experienced will ultimately substantiate the influence of fluids in localized intra-arc deformation.

Hormonal Contraceptive Use and Dynamic Knee Valgus in Female Athletes After Unilateral ACL Reconstruction

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Noncontact anterior cruciate ligament (ACL) injuries disproportionately affect female athletes. Dynamic knee valgus (DKV) is a well-established biomechanical risk factor for ACL injury and is more pronounced during single-leg landing tasks, which replicates sport-specific loading and highlights limb asymmetries. Hormonal contraceptives (HC) may alter these patterns, modifying knee biomechanics and therefore ACL injury risk.

PURPOSE: To investigate differences in DKV during single-leg drop landings between female athletes not using and using HC following unilateral ACL reconstruction.

METHODS: Female collegiate athletes at least 6 months post-op unilateral ACL reconstruction performed three, single-leg drop landings per limb from a 40 cm box. The second trial was used for analysis. 2D motion analysis was used to analyze DKV at initial contact and maximum knee flexion. Participants reported the start date of their last menstrual cycle and HC use via intake questionnaire. A 2x2 mixed-design ANOVA was conducted using SPSS to examine our data.

RESULTS: We recruited eight (n = 8) female varsity, club, and recreational athletes. ANOVA results were not significant ($p = 0.824$). DKV at max knee flexion was not different between the injured knee and uninjured knee in either HC (8.2 ± 7.16° and 6.55 ± 16.25°; injured and uninjured respectively, $p = 0.893$) or non-HC groups (5.78 ± 9.02° and 1.1 ± 9.33°, injured and uninjuredrespectively, $p = 0.514$).

CONCLUSION: Female athletes using HC demonstrated no difference in DKV between injured and uninjured limbs during single-leg drop landings compared with athletes not on HC. Lack of differences between injured and uninjured legs could be reflective of quality rehabilitation practices. Although not statistically significant, the observed trends support investigation and future research on how HC use affects biomechanical risk factors in injured versus non-injured limbs

Tracking Pesticide Presence in Indoor Dust

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Organophosphate pesticides have been shown to cause harm to human and animal health. Common side effects of exposure include nausea, headaches, muscle twitches, blurred vision, and other neurological and respiratory issues. Analyzing indoor dust collected by HVAC filters offers insight to indoor air quality, as dust acts as a sink for chemicals, like pesticides, in indoor spaces. Samples of HVAC filter dust (n = 47) were analyzed for a panel of eight pesticides (azinphos-methyl, chlorpyrifos, dichlorvos, disulfoton, ethoprophos, fenchlorphos, parathion-methyl, and prothiofos) after sample cleanup. QuEChERS (Quick, Easy, Cheap, Effective, Rugged, and Safe) method. Samples were analyzed via gas chromatography-mass spectrometry. Out of the eight pesticides tested, only parathion-methyl was found. Parathion-methyl was found at concentrations varying from 228 ng/g to 523 ng/g in five out of 19 tested samples. Parathion-methyl, often referred to as methyl-parathion in literature, is known to cause adverse health effects with acute exposure. As of December 2012, the insecticide parathion-methyl has been banned or heavily restricted in the United States, Japan, China, and the European Union. In the United States, it has been banned from use on crops commonly consumed by children, and its application methods have been highly restricted by the EPA. The absence of seven pesticides is beneficial, as they are known to cause neurological and respiratory issues. The presence of parathion-methyl in household HVAC dust is evidence that despite restrictions on how the pesticides can be applied to crops, droplets are migrating to urban areas.

Reverse Expansionism

Uriko Stout
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University of Colorado Colorado Springs

Original sourced documents provide first-hand accounts and additional insight to historic occurrences. Two examples of letters written, one to Ferdinand and Isabella and another to Queen Elizabeth about the New World (although almost one hundred years apart) provide clues to how European imperialism and expansionism was perceived from the eyes of the 'discoverers' and explorers of the fourteenth and fifteenth century when encountering the New World of the West. Although there are current references to post-colonialism, I argue that neo-colonialism and expansionist ideology exists in the twentieth century and is demonstrated by close reading of two original source documents in 1940, one from retired Major General O'Ryan to President Roosevelt, and the second from the U.S. Department of State, Division of Far Eastern Affairs as a 'Memorandum of Conversation' detailing their evaluation of Major General O'Ryan's mission to the Far East. Through this close reading I will compare the language used between these four documents to determine correlations, patterns, ideology of reverse expansionism (neo-colonialism) from the West toward the Pacific Oceanic Islands. Reverse expansionism addresses transpacific trade routes, military protectionist ideology and de facto governance in the name of capitalism and global safety.

Spotted Owls Select Areas with Higher Canopy Cover in Sierra Nevada

lily Swift
Kate McGinn, Faculty Mentor
Colorado College

Understanding habitat selection is essential for conserving forest-dependent species whose habitats are influenced by land use and environmental change. The Northern Spotted Owl is closely associated with structurally complex forests and is considered sensitive to changes in forest structure. This study evaluated the relationship between canopy cover and habitat use by Spotted Owls using a resource selection framework. GPS telemetry locations representing owl use were analyzed alongside randomly generated available points within the study area. Percent canopy cover values were extracted from a raster dataset for both used and available locations. Habitat selection was modeled using a binomial generalized linear mixed-effects model (GLMM), with canopy cover included as a fixed effect and individual owl identity included as a random effect to account for variation among birds. Results indicated a significant positive relationship between canopy cover and the probability of habitat use. Predicted probability of use increased steadily across the canopy cover gradient, indicating that owls were more likely to occupy areas with denser forest canopy. These findings support the importance of structurally complex forest habitats for Spotted Owls and highlight the value of resource selection modeling for evaluating wildlife–habitat relationships. Maintaining areas with higher canopy cover may be important for supporting suitable habitat conditions for this species.

CRISPR-induced floral gene mutation as a means for genetic containment in poplar

Emily Taylor, Ashley Jaeski, Gigi Douillard, and Alexis James
Amy L Klocko, Faculty Mentor
University of Colorado Colorado Springs

Modern genetic engineering methods can be used to create new and improved varieties of plantation trees useful novel traits such as insect resistance, herbicide tolerance, disease resistance and more. However, the use of genetically engineered (GE) trees controversial due to the possible movement of genes from plantation trees to wild trees. We are testing methods to prevent gene flow by modifying key floral development genes with the goal of engineering stable sterility. Our current main approach is CRISPR-Cas9 gene editing and our genes of interest are LEAFY (LFY) and AGAMOUS (AG). We are using male and female varieties of hybrid poplar, a valuable forestry species that is also amenable to genetic transformation. Currently, we have a total of 360 trees, representing 51 independent gene edited events, 8 Cas9 control events, and WT control trees. We are analyzing floral form and floral fertility, and assessing overall tree performance and health. Trees were planted in 2017 and 2019, providing us with several years of tree growth data and more than one year of floral data for most trees. Currently, there are no significant differences in vegetative growth between control and gene edited trees. We found that editing of either LFY or AG led to strong reliable male and female sterility. For LFY edits, we observed a dramatic reduction in flower size and a lack of pollen or ovules. For AG edits, flowers had replicated sterile organs. This approach could be used in elite commercial cultivars to achieve containment.

Oral Session 2
10:30-11:50 am

Neurological Systems, Addiction, and Modern Behavior

Room s215

Gender, Power, and Systemic Control

Room s228

Stress, Physiological Response, and Policy Impact

Room s232

The Overstimulated Brain: Evolutionary Perspectives on Modern Addiction

Taylor Chapman
DeLyn Winters, Dr. Elizabeth Bauer and Dr. Tom Francis, Faculty Mentors
University of Colorado Colorado Springs

Humans evolved with powerful, innate reward systems that ensured survival through ancestral conditions of scarcity. However, the modern world presents a landscape where reward comes quickly, abundantly, and in potent forms. While the role of evolution is to increase survivability, rapid technological proliferation has left underlying human reward systems calibrated for environments that no longer exist. This review integrates evidence from neurobiology, pharmacology, and evolutionary theory to explain how these modern environments make adaptive human reward systems vulnerable to addiction. Both substances and behaviors are examined for their addictive potential using two perspectives: (1) influence on neurochemistry involving reward and socialization—primarily the mesolimbic dopaminergic (ML-DA) pathway and the endogenous opioid (endorphin) system, and (2) ability to mimic natural human feelings and behaviors that, ancestrally, led to survival. Opioids and Social Networking Site (SNS) use are used as representative stimuli for the modern landscape of overstimulation. Findings indicate that synthetic opioids alter brain chemistry in a highly addictive manner and mimic survival-based feelings of safety and social fulfillment. SNS use is associated with adverse changes in brain chemistry, function, and structure. Specifically, SNS use activates ML-DA pathways, while chronic use leads to decreased volume in the striatum, amygdala, and the orbitofrontal cortex. Additionally, SNS use mirrors adaptive behaviors and reward at larger magnitudes. Addiction today becomes the predictable outcome of an evolutionary mismatch between ancient human reward circuits and modern environments of overstimulation, where biological systems become dysregulated and reinforce maladaptive behaviors.

KEY WORDS: addiction, behavior addiction, evolutionary mismatch, opioids, social media, overstimulation.

Digital Entertainment: Evolving Perspectives on Video Games

Sterling Hutchison
DeLyn Winters, Faculty Mentor
University of Colorado Colorado Springs

In December 2025, Newsweek published an article suggesting that video games in the 90's were better for children's brains, without any research citations and relying on only two practitioners. This article lacked supporting evidence and nuance, but it did highlight an interesting idea: the persistent misrepresentation of these games shows that the scholarly discourse has overwhelmingly come from adults and clinicians who did not consult those playing the games. My research explores peer-reviewed literature to make the case that video games have intrinsic developmental benefits for adolescents, including agency, identity development, emotional regulation and sense of community. Based on in-depth interviews with autistic teens, a survey of parent mediation and teen gaming habits, interdisciplinary critiques of autism as deficit discourse, and literary and media studies of video games, this research focuses on the positive aspects of video games as sources of developmental potential with the valuation of gaming as a developmental resource. Video games have had a lasting presence in players' lives and as an industry; over the past thirty years it has grown into more than simple entertainment. We should look at the players and game developers as experts in their own field and shift towards new perspectives on these games.

Expressing Recombinant β-Myosin Complexes Using Synthetic Heterodimerization Domains

Jonathan Davis
Stephen Langer and Leslie Leinwand, Faculty Mentors
Colorado College

Understanding the molecular mechanisms underlying hypertrophic cardiomyopathy (HCM), a dominant-negative genetic heart disease, requires tools that can model the co-expression of wild-type and mutant β-cardiac myosin (MYH7) proteins in a physiologically relevant context. While homodimeric recombinant myosin constructs have been widely used for in vitro studies, the functional impact of heterodimeric complexes, also implicated the native state in heterozygous patients, remains largely unexplored due to limitations in current expression systems, that cannot preferentially associate with a wild-type or mutant counterpart relative to itself. This project leverages synthetic orthogonal coiled-coil heterodimerization domains, N7 and N8, respectively, to drive the selective assembly of recombinant β-myosin heterodimers. Two 25-heptad (25HEP) β-myosin constructs were engineered: a "Bait" containing N7, an affinity tag, and a "Target" containing N8 alongside GFP and affinity tag. Following Gibson assembly and verification by nanopore sequencing, both constructs were packaged into adenoviral vectors to transfect mammalian cells for expression of myosin. Post-infection, heterodimer formation was assessed via co-purification assays, SDS-PAGE, and Western Blot. Our results demonstrate that the N7 & N8 enable efficient, high-yield purification of heterodimeric myosin complexes, offering a robust and reproducible expression strategy. This method overcomes key challenges of low yield and nonspecific dimerization observed in prior systems based on GCN4. The ability to selectively produce wild-type/mutant heterodimers has significant implications for modeling the true pathogenesis of HCM and genetic heart disease, as well as other heterozygous dominant-negative, coiled-coil–based protein disorders, laying the groundwork for future structural and functional analyses.

Nonlinear Harmonics in thin magnetic films with interfacial Dzyaloshinskii-Moriya Interactions

Laurel Powell
Robert E. Camley, Faculty Mentor
University of Colorado Colorado Springs

We study the effect of the Dzyaloshinskii-Moriya Interaction (DMI) on the nonlinear creation of spin wave harmonics. We analyze the Landau-Lifshitz equations, numerically and analytically, for a narrow Permalloy stripe with interfacial DMI. If the static field is perpendicular to the stripe, spin waves traveling in one direction can have harmonics that are more than 50 times larger than that for the waves moving oppositely. When the external field is parallel to the stripe and DMI is present, both even and odd harmonics are generated; without DMI, only odd harmonics appear. This potentially offers a different way to measure the DMI strength. In systems with larger nonlinearity, through an increased driving field or a different choice of driving frequency, frequency combs can appear.

The Digital Gilt Cage: Algorithmic Infantilization and the Modern Gender Contract

JD Ford
Emily Forand, Faculty Mentor
Pikes Peak State College

This study examines the evolution of systemic infantilization as a shifting social contract, moving from the protective hierarchies of the past to the extractive economies of the digital age. By tracing a genealogy of thought from Christine de Pizan's 15th-century moral sciences to modern critiques by Roxane Gay, the research explores how the goal of female education has transitioned from the cultivation of virtue to the performance of a monetizable aesthetic. Through a comparative analysis of the passive erasure in William Goldman's The Princess Bride, the dissident scholarship in Mercedes Lackey's The Fairy Godmother, and the negotiated docility in Angie Cruz's Dominicana, the paper argues that the ancient art of narrative has been repurposed by modern algorithms. This digital syllabus rewards curated girlhood and commodification of self over rational autonomy. The study concludes that where historical patriarchs championed a robust education, the modern algorithm imposes a digital gilt cage that incentivizes intellectual helplessness as a profitable, performative commodity.

The Pains of Childbirth Explored through Science and Literature

Natalie Hall
Emily Forand, Faculty Mentor
Pikes Peak State College

Childbirth is an extremely important part of human life and culture. In this presentation, the pains of childbirth are explored through literature and scientific studies. Through the writers, Amelia Lanyer, Sylvia Plath, Annie Ernaux, and many others. The pains of childbirth are seen in different perspectives. As with science, the stereotypes of how different races of women deal
with pain is explored. While also showing how these conceptions have lead to mistreatment throughout time.

Let's Talk About Sex: Relationships Between Women Religious and Intimacy with Christ in Medieval Europe

Tessa Schauer
Brittany Orton and Rebecca Posusta, Faculty Mentors
University of Colorado Colorado Springs

Throughout medieval Europe, there were no shortages of women religious. From English anchoresses such as Julian of Norwich to Italian Dominicans like St. Catherine of Siena, holy Christian women – such as abbesses, anchoresses, nuns, and devoted lay women– were scattered throughout and beyond the continent. My research, interdisciplinary in nature, analyzes the trends, themes, and imagery found in the Vitas (written works detailing a saint's life), writings, and personal works of medieval women religious. Specifically, I aim to highlight the abundant instances of sexual, intimate, and transcendent relationships between medieval women religious and Christ within their unique historical context. While my research is ongoing, the early analysis of primary sources from (or relating to) St. Catherine of Siena, St. Ida of Ireland, Julian of Norwich, and Margery Kempe has indicated that the complex and common occurrences of intimacy with Christ (in relation to women religious) reflect and adhere to the teachings found in St. Augustine of Hippo's The Excellence of Marriage and Holy Virginity. In these texts, St. Augustine outlines different purposes for sex within married couples, as well as defining the different nature between every human's physical and spiritual purity. Ultimately, medieval women religious were spiritually authorized to have metaphysical relationships with Christ because of church teachings on sex within marriage and their physical choice of religious devotion.

Violence against women in Ciudad Juárez and the Failure of Justice

Raul Venzor
Édgar Cota-Torres, Faculty Mentor
University of Colorado Colorado Springs

Since the 1990s, hundreds of women have been killed in Ciudad Juárez, Mexico, and most of these cases have never been solved. This research looks at how Alicia Gaspar de Alba's novel Sangre en el desierto (2005) uses detective fiction to show the violence against women on the U.S.-Mexico border. The story follows Ivon Villa, a Chicana woman who goes back to the border to adopt a baby but ends up caught in the middle of the femicide crisis. This study focuses on how Gaspar de Alba turns the detective genre into a way to call out injustice, highlighting how other methods of protest are particularly dangerous for women in Ciudad Juárez. The research focuses on three main ideas: how female factory workers are taken advantage of, how the authorities are involved in the violence, and how the border plays a unique role in facilitating this kind of violence. This topic is personally meaningful to me because I have traveled through Ciudad Juárez for years on my way to visit family in Mexico. As someone pursuing a career in medicine who hopes to work in border communities, I see this violence as a public health crisis. Understanding these issues is essential to serving these communities, and I believe this topic deserves far more attention than it currently receives.

The Impact of the Affordable Care Act Medicaid Expansion on Workers' Productivity in Colorado: A Case Study Comparison with Wyoming

Veronica Gonzalez Paris
Michael Bonnal, Faculty Mentor
Colorado College

This study contributes to the literature on the Affordable Care Act (ACA) Medicaid expansion by examining its impact on labor productivity, specifically comparing Colorado to Wyoming. Using the American Community Survey (ACS) and a difference-in-differences (DID) methodology, this research examines hours worked and absenteeism—including absences due to illness, family leave, and vacations—as proxies for worker productivity. To ensure the validity of the causal claims, the study conducts visual and statistical tests of the parallel trends assumption, alongside event-study regressions for robustness checks. The results indicate a statistically significant decrease of 8.8 annual hours worked and a 4.6 percentage point reduction in absenteeism. When restricted to the ACA Medicaid-eligible population, the impact on hours worked remains consistent at a 6.9-hour weekly decrease, while the probability of absenteeism increases by 13.4 percentage points. Given the relatively small size of the childless adult population in the ACS sample, these findings suggest that while the ACA Medicaid expansion in Colorado has a measurable impact on labor supply and attendance, it does not appear to pose a significant economic threat to the state's workforce productivity. KEYWORDS: Affordable Care Act, Medicaid, Colorado, Wyoming, hours of work, absenteeism JEL CLASSIFICATION: H75, I13, I18, J22

The Structural Reconfiguration of Chinese Students' Decisions in Yangtze River to Study in the United States under Sino–U.S. Political Uncertainty in President Trump's Second Administration

Perilla Wang
Shiqi Ma and John Williams, Faculty Mentors
Colorado College

In recent years, the tightening of U.S. student visa policies under the second Trump administration has prompted growing concern about its impact on international student mobility, particularly among Chinese students. Existing research generally holds that increased geopolitical uncertainty leads to a decline in Chinese students' willingness to pursue higher education in the United States. However, the latest data reveals an empirical discrepancy that requires nuanced explanation: according to the Common Application dataset of the early decision (ED) round for fall 2030 admission, while the number of applicants from most countries showed a significant downward trend, the Chinese applicants demonstrating counterintuitive stability– declined by only about 1%. The absence of systematic statistical analysis regarding the profiles of prospective Chinese applicants may lead to a misinterpretation of the underlying mechanisms driving their decision-making in academia. In this research, the author argues that although the number of Chinese applicants remains constant, the current administration under President Trump impacts whether they decide to enroll once they receive the offer. Adopting a mixed-methods approach, this research combines survey data with semi-structured interviews. The researcher collected a dataset from 55 Chinese senior high school students currently in the college application process. Notably, they share a similar background of highly educated and high-income families in China. However, their decision to enroll once receiving offers varies. Both quantitative and qualitative analyses show that STEM major students have a strong preference for high-ranking institutions, due to shrinking job opportunities in the US.This shows that although political uncertainty does not impact the number of Chinese student applicants, it does reduce their incentives to receive a US education from non-high-ranking institutions. For this generation of students,institutional prestige functions as a necessary buffer against the volatility of U.S. visa politics, making enrollment a viable risk only at top-tier universities. This study provides systematic evidence that measures the impact of Trump's second administration on international students. It provided a nuanced answer to what it means for the talent pool and American soft power.

Keywords: Status as Security; Institutional Prestige; Geopolitical Uncertainty; Educational Mobility; Visa Politics; Strategic Hedging.

Proceeding(?)
When Convention Says No

Lex Griffin
Karen deVries, Robert (Rex) Welshon and Jennifer Kling, Faculty Mentors
University of Colorado Colorado Springs

How can one proceed, if at all, when one cannot take the conventional mode of procession as granted? The "conventional mode of procession" is defined as the mode according to which, by some convention (popular rules, principles, methods, etc.), a resulting process is granted justification; in which "mode" is understood as a particular way of regarding some circumstance(s). A "conventional mode of procession" is that which, according to how these circumstances are by some convention or conventions regarded, I can proceed with the process that thus permitted—e.g. using a moral code as strict justification for some moral action. For example, take the use of the word "women." In the sense of referring to the class of all women, how am I to regard the implication that, in certain communities, "women" extends to the set of all trans women and in certain communities it does not—say, if I am an author who knows that I will have readers in either community? Can I, and if so, how can I, proceed to use the term "women" here—i.e. how can I, if at all, take the conventional mode of procession if I do not take the mode as granted. Here, the "conventional mode of procession" would be the use of a term to extend to a set of (socially circumscribed) beings, namely 'women.' If I do not trust that mode—here, for good reason: namely that it could produce undesired effects (not caching an extension to trans women in some readers)—how can I proceed? What am I to do when the jurisdiction of that term, in particular, or the conventional mode of procession, in general, may confer a power that I do not desire to be conferred?

Poster Session 2

11:45 am - 12:40 pm

The Learning Commons
1st Floor

Built Environment and Health Outcomes: Investigating Transit Accessibility and Life Expectancy Across Two Geographic Contexts

Jacob Abbott
David Havlick and Joey A. Lee, Faculty Mentors
University of Colorado Colorado Springs

This project investigates transit accessibility as a social determinant of health by examining its association with life expectancy in El Paso County, Colorado, and Ishikawa Prefecture, Japan. Although prior research has linked the built environment to physical activity, access to care, and broader health outcomes, less is known about how neighborhood-level transit access relates to population health at the local scale. Using geographic information systems (GIS) and publicly available health and transportation data, this study will measure transit accessibility as transit stop density and analyze its relationship to life expectancy at the census tract and municipal levels. Spatial mapping, correlation analysis, and spatial autocorrelation techniques will be used to identify geographic patterns within and across both study areas. By comparing a sprawling U.S. county with a denser Japanese prefecture, the project will generate insight into how transportation infrastructure may contribute to health disparities across different built environments. The study will support interdisciplinary student-faculty research in public health and geography while producing findings that can inform future work on transportation planning, health equity, and place-based approaches to improving population health.

Determination of copper, lead, and arsenic in pistachios by atomic emission spectroscopy (AES)

Mason Barone and Jacob Pintor
Shelby Noland, Faculty Mentor
University of Colorado Colorado Springs

This work aims to evaluate the concentrations of copper, lead, and arsenic in pistachios using atomic emission spectroscopy (AES). Pistachios are known to contain relatively high levels of copper as well as trace amounts of toxic metals such as lead and arsenic. Copper is an essential nutrient that is involved in different enzymatic and physiological processes. However, if too large an amount of copper accumulates within humans, it can lead to adverse health effects. In contrast, lead and arsenic are not biologically useful and are toxic to humans even at low concentrations. As a result, monitoring the concentrations of these metals in food products is important for assessing health risks. AES provides an effective analytical method for determining the concentrations of copper, lead, and arsenic in pistachios. Copper, lead, and arsenic emit light at specific wavelengths which allows for quantification with AES, which is a highly sensitive technique and can detect metals at trace levels. Detection of trace level analytes by AES is useful because lead and arsenic are often found at low quantities in pistachios.

Logs on Sticks

Peter Beachy
Jennifer Holmes, Faculty Mentor
Pikes Peak State College

The tedium of calculation has long been a problem for mathematicians, engineers, navigators, and astronomers. Shortcuts for easing the workload have been developed for centuries, or even millennia, including such arcane techniques as lattice multiplication and prosthaphaeresis. In the 1500s, mathematicians developed the rules for exponents and realized that calculations could be significantly shortened if all numbers could be expressed as a common value raised to a particular power. In 1614, the Scottish nobleman John Napier fulfilled this wish by publishing the ultimate book of shortcuts – what he called logarithms. Within a decade of Napier's announcement, inventors had inscribed logarithmic scales on sticks of wood to form a rudimentary calculator. The slide rule became the signature instrument for mathematicians and engineers for the next three centuries. Over that time, the technology was adapted for such diverse applications as designing steam engines, proofing alcohol, and determining ballistic trajectories. Slide rules quickly became a relic of a bygone era when electronic calculators became affordable in the 1970s. However, they still find use in some specialty applications and continue to be developed four-hundred years after their invention.

Perceptions of Aging and Depressive Symptoms: The Moderating Role of Gender

Amy Benge
Kyrsten Hill and Lori James, Faculty Mentors
University of Colorado Colorado Springs

Prior research suggests that perceptions of aging (POA) are associated with mental health outcomes, and that gender differences in POA may depend on the life domain examined. However, research examining gender differences in the association between POA and depression is limited. Using data from the St. Louis Personality and Aging Network (SPAN), the current study investigated longitudinal relationships between gender, POA domains, and depressive symptoms. A subsample of 233 SPAN participants (60.9% women, 39.1% men; Mage = 60.1, SDage = 2.7) reported perceptions of age-related changes across various life domains at wave 7 (2011-2012) and completed the Beck Depression Inventory-II at wave 12 (2019-2022). Regression analyses revealed that more positive POA at wave 7 predicted lower levels of depressive symptoms at wave 12 (beta = -.17, p = .01), although gender did not moderate this effect. The association between POA and depression was significant for four of the eight POA domains: physical attractiveness (beta = -.15, p = .02), ability to do everyday tasks (beta = -.15, p = .02), respect received from others (beta = -.14, p = .03), and life satisfaction (beta = -.18, p = .008). These findings suggest that more positive POA are associated with lower depressive symptoms over time and highlight the importance of considering domain-specific POA as potential intervention targets. However, gender did not moderate this association, suggesting that while men and women may differ in POA, the impact of these perceptions on mental health outcomes may not differ across genders. **Objective 1:** After attending this session, participants will be able to describe the relationship between different domains of perceptions of aging and depressive symptoms. **Objective 2:** After attending the session, participants will be able to discuss why gender differences may be seen in different domains of perceptions of aging, but not in the relationship between perceptions of aging and depression.

The Role of Christian Worship Body Posture in Improving Mood and Closeness to God

Carter Bergeron
Joseph Wagoner, Faculty Mentor
University of Colorado Colorado Springs

The proposed study aims to investigate whether physical body posture during Christian worship sessions would impact psychological processes such as affect and feelings of closeness to the divine. A literature review of recent empirical studies on these variables is provided. Studies cover the role of physical body posture and its relation to emotion. Other studies narrow in on religious worship posture and its effect on various psychological processes. In our study, 160 adult Christians will complete an online survey including an experimental manipulation to investigate the variables at hand. It is predicted that body posture will be a significant factor in influencing affect and feelings of closeness to God. Specifically, it is predicted that upward/expansive postures and downward/constrictive postures will yield greater improvements in mood and divine connectedness than the neutral sitting position. The findings of this study will be important for recommendations on worship styles to achieve better emotional states, individual and in relation to God.

Keywords: affect, body posture, closeness to God, embodied cognition, worship

Spatial Variability of Wetland Extent and Hydroperiod in the San Luis Valley, CO

Kate Bicks
Charlotte Gabrielsen, Faculty Mentor
Colorado College

Wetlands perform vital hydrologic functions and provide crucial habitat for vegetation and wildlife even when they are small and geographically isolated. The San Luis Valley (SLV) in southwestern Colorado has a complex hydrologic system, influenced by its high water table, the Rio Grande, and the closed basin effect, which creates diverse wetlands across the valley. These wetlands provide groundwater recharge and habitat for migratory birds, but agricultural water use and aridification due to climate change have altered their hydrology over time. This study uses remote sensing to examine changes in wetland extent and hydroperiod -- two important controls on wetland function -- between 1986 and 2024 on federal and state-protected SLV properties. Three of six wetland complexes showed significant decreases in both extent and hydroperiod, two showed no trend, and one appeared to increase for both variables, though likely due to classification error. These results highlight how SLV hydrology has shifted, which can affect vegetation, water cycling, and wildlife, and suggest that conservation efforts should address the specific needs of individual wetland complexes.

Sharing Stories, Sharing Hope: Fostering Mental Health and Academic Resilience by Sharing Anonymous Stories Within Communities

Lavender Branzei-Braunschweig, Mikey Justiniano, and Youngjin Kim
Glenn Rohlfing, Faculty Mentor
Pikes Peak State College

Our group investigated the topic of 'Power of Stories', focusing on themes of persistence, resilience, healing, and sorrow through research and campus initiatives. Based on our preliminary research of how stories connect and inspire people, we focused on answering the questions "To what extent do stories of persistence, resilience, healing, or loss provoke and inspire?" and "How can we use the power of stories to significantly impact our community?" Our main research discovery was that stories share hope by connecting people, which fosters healing and resilience, inspiring growth and change in individuals and communities. From this discovery, we identified two critical issues where storytelling could create meaningful impact among individuals and communities. Many U.S. young adults struggle with mental health, a global issue, and the three-year graduation rate for Pikes Peak State College (PPSC) was 25%. By creating storyboards distributed around our campuses, and hosting a wellness and connection pop-up event, we addressed these issues by creating a safe environment focused on fostering resilience through shared stories. To support the mental health of students, we partnered with our on-campus counseling center, bringing in over 100 participants to our event. Our storyboards gathered over 80 anonymous stories uploaded in our online archive, demonstrating our campuses' need for community and support. This research project allowed us to identify a need within our school community and address the identified need and make a significant impact. Using the power of stories, we were able to raise awareness about the importance of community and mental well-being. Our actions foster connections within our campuses, while inspiring individuals to be resilient through sharing their stories. This taught us that research should not be the end goal, but rather the first step toward actions to better the world.

Team Hot Air

Alease Church, Nick Jacobs, and Samuel Weatherby
McKenna Lovejoy, Faculty Mentor
Pikes Peak State College

Pilots look at weather patterns, government predictions, weight, and intended flight duration to determine fuel needed and if the day is flyable. Pilots are provided with a constant used in density altitude calculations and mandated oxygen requirements for high altitudes. However, this data is not experimental and does not get updated very often. Team Hot Air is setting out to measure the experimental values of density altitude, battery life, aircraft performance, oxygen partial pressure, and solar charging rates at changing altitudes to provide pilots with updated, experimental, and accurate data. Temperature, pressure, humidity, and acceleration sensors will be used in conjunction with an Arduino Uno, battery, and solar panels both on the payload and on the ground to test for experimental data and ground controls. Three pilots – helicopter, hot air balloon, and fixed wing were interviewed as stakeholders and made the combined list of desired tests at differing altitudes. The helicopter pilot requested the testing of solar panels, the hot air balloon pilot requested the testing of density altitude and oxygen levels, and the fixed wing pilot requested the testing of aircraft performance and properties of air. While the experiment has not yet been completed, it is expected to find similar experimental findings to the constant numbers pilots are using now in their calculations for density altitude and oxygen levels. As with fixed wing aircraft, the high-altitude balloon is expected to become more efficient the higher it goes as there is less air resistance. Solar chargers are expected to greatly increase their rate at extreme high altitudes when compared with ground controls. Team Hot Air's DemoSat will give updated information and experimental values that will benefit pilots of all kinds and make their calculations more accurate and efficient.

Parental Hostility and Warmth on Adolescent Anxiety: Disentangling Emotion Regulation Strategies

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

Parental hostility and warmth influence adolescents' development of anxiety, with emotional regulation (ER) thought to buffer risk and promote resilience (Gorostiaga et al., 2019; Yap et al., 2014). However, most work relies on global ER indicators, despite the recognition of variability in distinct ER strategies (Compas et al., 2017). In fact, the process model of ER (Gross, 1998) suggests that differing ER strategies may not influence interpersonal risk uniformly (Gross & John, 2003). Thus, the current study examined whether adaptive ER (cognitive reappraisal [CR]) and maladaptive ER (expressive suppression [ES]) moderate associations between parental environments (hostility, warmth) and anxiety at age 14. Adolescents (N = 157) self-reported all measures. A linear regression revealed a significant interaction between parental hostility and CR ($b = -0.18$, $p < .05$), suggesting that higher CR buffered the association between parental hostility and anxiety. In comparison, a significant interaction between parental warmth and CR ($b = 0.15$, $p < .05$) showed that when CR was low, parental warmth predicted less anxiety, but no relation was found when CR was high. sThere was a significant main effect of ES predicting greater anxiety in both models ($b = 1.33$, $p < .05$; $b = 1.71$, $p < .01$), but no significant interactions with both hostile and warm parenting. These findings align with previous studies to suggest that the influence of parenting depends on the distinct ER strategy used during adolescence, such that CR was protective against hostile parenting, whereas ES reflected risk regardless of parental input. These findings advance work on how adolescents navigate hostile and warm parenting and highlight specific targets for intervention. Future work should investigate longitudinal processes to clarify developmental pathways.

When Stress Meets the Self: How Respiratory Sinus Arrhythmia and Gender Shape the Impact of Early Adversity

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

Adverse Childhood Experiences (ACEs; e.g., abuse, neglect, or household dysfunction), have been shown to negatively affect individuals by increasing risk for a range of outcomes such as poor academic performance, increased psychopathology, and negative health outcomes (Webster, 2022). This relationship is especially important during early childhood, as exposure to adversity can hinder brain development, inhibit physiological stress response systems, and contribute to negative behavioral outcomes (Richter et al., 2019; Smith & Pollak, 2020). Importantly, increased exposure to adverse experiences has been associated with unfavorable ideas of oneself (i.e., self-concept; Melamed et al., 2024). However, not every child who undergoes adverse experiences will suffer from negative feelings about themselves. A gap exists in the literature of these relations, especially for young children. It is also unknown which children are at the greatest risk for these detriments. One important identifying factor is respiratory sinus arrhythmia, or RSA, which is a physiological biomarker for the body's parasympathetic nervous system (PNS), the division of our autonomic nervous system responsible for involuntary functions and reaction to stress. RSA is an indicator of who will regulate stress better compared to others (Tonhajzerova et al., 2016). Past literature has highlighted the importance of RSA and gender differences in the impacts of adversity (Gray et al., 2016). Therefore, the current study will investigate how RSA and biological sex modify the relations between adversity and self-concept. Identifying children who are at a heightened risk for developing a negative self-concept can help inform preventive measures to decrease the occurrence of adverse experiences and promote positive self-concept interventions for children.

Beyond Protein:
Quantifying Fruit and Vegetable Consumption Among Weightlifters

Leonard Espinoza
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University of Colorado Colorado Springs

The purpose of this study was to describe fruit and vegetable (F&V) consumption patterns among recreational and competitive weightlifters. Adequate F&V intake supports recovery, metabolic health, and overall diet quality, yet limited research has focused specifically on strength-trained populations. This descriptive study quantified daily servings of starchy vegetables, fruits, and non-starchy vegetables to establish baseline dietary patterns among weightlifters. Participants (n = 781 valid responses per item) completed a dietary questionnaire reporting typical daily intake of key food categories. Analyses were descriptive and included means, medians, standard deviations, frequency distributions, and visual assessment of histogram shapes. Weightlifters consumed an average of 2.48 ± 1.14 daily servings of starchy vegetables (median = 2), 2.95 ± 1.21 servings of fruit (median = 3), and 2.90 ± 1.22 servings of non-starchy vegetables (median = 2). Histograms indicated unimodal distributions with moderate variability and negligible positive skew across all variables. These findings provide a clear, descriptive snapshot of F&V intake among weightlifters, showing moderate but variable intake across categories. The results establish foundational dietary data for this population and may inform future hypothesis-driven research examining determinants of diet quality, nutritional adequacy, and potential relationships between F&V intake, recovery, and performance among strength-trained individuals.

Characterization of Reproductive Effects Associated with the ARI26162 Gene in Drosophila arizonae

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While RNA is a conserved feature within male ejaculate, the function is currently unknown. Our lab has previously discovered that RNA within male ejaculate is transcribed in the female reproductive tract of Drosophila arizonae (male-derived female-translated protein, mdFTPs). We postulate that these mdFTPs play a crucial role in reproduction (fecundity, fertilization, and components of reproduction. One gene in particular, ARI26162, is one of the most expressed genes in the female reproductive tract. In order to determine the functionality of ARI26162, CRISPR Cas-9 was used to knockout (KO) the gene. The KO was compared to wild-type (WT), and a WT x WT cross was used as a control in determining reproductive success in fertility. Albeit, this assay will only be testing the effects ARI26162 in the female reproductive tract when the gene is KO, and not the effects of male RNA/mdFTP on reproduction. This will give more insight on how ARI26162 proteins in the female reproductive tract contribute to reproduction, given that the gene is highly expressed in the female reproductive tract. Currently, the fertility assay is underway, and results are pending.

Simplified Procedure For The Synthesis of Biodiesel

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This work consisted of validating the synthesis of biodiesel fuel by transesterification according to a literature procedure. The procedure was reported as a laboratory experiment for the organic chemistry lab. We repeated the published procedure and found that the results agreed with those reported in the published work. The procedure called for the transesterification of a triglyceride with KOH and methanol to form fatty acid methyl esters using sonication. We found that the procedure could be done more efficiently with an organic base, soluble in methanol, which could be stirred conventionally without sonication. This efficient method produced the same results in less time, without requiring a sonication device to dissolve the base or perform the transesterification.

Analyzing ASOS Precipitation-Type Frequency Trends: Bridging the Weather and Climate Gap

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People experience short time scales in weather changes, but precipitation trends are most often researched on long time scales. Researching precipitation type frequency reflects the surface-level trends people have experienced through time with potentially greater accuracy than accumulation and radar data analysis. This research analyzes precipitation frequency trends from 1997 to 2025 in ASOS hourly and five-minute datasets, bridging a research gap between climate and weather research. This work analyzes trends in the number of days and hours with snow per year and the annual and seasonal proportion of snow within both respective datasets for 14 stations in Northeastern United States. All stations demonstrate a slightly negative trend in proportion of snow in boreal winter trends, though other trends varied by station due to spatial variability in this fairly discrete data. Five-minute data displayed marginally different trends as compared to hourly data, implying that higher frequency datasets provide more information about precipitation type changes. These results demonstrate the usefulness of precipitation type frequency analysis to trend analysis and provides a framework for ways in which this data may be used.

Variation in Total Phenolic Content of the Medicinal Plant Ligusticum porteri (Osha)

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Phenolics are important bioactive components that act as antioxidants and have anti-inflammatory properties. The roots of osha (Ligusticum porteri) are used in traditional medicinal practices to support the human immune system due to their antibacterial and antiviral properties. Medicinal plants are likely to produce chemicals in all parts and tissues. We investigated population-to-population variation in total phenolic contents of osha leaves and stems. We found evidence of significant variation in total phenolic contents both among populations and between tissue types.

Using Ring Theory to study Neuroscience

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This talk presents an algebraic perspective on how groups of neurons represent features of a stimulus space. Starting from observed on and off firing patterns, the project asks a central question: what can we infer about receptive field organization directly from neural activity data? Many standard topology based summaries are useful, but they can blur important details by allowing patterns that were never actually observed. This project addresses that limitation by using an algebraic framework designed to preserve the exact combinatorial structure of the neural code.

Atherosclerotic and Germinal Center Outcomes in B Cell CD40–Deficient ApoE$^{-/-}$ Mice

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Atherosclerosis is a chronic inflammatory disease of the arterial wall and the main contributor to the leading cause of death worldwide: cardiovascular disease. Identifying cell-specific immune drivers of atherosclerosis is essential for advancing new therapeutic strategies. The CD40–CD40L pathway is a key immune regulator in atherogenesis with distinct effects depending on cell type. In B cells, CD40 is required for germinal center (GC) activity in the spleen, driving plasma cell differentiation and antibody production. While CD40 signaling in T cells and myeloid cells is well studied, its role in B cells during atherogenesis is less defined. This study examined the impact of B cell-specific CD40 deletion on atherosclerotic plaque burden and splenic GC responses in ApoE-/- mice. Female ApoE-/-CD19CreCD40fl/fl mice and controls were fed a high-cholesterol diet for ten weeks. Plaque burden was quantified by H&E staining, and GC B cells and plasma cells were assessed by flow cytometry and immunofluorescence. Statistical comparisons were performed to evaluate differences between groups. Preliminary results show that knockout mice exhibited modest reductions in aortic plaque burden, while GC and plasma cell frequencies were largely unchanged.

Sex Comparisons:
Foot Placement and Power Production in Rock Climbing

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Rock climbing is a complex full body sport that requires the transfer of force across joints through dynamic multi-planar limb movements. Males and females demonstrate different kinematics, likely reflective of anthropometric differences. Their impact on power output in climbers is not explored.
PURPOSE. The purpose of this study is to understand how foot placement affects power output between sexes in rock climbers.
METHODS. Rock climbers aged 18-24 were recruited for this study. After a standardized warm-up, participants performed a powerslap move. Participants completed three trials under two conditions: high-foot (HF) and low-foot (LF) placement. Paired T-tests were used to compare within-group differences. Unpaired t-tests were used to compare between-group differences.
RESULTS. There was a significant difference in HF with males producing more absolute average power than females (939.3 ± 53 W, 689.1 ± 53 W, males and females respectively $p=0.0027$) and in LF with males producing more absolute average power than females (914 ± 50 W, 698.4 ± 53 W, males and females respectively, $p=0.0071$). There was no significant difference in normalized power for HF between sexes (13 ± 0.67 W, 12.1 ± 1 W, males and females respectively, $p=0.422$) or LF (13 ± 0.51 W, 12.2 ± 0.84 W, males and females respectively, $p=0.7365$).
CONCLUSION. While male rock climbers produce significantly more absolute average power in HF and LF conditions than female rock climbers, when power was normalized to body mass, no significant difference was found between sexes. This suggests that the male production of greater absolute average power was on the basis of body mass, and per kilogram of body weight, females produce similar power outputs to their male counterparts.

The Gilded Vanity : Ballads of Oppression

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This project analyzes the English folk ballad The Golden Vanity as a reflection of imperialism, patriarchy, and class exploitation, highlighting its themes and historical significance. It examines early versions and the historical contexts that shaped its evolution, focusing on the earliest broadside version, Sir Walter Raleigh Sailing in the Lowlands, and compares it to later adaptations that change the enemy ship's identity from Spanish to French or Turkish vessels. These shifts demonstrate how the ballad adapted to Britain's changing imperial conflicts and societal anxieties. The project also explores the reward promised to the cabin boy for saving the ship. In many versions, the captain offers gold and his daughter's hand in marriage, presenting women as property to be exchanged for male service and loyalty. At the same time, the boy is ultimately betrayed by the captain, and this betrayal reveals themes of class inequality and exploitation within maritime culture. This highlights a history of oppression passed down through generations to other differing cultures and genders. Folklore such as this upholds narratives that continue to be silenced.

The Persuasion of Women's Identity in Literature

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The inflexible identity of woman is something deeply ingrained in our society and culture. Our myths and histories tell us who woman is. However, the portrayed character of woman often does not align with the lived experience of women now and throughout history. Female writers have questioned for centuries: who has the authority to dictate the identity of woman? What forces have driven this narrative to the point that it is easily accepted as reality? As women have grappled with these questions throughout history, it becomes clear that certain gender expectations, especially for females, are invented to benefit one group over the other and to push certain agendas. Deconstructing the persuaded identity of woman through literature takes a step toward treating people as individuals rather than as indistinguishable parts of a monolith. Through a brief historical literature review, analysis of Ray Bradbury's Fahrenheit 451 and Zora Neale Hurston's Their Eyes Were Watching God, and perspectives offered by modern scholars, this research unravels the deconstruction of female identity.

Evaluation of the Pikes Peak Elder Justice Center's Elder Abuse Multidisciplinary Team

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The Pikes Peak Elder Justice Center Multidisciplinary Team has worked together since 2022 to help older adults in the Colorado Springs community. Elder abuse multidisciplinary teams are comprised of individuals from a variety of specialties that work together to address cases of elder abuse, neglect, and mistreatment. The goal of this study was to identify effectiveness of the team, as well as most common barriers encountered. It serves to provide valuable information to the team, as well as contribute further knowledge to the fields of multidisciplinary teams and elder abuse. Data from 2025 operations was compiled using team meeting sign in sheets, referral forms, and meeting minutes. The data was input into a Qualtrics survey for uniformity, then exported to IBM SPSS Statistics for analysis. Self-neglect was the most common presenting problem (45.8%), followed by caretaker neglect and other reason (20.8% each). Finding housing or placement was a goal in 20.8% of cases, despite being the least commonly represented reason for referral. The team was effective in providing recommendations and/or tangible assistance for 86.4% of cases addressed.

Foot Placement and Power Output in Rock Climbing

Amelie Piburn
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Rock climbing is a complex full body sport that requires the transfer of force across joints through dynamic multi-planar limb movements. Across athletics, whole body kinematics are determinants of optimizing power and performance, though the relationship between kinematics and force production in rock climbing is still unclear.
PURPOSE: The purpose of this study is to understand how foot placement affects average power output in rock climbers.
METHODS: Rock climbers aged 18-24 were recruited for this study. After a standardized warm-up, participants performed a powerslap move. Participants completed three recorded trials under two conditions: high-foot and low-foot placement. Paired T-tests were used to compare within-group differences.
RESULTS: Between the two foot conditions, no significant difference was found in absolute average power (858.57 ± 248.87 W, 844.33 ± 232.5 W, top and bottom foot conditions respectively, p=0.5608) or in normalized average power (12.7256 ± 3 W, 12.4317 ± 2.4 W, top and bottom foot conditions respectively, p=0.3871).
CONCLUSION: Foot placement does not influence power production between rock climbers of all skill levels. Future studies should consider the interaction between sex and experience in relationship to power production as well as the influence of lower extremity kinematics.

The Sustainability Challenge of AI: Data Centers, Resource Demands, and Community Burdens

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Artificial Intelligence is becoming deeply embedded in everyday life; from education, media, and entertainment to business, politics, and communication. As this reliance on AI grows, the demand for AI data centers is also increasing, placing pressure on electricity grids, water systems, and surrounding communities. This research project analyzes why AI- driven data centers are expanding; the environmental implications of this expansion, such as electricity demand, emissions, water use and lifecycle impacts; the social and community-level consequences of data center siting and operation; and the emerging innovations proposed to reduce harm while sustaining infrastructural growth. The key environmental concerns include rising electricity demands, greenhouse gas emissions, water consumptions, and lifecycle impacts such as carbon. Social issues include intensive and extensive land use, unequal community burdens, and growing community opposition in areas where data centers are being built. This research also highlights a distinction between power and water sustainability concerns, while emphasizing that technological innovations alone are not enough to ensure sustainable outcomes. The literature suggests that the long-term sustainability of AI infrastructure remains uncertain and will depend on whether significant improvements are made in computing efficiency and cooling systems, alongside stronger grid integration strategies and more open communication and collaboration with local communities.

Capture method affects physiological capture stress response in Atlantic nurse shark (Ginglymostoma cirratum)

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Sharks exhibit relatively higher stress responses to capture and handling compared to other vertebrates, resulting in increased likelihood of mortality following release. Despite the strong negative fitness impacts of capture and handling, little is known about how different capture methods affect the level of stress induced in sharks, especially in species that maintain ecosystem stability. The Atlantic nurse shark (Ginglymostoma cirratum) is a benthic mesopredator that controls prey populations in coastal and reef ecosystems and is frequently captured as bycatch by commercial and recreational fisheries via longlines, handlines, and other methods. Here, we assess how stress levels in G. cirratum vary by three capture methods: longline, where captured sharks are kept at the ocean surface, drumline, where captured sharks remain on the ocean floor, and handline, where time between capture and data collection is eliminated. We captured 61 sharks between 2023 and 2025, extracted blood samples, and compared serum concentrations of lactate, phosphorus, and urea. While lactate and phosphorus were found to be unrelated to capture method, urea differed significantly among groups. Specifically, post-hoc pairwise comparisons of post-capture urea levels reveal significantly higher urea in sharks caught via drumline compared to sharks caught via longline, with urea levels of sharks caught via handline found to be in between. Urea is important for osmoregulation in sharks, and a decrease in urea has been linked to elevated stress levels, which can increase the risk of mortality. Thus, future studies on sharks should consider how capture method impacts stress to minimize the physiological impact of capture and handling.

Examining Visibility Conditions in the Continental United States and Southern Appalachian Region at 5 Minute Resolutions

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The Southern Appalachian region has one of the highest fatality rates for general aviation pilots in the continental United States. One of the contributing factors to this statistic is the deadly combination of mountainous terrain and a high percentage of instrument meteorological conditions (IMC) time. Existing literature has characterized IMC percentage in terms of hours, but this method underestimates the percentage of IMC time and implies a slower onset of these hazardous conditions. Using 5-minute increment automated surface observation station reports from 111 Continental United States stations and 49 Southern Appalachian stations over the course of 10 years, this study was able to reaffirm seasonal differences in visibility conditions between the regions, reveal a greater percentage of IMC time in the southern Appalachians than initially thought, and demonstrate the rapid rate at which IMC conditions can arise. These findings indicate that higher-resolution visibility measurements are essential to general aviation safety and suggest the need for greater pilot awareness regarding IMC behaviors.

Amyloid Beta and Epigallocatechin Gallate Interactions With Anionic and Complex Lipid Membranes

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Amyloid beta (Aβ) is a protein implicated in the development of Alzheimer's disease through its ability to bind to neuronal membranes and aggregate into fibrils that form amyloid plaques. These interactions can cause pore formation, membrane thinning, and increased fluidity, ultimately disrupting neuronal function. However, the precise mechanism by which Aβ binds to different types of membranes and the structural consequences of these interactions remain unclear. This study investigated how Aβ interacts with an anionic lipid membrane (DMPG) and a physiologically relevant six-component complex membrane, and whether epigallocatechin gallate (EGCG), a polyphenol found in green tea, can affect these interactions. X-ray reflectivity was used to measure the lipid monolayers before and after exposure to Aβ and EGCG. Reflectivity profiles were fitted to extract membrane-binding information and structural parameters such as membrane thickness, electron density, and interfacial roughness. Results showed that Aβ binds more strongly to the anionic DMPG membrane compared to the complex membrane, where Aβ primarily embedded within the monolayer rather than binding to its surface. Previous research has shown that Aβ will bind strongly to complex membranes given sufficient incubation time; for this study, neither the instrumentation nor the time were available to observe this. When EGCG was added, Aβ embedding decreased in both membrane systems, suggesting that EGCG interferes with Aβ-lipid interactions either by altering Aβ conformation or by occupying membrane regions that block insertion. Overall, these findings demonstrate that membrane composition strongly influences Aβ behavior and that EGCG effectively limits Aβ insertion into membranes.

Use of Small Peptide Inhibitors in the Complement Immune System and Epstein-Barr Virus

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The Epstein-Barr virus (EBV) infects more than 90% of the world's population, largely mediated by the EBV viral glycoprotein 350 (gp350), which binds to human complement receptor type 2 (CR2/CD21) on B-cells1,2. Primary infection occurs early in childhood, but is usually asymptomatic; however, delayed infection in adolescence or later results in the development of infectious mononucleosis1. EBV infection can result in long-term carriage, which can result in nasopharyngeal carcinoma, non-Hodgkin lymphoma, and autoimmune conditions like lupus erythematosus and rheumatoid arthritis1,2. Currently, there are no vaccines or therapeutics against EBV3. In this study, we investigated the use of small peptide sequences to inhibit the binding of gp350 to the CR2 receptor protein through using Bio-Layer Interferometry (BLItz) assays. Validation of our BLItz assay was shown as the interactions between gp350 and CR2, and C3d and CR2 matched literature values. Our results show inhibition characteristics between CR2 and gp350 and CR2 and C3d with the introduction of small peptides; however, there are no inhibition characteristics of CR2 – IFNα interactions with the use of small peptides. Future research should focus on altering and designing peptides that are specific to interactions with CR2 and gp350 and do not inhibit interactions of CR2 and gp350.

Adaptive Gym Training for Individuals with Neruological Conditions

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Around the world, over 3 billion individuals (roughly 43% of the population) are affected by neurological conditions (Steinmetz J, Seeher K, Schiess N et al., 2021). There are many types of conditions that vary widely in their presentations and impacts. Many of these individuals find it difficult to exercise in a gym setting the way a neurologically typical individual may. The purpose of this research was to shadow a Grand-Junction, Colorado, based neurologically adaptive gym program, Kutthaus Neuro, to see how they overcome these challenges. Many clients were interviewed on their experiences and the trainers discussed the different challenges in running a program like this. The clients varied in their abilities and their backgrounds. This program may help inform future development of accessible and inclusive fitness programs for diverse neurological populations.This highlights the importance of individualized exercise adaptations in promoting both physical training and overall quality of life for individuals with neurological conditions. Programs like this are important in maintaining a better standard of living for these clients.

Mathematically characterizing noise in ecosystem approximations

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The generalized Lotka-Volterra (gLV) model describes the population dynamics of interacting microbial species and was fit to mouse experiments involving C.difficile infection. Stochastic noise was incorporated to capture biological variability in population growth. To simplify analysis, we applied Steady State Reduction (SSR), which projects the high-dimensional gLV system onto two-dimensional subsystems defined by the “healthy” and “antibiotic-depleted” steady states. These reduced systems approximate the full dynamics while enabling tractable analysis of transitions between microbiome states. By examining the transition region between the healthy and antibiotic-depleted states, we investigate how stochastic fluctuations are transformed under SSR and how this transformation influences microbiome state switching dynamics.

Queen Lili'oukalani's Letter to William McKinley

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This poster analyzes Queen Lili'oukalani's letter to United States president William McKinley in 1897, in order to challenge the discovery narrative and create a better understanding of the annexation of Hawaii and its corresponding implications regarding colonialism and loss of sovereignty. By framing annexation as an illegal seizure rather than a mutual treaty, Lili'uokalani argued that the United States was acting against its own stated beliefs about government by consent and the rule of law. The paper places her protest within the broader idea of discovery narratives, showing how the United States treated Hawaii as something to be acquired rather than as a sovereign nation. In this context, her protest was a political and legal argument, rather than a mere personal one, that rejected the logic of discovery and asserted Hawaiian sovereignty using the United States' own legal and political language. This paper argues that Queen Lili'uokalani's 1897 protest to William McKinley was a strategic act of diplomatic resistance that challenged American expansion by using the language of American constitutional principles.

Concentration of Arsenic in Private Well Water and City Water

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Many communities include a mix of households relying on private well water, city water or have switched from well water to city water. A common concern for those using well water is the presence of arsenic, a naturally occurring element in rocks and minerals that can leach into ground water. Arsenic is considered to have a maximum safe concentration in water of 10ppb (ug/L) as set by the U.S Environmental Protection Agency, but prolonged consumed, even at low levels, is known to increase risk of cancer, cardiovascular disease, cognitive issues, type 2 diabetes, and more. This study aims to evaluate the arsenic concentrations in private well and city water sources from homes in woodland park and Colorado springs using Atomic Emission Spectroscopy (AES). It is important to note that arsenic does not absorb through the skin easily, so water with concentrations below 500ppb is safe to use for other activities besides drinking, such as washing dishes, watering plants, showering, and brushing teeth. If the arsenic levels are found to be unsafe, homeowners using private well water not only for activities but water consumption can be informed and changes can be made to the water they are consuming. They may choose to get a filtration system for their drinking water or choose to switch to city water if it is shown to have safe levels or arsenic.

Atomic Emission Spectroscopy for Analysis of Zinc Oxide in Sunscreen

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Zinc oxide is an important ingredient commonly found in sunscreens due to its broad-spectrum UV protection. After sample preparation, it is detectable and quantifiable by atomic emission spectroscopy (AES). Determining the concentration of zinc in various sunscreen brands helps assess labeling accuracy and the development of sample preparation techniques for analyzing metals in sunscreen. In the future, this work could be used to test sunscreens for more harmful metals like arsenic and mercury.

Psilocybin-Assisted Therapy: Barriers to Access and Treatment

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Psilocybin-assisted therapy has emerged as a dynamic treatment option for mental health and addiction diagnoses. Though indigenous communities have been utilizing the medicine for centuries, it was only brought into western society in the 1950s. In 2022, Colorado passed legislation decriminalizing psilocybin and licensing facilitators to perform therapy. Although Colorado has the framework for rules and regulations, it has yet to build a solid foundation as it continues to change its code. Continually evolving legislation, along with greed, are gatekeeping Psilocybin-assisted therapy, which makes access to treatment difficult. Increasing fees, limited resources, and large organizations prevent those who need the medicine most from receiving it. Studies show the effectiveness of psilocybin and the necessity for it; however, accessibility has become a difficult path to navigate. With high costs for training and licensing, few resource options, and well-funded organizations dominating the market, potential monopolies are developing, which exacerbates these problems by prioritizing wealthy consumers. Regulatory stability, financial support, and expanding availability could alleviate some of the barriers, granting further access and aiding the country's mental health crisis.

KEYWORDS: Psilocybin, facilitators, medicine, treatment, therapy

Impact of Galectin-3 Protein on Membrane Organization

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The cell membrane and its composition play a crucial role in cell-cell adhesion and signaling pathways, which in turn have direct implications in immune response, cancer metastasis, and neurodegenerative disease, among many others. One of these interactions occurs between the chimeric type galectin-3 protein expressed by various human cells, and the membrane embedded GM1 ganglioside, a type of sphingolipid predominantly found in lipid rafts. Lipid rafts themselves are distinct, highly rigid features of the membrane that exist in the liquid ordered phase and serve as sites for membrane receptors and other signaling functions. Thus, clustering of GM1 has the potential to reorganize the cell membrane when bound to its ligand, which is mediated by affinity of Gal-3's carbohydrate recognition domain (CRD) to the ganglioside's carbohydrate moiety. This research project aimed to monitor the rearrangement of domains caused by these binding partners in a supported lipid bilayer (SLB) of physiologically relevant composition. SLB preparation followed by confocal fluorescence microscopy was used to image a section of the membrane over time to confirm the presence (or absence) of distinct domains. The membrane was labeled with TexasRed-DHPE, a fluorescent phospholipid that tends to partition into the liquid disordered phase. Three experimental scenarios were imaged over a span of 5 hours. Dark patch formation, presumed to be liquid ordered (condensed) domains, was observed after protein injection into a 5% GM1 membrane. This morphology suggests membrane reorganization, and was not present in the other compositions, as expected.

Investigating the influence of topography on Great Horned Owl (Bubo Virginianus) occupancy in the Sierra Nevada, California

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Dry, mixed conifer forests in the Sierra Nevada are home to Great Horned Owls (GHOW; Bubo virginianus). These forests, which historically experienced frequent, mixed-severity fires, are expected to experience larger, more proportionally severe fires as a result of fire exclusion and climate change. Previous research has shown that GHOW are more likely to occur in sites where patchy high-severity fire occurred 21-35 years prior, potentially due to understory regrowth and greater availability of suitable prey habitat. While topography dictates vegetation characteristics and therefore impacts wildfire behavior, composition, and configuration, it is currently unknown how topography influences the distribution of GHOW in the Sierra Nevada. In this study, we leverage a regional passive acoustic monitoring program and occupancy models to investigate the effect of slope, aspect, and ruggedness on the distribution of GHOW across the Sierra Nevada. Our preliminary findings suggest that GHOW are more likely to be detected earlier in the breeding season and are more likely to occur in more rugged landscapes than flat landscapes. We suspect these results are due to the phenology of GHOW, the availability of nesting habitat in riparian zones in drainages, and prey habitat near nesting and roosting habitat. In the future we hope to expand on this project by further investigating the relationship between topography, vegetation, and disturbance and project the occurrence of GHOW in the Sierra Nevada under different wildfire scenarios.

Synthesis and Characterization of κ-Carrageenan Carbon Quantum Dots for Electrochemical Quantification of Capsaicin

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Capsaicin, the molecule responsible for the spicy flavor of peppers and chilies, is a molecule of interest due to its culinary uses, as well as use in geographic authentication of spices, identification of waste oils, and therapeutic treatments. Current methods of capsaicin quantification involve instrumentation that is expensive and requires specialized training, making it diU'icult for many smaller operations to implement. Electrochemical quantification of capsaicin oU'ers several advantages including fast detection times, and relatively cheap and simple instrumentation and sample preparation, but previous methods have utilized expensive and diU'icult to fabricate electrode materials. Carbon Quantum Dots are a class of zero-dimensional (0D) nanomaterials that have been previously used to modify electrodes for the electrochemical quantification of many chemical compounds, including capsaicin. This research seeks to test the eU'icient fabrication of cheap CQD modified electrodes for electrochemical capsaicin quantification. We modified a CQD synthesis methods to reduce reaction time through use of a synthesis microwave. After synthesis and characterization CQDs were grafted onto ITO electrodes or mixed with graphite powder to form carbon paste electrodes (CPEs). Electron transport rate was measured using cyclic voltammetry (CV) in a ferrocyanide solution, and capsaicin quantification was tested with CV over a range of 0-62 ppm capsaicin. The more eU'icient synthesis protocol proved eU'ective, but while capsaicin detection results were promising, the eU'ect of CQD modification on electron transport rate and capsaicin detection were inconclusive due to the instability of the water soluble CQDs on the electrode surfaces. Continuing research has involved conducting synthesis in non-polar organic solvents such as toluene to reduce the water solubility of the produced CQDs, allowing for their use in the modification of electrodes intended to be used for aqueous CV.

Dorsiflexion and Dynamic Knee Valgus Kinematics in Female Athletes After Unilateral ACL Reconstruction

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Female athletes are significantly more likely to sustain anterior cruciate ligament (ACL) injuries than males, particularly through non-contact mechanisms. Peak ACL loading is believed to occur at initial ground contact, making this phase of landing critical for injury risk. Because the ankle serves as the first joint to absorb forces at initial contact and influences tibial motion, restricted dorsiflexion may influence frontal plane knee mechanics during landing. PURPOSE: This study aims to investigate the relationship between dorsiflexion range of motion (DFROM) and dynamic knee valgus (DKV) in female athletes with unilateral ACL reconstructions during a single leg drop landing. METHODS: Eight female athletes at least six months post-unilateral ACL reconstruction completed single leg, 40cm drop landings and weight-bearing DFROM assessments. DFROM and DKV were analyzed using 2-D motion capture software at both initial contact and maximum knee flexion. Spearman's rho correlations were performed to examine the relationship DFROM and DKV during landing. RESULTS: A strong, negative, statistically significant correlation was observed between DKV at initial contact and maximum DFROM in injured limbs (rho= -0.74, p= 0.04). No significant relationships were found in uninjured limbs (Initial contact: rho =-0.05, p= 0.91; Max knee flexion: rho= 0.07, p= 0.86) DISCUSSION: Limited DFROM was associated with greater degrees of DKV at initial contact in injured limbs, the phase when ACL loading is greatest. These findings suggest that restricted DFROM may contribute to persistent high-risk landing mechanics after rehabilitation and may provide an additional avenue for secondary ACL injury prevention. Further research is warranted to better understand the role of ankle mobility influence on frontal plane knee mechanics following ACL reconstruction.

Unplugged and Restored: Reversing the Negative Effects of Smartphone Use on Attention to Nature, Empathic Connection, and Mindfulness

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Smartphones have become an essential tool in daily life, and, given their pervasiveness, problematic smartphone use (PSU) is increasingly linked to depletion across multiple attentional domains. This study examined whether PSU predicts attentional deficits in nature connection, interpersonal empathy, and mindful awareness, and whether tech-free nature immersion can restore these deficits. At Time 1, 71 young adult camp counselors completed validated self-report measures; PSU significantly predicted reduced nature connectedness, diminished empathic concern, heightened personal distress, lower collaboration skills, and decreased mindfulness. After a four-week break from their smartphones, while immersed in a nature-based summer camp, a subset of 32 counselors showed significant improvements in connectedness to nature, empathic concern, and reduced personal distress. The findings support Ward et al.'s (2017) unified attentional depletion framework, and extend Attention Restoration Theory to smartphone-induced deficits, providing preliminary evidence that prolonged tech-free immersion in nature can reverse the attentional costs associated with problematic smartphone use.
Keywords: Problematic smartphone use, attention restoration theory, nature connectedness, mindfulness, empathy, digital detox, directed attention, tech-free immersion.

Depression Stigma in the Workplace

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Goffman (1963) defined stigma as a "deeply discrediting" attribute that reduces the possessor to a spoiled social identity. Weiner et al. (1988) further demonstrated that stigmas perceived as controllable, especially mental-behavioral ones, elicit greater anger and blame as well as more support for neglect or punishment. Because causal controllability can shift affective reactions, additional research is needed to understand how causal attributions shape responses to specific mental illnesses such as depression which can stem from a variety of causes. Moreover, prior research on stigma has not evaluated group scenarios like the workplace, where deviance threatens the group's positive identity. This research attempts to fill the gap in understanding how stigmatizing attitudes toward depression may combine with perceived controllability to shape reactions toward coworkers who exhibit symptoms of depression. Data were collected from 326 participants who completed a measure of personal depression stigma, then were exposed to one of two vignettes describing depression that resulted from a controllable or uncontrollable event. Participants then rated their support for realignment tactics (resocialization, avoidance, and punishment) and selected recommendations for the depressed coworker. Results showed that depression stigma significantly predicted greater support for each realignment tactic and recommendations of talking to someone. The controllability manipulation significantly predicted resocialization, but it did not predict the other realignment tactics or any recommendations. The interaction between depression stigma and the manipulation also did not significantly predict any realignment tactics or recommendations. These findings help explain how personal stigma against depression may predict different realignment tactics in group scenarios like the workplace. Further research is needed to better understand how causal controllability may interact with stigma to produce different outcomes in workplace scenarios.

Keywords: depression, stigma, group socialization, workplace, attributions

Alphabetical List of Presenters

List of Presenters

Last Name	First Name	University	Discipline	Faculty Advisor	Presentation Assignment
Abbott	Jacob	UCCS	Social Sciences	David Havlick and Joey A. Lee	Poster Session 2
Arista	Lina	UCCS	Natural Sciences	Brandon Vogt	Poster Session 1
Axel	Jo	CU BOULDER	Humanities	Thomas Andrews	Oral 1 - Room s232
Barone	Mason	UCCS	Natural Sciences	Shelby Noland	Poster Session 2
Beachy	Peter	PPSC	Engineering/Math	Jennifer Holmes	Poster Session 2
Beal	Elizabeth	UCCS	Natural Sciences	Crystal Vander Zanden	Poster Session 1
Beitle	Nicole	UCCS	Natural Sciences	Allen Schoffstall	Poster Session 1
Benge	Amy	UCCS	Social Sciences	Kyrsten Hill and Lori James	Poster Session 2
Bergeron	Carter	UCCS	Social Sciences	Joseph Wagoner	Poster Session 2
Bicks	Kate	CC	Natural Sciences	Charlotte Gabrielsen	Poster Session 2
Bogar	Kylie	CC	Engineering/Math	Danielle Ellsworth	Oral 1 - Room s228
Bost	Ethan	CC	Natural Sciences	Eli Fahrenkrug	Oral 1 - Room s228
Brancieri	Nick	UCCS	Natural Sciences	Amanda Morgenstern	Poster Session 1
Brancieri	Nick	UCCS	Natural Sciences	Shelby Noland	Poster Session 1
Branzei-Braunschweig	Lavender	PPSC	Social Sciences	Glenn Rohlfing	Poster Session 2
Braun	Hayden	UCCS	Natural Sciences	Ezio Iacocca	Poster Session 1
Capen	Grant	UCCS	Natural Sciences	Doug Risser	Poster Session 1
Chapman	Taylor	UCCS	Social Science	DeLyn Winters, Elizabeth Bauer, and Tom Francis	Oral 2 - Room s215
Church	Alease	PPSC	Engineering/Math	McKenna Lovejoy	Poster Session 2
Cole	Josiah	UCCS	Social Sciences	Krisen L. Rudd	Poster Session 2
Collinsworth	Tood	UCCS	Social Sciences	Kristen L. Rudd	Poster Session 1
Collinsworth	Todd	UCCS	Social Sciences	Kristen L. Rudd	Poster Session 2
Coursey	Diamond	UCCS	Natural Sciences	Douglas Risser	Poster Session 1

Davis	Jonathan	CC	Natural Sciences	Stephen Langer and Leslie Leinwand	Oral 2 - Room s215
Delaney	Torah	CC	Natural Sciences	Neena Grover	Poster Session 1
Douillard	Gigi	UCCS	Natural Sciences	Amy L Klocko	Poster Session 1
Duncan	Steve	UCCS	Natural Sciences	Shelby Noland	Poster Session 1
Espinoza	Leonard	UCCS	Natural Sciences	Keston Lindsay	Poster Session 2
Fisher	Evren	UCCS	Natural Sciences	Jeremy Bono	Poster Session 2
Flores	Nyah	CC	Social Sciences	Tomi-Ann Roberts	Poster Session 1
Ford	JD	PPSC	Humanities	Emily Forand	Oral 2 - Room s228
Frederickson	Steven	UCCS	Natural Sciences	Allen Schoffstall	Poster Session 2
Gomez Rodriguez	Omar	CC	Natural Sciences	Murphy Brasuel	Poster Session 1
Gonzalez Paris	Veronica	CC	Social Science	Michael Bonnal	Oral 2 - Room s232
Griffin	Lex	UCCS	Humanities	Karen deVries, Robert (Rex) Welshon and Jennifer Kling	Oral 2 - Room s232
Hall	Natalie	PPSC	Humanities	Emily Forand	Oral 2 - Room s228
Hall	Natalie	PPSC	Natural Sciences	Sandi Harvey	Oral 1 - Room s215
Hampton	River	UCCS	Humanities	Ilaheva Tua'one	Poster Session 1
Hams	Jake	CC	Natural Sciences	Michelle Gevedon	Oral 1 - Room s215
Huckell	Emily	CC	Natural Sciences	Eryn Murphy	Poster Session 1
Hutchison	Sterling	UCCS	Social Science	DeLyn Winters	Oral 2 - Room s215
Hutfilz	Sarah	PPSC	Natural Sciences	Stephen M. Budy	Poster Session 1
Jackson	Nadia	CC	Natural Sciences	Daniel Hueholt	Poster Session 2
Jacobs	Nick	PPSC	Engineering/Math	McKenna Lovejoy	Poster Session 2
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James	Alexis	UCCS	Natural Sciences	Amy L Klocko	Poster Session 1
Johnson	Heidi	UCCS	Natural Sciences	Emily Mooney	Poster Session 2
Johnson	Madeleine	CC	Engineering/Math	Danielle Ellsworth	Oral 1 - Room s228

Justiniano	Mikey	PPSC	Social Sciences	Glenn Rohlfing	Poster Session 2
Kang	Sophia	CC	Natural Sciences	Eryn Murphy	Poster Session 1
Katzen	Miles	CC	Natural Sciences	Jesus Pena	Oral 1 - Room s215
Kearney	Izzy	CC	Natural Sciences	Eryn Murphy	Poster Session 1
Khan	Rafiul	CC	Engineering/Math	Edward F. Price III	Poster Session 2
Kim	Younglin	PPSC	Social Sciences	Glenn Rohlfing	Poster Sesson 2
Kim	Songhyun	CC	Natural Sciences	Murphy Brasuel	Poster Session 1
Kujawa-Levine	Lisa	UCCS	Social Sciences	Leilani Feliciano	Poster Session 1
Lee	Gyuri	CC	Natural Sciences	Murphy Brasuel	Poster Session 1
Leung	Chung	CC	Natural Sciences	Habiba Vaghoo	Poster Session 1
Lindell	Linnea	CC	Natural Sciences	Katrin Nitz and Esther Lutgens	Poster Session 2
Lues	Gabriela	CC	Natural Sciences	Eryn Murphy	Poster Session 2
Lyons	Lily	UCCS	Natural Sciences	Crystal Vander Zanden	Poster Session 1
Malott	Caroline	CC	Social Sciences	John Horner	Poster Session 1
Melton	Isabel	UCCS	Social Sciences	Mike Kisley	Poster Session 1
Mital	Sophia	UCCS	Natural Sciences	Allen Schoffstall	Poster Session 1
Mongin	Lynn	UCCS	Natural Sciences	Jeremy Bono	Poster Session 1
Moore	Aidan	UCCS	Natural Sciences	Douglas Risser	Poster Session 1
Mulcahey	James	UCCS	Natural Sciences	Amanda Morgenstern and Hunter Redmon	Poster Session 1
Musgrave	Leah	UCCS	Humanities	Ilaheva Tauone	Poster Session 2
Nagel	Hailey	CU BOULDER	Humanities	Andrew Detch	Oral 1 - Room s232
Neal	Elise	PPSC	Humanities	Emily Forand	Poster Session 2
Neal	Elise	PPSC	Arts	Emily Forand	Poster Session 2
Nesenson	Hailey	UCCS	Social Sciences	Rachel Weiskittle	Poster Session 2
Ollier	Theodore	CC	Natural Sciences	Jesús Peña	Oral 1 - Room s215

Pardo	Conner	UCCS	Social Sciences	Frederick Coolidge	Poster Session 1
Park	Michael	UCCS	Natural Sciences	Jeremy Bono	Poster Session 1
Parks	Sarah	UCCS	Social Sciences	Kyrsten Hill	Poster Session 1
Perez	Viviana	PPSC	Arts	Emily Forand	Poster Session1
Piburn	Amelie	CC	Natural Sciences	Eryn Murphy	Poster Session 2
Pintor	Jacob	UCCS	Natural Sciences	Shelby Noland	Poster Session 2
Pintor	Jacob	UCCS	Natural Sciences	Allen Schoffstall	Poster Session 1
Pooley	Keller	CC	Natural Sciences	Michelle Gevedon	Poster Session 1
Powell	Laurel	UCCS	Natural Sciences	Robert E. Camley	Oral 2 - Room s215
Rives	Noemi	UCCS	Social Sciences	David Havlick	Poster Session 2
Rocca	Sofia	CC	Natural Sciences	Eryn Murphy	Poster Session 1
Rosenbaum	Maddy	CC	Natural Sciences	Maybellene Gamboa	Poster Session 2
Rucker	Fiona	CC	Natural Sciences	Daniel Hueholt and Allison Lawman	Poster Session 2
Sandino	Jose	UCCS	Natural Sciences	Crystal Vander Zanden	Poster Session 2
Schauer	Tessa	UCCS	Humanities	Brittany Orton and Rebecca Posusta	Oral 2 - Room s228
Schramm	Mitchell	PPSC	Humanities	Glenn Rohlfing	Oral 1 - Room s232
Schroeder	Kevin	UCCS	Natural Sciences	James Kovacs	Poster Session 2
Simpson	Owen	CC	Natural Sciences	Lori Driscoll	Poster Session 2
Smoak	Senna	UCCS	Engineering/Math	Eric Jones	Poster Session 2
Snelling	Julia	CC	Engineering/Math	Jane McDougall	Oral 1 - Room s228
Stevens	Marin	UCCS	Natural Sciences	Ana Barovic, Luis Lowe, and Janel Owens	Poster Session 1
Stevens	Marin	UCCS	Natural Sciences	Shelby Noland	Poster Session 2
Stout	Uriko	UCCS	Social Sciences	Ilaheva Tua'one	Poster Session 1
Swift	Lily	CC	Natural Sciences	Kate McGinn	Poster Session 1
Taylor	Emily	UCCS	Natural Sciences	Amy L Klocko	Poster Session 1

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Tennant	Izabel	UCCS	Natural Sciences	Shelby Noland	Poster Session 2
Thomas	Gracie	UCCS	Natural Sciences	Shelby Noland	Poster Session 2
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Venzor	Raul	UCCS	Humanities	Edgar Cota-Torres	Oral 2 - Room s228
Wang	Perilla	CC	Social Science	Shiqi Ma and John Williams	Oral 2 - Room s232
Weatherby	Samuel	PPSC	Engineering/Math	McKenna Lovejoy	Poster Session 2
Willner	Rebecca	CC	Natural Sciences	Eli Fahrenkrug	Oral 1 - Room s228