

Student Research & Internship Symposium

Summer Faculty-Student Collaborative
Research (SCoRe) and Internship Presentations

THURSDAY, OCTOBER 6, 2022

3 - 5 p.m.



SCHEDULE

Student Research & Internship Symposium

Thursday, October 6, 2022

Edith Kinney Gaylord Cornerstone Arts Center

3-3:50 P.M. RICHARD F. CELESTE THEATRE

Opening Remarks

Song Richardson, President of the College

Student Presentations on their Collaborative Research

Adele Matter '23, "Characterizing RBM-39's Behavioral and Transcriptomic Effects in *C. elegans*"

Chloë Brooks-Kistler '23, "Sì, esistiamo: Podcasts Centering the Experiences of Afroitalians"

Alex Weiss '24, "The Pen, the City, and the Grave: Islam & the Inheritance of Ancient Near Eastern Humanism"

Connor McMaster '23, "Exploring the Interactions Between Political Protest Participation and Excess Liquidity in Kyrgyzstan"

Student Presentations on their Internships

Meredith Kuster '23, The Durst Organization, Manhattan, NY

Leigh Walden '25, American Civil Liberties Union of Colorado (ACLU – CO), Denver, CO

3:50-5 P.M. CORNERSTONE MAIN SPACE

Poster Presentations

3:50-4:25 P.M. Poster Session 1 Research Abstracts P1-P34/ Internship Summaries P1-P34

4:25-5 P.M. Poster Session 2 Research Abstracts P35-P69/ Internship Summaries P35-P68



Dear CC Community and Parents,

Welcome to the annual Student-Faculty Collaborative Research (SCoRe) and Internship Symposium! This fascinating event celebrates the outstanding research and internship experiences that Colorado College students undertake with the support of their faculty, staff, alumni, and internship mentors, both on and off campus.

Today you will take part in presentations, poster sessions, and conversation across the disciplines. You will have a window into the experiential and deep learning that summer research and internships provide as our students tackle complex issues and exploration, and gain invaluable real-world experience.

This kind of learning prepares students for success by cultivating many important skills, including critical thinking; the ability to communicate clearly in writing and speaking; comfort with complexity and ambiguity; collecting, organizing, and analyzing information; and the resilience to learn from failure and then find new approaches.

These are essential skills for the leaders of the future. Studies also tell us that students who take part in these experiences are more likely to thrive in their careers and lives.

Thanks to the faculty, staff, alumni, and internship providers who mentor and encourage these students, whose passion and potential for learning inspire us every day.

Thank you for joining us!

Sincerely,

L. SONG RICHARDSON
President of the College

STUDENT ORAL PRESENTATIONS

Characterizing RBM-39's Behavioral and Transcriptomic Effects in *C. elegans*

Student Researcher: Adele Matter '23

Major: Genetic Epidemiology and Society (IDM)

Faculty Collaborator: Darrell Killian, Molecular Biology

Research Collaborator: Noah Johnson '23

This project completes ongoing work connecting RBM-39, an RNA-binding protein in the *C. elegans* genome, to morphology and behavior. Previous work in Dr. Killian's lab identified this gene as a putative cause of alternative splicing changes and defects in neuronal morphology, and involved a broad RNA-seq comparison of the transcriptome of RBM-39 deletion and wild-type worms. Currently, I am characterizing the movement changes induced by RBM-39 deletion and identifying the source (neuron, muscle, or other) of these locomotion changes. To characterize these changes, I designed, built, and am executing a behavioral assay intended to capture the specific behavioral changes these RBM-39 deletion worms display. To discover the source of these changes, I built (via Gateway cloning) and will inject plasmids expressing RBM-39 in muscle, neurons, and ubiquitously to see whether neuronal or muscular RBM-39 restores wild-type behavior and movement in RBM-deletion mutants. I am also determining what RNA RBM-39 binds in different tissue types by designing and building a set of worms expressing GFP-tagged RBM-39 protein in neurons and ubiquitously. This project will help determine what RBM-39 is directly influencing the splicing of. Both of these projects contribute to a mechanistic understanding extending from the RBM-39 gene to its' influences on phenotype and morphology.

Sì, esistiamo: Podcasts Centering the Experiences of Afroitalians

Student Researcher: Chloë Brooks-Kistler '23

Majors: Political Science and Italian

Faculty Collaborator: Amanda Minervini, Italian

Sì, esistiamo is a podcast series created with the aim to spread awareness about the experiences of Afroitalians in Italy. The series is made up of three episodes, each spotlighting an Afroitalian social activist/content creator. The guests include Fred Kudjo Kuwornu, Italy's first documentary filmmaker of African descent; Ian Elly Ssali Kiggundu, a professional pianist who has been protesting and lobbying for citizenship law reform; and Kwanza Musi Dos Santos, president and co-founder of the first POC, non-profit organization QuestaèRoma, based in Rome. Through these episodes I discuss the Ius Soli citizenship laws in Italy, the rise of populist governments in Europe, and the treatment of non-white immigrants and their children in Italy. *Sì, esistiamo* uses storytelling to share the experiences of underrepresented and misrepresented groups of Italian society. To try to understand the experiences of a group of people, it is crucial to talk to them and get their perspectives first-hand.

This QR Code will take you to Chloe's website:



The Pen, the City, and the Grave: Islam & the Inheritance of Ancient Near Eastern Humanism

Student Researcher: Alex Weiss '24

Major: History

Faculty Collaborator: Peter Wright, Religion and Arabic, Islamic, and Middle Eastern Studies

The Pen, the City, and the Grave: Islam & the Inheritance of Ancient Near Eastern Humanism— is the working title of Professor Peter Wright's manuscript project, in which for six weeks (and continuing), I got to be part of its editorial process. The book is primarily a scholarly work of Islamic Studies that reflects the author's expertise in his field. At its foundation is a historical narrative of the Islamic tradition from 2100 B.C.E to the 14th Century C.E., all the while exploring a few eminent minds of those belonging to it. Center to the book's subject is a discussion and new definition for the idea of humanism; driven by the essential question, "What does it mean to be human?" Through the act of independent reading followed by hours of conversation, the manuscript project provided deep insights on the stories we tell ourselves, about ourselves.

Exploring the Interactions Between Political Protest Participation and Excess Liquidity in Kyrgyzstan

Student Researcher: Connor McMaster '22

Major: Economics

Faculty Collaborator: Oguzhan Batmaz, Economics

The relationship between protest participation and the economy is theoretically known but has not been sufficiently quantitatively explored. This paper gives a history of political unrest in Kyrgyzstan after the fall of the Soviet Union and explains why Kyrgyzstan may be an important candidate for study on the impact of civil society on the economy. This project uses the interaction between protest participation from 2018 to May 2022 in Kyrgyzstan and excess liquidity, remittances, and other financial data and contrasts results from conventional regression analysis with bivariate wavelet coherence methods. Results suggest that political violence may lead excess liquidity, especially when particularly large-scale events occur during otherwise peaceful times. There is also a high correlation between protests and remittances which warrants further research.

Durst Organization, Manhattan, NY

Student Intern: Meredith Kuster '23

Major: Environmental Studies

The Durst Organization is a real estate development firm based in Manhattan, NY. What sets Durst apart from other developers is their effort to leave every place better than they found it. During my summer at Durst, I was able to see how much value and investment they place on sustainable development. My favorite part was having the opportunity to tour most of their iconic properties with the sustainability, design management, and engineering teams. Many of these buildings have in-house wastewater treatment plants, cogeneration plants, and air circulation mechanics, all of which help reduce the impact the buildings have on the environment every day. The materials used to build and decorate these portfolios must pass chemical exclusions, carbon emissions, and waste management standards. The Durst Organization's standards are very important when considering the expanding field of sustainability. Their work exceeds several different LEED requirements, and all but 2 properties are LEED certified, including One World Trade Center. Working with such a motivated, knowledgeable, and experienced team gave me insight on how we can combat climate change and care about the environment on a large corporate scale. <https://www.durst.org/>

American Civil Liberties Union of Colorado (ACLU – CO), Denver, CO

Student Intern: Leigh Walden '25

Major: Undeclared

The American Civil Liberties Union of Colorado is part of the larger ACLU mission to create a nation where the civil freedoms of all American citizens are recognized and celebrated. I primarily worked with the Advocacy and Strategic Alliance team supporting the work of research, community outreach, and information distribution. Some of the larger projects I worked on during my time included updating the “Know Your Rights” pamphlets for immigrants living in Colorado, and working on the “Know Your Sheriff” campaign for which the ACLU-CO will be the first to ask all sheriff candidates across the state their stance on issues like reducing recidivism rates, prioritizing student mental health in schools, and de-escalation practices. I also had the privilege to work with the ACLU-CO’s communication team to integrate more opportunities for student journalism. Collaboration with their team alongside my work with the on-campus student newspaper, the Catalyst, is slowly creating more opportunities for young people to be part of the larger ACLU conversation. The most rewarding part of my experience with the ACLU was speaking with people at tabling events around the state including Denver’s Pride Festival, Aurora’s Pride Festival, and even a Red Rocks concert for Tower of Power. This summer saw a reduction of historically ingrained civil rights, and these events, though fundamentally celebrations, were also spaces for community action and communal grief processing. Being in this position gave me a sense of purpose, but more powerfully, it gave me a feeling of authority to tell people there’s hope for a more equitable future. <https://www.aclu-co.org/>

What is SCoRe?



During the summer of 2022, over 140 students participated in research under the mentorship and support of Colorado College's dedicated faculty both on and off campus. While the Block Plan structures academics around a condensed timeline, summer research allows students and faculty collaboratively to explore deeper into topics, by spending extended time researching in the classroom, the library, the lab, and the field.

The Student Collaborative Research (SCoRe) Program supports both students and faculty through academic and community field trips and gatherings, peer-to-peer presentations and discussions, and professional development workshops. We are excited to showcase the work CC faculty and students have done this summer.

Visit: <https://www.coloradocollege.edu/offices/careercenter/our-programs/research-opportunities/index.html>

RESEARCH POSTER PRESENTATIONS, ABSTRACTS P1-P34

P1 **Determining the ideal node spacing for meandering bedrock channel numerical expressions**

Student Researcher: Luca Espinosa '23

Major: Environmental Science

Minors: Computer Science and Mathematical Biology

Faculty Collaborator: Sarah Schanz, Geology

Determining the ideal node spacing for the numerical expression of bedrock channels is critical for accurately representing river meandering, including curvature, meandering rate, and meandering direction. I traced paleochannels guided by slip-off surfaces and river terraces, ran model simulations of paleochannel sections along the Wynoochee and Clearwater rivers in Washington, and analyzed the results through a normalized misfit comparison between the pre-model and post-model channels. Misfit was represented by the difference in meander path between the model output and the current channel. Through this methodology, I determined that the ideal node spacing is between 50 and 75 meters. As lateral erosion rates increased across all models, as well as when the model was run with older paleochannels, a node spacing of 50 meters or coarser minimized the model misfit. An ideal node spacing of 50 to 75 meters for bedrock channel simulations allows for more efficient model runs while maintaining or even improving the accuracy of the model outputs.

P2 **Figuring the Mad Child: Student Identity and Agency within the Cultural Practices of Special Education for Serious Emotional Disturbances**

Student Researcher: Colleen Campbell '23

Majors: Education and Race, Ethnicity, and Migration Studies

Faculty Collaborator: Nickie Coomer, Education

This preliminary study seeks to describe the ways in which parents and caregivers of students who have emotional and behavioral disorders and difficulties in school, and the students themselves, narrate their experiences with behavioral practices in school. Using a Critical Disability Studies and Mad Studies theoretical frame to explore constructions of emotion, thought, and behavior as agentic, this study attempts to deepen the current body of research on student behavior by examining the ways in which parents/caregivers and students narrate themselves in relation to their teachers, peers, and broader schooling norms, and the ways in which a child's non-normative behavior in school may not, necessarily, only serve to pathologize them, but also serve as an agentic force against the symbolic and material violence embedded in schooling. In this interpretive study, Roy D'Andrade's work in cultural psychology was used to frame and to examine the ways in which young children (ages 6-8) understand the meaning of behavior in school (what it means to "be good" and what it means to "not be good"), as well as the ways in which parents and caregivers of children who have emotional difficulties in school make meaning of their experience and that of their child's. A series of in-person, semi-structured interviews with students and their families were conducted exploring student experiences in school and narrations of self and behavior. Preliminary data analysis surfaced the ways in which participants used two narratives to categorize their experiences with emotional difficulties in school: (a) processes of pathologization and (b) the *feeling* of punishment. Due to the preliminary nature of the study, it will act to guide future research. Specifically, it allows for insight on more approachable recruitment strategies and more focused interview processes and questions, particularly with children. Additionally, this research stands to promote a hermeneutical structure for communicating the experiences of children and their caregivers beyond pathologizing language, and toward heuristics that promote agency. Future research might expand on this study by increasing the participant pool and interview development for caregivers and their children.

P3 **Fluorinated L-Phe Dipeptides May Inhibit Bacterial Growth and Biofilm Formation of *P. aeruginosa***

Student Researcher: Caitlin Kim '24

Major: Molecular Biology

Faculty Collaborator: Olivia Hatton, Molecular Biology

Biofilm formation allows for pathogenic bacterial infections that can be resistant to treatment and deleterious to collateral tissues in hosts. *Pseudomonas aeruginosa* is an opportunistic pathogenic bacteria which causes harmful biofilm-mediated infections such as those fatal to cystic fibrosis patients. Previously, D-amino acids have been found to trigger disassembly of biofilms, such as those formed by *P. aeruginosa*. Similar findings from the Distributive Drug Discovery (D3) Project suggest that fluorinated L-amino acids may also allow for biofilm disassembly. In collaboration with the D3 project, this study investigates the biological activity of various prodrug formulations of fluorinated L-Phenylalanine dipeptides. The ultimate goal is to find a compound with selective toxicity against *P. aeruginosa* and its associated biofilms. The PA14 strain of *P. aeruginosa* was cultured in the presence of D3 compounds or controls. Bacterial growth and biofilm formation were analyzed by optical density at 600 nm (OD600) and crystal violet staining, respectively. Of the compounds tested, compound #42 reduced bacterial growth, although not significantly, and did not inhibit biofilm formation. Interestingly, compounds #2, #3, and #5 increased biofilm formation. Future studies may replicate these results and investigate the exact concentration necessary, mechanisms of the prodrug, and toxicity in human cell line.

P4 **UV-LED Triggered Spark Gap Using Photoelectric Effect**

Student Researcher: Liam Keeley '24

Major: Physics

Faculty Collaborator: Adam Light, Physics

We present work on using a UV-LED and the photoelectric effect to trigger a spark gap and achieve nanosecond scale high voltage pulses. We confirm that the use of a UV-LED is successful in reducing the timing jitter of the spark gap, and present analysis which shows that the timing could be further reduced. Finally, we offer an initial theoretical discussion of why we expect better timing and have observed sub-breakdown voltage discharges in the presence of the UV-LED.

P5 **A Linear Algebra approach to the Jones Polynomial for Torus Knots**

Student Researcher: Jingyi Liu '24

Major: Mathematics

Faculty Collaborator: Molly Moran, Mathematics and Computer Science

Much of knot theory is concerned with whether two knots can be manipulated in three-dimensional space (without cutting) to be exactly the same. Mathematicians use mathematical objects, known as knot invariants, to answer this question. One of the unsolved problems is an elementary proof of the formula for the Jones polynomial invariant of an (m, n) -torus knot. In this research, we use trip matrices and knowledge from linear algebra to compute the Jones polynomial of $(3, n)$ -torus knots. We also describe the general form for the trip matrix for any (m, n) -torus knot and detail the challenges that arise in using this more elementary approach for the computation of the Jones polynomial.

P6 **Assessing the vulnerability of the Juneau Icefield to atmospheric warming**

Student Researcher: Lili Weir '22

Major: Organismal Biology and Ecology

Minor: Environmental Studies

Faculty Collaborator: Dr. Jessica Badgeley, University of Seattle, Department of Earth and Space Sciences

The Juneau Icefield is a low-elevation plateau that is sensitive to climate warming because an upward shift in the 0°C isotherm can significantly expand the ablation zone. To understand the changing ablation area, we examine lapse rates over time and space. We found no significant change in lapse rate over time, however there is a consistent seasonal pattern of higher lapse rates in the spring and fall and lower lapse rates in the winter. We begin assessing regional variability in lapse rates by comparing the icefield average to a July 2022 temperature transect in the mid-eastern region of the icefield. Our results indicate that we can apply measured lapse rates to predict future temperatures across the icefield, even with variation seasonally and regionally. We establish icefield vulnerability to future warming by calculating the increased size of the ablation area and change in ablation season resulting from a rising 0°C isotherm.

P7 **Female Preference for Male Distant Calls in the Socially Monogamous Zebra Finch**

Student Researcher: Julia Solano '24; Rachael He '23

Major: Neuroscience

Faculty Collaborator: Marcela Fernandez Peters, Psychology

Research Collaborators: Diva Taylor '23; Mags Dvorakova '23

The zebra finch is a widely used monogamous model species for neurobehavioral studies of vocal learning, auditory processing, and pair-bonding formation. They live in large assemblies and use distance calls to recognize and stay in contact with their mate. Previous literature has demonstrated how female zebra finches can discriminate between different calls and show a preference towards the signals from the mate in a preference test setting, where the female is exposed to pre-recorded distance calls from their mate and a non-mate male. However, it is unclear from the existing literature what is the most effective research design to record mate calls and test female preference. We modified a previous preference test and examined whether familiarity of the non-mate male influences female's preference. We found that familiarity of the caller disrupts preference for the mate's call. Females are more likely to prefer the mate's call when compared to an unfamiliar male but not to a familiar non-mate call. These results illustrate the complexity of the zebra finch social relationships and their ability to recognize individuals by their calls. A larger sample size is needed to confirm the external validity of the current version of preference test before it can be used in future studies regarding affiliation behavior and auditory discrimination ability.

P8 **Liquid-Liquid Phase Separation in the Glucocorticoid Receptor and Other Nuclear Receptors**

Student Researcher: Devlin Swanson '24

Major: Biochemistry

Faculty Collaborator: Peggy Daugherty, Chemistry and Biochemistry

Research Collaborators: Nate Kesti '23

The Glucocorticoid Receptor (GR) is a transcription factor in the nuclear receptor family that plays roles in regulating metabolic, immunological, and other pathways. GR acts by binding DNA and can either activate or repress target genes. Liquid-liquid phase separation (LLPS) is a phenomenon where proteins, RNA, or other solutes separate from the aqueous solution to a non-water soluble liquid phase. The separation results in changing local concentrations in order to control activity of target macromolecules. Current evidence suggests GR undergoes LLPS. LLPS in GR is driven by hydrophobic effects regulated by the intrinsically disordered N-terminus. We investigated LLPS using flow microscopy (FlowCam). We used a molecular crowder titration to show a phase transition between a dense and soluble phase. We further analyzed LLPS in other nuclear receptors, showing these receptors undergo LLPS with unique properties. We looked at the effect of SEGRAs (selective glucocorticoid receptor agonist), showing LLPS as a potential mechanism for selective repression in GR. Finally, we investigated LLPS in GRIP-1, one of GR's primary cofactors, but found no evidence of LLPS. The FlowCam technique furthered our understanding of LLPS in GR and related cofactors/nuclear receptors, but additional investigation is warranted.

P9 **Using Broadening Functions to Compute the Radial Velocity of Sub-Subgiant Stars**

Student Researcher: Luc Rousseau '23

Major: Physics

Faculty Collaborator: Natalie Gosnell, Physics

Sub-subgiant stars (SSGs) are a new classification of stars that are redder than main sequence stars and less luminous than stars in the subgiant branch. They occupy a location on a color magnitude diagram (CMD) where our understanding of normal single star evolution does not predict stars to be. SSGs exist in binary pairs, are highly magnetically active, and have faster rotation periods than stars on the subgiant branch. By studying the radial velocity of SSGs we gain a more complete understanding of the binary parameters of these systems. We studied spectra from 99 SSGs, using a python package called SAPHIRES to compute a spectral line broadening function from each spectra using a synthetic template, from which we calculated a radial velocity. We determined an inverse trend between radial velocity and rotational period. Future work will search for binary orbital solutions from SSGs with multiple radial velocity measurements.

P10 3D Printing for Mathematical Exploration

Student Researchers: Ollie Beland '25; Eric Tang '24; Harry Yao '24

Majors: Organismal Biology and Ecology and Chemistry; Mathematics; Mathematics

Faculty Collaborator: Jane McDougall, Mathematics

Research Collaborators: Rebecca Parker, Jeremiah Houck, Brenda Houck

We picked a variety of mathematical concepts to explore and illustrate utilizing 3D printing. These concepts varied from complex analysis regarding minimal surfaces, geodesics, surfaces of revolution, and Platonic and Archimedean solids. We utilized both standard PLA and relatively new ceramic 3D printing to explore these topics. The more complex models to construct and visualize – typically the minimal surfaces, geodesics, and surfaces of revolution – were printed using PLA. The ceramic printer was typically used for the Platonic and Archimedean solids. Regardless of the printing medium, we used Rhino3D and Cura to model and slice our objects for printing. Complex analysis drove much of the mathematics behind creating the minimal surfaces, geodesics, and surfaces of revolution. Relatively simple geometry was used for the Platonic and Archimedean solids. We explored geometric and topological proofs for each section of this project. Many of the objects we created are hard to visualize as a 2D projection. Thus, creating and obtaining 3D projections of these objects is a powerful tool for increasing mathematical accessibility. The process of creating and printing these objects illuminated further areas of research regarding these mathematical concepts, some of which we developed over the course of this project.

P11 Surface Modification of Brass by Atmospheric-Pressure Plasma Jet Treatment

Student Researchers: Jennifer Aggrey '25; Mauricio Erazo Jr. '25

Majors: Neuroscience; Molecular Biology

Faculty Collaborator: Adam Light, Physics

Surface modification of brass by atmospheric pressure plasma remains relatively unexplored. As an alloy of reactive metals, brass provides an interesting substrate to study plasma-surface interaction. Surface modification of brass was performed using an Argon-fueled atmospheric pressure plasma jet at room temperature. We focused on increasing the wettability of the surface by observing changes in the contact angle at the solid-liquid interface over time following the Young-Laplace equation. Contact angle of water droplets on treated brass surfaces decreased significantly when compared to untreated surfaces. The wettability decreased over time, and the contact angles reverted to their original values. With much smoothly polished brass surfaces, the opposite was seen. By using Raman spectroscopy, we hope to identify the chemical species that produce this temporary and reversible surface modification, along with anomalies observed at smoother surfaces. We present our experimental setup, analysis techniques, and preliminary results.

P12 *Populus deltoides* stomatal morphology at Fountain Creek Regional Park

Student Researcher: Sarah Senese '23

Major: Organismal Biology and Ecology

Faculty Collaborator: Shane Heschel, Organismal Biology and Ecology

Native cottonwoods are keystone species in riparian ecosystems across the Southwest. *Populus deltoides*, the eastern cottonwood native to North America, grows from the eastern to southwestern United States and thrives in riparian habitats. As phreatophytes that tend to avoid water stress by tapping into the water table adjacent to streams, drought and lack of flooding can exacerbate the effects of their high transpiration rates and low water-use efficiencies (Blake et al. 1984). Across the genus, poplars have been shown to exhibit either a conservative strategy where they restrict water use (and in turn productivity) under water stress conditions, or a riskier strategy in which they continue to function under increasing water stress despite the low soil moisture and/or high vapor pressure deficit. Facing varied physical and biotic conditions throughout *Populus deltoides* large species range, population variation—especially in leaf economic traits and morphology—is common and pronounced (Dunlap and Stettler 2001). Leaf economic and morphological traits like stomatal density and aperture and their regulation are of main interest in the study of drought adaptation and plasticity in semi-arid and heat-stressed climate conditions. Interestingly, past work has indicated that cottonwood leaf traits and water relations can vary with development, such that the importance of leaf traits to viability might change with age. Population transition matrices might depend on a combination of leaf morphology/physiology and cottonwood age in the riparian systems of the Southwest. We asked the following research questions: How do leaf stomatal traits change with cottonwood age? How do leaf morphology traits as a whole change with age? Do stomatal traits and photosystem efficiency have any significant relationship?

P13 State of the Rockies Public Lands Survey

Student Researchers: Anil Jergens '23; Cecilia Timberg '24; Henry Hodde '24; Sam Nystrom Costales '25; Sama Zaman '25

Majors: Mathematical Economics and History; Anthropology and Environmental Studies; Environmental Science; Economics and History; Undeclared

Faculty Collaborator: Kat Miller-Stevens, Economics and Business, State of the Rockies

Research Collaborator: Cyndy Hines, State of the Rockies

Our team of student interns conducted approximately 400 interviews of visitors of public lands in the Rocky Mountain West over the summer about their experience. Overall, visitors were overwhelmingly positive about public lands, and they wished that they would stay as they are now. People visited public lands for recreation, freedom, and spiritual experiences. There were a variety of issues that visitors wanted to be addressed. An increase in funding that would lead to nicer facilities, lower entrance fees, greater accessibility, and more education. Enforcement was a primary concern. Visitors also desired public lands to be an apolitical space. Public lands can be crowded, though visitors were understanding as they themselves were contributing to that crowding. Visitors wanted others to respect the land by not littering, staying on trail, and respecting fellow visitors. Visitors often felt that public lands are disappearing, and they connected this to encroachment by private interests. Oil and gas leasing was the most-listed offender, though personal examples usually centered around private land development and access road closures. We found that public lands were a significant reason why people visited, and lived, in the Western United States.

P14 Snow in June

Student Researcher: Matthew Silverman '23

Major: History; **Minors:** Journalism and Anthropology

Faculty Collaborator: Eli Fahrenkrug, Chemistry and Biochemistry

Research Collaborator: Aidan Powell '22

In January 2022, Dr. Fahrenkrug led a pilot course over half block and hopes to establish the exciting field of snow science within Colorado College. One fundamental aspect of snow science is studying the physical properties of snow as a material but doing that requires the ability to make artificial snow in a laboratory setting that is as true to snow crystals found in nature as possible. With this goal in mind, this summer we set out to construct a machine that would be able to make true snow crystals (as opposed to other forms of frozen water crystals such as frost, which forms on surfaces as opposed to snow, which forms on a nucleation point higher in the troposphere). We based our machine off designs published by the WSL Institute for Snow and Avalanche Research in Davos, Switzerland, and adapted their methods to fit our criteria and constraints. While we succeeded in making a machine that was able to make snow, it needs refining to be more effective in its consistent snow making capabilities and more fine tunable to be able to create different crystal structures.

P15 An Investigation into Reactivity of Dewar Pyridine and Benzyne

Student Researcher: Minh Pham '23

Major: Biochemistry

Faculty Collaborator: Jessica Kisunzu, Chemistry and Biochemistry

Research Collaborator: Brandon Wright

Nitrogen-containing heterocyclic systems have long occupied a position of value as a source of therapeutic agents in medicinal chemistry. Based on previous work in which a Dewar pyridine derivative has been observed to react with benzyne and produce a nitrogen-containing heterocyclic compound, we are investigating the reactivity of phenylmethyl 2-azabicyclo[2.2.0]hex-5-ene-2-carboxylate with benzyne and its derivatives. The highest quantitative NMR yield of the desired product was obtained after a reaction time of 10 hours at 25°C. The investigations into reactivity of Dewar pyridine and benzyne not only examines a novel synthetic method for the construction of nitrogen heterocycles but also contributes the understanding of benzyne reactivity profile.

P16 Kinetics of Gait Termination as it Pertains to Falls Risk in Older Adults

Student Researcher: Ben Blackmore '23

Major: Organismal Biology and Ecology

Faculty Collaborator: Eryn Murphy, Human Biology and Kinesiology

Research Collaborator: Hart Hancock '23

Background. Gait termination strategies distinguish between individuals with and without neurological conditions. However, gait termination patterns in older adults as it relates to falls risk is unknown. Purpose. The purpose of this study was to identify differences in gait termination of older adults with and without recent falls histories and questionnaire responses. Methodology. 20 older adults volunteered for this study. High and low risk (HR and LR respectively) groups were determined by positive responses to the questionnaire. Individuals with and without a 3-year history of falling created faller (F) and non-faller (NF) groups. Participants terminated gait on a Tekscan Strideway™ system. Analysis of anteroposterior (A/P) velocity, braking forces, rate of braking force development, GRF and COP overshoot was completed for the last three heel strikes by Independent two – sample t-tests. Results. Significant differences between LR and HR groups were present in the preparatory braking period and fast-breaking period. There were no significant differences between the F and NF group. Conclusion. Individuals who reported positive responses on the CDC STEADI demonstrate different gait termination kinetics than their low-risk counterparts.

P17 **The Feasibility of Novel Metric \mathcal{H} in Identifying Older Adults with a 3 Year Falls History During a Five-Time Sit-to-Stand Test**

Student Researcher: Hart Hancock '23

Majors: Organismal Biology and Ecology

Faculty Collaborator: Eryn Murphy, Human Biology and Kinesiology

Research Collaborator: Ben Blackmore '23

BACKGROUND. The Five-Time Sit-to-Stand (FTSTS) test is used to assess lower body functional strength and coordination, however evidence surrounding the use of this test in fall risk screening is conflicting and largely focused on community-dwelling and hospitalized participants. **PURPOSE.** The purpose of this study is to determine if a novel FTSTS center of pressure (CoP) metric can detect differences between older adults with and without a one-year history of falling. This metric, \mathcal{H} , weights anteroposterior movement of CoP by the square of the distance from the mean mediolateral CoP position. **METHODS.** CoP position was tracked during 5TSTS tests. **RESULTS.** Participants who had fallen in the last year had significantly lower values of \mathcal{H} than non-fallers (1843.9 ± 1062.7 vs 5208.8 ± 3025.9 cm³, $p=0.003$, fallers and non-fallers respectively). Fallers also had significantly lower values of anteroposterior-normalized \mathcal{H} (\mathcal{H}_{ap}) than those who had not fallen (11.9 ± 5.9 vs 26.2 ± 12.0 cm², $p=0.004$, fallers and non-fallers respectively). **CONCLUSION.** We conjecture that individuals with a recent fall may be more cautious during a dynamic task like the 5TSTS test, and as a result be more hesitant to allow mediolateral CoP movement for fear of falling. This evidence demonstrates a need for further investigation of dynamic task CoP metrics.

P18 **Finding Fake News Without the News: Structural Detection of Misinformation Using Machine Learning**

Student Researcher: Simay Cural '24; Max Perozek '23

Major: Computer Science; Computer Science

Faculty Collaborator: Cory B. Scott, Mathematics and Computer Science

Social media has caused an explosion of misinformation in public discourse, creating an urgent need for tools which can identify misinformation. Traditionally, machine learning (ML) methods for misinformation prediction have used natural language processing (NLP) tools to predict whether a given statement i.e. tweet is true. However, NLP tools struggle at this task, since 1) tweets may have too little text to classify confidently, and 2) when the misinformation concerns a novel subject like the COVID19 pandemic, there is no data to use to train an NLP model. Instead, we propose a structural approach to misinformation detection, based on the assumption that true and false information spread differently in social networks. We seek to use graph neural networks, a type of ML model which exploits structural features, for this task. We test a wide variety of ML models to see which is most accurate at predicting whether a given tweet is COVID misinformation. We also test a model which examines specific graph motifs to determine whether there are motifs that consistently appear in misinformation. We present an analysis of which motifs are most useful in identifying misinformation simply from the way it spreads in a social network.

P19 **Conserving Our Constellations**

Student Researcher: Katie Joslyn '24

Major: Comprehensive Physics

Faculty Collaborators: Shane Burns, Physics; Christina Leza, Anthropology

Research Collaborators: Cyndy Hines, State of the Rockies Project; Michael Braithwaite '24; Drew Manning '23; Ben Roche '24

My research project was guided by the main question, why do dark skies matter? The main goal of my research this summer was to discover if preserving dark skies should be a conservation issue, and I thought that a crucial first step to this was understanding why individuals and groups around the Rockies Region care about the night sky. Throughout the summer, I interviewed a variety of dark sky “experts” (people associated with the International Dark Sky Association, SLV GO) and members of Astronomical Societies around Colorado to understand why they are committed to conserving the dark and get advice on how to take action. I also interviewed Debbie Howell, Colorado College’s Elder in Residence, to learn about her tribe’s (the Skidi band of the Pawnee) connections to the night sky. The interviews illuminated an additional path for my research, inspiring me to dive into the effects of light pollution on humans, wildlife, energy/climate change, heritage, and safety. I created an interactive website to display my findings, all in hopes of helping educate others and spread awareness of the threats of light pollution, and ultimately establish that dark sky preservation is a conservation issue.

P20 **Choosing ϵ for a Locally Differential Private Linear Regression**

Student Researcher: Tim Somerset '23

Major: Mathematics

Faculty Collaborator: Minh Kim, Mathematics and Computer Science

Our increasing reliance on data for research and analysis purposes, and demonstrations of serious privacy breaches in traditional data protection methods has drawn significant attention to the urgency and necessity of sound privacy standards. Local differential privacy is a promising new privacy standard where individuals perturb their own data and do not rely on a trusted curator. It has already been implemented by various technology firms, and there is extensive research on new mechanisms and implementations. This project looks at differential privacy from a data analyst’s point of view, and uses linear regressions – a common tool of data analysis – to determine the utility of privatised data. The central privacy parameter ϵ is represents a trade-off between privacy and accuracy, but it is not known how the selection of ϵ in local differential privacy affects the accuracy of regressions. We perform experiments on simulated data to determine the accuracy of regression coefficients when the underlying data has been protected at multiple values of ϵ , and also observe how varying typical regression parameters – sample size and sample variance – can affect regressions on privatised data. However, a lot is left to understand before differential privacy becomes a true industry standard. In particular, the role of a key privacy parameter, ϵ , is still poorly understood. Literature on differential privacy provides extensive examples of ϵ values that suit certain tasks and mechanisms, but none elaborate on how these values were chosen. This gives no useful information to real-world analysts who are typically asked to set ϵ .

P21 **Acknowledging the Experiences of Volunteer Kenyan Soldiers**

Student Researcher: Arez Khidr '25

Major: Undeclared

Faculty Collaborator: Danielle Sanchez, History

Often, African Soldiers in World War 2 have been perceived as victims of conscription, or desperation to survive the conditions brought by the colonial system. However, there are Kenyan soldiers who held ulterior reasons for enlistment. Whether for combatting the “greater evil” of Nazism or viewing conscription as an economic and social opportunity, the experiences of these soldiers are important to analyze and evaluate. In fully acknowledging the experiences of these soldiers, one can better grasp Kenyan colonial society, understand the breadth of Kenyan sacrifices on the war front, and also the role veterans played in shaping post-war colonial Kenya, specifically the fight towards independence.

P22 Firm Size and Optimal Innovation Strategy

Student Researcher: Willow Ma '24

Major: Economics

Faculty Collaborators: Guanyi Yang, Business and Economics

We investigate the theoretical role of firm sizes in affecting R&D spending. We focus on two specific dimensions of firm sizes: physical capital and innovative capital. We show that firms increase their optimal R&D spending as they accumulate more physical capital. However, given the same level of physical capital, firms tend to decrease their R&D spending as their innovative capital accumulates. When the two dimensions interact, firms with more physical capital but less innovative capital engage in major R&D investment. Our theory on firms' optimal R&D investment implies that the physical and innovative capitals are concentrated within the few large firms. These findings correspond to our empirical examination using the US PatentsView database. To reach these conclusions, we write a heterogeneous firm capital investment model. The key innovation of this model resides in the firm's simultaneous physical and innovative capital accumulations. We employ value function iteration and multidimensional non-linear optimization algorithms to solve the model. Our findings contribute to the economics of innovation literature by providing a theoretical framework to explain the financial constraints on firms' innovation strategy.

P23 Stochastic Model of Quorum Sensing in Bacteria

Student Researcher: Edie Brazil '23

Major: Mathematics

Faculty Collaborator: David Brown, Mathematics and Computer Science

Quorum sensing (QS) is a communication mechanism bacteria use to monitor and react behaviorally to local fluctuations in population density by producing, releasing, and sensing small, diffusible signaling molecules called Autoinducers (AIs). Mathematical models have been developed to investigate aspects of QS but few have studied fully stochastic models to study how the noise present at the individual cell level affects the dynamics of the mechanism as it is scaled up as population increases. Our results showed that, holding the population constant, at larger cell populations the model behaves deterministically. However, for (logistically or stochastically) growing populations, we got interesting simulation results demonstrating the effects of noise on the transitions between QS states and the long-term results. Future work might include developing the formula and running simulations on first passage transitions.

P24 Presence of Pathogenic Variants in Circular RNA of Presenilin 1 and 2

Student Researchers: Ian Johnson '24; Tia Peterson '24

Majors: Neuroscience; Molecular Biology

Faculty Collaborator: Meredith Course, Molecular Biology

Alzheimer's Disease (AD) is the most common form of neurodegenerative disease, currently affecting over 6 million Americans. Previous research suggests that circular RNA is heavily implicated in neuronal gene regulation; however, the precise role of circular RNA in AD pathogenesis has yet to be established. In this study, we aim to identify pathogenic variants in circular RNA of two AD-causing genes, presenilin 1 and 2 (*PSEN1* and *PSEN2*). Brain tissue from individuals with familial AD were obtained within 12 hours post-mortem, RNA purified, and converted to cDNA using both an oligo(dT) and random hexamer approach, to amplify mRNA and all forms of RNA respectively. cDNA containing five pathogenic variants of interest were PCR amplified to target backspliced regions specific to circular RNA. Successful amplification of pathogenic areas of interest were visualized via gel electrophoresis, purified, and Sanger sequenced. Four variants, three in *PSEN1* and one in *PSEN2*, were identified in circular RNA. The presence of pathogenic variation in circular RNA provides the groundwork for future investigation concerning their potential role in AD pathogenesis. To our knowledge, this research is the first of its kind to identify pathogenic variations in circular RNA.

P25 Visualizing Sodomitical Paris

Student Researcher: P Musser '22

Major: Computer Science

Faculty Collaborators: Top Ragan, History; Jennifer Golightly, Information Technology

Accounts of queer sexual practices in 18th century Europe are few and far between. The scarcity of these accounts often restricts students to analysis of individuals, obscuring larger scale community dynamics. 18th century records of the Parisian Police give students a rare opportunity to study queer sexual practices on the level of communities, through a wealth of data on masculine homosexual practices, and the policing thereof. The project "Policing Male Homosexuality in 18th Century Paris," (PHS) founded in 2016, is working to translate these documents into English, publish them online, and supply the tools necessary for community scale analysis of these records. This summer research project contributes to PHS by building a proof-of-concept data visualization tool around data from the year 1781. Our primary goal this summer is to create a template that can eventually be scaled to an entire century of data.

P26 Mother of Innovation: The impact of weak municipal power on local climate change mitigation efforts in the Greater Boston Area

Student Researcher: Ronan Fitzgerald '23

Major: Economics

Faculty Collaborator: Corina McKendry, Environmental Program

Cities occupy an ever-growing position in the world of climate change mitigation. The portion of daily life controlled by municipal governments is critical to effective policy. Much of the current literature focuses on the role of cities as experiments, with smaller governments able to pursue more drastic policy than national or regional counterparts. These climate-leader cities generally possess strong political powers. While enabling their action, this power hinders the rollout of successful experiments by regional and national governments. This paper explores municipal climate governance with regards to the cities of Boston, Cambridge, and Brookline in Massachusetts. Massachusetts withholds notable amounts of powers generally afforded to American cities. Despite this, these cities employ comprehensive policy, policies which are more enforceable by the Commonwealth than in other states and nations. Although strong municipal power allows cities to pursue radical climate policy, the absence of enforced diffusion by larger governing bodies limits their impact. Restricted cities are still able to self-govern on climate whilst simultaneously influencing their larger governing institutions. This paper argues that strong regional power combined with broad local political support is a viable path to successfully mitigating climate change.

P27 West Valley, NY Nuclear Service Center Probabilistic Modeling of Nuclear Chemical Transport

Student Researcher: Lily Johnston '24

Major: Environmental Science

Faculty Collaborator: Neptune and Company

Previous studies involving the use of SWAT+ (Soil and Water Assessment Tool) a QGIS software have discussed selecting the appropriate number of HRUs (Hydrological Response units) and landscape unit thresholds to improve the resolution of the model. Here, I build on previous research by taking the variable of time into consideration in selecting the appropriate thresholds and number of HRUs to run the GIS model with. Through testing five different scenarios for four different channels in the West Valley watershed I was able to compare the resolution of GIS mapping tool for each scenario against the time it took for each scenario to run using SWAT+ software in QGIS. Time is a vital component to hydrologic modeling, especially when models are run 5,000+ times to ensure the accuracy of the model. It was found that trend for scenario 4, running half the HRUs (3,915 HRUs), decreased the amount of time the model took to run without sacrificing the accuracy of the model's predictions.

P28 **Policy Actor Proximity to Fracking and Political Behavior on Colorado's SB 19-181**

Student Researchers: Dova Castañeda Zilly '23; Ben Gibson '23

Majors: Economics and Environmental Studies; Environmental Studies

Faculty Collaborator: Kat Miller-Stevens, Economics and Business, State of the Rockies

Research Collaborator: Jonathon Pierce

Since 2010 oil and gas production has increased due to technological innovations in hydraulic fracturing, also known as fracking. Colorado has also experienced a boom and is an interesting case study. Historically, the fracking industry in Colorado has heavily influenced policy. However, in 2019 SB19-181, a bill that prioritizes the environment, health, and safety, was passed by a democratic trifecta of the house, senate, and governor after undergoing four public hearings, drawing over 700 policy actors, who testified in support or opposition to SB19-181. Given the environmentalists' success, we wanted to investigate the geospatial distribution of policy actors', their political behavior, and their proximity to fracking. According to construal level theory, spatial distances influence people's beliefs along with other socio-demographic characteristics. We expect that those closer to fracking are on average more supportive while those farther away form their opinions via world views, such as partisanship and the timeline of development. We expect to gain an understanding of what drives policy actors' political behavior and insight into how the environmentalists were able to overcome industry pushback. We are adding to the literature by focusing on policy actors' political behavior in Colorado, their location-based proximity to active, recent, and historical fracking, and their explicit partisan affiliation.

P29 **State of the Rockies: Dark Skies at Colorado College's Baca Campus**

Student Researcher: Michael Braithwaite '24

Major: Astrophysics

Faculty Collaborator: Shane Burns, Physics

Research Collaborators: Cyndy Hines, State of the Rockies Project

Colorado College's Baca campus is located in Crestone, Colorado, a town that has self-imposed restrictions on artificial lighting in order to preserve the sanctity of the night sky. However, Baca falls short in meeting Crestone's artificial lighting restrictions, as the campus is technically located directly outside the town's borders and in the neighboring community of Moffat. Due to this technicality, Baca does not have to comply with Crestone's artificial lighting restrictions. In turn, the campus utilizes streetlights, walkway lights, and other forms of outdoor lighting at night to help residents navigate their way through the darkness. The outdoor campus lights remain the same type of old, incandescent lightbulbs that were installed when it was first built in the 1990s, shining even brighter than modern-day LEDs and providing a roadblock to the ability to see the night sky in Crestone. This project looked to limit that roadblock, not only by installing new, LED lightbulbs in the outdoor light fixtures on Baca's three apartments, but ones that are outfitted with wireless technology which automatically dims them if they are lit too late at night, not only saving the campus energy but also making it comply to the Dark Sky restrictions in Crestone.

P30 Self-Dematerialization Theory

Student Researcher: Rhetta Power '20

Major: Psychology

Faculty Collaborator: Tomi-Ann Roberts, Psychology

It is not news that we live in a digital age, however, the way we live *through* our devices has yet to be examined. Existing psychological literature on smartphone use relies heavily on a narrative of addiction that designates phone use as healthy or unhealthy. However, this framework fails to consider the modern world where the everyday lives of most are facilitated through devices in some way. In response to a world inseparable from technology, we propose the theory of Self-Dematerialization (SDM). Our smartphones are not simply tools, they facilitate our very mode of being in the world. When someone self-dematerializes, they become so deeply invested in their mobile device that they lose awareness of their physical surroundings and physical body. Throughout this summer, we created a questionnaire to assess the trait of Self-Dematerialization in individuals (SDMQ). It is a statistically reliable 20-item measure with a 7-point Likert response scale. Preliminary analyses demonstrate that women, younger people, and those that spend more hours per day on their devices are more likely to be higher in SDM. These findings could be the foundation of a new body of work that recognizes how we are beginning to live through, not simply with, technology.

P31 Natural Transformation Induction in *Acinetobacter baylyi*

Student Researchers: Ruby Lamb '23; Ella Beck '23

Majors: Molecular Biology; Molecular Biology

Faculty Collaborator: Phoebe Lostroh, Molecular Biology

The soil bacterium *A. baylyi* is a Gram-negative coccobacillus that is known to be naturally competent. Competence is a category of horizontal gene transfer that is the ability of a bacteria to uptake exogenous DNA from its environment and incorporate it into its own chromosome. This topic is of scientific interest because it is thought to be the way in which bacteria acquire antibiotic resistance, and because of the role it potentially plays in bacterial evolution. We induced competence in *A. baylyi* during LTSP (Long-term stationary phase), as it has been shown to be naturally competent during this stage of relative 'famine' in terms of nutrient density. A new protocol for competence induction was implemented that increased the time after providing bacteria with linear DNA to uptake and the time of competence measurement. This resulted in the generation of transformants, confirmed by the presence of antibiotic resistant colonies of *A. baylyi*. Future directions of this project include experiment repetition to demonstrate higher rates of transformation efficiency and the genomic analysis of LTSP bacteria to identify genes involved in competence.

P32 Tamarix Shade Intolerance in Fountain Creek

Student Researcher: Olivia Dossett '23

Major: Organismal Biology and Ecology

Faculty Collaborator: Shane Heschel, Organismal Biology and Ecology

The invasive species, *Tamarix ramosissima*, has been rapidly colonizing riparian ecosystems throughout the southwestern US, including areas along Fountain Creek in Colorado. Many of these areas are riparian forests dominated by native cottonwoods (*Populus deltoides*) and willows (*Salix exigua*). In recent years, however, there have been high levels of cottonwood mortality, most likely due to drought stress and climate change, which has reduced the canopy coverage in these forests. The purpose of this study was to examine how tamarisk functional traits and morphology respond to varying light exposure to further understand tamarisk physiology and advance conservation management efforts. We measured photosystem efficiency, chlorophyll content, and stomatal conductance as well as number of flowering branches, number of stems, and stem diameter in two sites of differing light exposure along Fountain Creek. The study is based on the following research questions: How do changes in light exposure from canopy mortality impact the functional traits of tamarisks? How does light exposure impact allocation to stem and reproductive biomass in tamarisks?

P33 **Production and detection of solvated electrons with atmospheric-pressure plasma jets**

Student Researcher: John T. Lê '24

Major: Comprehensive Physics and Mathematics

Faculty Collaborator: Adam Light, Physics

At the plasma-liquid interface, plasma electrons can dissolve in a liquid solution to form solvated electrons. Solvated electrons are a strong reducing agent and have applications in chemistry and plasma medicine. The Bartels & Go groups at the University of Notre Dame have produced and detected solvated electrons at a plasma-liquid interface using a direct DC discharge. However, little work exists on the production of solvated electrons by remote sources such as atmospheric pressure plasma jets (APPJs). We plan to implement the total internal reflection geometry of Rumbach, et al. [1] to measure solvated electron concentration produced by APPJs. Laser light is reflected off the underside of the water-plasma interface to probe the ~10nm layer in which electrons are solvated and lock-in detection is used to recover the modulated absorption signal. We present our design, preliminary measurements, and possible diagnostic improvements (e.g., cavity enhancement) in detecting and producing these solvated electrons with jet sources. [1] Rumbach, P., Bartels, D. M., Sankaran, R. M., & Go, D. B. (2015). The solvation of electrons by an atmospheric-pressure plasma. *Nature Communications*, 6(1), 7248. <https://doi:10.1038/ncomms8248>

P34 **Effectiveness of Centering in the 2022 Hungarian Elections**

Student Researcher: Jaxon Hoskinson '24

Major: Political Science and Philosophy

Faculty Collaborator: John Gould, Political Science

Centering is a non-violent resistance tactic that is used by movements to gain followers and momentum for a cause. Centering requires creating broad messages with wide-ranging appeal to maximize the amount of supports a movement can bring in, however, it also requires sub-groups and participants to set aside personal goals, struggles, and beliefs. Centering strategies were used by the United Opposition political movement in Hungary in the 2022 Parliamentary elections to try and unseat the current prime minister Viktor Orbán. Orbán and his party, Fidesz, have implemented illiberal tactics to reinforce their position of power. Therefore, propelling the United Opposition to form alliances with political parties from across the political spectrum with the sole goal of unseating Orbán. The United Opposition failed, not only in overtaking Fidesz's majority in Parliament but also in gaining more seats. Through research into each sides' campaigns and conversations with local experts and academics, we concluded that confusing political messaging, lack of a strong alternative to Orbán, and Orbán's control over media and advertising culminated in the Untied Opposition's loss. This raises questions about centering's effectiveness and its potential alienation of diverse groups under one movement.

RESEARCH POSTER PRESENTATIONS, ABSTRACTS P35-P67

P35 Sex Differences in Morphological Development in Flammulated Owls

Student Researcher: Evan Rao '23; Eve Karowe '24; Leighton Graham '23

Majors: Environmental Studies; Organismal Biology and Ecology; Organismal Biology and Ecology

Faculty Collaborator: Brian D. Linkhart, Organismal Biology and Ecology

Research Collaborator: Olivia Noonan '20

The avian group of raptors, which includes eagles, hawks, falcons, and owls, exhibits a trait known as Reverse Sexual Size Dimorphism. Females in the raptor group are larger than males, while in most other birds males are the larger sex. Despite its prevalence among raptorial species, when sex differences in morphology manifest during development is little understood, particularly in owls. We sought to address this gap by studying morphological development in Flammulated Owls (*Psilosops flammeolus*), an insectivorous owl that breeds in Ponderosa Pine ecosystems in western North America, and winters in Mexico and Central America. Specifically, we analyzed growth rates and blood sex data in nestling owls in order to reveal sex-based patterns of development. Over the span of about 40 years, data has been collected on various broods of owlets, measuring their weight and growth of flight feathers over the duration of their nestling period. In the past 20 years, blood samples have also been collected from the owlets and analyzed in a lab to determine the sex of the owlets, since sex of owls cannot be determined by plumage characteristics or external morphology. By combining the blood sex data and growth data, we were able to reveal trends in owlet growth based on their sex.

P36 The Discourse of the Veil: A Comparative Study

Student Researcher: Latra Demaci '24

Major: Feminist and Gender Studies

Faculty Collaborator: Nadia Guessous, Feminist and Gender Studies

The Discourse of the Veil is a proliferating relic of Orientalist legacies that make ontological and epistemological statements about the veil with nearly unwavering authority. This comparative study of the discourse of the veil details some of the analytical leaps that have been deployed historically and to this day to render the headscarf an affront to civilization, modernity, and progress. Specifically, this research comparatively investigates the construction of the veil's relative "elsewhereness" in each case study to examine how the headscarf is forged as a putative cultural threat, a remnant of a "backward" past, and a regressive "act of citizenship" which calls for "strenuous" efforts of toleration. Based on library and media sources, case studies were grouped as follows: Countries with a past as colonial powers, countries with a past as former colonies, and countries with no colonial past but with a Muslim minority. This research traces the discourse of the veil in various contexts, where questions of modernity/tradition, progress, secularism, private/public sphere, national belonging, competing collective memories, and culture remain central as they intertwine with notions of beauty, decency, homogeneity, neutrality, and feminist discourse, to name a few, in nuanced but unsurprising ways.

P37 Romantic Interventions in 19th Century Greece

Student Researcher: Samantha Lorca '24

Major: Comparative Literature

Faculty Collaborator: William Davis, Comparative Literature

This research focused on specific physical interventions in 19th century Greek Architecture after the occupation of the Ottoman Empire and declaration of Bavarian Prince Otto I as the first King of Greece. Engaging in the work of cultural critique, this research used the framework of Hegel's Aesthetics in order to examine the aesthetic of the "classical" as preceded by deliberate violent interventions and strategic orientalism. I focused on pulling sources around the 'picturesque' nature of the Frankish Tower formally found in the Acropolis as well as Lord Byron's name on the Temple of Poseidon in Sunion. Additionally, my part in this research connected the elevation of specific monuments and ruins as never again to be seen ideals of architecture to UNESCO classifications of World Heritage Sites across the world. This research will hopefully lead to a book the process through which 19th century beauty ideals preserved until now are critiqued at their conception.

P38 A Preliminary Analysis of Opinions on the Oil and Gas Industry through the Annual Conservation in the West Survey

Student Researchers: Zoey Roueche '24; Zoraiz Zafar '24

Majors: Environmental Studies and Political Science; Mathematics and Economics

Faculty Collaborator: Kat Miller-Stevens, Economics and Business, State of the Rockies

The oil and gas industry has experienced unprecedented growth in the United States in the last 20 years, the result of increases in population and per capita consumption of goods. However, this industry, in addition to fracking, is a complicated and often controversial topic because of the health and environmental risks associated with its practices. Thus, this study delves into the responses from 2018 to 2022 of the Conservation in the West Survey which aims to capture bi-partisan public opinions of registered voters in the Rocky Mountain West region on a variety of topics. Specifically, this study looked at whether respondents wanted the then-incumbent administration to focus on ensuring the safety and quality of the environment or on prioritizing domestic energy production. It found that, overall, there is a greater support in the 8 surveyed states for focus on environmental issues than there is for domestic energy production through years 2018 to 2021, but that this support declines in states where fracking is legal and additionally declined in the year 2022, likely because of increased gas prices. Furthermore, the findings of this study indicate that female-identifying individuals are more likely to support focus on environmental issues over domestic energy production.

P39 Diversity (or the lack thereof) in Digital Musicology Scholarship and Recordings of the Paul Whiteman Orchestra

Student Researcher: Emmett Tucker '24

Major: Music

Faculty Collaborator: Ryan Bañagale, Music

This research explores diversity and representation in two areas of academic music studies: digital and multimedia scholarship (DMS) published in the *Journal of the American Musicological Society (JAMS)* from 2014-2022, and in the recordings of Paul Whiteman and His Orchestra from nearly a century earlier. Both reveal a similar picture of the harm caused by a lack of diversity in popular music structures. In this poster, I will share my findings about the diversity of authors represented in the flagship musicology journal alongside what emerged from my work on Whiteman's sonic representations of Asian and Asian-American culture. Viewing these two projects simultaneously through the lens of diversity revealed a significant connection; the exclusionary practices and biases found in early 20th century recordings continue to be reflected in modern musicology, as certain topics and voices are elevated over others. Combined, both aspects of my research show that the loudest voices in music have been, and continue to be, white men. While academic music studies have certainly become more diverse, bias and underrepresentation within the field of music remain problematic.

P40 **A Wave-Corrected Assessment of the Milky Way's Vertical Structure Near the Solar Neighborhood**

Student Researcher: Ziyuan Yin '25

Major: Undeclared

Faculty Collaborator: Austin Hinkel, Physics

The observations of the Galaxy's vertical structure are often confounded by a combination of the previously discovered vertical waves and the Galactic warp, as the analyses of different regions of the Galaxy will inevitably sample different portions of the antisymmetric vertical wave in the distribution of stars. In this study, we develop a method for filtering out the perturbations of the vertical waves on the Milky Way, enabling a renewed look at the vertical structure near the sun. By applying an Odd Low Pass Filter (OLPF) to the frequency-space representation of the Galaxy's vertical structure, we remove the vertical waves and discover a radial wave that bends the Galactic mid-plane above and below the global average with a wavelength of 1.5 kpc in the region $225 < l < 245$ deg, $-2 < z < 2$ kpc, $8.0 < R < 10.0$ kpc. The OLPF enables a renewed interpretation of the Galaxy's vertical structure, and we discover significant variations in the general behaviors of the mid-plane around the sun as we plot a map of the local Galaxy's mid-plane in the region where $-2 < z < 2$ kpc and in-plane distance < 500 pc.

P41 **Developing Requirements for Software Design Meeting Support**

Student Researcher: Liz Seero '23

Major: Computer Science

Faculty Collaborator: Janet Burge, Mathematics and Computer Science

Research Collaborator: University of California, Irvine

During a repeating, or cadence, meeting, which are essential in software development, some issues discussed earlier will need to be addressed in the future. Gaps between follow-up discussions can cause participants to fall out-of-date, or forget details, making teams ill-prepared to address problems efficiently. Information that meeting participants believe is important, and might reference later, is called an Important Design Bit (IDB). Last summer, we began our study by tracking the flow of information in a series of design meetings, analyzing the tool use, issue reporting, information requesting in meetings, and more. Our partners at UC Irvine developed a prototype for the capture of IDBs during meetings called KnoCap (Knowledge Capture). Just as vital as information capture is information retrieval, and we began to explore how we could extend KnoCap to retrieve captured information in future meetings. A competitive analysis report was created to understand what sets KnoCap apart from the current market, and identify areas for improvement, based on commercial meeting productivity and note taking software, or other research projects. Afterwards we created a set of user stories, a method to express what the actions available to users in the final product, including pre-meeting, during, and post. Then we created a chart combining the competitive analysis and user stories to strengths and weaknesses. The user stories will serve as the initial software requirements for a new meeting support tool that will extend KnoCap so that it can manage both the capture and use of IDBs in software design meetings.

P42 **Consistent method for the detection of perfluorooctanesulfonic acid utilizing a molecularly imprinted polymer, and investigating factors that influence sensor binding affinity (K)**

Student Researcher: Ian Huelsbeck '23, Sammy Ries '23

Major: Biochemistry; Chemistry

Faculty Collaborator: Eli Fahrenkrug, Chemistry and Biochemistry

Per- and polyfluoroalkyl substances (PFAS) are a family of chemical pollutants of considerable importance to the safety of global water supplies. Detection of these substances has remained costly and technically prohibitive for most consumers to readily test their own sources of drinking water. This research aims to use a molecularly imprinted polymer (MIP) as the basis for a cheap and replicable method to manufacture a sensor for rapid, on-site detection of PFAS compounds. Our work focused on systematically evaluating key experimental factors in the fabrication of the MIP on glassy carbon electrodes with a goal of tuning the binding thermodynamics between the analyte PFAS molecule and the polymer sensing layer. We used a combination of electrochemical methods like cyclic and differential pulse voltammetry to generate Langmuir binding isotherms in order to extract the binding constant (K) and the number of binding sites on the electropolymerized MIP. Both precursor concentration and scan rate are statistically correlated to a change in K. We'll describe the results of these experiments and their impact on the overall sensor development.

P43 **High Altitude Permaculture and Soil Restoration in Response to Aridification and Climate Change in the Rocky Mountain Region**

Student Researcher: Lily Johnston '24

Major: Environmental Science

Faculty Collaborator: Shane Heschel, Organismal Biology and Ecology

Previous studies have reported on high altitude permaculture as a means to restore mismanaged soil and increase food security. Here I report that through the combination of the planting native perennial plants and the spawning and inoculation of mushrooms, the effects of climate change and aridification in the Rocky Mountain Region can be mitigated. Furthermore, the conscious planting and spawning can be implemented to ensure invasive and non-native species are not introduced. The utilization of knowledge of plants that can survive without readily available access to water will ensure that the soil is restored in an environmentally sustainable and self-sustained manner. The impact of climate change on aridification and the establishment of root systems was visible in the perennial seedlings that were able to survive past planting. Perennial seedlings that were more drought tolerant were able to retain water in a more effective manner through extensive root systems and were able to thrive. These seedlings continue to restore nutrients to the soil which allows for the growth of other organism and promotes the health of the soil back from aridification.

P44 **Payments for water-based ecosystems**

Student Researchers: Samwel Makyao '25; Ewan Henderson '23

Majors: Computer Science; Environmental Science

Faculty Collaborator: Kat Miller-Stevens, Economics and Business, State of the Rockies

Water Funds are organizations that design and enhance financial and governance mechanisms which unite public, private, and civil society stakeholders around a common goal of contributing to water security through nature-based solutions and sustainable watershed management. As a starting point, we are conducting a nationwide research on payments for water-based ecosystem services programs (PWES). In this research, we anticipate answering difficult questions like what obstacles and challenges organizations have faced to create successful PWES or watershed conservation programs. What improvements can be made from an organizational standpoint for program design and administration, what have been the most successful programs, and how are payment values or funding levels determined? We serve as neutral, objective researchers who collect information that can provide increased knowledge and value-added for the community of natural resource conservation program managers and researchers.

P45 The Ruin Dwellers

Student Researcher: Star Goudriaan '20

Major: History-Philosophy

Faculty Collaborator: Jake P. Smith, History

Over the 2022 SCoRe program, I worked alongside historian Jake Smith on their book project entitled “The Ruin Dwellers.” The project analyzes urban activism and countercultural milieus in Central Europe. They argue that some 1970s and 1980s activists in places like Amsterdam, Berlin, Freiburg, and Zurich disinvested from attempts to hastily free themselves from the shackles of the past (a past plagued by the horrors of war, colonization, and emergent consumer capitalism) so as to delve headlong into a socialist revolutionary future. In place, Professor Smith observes attempts to construct alternative ways of being out of the ruins of modernity, ways that include hauntological aesthetics and post-progressive imaginaries that coincided with moments in which, to quote novelist Ben Lerner, “what normally felt like the only possible world became one among many, its meaning everywhere up for grabs” (10:04, 19). I read books, took notes, participated in long discussions, and served as a pair of theoretically-versed eyes for manuscript drafts.

P46 Optimization of a Photochemically Driven Benzyne Reaction

Student Researcher: Enrique Hernandez Salcido '24

Major: Chemistry

Faculty Collaborator: Jessica Kisunzu, Chemistry and Biochemistry

Research Collaborator: Ben Sokol '22

The reactivity that comes from arynes' unstable strain has made it a molecule that is highly sought out to use and intentionally apply. Currently, one of the more widespread methods for benzyne formation is the use of ortho-silylaryl triflates with a fluoride source such as CsF. There is still a need for a new complementary benzyne generation method that is more time efficient. An early appearance of a photochemically produced benzyne was reported in 1975 by Y. Maki and coworkers through the utilization of a high-pressure mercury lamp where they discovered that 2-(3-acetyl-3-methyltriaz-1-en-1-yl) benzoic acid (AMTBA) can be a useful benzyne precursor. Upon irradiation of AMTBA with a UV light, it can produce benzyne which react with substrates at a highly reduced time frame compared to other methods. Previous work in our group shows the successful synthesis of AMTBA and the replication of known benzyne reactions under photochemical conditions. Through the use and practice of sparging and a new photoreactor design, we are able to report the successful optimization of an insertion reaction using AMTBA.

P47 Using Electric Fields to Drive the Formation of Kinetically Unfavored Form II Paracetamol Crystals

Student Researchers: Cathy Xiao '25; Will Zagrodzky '23

Majors: Physics; Biochemistry

Faculty Collaborator: Eli Fahrenkrug, Chemistry and Biochemistry

Most active pharmaceutical ingredients can adopt several crystalline phases known as polymorphs. However, controlling which phase crystallizes from solution is notoriously challenging owing to a competition between the rate at which a phase is produced (kinetics) and the lowest energy version of a particular crystal (thermodynamics). Our work tries to control the kinetics of crystal formation by aligning molecules in solution with extremely large electric fields. To deliver large electric fields to solution, we 3D printed a custom thin film capacitor reactor with a laser-cut gasket to contain the solution. We used the reactor to evaluate the impact of the electric field magnitude and the crystallization time on the prototype molecule paracetamol. To characterize the phase of the resulting crystals, we developed a Raman spectroscopy protocol that allows for differentiation between different polymorphisms. Initial results of crystal growth at 1 V for 24 hours at -2 C suggest crystallization occurs consistently within our reaction cell. Though characterization has been complicated by co-crystallizing polymorphs and excess solution evaporating and crystallizing after the electric field is no longer applied. The future direction of the research will focus on preventing evaporation before analysis under the Raman.

P48 **Modeling Eclipsing Binary Light Curves to Understand Sub-sub-giant Characteristics**

Student Researcher: Will Taylor '24

Major: Physics

Faculty Collaborator: Natalie Gosnell, Physics

Research Collaborators: Luc Rousseau '23; Chris Chang

Sub-subgiant (SSG) stars are a newly classified type of star that is currently being researched and understood. SSGs are highly magnetically active and are less luminous and cooler than the better understood subgiant class of stars. SSGs occur exclusively in binary systems. Occasionally, these binary systems are oriented such that the orbital plane of the system aligns with our line of sight from Earth, which causes a phenomena called an eclipsing binary (EB). By studying the flux of light coming from the EB, we can identify characteristics of the SSG and companion star based on how much light is blocked out during the eclipses for a given amount of time. We studied TESS light curves for 20 EBs and extracted physical parameters of the systems by fitting model light curves to the observed light curves using a Markov Chain Monte Carlo fitting process. Future work will reveal values for the radii of the SSGs and companion stars.

P49 **Investigating the Antimicrobial Properties of Gordolobo against *P. aeruginosa***

Student Researcher: Fiorella Murillo '23

Majors: Southwest Studies and Molecular Biology

Faculty Collaborator: Olivia Hatton, Molecular Biology

Gordolobo, also commonly known as mullein, is a plant grown in northern Mexico commonly used by Indigenous communities in a tea to expel phlegm as a treatment for bronchial asthma and coughs, amongst other things. Although it is traditionally used as an anti-inflammatory, we were interested in examining whether it also contained anti-microbial properties, specifically against *P. aeruginosa*. *P. aeruginosa* causes respiratory system infections with mortality rates ranging from 18-61%, depending on comorbidity factors. Gordolobo's potential anti-microbial properties were assessed via minimum inhibitory concentration (MIC) and disc diffusion assays. Different preparations of Gordolobo including traditional teas, tinctures, and extracts of different parts of the plant, were compared. The results of the MIC assays all suggest no anti-microbial properties were present in any of the Gordolobo preparations; growth inhibition was only seen in preparations containing ethanol, including the tincture control, suggesting that ethanol was the ingredient inhibiting growth and not Gordolobo. The disc diffusion assays all showed no zones of inhibition for any of the samples excluding the tobramycin control. All the data collected suggests that Gordolobo does not have anti-microbial properties against *P. aeruginosa*.

P50 **A Changing Media Landscape: Environment and Climate News in the Roaring Fork Valley**

Student Researchers: Claire Barber '22

Major: Environmental Studies, Journalism, and Film

Faculty Collaborators: Corey Hutchins, Journalism; Jean Lee, Environmental Studies

Combining both media studies and environmental studies, this research aims to explore the environmental news ecosystem in the Roaring Fork Valley (RFV). "Environmental news" here encompasses the information systems in place to inform residents of the region of both acute and long-term environmental events: think road closures from landslides, wildfire risk, to media coverage of municipal conservation efforts. Particularly, this research aims to explore the intersection of new and old media, traditional and non-traditional (newspapers, social media groups, word of mouth, etcetera). With this in mind, we explore who/what the primary actors of environmental communications are in the valley, and what those actors might tell us about the roll of different media forms in environmental communications. Importantly, we find that even as the traditional media environment is viewed as healthy and strong in the RFV, non-traditional media sources, including Facebook, play a significant roll in environmental communications. This research aims to further the intersection of environmental studies and local, regional information networks to better examine how residents might be better communicated to in future to mitigate climate and environmental risk— what works, what doesn't, is anyone or anything being left out?

P51 **Impact of Prenatal and Postnatal Inulin Supplementation on Memory and Gut Microbiota in Maternally Separated Rats**

Student Researchers: Rocky Sui '23; Nick Firestone '24; Jack Beattie '23, Peyton Classon '23

Majors: Neuroscience; Neuroscience; Neuroscience; Human Biology and Kinesiology

Faculty Collaborator: Lori Driscoll, Psychology

Stressful experiences early in life, such as being neglected by caregivers, can influence mental health later in life, both directly, but also through impacting the health of the gastrointestinal tract. In rodent models, these stressful experiences, called early life adversity (ELA), are commonly modeled through maternal separation, in which newborn pups are isolated from their dam during the first two weeks of life. The aim of the current study is to determine whether prenatal and postnatal dietary supplementation with inulin fiber could mitigate the negative impacts of ELA on anxious behaviors and memory. Long-Evans Dams were randomly assigned to purified control or inulin-enriched chow on the last week of gestation. At birth, litters were maintained on the control or inulin chow to which their dams were assigned. Half of the litters from each diet group were randomly administered maternal separation in which they were isolated from their dam for three hours per day from postnatal days 1 to 14. After weaning, rats were tested in behavioral paradigms designed to examine recognition and spatial memory. Six pups from each treatment group were euthanized and fresh cecal samples were taken on PNDs 14, 21, and 28 for 16S ribosomal DNA analysis of bacterial species composition and diversity, a measure of gut health. Available results indicate that maternal separation did not consistently induce depressive or anxiety-like behavior across males and females. Inulin supplementation decreased fear and anxiety behavior and increased navigation speed and distance in the memory task. Our results suggest that inulin supplementation might be a viable strategy in treating early life adversity.

P52 **Nomarski Interferometry for Electron Density Detection in Atmospheric Pressure Plasma**

Student Researcher: Fengyan Zhang '24

Major: Physics

Faculty Collaborator: Adam Light, Physics

Interference is the net effect of the combination of two or more wave trains moving on intersecting or coincident paths[1]. When the two beams of light interfere with each other, looking at a place that is perpendicular to their direction of propagation, there will be bright spots that come from constructive interference where the magnitude of the two beams add up and dark spots from destructive interference where the magnitude of the two beams cancel each other. Knowing the refractive index of the air and the plasma jet are different, we intend to employ the characteristic of light as a wave and change the refractive index of the plasma jet by modulating its electron density and interfere the light travelling through the plasma jet and through air. We expect to detect changes in the interference pattern intensity and use it to calculate the electron density of the plasma jet.

[1] The Editors of Encyclopaedia Britannica. (n.d.). *Interference*. Encyclopædia Britannica. Retrieved August 24, 2022, from <https://www.britannica.com/science/interference-physics>

P53 **Public Defender Advice-Giving: A Thematic Analysis**

Student Researchers: Fargol Yeganeh Fathi '24; Alycia Supperstein '23

Majors: Psychology; Business, Economics, and Society

Faculty Collaborator: Christina Rader, Economics and Business

The present study employs a thematic analysis of literature on advice-giving and the lived experiences of five public defenders. Public defenders were interviewed about advising clients on whether to plead guilty or go to trial. Researchers coded using a shared list of potential themes in the interviews. Due to time constraints, researchers focused on the research question: "What themes on advice-giving are presented in the academic literature and lived experiences of public defenders advising their clients about whether to plead guilty or go to trial?", reserving the comparison between themes in the interviews and literature for the broader research question. Six main themes were present: Advising based on client's feedback, insightful advising based on professional experience, creating space for mutual understanding, acknowledging the client's right to autonomy, establishing common ground, and considering a client's personal factors when advising. Keywords: public defenders, advice-giving, themes.

P54 **Consensus Label Propagation with Graph Convolutional Networks for single-cell RNA sequencing Cell Type Annotation**

Student Researcher: Daniel Lewinsohn '23

Major: Computer Science

Faculty Collaborator: Cory Scott, Computer Science

Research Collaborator: Don Conrad, Chief, Division of Genetics, ONPRC

A crucial step in single-cell RNA sequencing (scRNA-seq) analysis is the assignment of cell type populations. Manual annotation with known marker genes is both time-consuming and subjective, however, accurate labelling is necessary for drawing relevant biological conclusions downstream. We present a Graph Convolutional Network (GCN) based approach to automate the annotation process. Our process builds upon already existing labelling approaches, using state-of-the-art tools to find highly-confident cells through consensus and spreading these confident labels with a semi-supervised GCN. Using simulated data and two scRNA-seq datasets from different tissues, we show our method improves accuracy over a simple consensus algorithm and the underlying tools' average. We also demonstrate our GCN method allows for feature interpretation, pulling out important genes for cell type classification. The valuable method will be available as a Python package.

P55 **Atmospheric Transport Regimes of Elemental and Oxidized Mercury at Storm Peak Laboratory**

Student Researcher: Brandon Chan '23

Major: Environmental Science

Faculty Collaborator: Lynne Gratz, Environmental Science

Research Collaborators: Ellie Derry '23; Nicholas Hoch '22

Mercury is a globally-distributed hazardous air pollutant that can bioaccumulate within food chains. Elemental mercury (Hg^0) is relatively inert in the atmosphere compared to its oxidized state (Hg^{II}), which is more water soluble and bioavailable. This study uses hourly-averaged measurements of Hg^0 , Hg^{II} , criteria gases, aerosol properties, and meteorology to characterize seasonal atmospheric transport regimes at the remote, high-elevation Storm Peak Laboratory (SPL) in Steamboat Springs, CO (3,220m asl). We applied cluster analysis to 10-day air mass back trajectories using the Hybrid Single Particle Lagrangian Integrated Transport model, and merged the cluster output with the hourly measurement data to investigate origins of Hg and other trace gases. In spring 2021, the highest mean concentration of Hg^{II} was associated with northerly transport from continental Canada as well as transport from the north-central Pacific, whereas in spring 2022 the highest mean Hg^{II} concentration was associated with trans-pacific transport from east Asia. These clusters also had the lowest mean concentrations of Hg^0 , consistent with oxidation chemistry as a source of Hg^{II} at SPL. In contrast, the highest mean Hg^{II} in summer and fall was associated with northerly trans-Pacific transport. Ongoing work will examine the levels of other measurements at SPL within the clusters to further characterize air mass origins and composition.

P56 **The Effect of 3 Upwind, Coal-Fired Power Plants on Air Mass Composition at a High Elevation Laboratory in the Intermountain West**

Student Researcher: Nicholas Hoch '22

Major: Environmental Science

Faculty Collaborator: Lynne Gratz, Environmental Science

Research Collaborators: Ellie Derry '23; Brandon Chan '23

Coal combustion is a major source of criteria air pollutants in the U.S. Though pollutant emissions from coal-fired power plants have generally declined in the last decade, coal-fired electricity generation remains a large contributor (>20%) to total U.S. energy production. This study uses hourly-averaged measurements of sulfur dioxide (SO₂), ozone (O₃), nitrogen oxides (NO_x), mercury (Hg), and meteorological variables from March to October 2021 to investigate the impact of three upwind coal-fired power plants on atmospheric composition at the Storm Peak Laboratory (SPL), a high elevation observatory (3220 m ASL) in Steamboat Springs, CO. Elevated SO₂, a tracer of recent coal combustion, along with local wind direction and modeled air mass back-trajectories determined times when the lab was likely influenced by power plants. When SO₂ was above its 95th percentile in each season (spring = 0.1 ppb, summer 0.2 ppb), NO_x and O₃ were elevated above their seasonal averages by 0.2 and 3 ppb, respectively, while Hg did not show a significant difference. Additionally, SO₂ and NO_x were moderately correlated during several case studies, though the relationship was not consistent (Pearson's R² from 0.06 to 0.92), suggesting varying degrees of air mass dilution within events. Lastly, this study shows an average decline in seasonal average SO₂ by 94% from earlier measurements at SPL in 2013-14, consistent with reported emission reductions in the southwest region.

P57 **Events of elevated oxidized atmospheric mercury levels at Storm Peak Laboratory**

Student Researcher: Ellie Derry '23

Majors: Environmental Science and French

Faculty Collaborator: Lynne Gratz, Environmental Science

Research Collaborators: Nicholas Hoch '22; Brandon Chan '23

Mercury is a global pollutant and neurotoxin that bioaccumulates within food chains and can cause adverse health effects with high levels of exposure. Although elemental mercury can persist in the atmosphere for months, it can also undergo oxidation chemistry to a more water-soluble form that is readily removed from the atmosphere and introduced into ecosystems. However, the chemical mechanisms for mercury oxidation are not well understood. During the spring and summer seasons of 2021 and 2022, continuous measurements of oxidized and elemental mercury, meteorology, and trace gases were collected at the high elevation Storm Peak Laboratory (SPL; 3220 m ASL) in Steamboat Springs, Colorado to investigate the origins of atmospheric mercury and the conditions under which oxidation occurs in a continental environment. We used statistical methods and the HYSPLIT air mass transport model to examine multi-day events of enhanced oxidized mercury for air mass composition and origin. In 2021, we found three events in spring and seven in summer. Across most events, oxidized mercury was significantly anticorrelated with elemental mercury and relative humidity, suggesting in-situ oxidation within dry air masses. These results validate and expand upon earlier work at SPL and will be used to further study the underlying chemistry of atmospheric mercury oxidation.

P58 Impact of Narrative Frames on Beliefs and Emotions About Fracking

Student Researchers: Micah Arrison '23; Charlotte Toogood '23

Majors: International Political Economy; Environmental Studies

Faculty Collaborator: Kat Miller-Stevens, Economics and Business, State of the Rockies

Research Collaborator: Jonathan Pierce, Vice-President of Safeguard Marine, LLC

Hydraulic fracturing is one of today's most controversial political issues due to its economic, environmental, and health implications in the US, including the Rocky Mountain region. This process, also known as fracking, involves injecting a mixture of water, sand, and chemicals deep below the ground at very high pressure to release oil and natural gas usually from shale plays. It is used in over 90% of newly drilled wells nationally. This poster reports an experimental national survey that tested the narrative strategy of emphasis frames concerning fracking comparing a loss frame to a control frame. This study found that a loss frame can persuade beliefs and emotions about fracking. The loss frame was shown to elicit a significant response in opinions surrounding the harm to local environments, the risk to public health and safety, moral values, and anger.

P59 Thermodynamic Analysis of SARS CoV-2

Student Researcher: Quinn Eaheart '23

Major: Biochemistry

Faculty Collaborator: Neena Grover, Chemistry and Biochemistry

SARS-CoV-2 utilizes a positive-sense single stranded RNA as its genomic material. This single stranded mRNA hijacks the host cell's ribosome to translate its own proteins. Upon infection of a host cell, SARS-CoV-2 produces polyprotein 1ab which is then cleaved into 16 non-structural proteins. Non-structural protein 1 (Nsp1) inhibits host cell translation by binding to the 40S ribosomal subunit. Stem loop 1 (SL1) in the 5'-UTR of the mRNA mediates the binding of Nsp1 to the ribosome. SARS-CoV-2 specifically contains a 1x2 internal loop within the SL1 that is not seen in other coronaviruses. In this study, we are examining the thermodynamic properties of the 1x2 internal loop of SL1. UV-visible thermal melts and isothermal titration calorimetry (ITC) were performed on various DNA and RNA constructs containing the 1x2 internal loop in SL1 in the presence of 1 M KCl or 10 mM magnesium chloride at two different pHs. Initial results show additional base pairing at lower pH in 1 M KCl buffer, indicating the formation of an A+•C base pair.

P60 Documentary Archival Research

Student Researcher: Katherine Beard '24

Major: Film and Media Studies

Minors: Journalism and Spanish

Faculty Collaborator: Dylan Nelson, Film and Media Studies

Archival research findings in documentaries continue to help support the arguments and ideas being presented by to college in the U.S.A. in "Mississippi Messiah" to los desaparecidos and the Videla dictatorship in Argentina in The communications with organizations and copyright holders allowed for an even deeper understanding of the r language to find still images, archival news footage / videos, and interviews with key subjects. Some of the foota provided to law firms for copyright checking.

P61 Improve The Upper Bound of $R(J_5, K_5)$

Student Researchers: Iverson Wang '24; Haoru Yang '24

Majors: Mathematics; Mathematics

Faculty Collaborator: Luis David García Puente, Mathematics and Computer Science

Ramsey Theory is part of the field graph theory. It was first introduced by Frank Ramsey in 1930 as a foundational result in combinatorics. This summer, we are focusing on the Ramsey number. The Ramsey number $R(s, t)$ is defined to be the smallest n such that every graph of order n contains either a clique of s vertices or an independent set of t vertices. In 2017, Vigeik Angeltveit and Brendan D. McKay improved the upper bound $R(K_5, K_5)$ to 48. We are trying to apply the same method they used in their paper to improve the upper bound $R(J_5, K_5)$. Note that K_n is a complete graph with n vertices and J_n is $K_n - e$ (Complete graph with n vertices minus an edge). Most of the cases are tested by computing and program. We are still working on the program and trying to check all the cases. If the cases are too large for computing, we will improve on theoretical proof to reduce the cases.

P62 Climate Mitigation Ambition in Colorado Springs

Student Researcher: Mika Alexander '23

Major: Anthropology

Faculty Collaborator: Sarah Hautzinger, Anthropology

Mitigating the detrimental effects of climate change has been on the dockets of governments ranging from the local to the international scale. In Colorado Springs, climate-focused activists and politicians have often struggled to achieve pro-environmental policy decisions. Interestingly, Colorado Springs Utilities, which also operates as City Council in which many members are climate change deniers, recently decided to accelerate the closure of the Martin Drake Power Plant from 2035 to September 2022. Despite the city's conservatism, strong military presence, and slurry of Christian institutions—many evangelical—community members, activists, and local leaders achieved a decision with implications for the reduction of carbon emissions and a commitment to renewable energy. What factors led to the closing the Martin Drake Power Plant? What is the future of pro-environmental policymaking within Colorado Springs and similar communities? Community leaders participated in interviews and a focus group discussion in order to gauge an ethnographic understanding of the forces at play in this decision. These preliminary discussions posit that achieving this decision has involved the strategic framing of the climate issue to fit economic and aesthetic concerns as well as a high level of ambition by community members to push for the Power Plant's closure.

P63 Determination of metal-PDMA stability constants via spectrophotometric and potentiometric titration

Student Researcher: Jackson Kohn '23

Major: Geology

Research Collaborator: Anna Evers, Dr. Owen Duckworth

Trace metal limitation is a widespread agricultural issue with far-reaching implications for managing productive soils worldwide (Kraemer et al., 2006). Essential metal nutrients primarily exist outside of the bioavailable pool due to their low solubilities (Kraemer et al., 2015). To overcome this problem, organisms have developed the ability to exude metal chelating compounds called siderophores that promote biologic uptake of metal nutrients (Harrington et al., 2015). These exudates display variable binding affinities for specific metals, contributing to large discrepancies in nutrient uptake rates in soil ecosystems (Treeby et al., 1989). This study seeks to quantify the stability constants of Mn, Co, Cu, Ni, and Zn with PDMA, a recently developed analog of the well-studied but notoriously expensive 2'-deoxymugineic acid (DMA) (Suzuki et al., 2021). Stability constants of each metal-siderophore chelate were determined via simultaneous potentiometric and spectrophotometric titration of 1 mM of metal and 1 mM of siderophore in a 0.1 M electrolyte background using a standardized 0.1 M NaOH titrant. A UV-VIS-NIR Deuterium-Halogen Light Source (OceanOptics, FL, USA) was used to collect our spectral measurements following each dose of titrant. Data was fit in KEV to determine stability constants for specific metal-siderophore combinations. Our results are critical for furthering our understanding of PDMA's effectiveness at mobilizing trace metals, particularly in nutrient-poor soils that comprise one third of Earth's land area (Kraemer et al., 2006).

P64 **Characterizing RBM-39's Behavioral and Transcriptomic Effects in *C. elegans***

Student Researcher: Adele Matter '23

Major: Genetic Epidemiology and Society (IDM)

Faculty Collaborator: Darrell Killian, Molecular Biology

Research Collaborator: Noah Johnson '23

This project completes ongoing work connecting RBM-39, an RNA-binding protein in the *C. elegans* genome, to morphology and behavior. Previous work in Dr. Killian's lab identified this gene as a putative cause of alternative splicing changes and defects in neuronal morphology, and involved a broad RNA-seq comparison of the transcriptome of RBM-39 deletion and wild-type worms. Currently, I am characterizing the movement changes induced by RBM-39 deletion and identifying the source (neuron, muscle, or other) of these locomotion changes. To characterize these changes, I designed, built, and am executing a behavioral assay intended to capture the specific behavioral changes these RBM-39 deletion worms display. To discover the source of these changes, I built (via Gateway cloning) and will inject plasmids expressing RBM-39 in muscle, neurons, and ubiquitously to see whether neuronal or muscular RBM-39 restores wild-type behavior and movement in RBM-deletion mutants. I am also determining what RNA RBM-39 binds in different tissue types by designing and building a set of worms expressing GFP-tagged RBM-39 protein in neurons and ubiquitously. This project will help determine what RBM-39 is directly influencing the splicing of. Both of these projects contribute to a mechanistic understanding extending from the RBM-39 gene to its' influences on phenotype and morphology.

P65 **Artivismo: Art-Activism, Visual Arts and Social Change in Salvador, Brazil**

Student Researcher: Jasmine Linder '23

Major: Art Studio

Faculty Collaborator: Naomi Pueo Wood, Spanish and Portuguese

In my research, I investigated the deeply complicated relationship between visual arts and identity representation in Salvador, Brazil. Due to its history as a colonial city with deep ties to the Transatlantic Slave Trade, racial identity is an incredibly complicated and an important part of culture, power, and politics in the city. I began my research by looking into historic visual art made in Salvador. I then turned my focus toward contemporary artists from Salvador, to see how artists are currently working with the subject of identity representation in their artmaking. I began this by working with visual artists Ani Ganzala, whose work prominently features non-white bodies, queerness, and references to Candomblé (an African diasporic religion that developed in Brazil), as well as Eder Muniz, whose work is heavily based in depicting human connectivity elements such as water, vegetation, and animal life. From this I was able to ask questions such as: how does the power of a piece of art change based on characteristics such as location, size, subject matter, palatability, and legality? How are these pieces commenting on, working against, and/or constrained by systems of power? I furthered these questions through meeting other artists and engaging with art-focused spaces/groups in Salvador, such as pixamina, a collective of femme-graffiti artists/taggers, as well as Acervo da Laje, a group that is working to create spaces for artists from lower-income neighborhoods in Salvador.

P66 Possible Inhibition of *P. aeruginosa* Biofilm Formation by Fluorinated D3 Compounds

Student Researcher: Mauricio Erazo Jr. '25

Majors: Molecular Biology and Southwest Studies

Research Collaborator: Olivia Hatton, Molecular Biology

The Distributed Drug Discovery (D3) project aims to use synthesized organic compounds in aims of curing neglected diseases. The purpose of this experiment was to see which fluorinated D3 organic molecules have the ability to inhibit biofilm formation caused by *Pseudomonas aeruginosa*, the main contributor to health issues to patients with cystic fibrosis each year. To identify whether the D3 compounds act as biofilm inhibitors - and potential antimetabolites to L-Phenylalanine - biofilm assays were performed to observe changes in biofilm formation. The assay consisted of testing the following D3 compounds: 2-F-Phe-Val-OH (#3), 2-F-Phe-Ile-OH (#5), 2-F-Phe-Ala-OH (#2), and 4-F-Phe-Ala-OH (#42). To optimize biofilm formation, a growth curve experiment was also performed to identify key conditions for biofilm growth; optimized biofilm formation would require liquid cultures to be incubated for approximately 8-10 hours at 37°C during the stationary phase. When testing D3 compounds #3, #5, #2, and #42, it was found that the compounds acted as antimetabolites to L-Phe as L-Phe acted as a "rescue" agent to the effects of the D3 compounds. D3 #42 appeared to be the only compound that reduced biofilm formation. Future studies of this project will replicate trials with these drugs and additional D3 compounds.

P67 Mapping Light Pollution and Dark Sky Areas in Colorado

Student Researcher: Drew Manning '22

Majors: Physics and Environmental Studies

Research Collaborator: Cyndy Hines, State of the Rockies Project

Light pollution is a growing issue across the world as communities and municipalities grow, develop and expand their lighting infrastructure, consisting of street lights, storefront lights, and residential lighting, to name a few. Since increased light pollution limits the ability to stargaze and observe the night sky, many efforts have popped up to mitigate artificial light and preserve a dark night sky. This project aims to visualize Colorado's night sky through mapping artificial light in the state as well as a topographical map of the proposed Sangre de Cristo Dark Sky Reserve. The purpose of these maps is to provide a visual aide to educate viewers about both the extent of light pollution in Colorado and what the proposed Dark Sky Reserve consists of.

P68 **Modeling self-organized periodic pattern in arid grasslands: Patterns askew to the slope develops when vegetation impedes sheet flow**

Student Researcher: Silvi Lui '23

Major: Environmental Science

Faculty Collaborator: Miro Kummel, Environmental Science

Self-organizing vegetation patterns in arid and semi-arid landscapes have attracted extensive theoretical research focusing on their formation and stability, providing invaluable insights not only to ecological research but also to the study of complexity across fields. The development of periodic vegetation patterns depends on hydrological factors such as scarcity of rainfall and the development of sheet flow. When water is distributed primarily by diffusion-like processes, the landscape transitions from homogeneous isotropic to periodic isotropic patterns. When surface water advection is present as sheet flow, vegetation bands appear perpendicular to flow and migrate upward on the slope. The two features of the self-organized patterns in the field that are difficult to replicate in models are the lack of upward migration of the bands (as bands in some real ecosystems migrate and in others do not) and the frequent empirical observation of bands skew to sheet flow. Using the ReacTran package in R, we adapted the model developed by Hille Ris Lambers (2001) and augmented the model by explicitly including the impact of vegetation on sheet flow speed observed in the field. The resulting spatial patterns were analyzed using Fast Fourier Transform (FFT) and compared to those in the field. The analysis proved the unique role of vegetation-sheet flow rate in pattern generation. The slowing down effects of the vegetation pattern on the sheet flow is responsible for this generation of an askew pattern by simulation. Filling in the gaps in oblique pattern formation, we hope this analysis can provide some insights into the multiple potential mechanisms and formulate interesting possibilities for future research.

P69 **The Regulation of Long Oskar and Short Oskar Protein in *Drosophila melanogaster***

Student Researcher: Zoë Zizzo '25

Major: Biochemistry

Faculty Collaborator: Austin Chiappetta, Department of Biology, John Hopkins University; Tatjana Trcek, Department of Biology, John Hopkins University

RNA granules are membraneless condensates formed through phase separation.¹ These granules incorporate mRNA and proteins, impacting cellular function.² *Drosophila* germ granules, specifically, are formed during oogenesis and necessary for posterior patterning of the embryo and germ cell formation, allowing the organism to reproduce itself in the future.³ Hence, the formation of germ granules is integral to embryological development.⁴ In *Drosophila*, the protein Oskar is responsible for the assembly of germ granules.¹ Translation of oskar mRNA produces either Long Oskar or Short Oskar, two proteins with complementary functions: Long Oskar anchors germ granules to the posterior pole of the cell, and Short Oskar is responsible for germ granule assembly and germ cell formation.⁵ Vasa, a germline-specific DEAD-box RNA helicase, regulates whether Short Oskar or Long Oskar is produced, though the mechanism by which Vasa regulates oskar mRNA translation is unclear.¹ We set out to address this question by detecting the two Oskar isoforms using Western blot analysis. Therefore, we optimized the detection of Long Oskar and Short Oskar via immunoblotting. Different SDS-PAGE conditions, gel compositions, and primary and secondary antibodies were tested. Using a 7.5% Bio-Rad Mini-PROTEAN TGX gel and constant 100 volts during SDS-PAGE optimized band separation, and JL-8 anti-GFP primary antibody and goat anti-mouse secondary antibody was optimal for detecting Long Oskar and Short Oskar during immunoblotting. This optimized protocol will be used to investigate the regulation of Long Oskar and Short Oskar expression by Vasa and other RNA regulators. 1. Trcek, T., & Lehmann, R. (2019). Germ granules in *Drosophila*. *Traffic (Copenhagen, Denmark)*, 20(9), 650-660. doi:10.1111/tra.12674 [doi] 2. Protter, D. S. W., & Parker, R. (2016). Principles and properties of stress granules. *Trends in Cell Biology*, 26(9), 668-679. doi:S0962-8924(16)30047-2 [pii] 3. Ephrussi, A., & Lehmann, R. (1992). Induction of germ cell formation by oskar. *Nature*, 358(6385), 387-392. doi:10.1038/358387a0 4. Ansari, S., Troelenberg, N., Dao, V. A., Richter, T., Bucher, G., & Klingler, M. (2018). Double abdomen in a short-germ insect: Zygotic control of axis formation revealed in the beetle *Tribolium castaneum*. *Proceedings of the National Academy of Sciences of the United States of America*, 115(8), 1819-1824. doi:10.1073/pnas.1716512115 [doi] 5. Lehmann, R. (2016). Germ plasm biogenesis--an oskar-centric perspective. *Current Topics in Developmental Biology*, 116, 679-707. doi:S0070-2153(15)00190-8 [pii]

NON-PRESENTATION RESEARCH

Understanding What Professional Touring Folk Musicians did during the Covid-19 Quarantine

Student Researcher: Matthew Nesselrodt '23

Major: Film and Media Studies

Minor: Music

Faculty Collaborator: Keith Reed, Music

The Covid-19 pandemic affected touring folk musicians' lives in many ways. I was interested in exploring how the social and economic repercussions of the quarantine affected musicians whose primary source of income came from touring. Through in-the-field interviews of touring musicians conducted alongside of my faculty collaborator, I discovered three main responses to the quarantine period: studio recording time, writing music, or living at home with parents or friends, reflecting on their roles as artists. Summary of Findings: Folk Musicians who spent their lives on the road relying on performance for income quickly had to turn to other means to make ends meet. Those that I interviewed were lucky because they were performing at festivals and had made it through the pandemic, but according to these artists, some of their friends were forced to give up their hopes in a career in music because all of the small venues they were performing weren't open. Others spent their time writing new material and said that the time forced to slow down was particularly good for their mental health and the work they were producing as musicians. They were forced to reflect about their roles as musicians and how they could contribute to the isolation everyone was feeling. Many resorted to doing pro-bono virtual concerts that were intended to bring people together. Ultimately, those that are successful in the Recording Studio as well as through performance were able to scrape by, but others were forced to do non-industry jobs and give up their dreams as musicians for the time being.

Structural Violence and Black Diasporic Subjectivity: The Italian Case

Student Researcher: Marco Barracchia '23

Major: Anthropology

Minor: Global Health

Faculty Collaborator: Carla Cornette, Italian Program

My Summer Research was conducted under the guidance of Dr. Cornette, in the Italian Studies Department. The collaborative project focused on histories of Italian colonialism, Fascism and imperialism in relation to modern-day discrimination and exclusionary migration policies which, in turn, impact Black diasporic individuals and migrants' mental and physical health in contemporary Italy. The research engaged questions of subjectivity, blackness, institutional racism and structural violence, as well as the reality of black subjectivity, citizenship, and identity in a monolithic, homogenous, white and Mediterranean Italian Nation. I particularly centered my research around the establishment of colonial settlement and practices from the 19th and 20th centuries, and their continuities in new forms of post-coloniality that manifest as laws, policies, and practices governing immigration, people's movements, incarceration, marginalization and laws established during the former colonial periods, though never removed or re-considered (for example, the Italian State's denial of *ius soli* citizenship). Using Post-Colonial Theory, Critical Race and Migration Studies, Anthropological frameworks and Ethnopsychology, I investigated how structural violence produces preventable suffering in Black Diasporic Individuals born and raised in Italy, caused by unjust institutions. Additionally, the use of postcolonial pathology helped me highlight the causal relationship between affect and "disordered states," that is, the deleterious consequence on mental health of black diasporic individuals who exist in modern nation-states that failed to undergo a decolonization process. I interviewed over 25 people in the entirety of the project, presented a draft this summer in Rome, and engaged in different anti-racist activist campaigns and projects happening in Italy during the last summer, including extensive social work against the current *ius sanguinis* - blood based citizenship.

Researching and editing the first draft of Professor Riker's book, "Revising Kohut's Self Psychology; Envisioning an Ideal Self Psychology World"

Student Researcher: Macie Aronsky '23

Major: Philosophy

Faculty Collaborator: John Riker, Philosophy

John Riker's book expands on Heinz Kohut's concept of "the self" to conceive of new ways to construct society that do not reinforce the socio/economic/political problems plaguing the modern individual. My work was two-fold: (1) I conducted research into homelessness, loneliness, divorce, addictions, debt, obesity, racism and prejudice, sexual violence, cheating, incarceration, and the correlation between happiness and wealth. (2) I assisted Riker in developing and editing the first draft of this book. We met by zoom and in person nine times to go over each of the nine chapters. This book seeks to (1) articulate Kohut's great discoveries about the human psyche; (2) clarify and develop his basic concepts; (3) offer a self-psychological metapsychology that distinguishes the self from the ego; (4) respond to Kohut's main critics and the post-modern emphasis on fluidity rather than structure, and (5) use this expanded self-psychological theory to analyze many of the social problems plaguing contemporary society, including the practices that generate devastated human beings, vicious bigotry, and environmental degradation. This book aims to relay the type of world ideal for developing and sustaining nuclear selves so that more human beings can live a life of deep fulfillment.

Investigating the temporal dynamics of plant-insect interactions in the Alaskan Arctic

Student Researcher: Zachary Ginn '23

Major: Organismal Biology and Ecology

Faculty Collaborator: Roxaneh Khorsand, Organismal Biology and Ecology

The phenology of Arctic plant-pollinator interactions may shift in a warming climate, potentially resulting in trophic mismatch and community changes. In the Alaskan Arctic, a stronger understanding of temporal trends in plant-pollinator communities is needed. Between June and August 2023, we observed plant-pollinator communities at two sites in the Low Arctic: Toolik Lake and Imnavait Creek. We noted species-specific flowering phenology and floral density in both control and experimentally warmed plots. We also carried out standardized insect visitor watches and collected voucher specimens for laboratory pollen analysis. Preliminary data suggest that flies (Order Diptera) were the most common floral visitors, while bumblebees (Order Hymenoptera, *Bombus spp.*) carry more pollen grains. *Bombus* queens were active in early June, while *Bombus* worker activity peaked in July. Dipteran activity peaked in early July, corresponding with peak flowering. We also observed wasps (Order Hymenoptera) and butterflies (Order Lepidoptera) throughout the summer. Moving forward with these data, we intend to (1) create a plant-insect visitor matrix for the Toolik Lake community, (2) investigate species-specific trends in floral density and insect visitation, and (3) compare pollen carrying efficiency of insect taxa over time.

Form-Particularity: Disabled and Transgender Bodies Colliding with the Development of a Genre in the Early Modern Period

Student Researcher: Alex Hill '23

Major: English and Computer Science

Faculty Collaborator: Genevieve Love, English

The genre of the early modern city comedy presents a formal shift in dramatic aesthetics from late medieval narratives. The change in narrative form(s) between these periods collides meaningfully with a change in the form(s) of the citizenship-making process(es). Utilizing Caroline Levine's *Forms* and Jasbir K. Puar's *The Right to Maim* as a theoretical landscape, I explore this development in form from late medieval cycle plays, moral plays, interludes, romances, and lais to the early modern city comedies "The Shoemaker's Holiday" and "The Roaring Girl" to illuminate its collisions with a mimetic development in forms of citizenship. If we take notice of the fact that citizenship is a legal recognition of an individual personhood by a power structure, we can recognize also that this recognition forms personhood. As such, the set of requirements both explicit and implicit for a person to be considered "of the form" to qualify as "citizen" define an exclusionary process: by stating a person who meets these requirements is included simultaneously states that one who does not is excluded. Drastically, exclusion means an unrecognized personhood; an executioner's switch that looms as a threat regardless of whether or not it is ever thrown. Thus those that become defined by difference – in particular for this research, we consider disabled and transgender people – have a unique relationship to citizenship in that they have been forced to embody the excluded forms that make clearer for those included the legitimacy of their own identities.

Japanese American incarceration and the ongoing crisis of memory and memorialization at the Topaz concentration camp site

Student Researcher: Shea Li Dombrowski '23

Major: Philosophy

Faculty Collaborator: Brandon Shimoda, English

Over the summer I collaborated with Professor Brandon Shimoda on his current book of nonfiction focused on the afterlife of Japanese American incarceration. This included reading various articles and books reflecting on JA incarceration and its memorialization and representation, works of creative nonfiction, and works of historical fiction, by survivors, descendants, and scholars. These books, articles, short stories, graphic novels, and documentaries all confronted various aspects of JA incarceration and its afterlife including erasure and government propaganda, anti-Asian racism, and memorialization which continues into the present day. While there were 10 camps in total the one mentioned most in the selected works was Topaz (in rural Utah). My work involved engaging with a variety of content and mediums and offering thoughts and analysis for how they might interact with the memorialization and memory of JA incarceration and the themes therein. Additionally, I looked at the different focuses, and styles whereby authors engaged with the readers. I also participated in conversations with Professor Shimoda with the goal of discussing these works in relation to his own writing and work.

Multi-level Governance and Just Transition Strategy in Creating Effective National Climate Policies: A Case Study on Spain

Student Researcher: Lorea Zabaleta '23

Major: International Political Economy

Faculty Collaborator: Corina McKendry, Environmental Policy

Climate change and its world-altering effects is considered the largest environmental challenge of this era and preventing it an enormous but necessary undertaking, that can only be accomplished via large scale political and societal transformation. This paper offers a case study in the intersection of influences from multiple scales of government, from the municipal to international, and concepts of justice for all during the decarbonization process in creating comprehensive and feasible national climate policies. Literature on multi-level governance covers a wide-span of politics, from direct hierarchal structures to informal agreements and lateral influences. Just transition is an extension of previous theory surrounding climate justice as a whole and offers new insight on how to overcome particular barriers to the necessary societal transformations, like eliminating the fossil fuel industry. However, the literature offers very little on how the two fields have or can work together to create real life results. By focusing a country enmeshed in many layers and forms of governance, Spain, we can examine where MLG and just transition come together to create actionable policy to mitigate the climate crisis. This paper will argue that Spain, while uniquely situated in those regards, demonstrates a realistic framework for how individual countries can work with domestic and supranational bodies towards a just transition.

Researching the undisclosed truth about execution of condolence performances in South Korean military troops

Student Researcher: Gina Jeong '24

Major: Political Science

Faculty Collaborator: Jiun Bang, Political Science

Consolation performances (wee-mun-gong-yeon) within the South Korean military troop has been a big part of the military culture of South Korea since the country's history. While the performance began with the purpose to condone refugees from the North in the 50s and the 60s, their purpose transformed as the South Korean society did. Today, different kinds of celebrities perform on stage for the mostly-male military troops. A large proportion of the performers are young women in late teens or early twenties, wearing provocative attires and singing and dancing. Such a pattern of women performing to comfort the sexual side of men have become a social issue in South Korea. In this research, I aimed to further investigate the organizations and parties in charge of organizing and conducting consolation performances in the military troops. To do so, I tracked down several documents that explained the laws and stipulations that contained the word consolation (wee-mun), documents that recorded the funding and distribution for consolation. From the law and stipulations document, a big hint about the involvement of military chaplain in the planning of consolation performance was found in Ordinance of the Ministry of Defense No. 822: Regulations on Military Chaplain Service. Article 29 stated that "a military officer may engage in public activities and relief activities, such as consolation, consolation performance..." The documents about the funding and distribution for military consolation led me to get in touch with the Discharged Soldiers Department within the Ministry of Patriots and Veterans Affairs. After conducting several interviews through phone call, I was able to conclude that this sub-organization does not take part in planning or executing consolation performance, nor work with the military chaplains.

DeFlow Microscopy Characterization of Liquid Liquid Phase Separation Droplets of Human Analog Glucocorticoid Receptor Protein

Student Researcher: Nathan Kesti '24

Major: Biochemistry

Faculty Collaborator: Peggy Daugherty, Chemistry and Biochemistry

Research Collaborator: Devlin Swanson '24

Glucocorticoids are a class of hormone produced by the adrenal gland that incite transcriptional response to extraneous stress. To start the signaling pathway, a glucocorticoid ligand, cortisol for example, binds to the glucocorticoid receptor protein and releases the receptor from its protein dock in the cytoplasm. The complex and it enters the nucleus where it selectively binds to DNA to activate transcription of selective genes that aid in inflammatory responses, metabolism regulation, and nutrient uptake. The glucocorticoid receptor protein is a 777-residue protein possessing a helical ligand binding domain at the c terminus, a DNA binding domain in the middle, and an inherently disordered N-terminus. Experiments on an ancestral GR protein indicated that it underwent liquid liquid phase separation to form droplets¹. This LLPS has been theorized to be a mechanism of how the glucocorticoid receptor complex interacts with the genome to control the transcription of specific sequences. The LLPS droplets consolidate transcription factors, and these droplets are very sensitive to salinity, temperature, and concentration allowing them to be swiftly controlled by environmental factors. Here, full length eukaryotic Glucocorticoid receptors were characterized with flow microscopy indicating that the proteins form droplets corresponding with LLPS and that there may be a shift in size and number of droplets when the receptor is bound to differing DNA sequences.

1. Frank, F.; Liu, X.; Ortlund, E. A. Glucocorticoid Receptor Condensates Link DNA-Dependent Receptor Dimerization and Transcriptional Transactivation. *Proceedings of the National Academy of Sciences* **2021**, *118* (30), e2024685118. <https://doi.org/10.1073/pnas.2024685118>.

What are internships?



Internships provide high-impact experiences that allow students to demonstrate their ability to apply the knowledge and skills they are learning in the classroom to workplace settings. Through these applied learning experiences students enhance their existing skill set, expand their professional network, and discern future career goals. Colorado College students participate in a wide array of internships in various roles and industries.

This summer over 80 students received Summer Internship Funding Awards, allowing them to participate in internship opportunities many of which remain unpaid or underpaid. Students who receive funding participate in prep programs, reflection activities, and ongoing support to enrich their internship experience.

Students also participated in other signature internship programs. Edge Internships support rising juniors and rising seniors in applying their liberal arts education in the corporate sector through paid summer internships. Through the Public Interest Fellowship Program, students participated in paid fellowships in Colorado's non-profit sector. Students also participate in internships through special partnerships such as Colorado Public Radio.

To learn more about these programs, and more, visit:
www.coloradocollege.edu/offices/careercenter/

INTERNSHIP PRESENTATIONS, SUMMARIES P1-P34

P1 Food to Power, Colorado Springs, CO

Student Intern: Mary Andrews '23

Major: Environmental Science

Student Intern: Eve Gutheinz '23

Major: Environmental Science

Food to Power is a local non-profit organization located in the Hillside Neighborhood of Colorado Springs. Food to Power was founded in 2013 by two Colorado College graduates who originally named the organization Colorado Springs Food Rescue. In 2019 they rebranded to Food to Power and their goal is to cultivate a more equitable food system in Colorado Springs. During this experience we worked closely with the Food Access and Food Production departments. During our time with the Food Access department, we helped with programs including the no cost grocery program, street pets, senior grocery deliveries, and tabled at the farmers' market. For the no cost grocery program, we would receive donations from local grocery stores such as Sprouts, Whole Foods, and Trader Joes as well as donations from local gardens and our own farm. We would sort through the food to make sure it was up to standard for the program. Then we would set up the facility like a grocery store for members of the community to shop free of charge. Street Pets is a partnership with a non-profit veterinarian who provides food for houseless peoples' pets and in turn we provide hearty lunch for the people. For the senior deliveries we would deliver groceries once a week to seniors who cannot make it to the grocery store. Our work with food production consisted of prepping the beds for planting, caring for the plants, and harvesting once they were ripe. <https://foodtopowerco.org/>

P2 Youth Documentary Academy, Colorado Springs, CO

Student Intern: Katherine Beard '24

Major: Film and Media Studies, **Minors:** Spanish and Journalism

The Youth Documentary Academy (YDA) is a summer program based in Colorado Spring that provides local high school students with the opportunity to direct documentary films about topics that are personal, and they are passionate about. The organization was founded in 2013 by Tom Shepard, an accomplished documentarian, and works closely with Rocky Mountain Women's Film. My favorite part of working with YDA was learning from my coworkers along with the students who are a part of the program. Many of my coworkers are professionals with different backgrounds and their advice throughout the summer was priceless. The student documentary topics ranged from beauty standards in the media to the relationship between climate change and our everyday eating habits. The students come from all over Colorado Springs and have a variety of life experiences and interests. I learned so much about working with new teams, networking, stylistic filming and editing choices, and how to implement what I have learned in class into the real, working industry. At the end of the summer, I was entrusted to edit a film by my coworkers which was a huge honor. I am so thankful to Colorado College and Dylan Nelson, my Film and Media Studies advisor, for this amazing opportunity. Our premiere of films from this past summer is November 5th, and I hope to see you all there! <https://www.youthdocumentary.org>

P3 Western Forestry Initiative, Utah State University, Logan, UT

Student Intern: Gena Blumenweijg '24

Majors: Organismal Biology and Ecology

As a Forestry research intern and technician for the Western Forest Initiative, I worked in the Yosemite, Wind River, and Cedar Breaks plots, conducting mortality surveys of the gymnosperms, mapping fallen trees, and collecting samples for fuel biomass analyses. The data collected is part of a long-term study of old growth forests in North America, and part of the Smithsonian Forest dynamics plots, so the data is widely accessible for professionals to cite in their own research projects. I learnt the basic skills necessary for not only being a field technician, but also to pursue the next level of education. I also learnt much more about the dynamics of the forest, and the ecology of each plot. Looking forward, I now feel more prepared to apply for graduate programs after my time at CC, and more sure of what I want to pursue after graduation. <http://westernforestinitiative.org/>

P4 **Burple, New York City, NY**

Student Intern: William Broder '23

Major: Music

Burple started a couple of years ago as a digital art NFT (non-fungible tokens) project highlighting the untold stories of icons and artists. Since beginning work there in February, I have repositioned the company to be a pioneer in the web3 sphere. Now, Burple is positioned to be the first entertainment and media company in the crypto world. One way to describe what that means is to think of the company Disney. They create films, shows, experiences, and more. Burple will be the first web3 company to offer what existing companies do but built completely within the blockchain using cryptocurrencies. It has been quite an exciting experience and shall continue as I work at the company full time. The nature of the startup is that no one in the company gets paid at this point in time. All money has been invested within the company for various necessary resources. I am very grateful that I was able to pursue a position at Burple with the help of the internship funding supporting me through the summer.

P5 **Exponential Impact, Colorado Springs, CO**

Student Intern: Owen Brown '24

Major: Mathematical Economics

This summer, I worked for the startup accelerator and incubator, Exponential Impact (XI). I was able to host my own podcast series to increase the XI brand image, conduct best practices research that informed how the executive committee should change XI's structure to increase its reputation/results, and played a financial and strategic role for four different startup companies, landing me a job for the current academic year at one of them. While this internship advanced my passion for venture capital, it most importantly gave me a better sense of place in Colorado Springs. I now know around 20 founders on a personal level, developed relationships with community leaders from all sectors, and have ties to the Springs that can provide opportunities later in my career. <https://www.exponentialimpact.com/>

P6 **Chilton Trust, New York, NY**

Student Intern: Kate Brush '23

Majors: Economics and Art

Chilton Trust, born out of Chilton Investment Company, is based in New York, NY with additional locations in North Carolina, Florida, Connecticut, and Delaware. Chilton is dedicated to providing high-net-worth clients with wealth planning, investment management, family office, and trust and fiduciary. Chilton chooses high-quality investments using a value investing philosophy in global markets and various asset classes. This summer, I worked on a rotation of Manager Research and Client Advisory, learning how to practice due diligence in selecting external managers, compile tear sheets and white pages, work with raw data in Excel, and analyze market research. Although I enjoyed both roles, I preferred interacting with clients and helping people reach their financial goals and have their wealth reach its fullest potential. Such support helps families pay for their children's school, pass on wealth tax-efficiently, and make donations, to name a few. I was lucky enough to receive and accept a full-time return offer on the Client Advisory team and will be returning to work in NYC starting next summer. <https://www.chiltontrustcompany.com>

P7 **Redefine Design, Las Vegas, NV**

Students Intern: Sienna Busby '24

Major: Art (Integrative Design and Architecture); **Minor:** Urban Studies

This summer I had the opportunity to gain interior design experience at Redefine Design. I created reference books, designed a website, researched different styles, gathered samples from supplier stores, and helped my boss design a house she was working on. Most of my work was done remotely in Colorado Springs, however, I was able to go to Las Vegas. I had the privilege of seeing her other projects as well as going to the house I worked on with her during the summer. This internship was valuable for me because I was able to gain real world experience in my field of study. This experience will help me figure out the specific area of design I want to go into after college. <https://redefinedesign.squarespace.com/>

P8 Flying Pig Farm, Manitou Springs, CO

Student: Piper (Pi) Campbell '23

Major: Environmental Studies

Flying Pig Farm is a small urban farm run by two CC grads (Ruthie and Barak) located in Manitou Springs, CO. During the course of this internship, Ruthie and Barak connected us with other urban farms in the areas to engage with a variety of different operations, nonprofits, and ways in which local communities connected with the land. Beyond working at Flying Pig, we also did work such as helping build the community gardens at a Waldorf school in Old Colorado City, working at the CFAM farmers market under New Roots business, assisting at Food to Power, and working at a flower farm in Canon City, CO. In July, we shifted into summer camp mode and helped run 2 weeks of farm camp on Flying Pig farm. My favorite part of this internship was maintaining the constant dialogue about what it means to connect with the land, food, and plants we walk with. As an environmental studies major, it feels we often sit back and talk about how important it is that we get the youth involved and invested in our quickly changing climate. This internship put my feet on the ground, and allowed me to actually have those conversations with children in this community. I am thankful to Ruthie, Barak, and CC for connecting me with these many farms and new friends. I have a whole new appreciation for Colorado Springs and what is possible to accomplish within urban farming. <https://www.facebook.com/flyingpigmanitou/>

P9 Suitup, New York, NY

Student Intern: Haley Caspersen '23

Major: Political Science

SuitUp is a 501c3 education nonprofit based out of Manhattan, New York. SuitUp increases career awareness for all students through innovative business competitions. Through these competitions, SuitUp is taking the corporate world and bringing it right in front of students across the country. The organization wants to show people that those next big steps in life, whether that be college or a career, are not impossible; that anyone can be the next big CEO. Since the organization was created, over 9,000 volunteers and 14,000 students across the nation have been engaged. Over the summer, I served as a programs intern, assisting with the students' competitions as well as preparing all of the proper materials needed for the competitions that the organization held. I am so thankful that I worked with this organization for the duration of the summer. The people that work for this organization are hard-working and passionate individuals who truly want to make a difference in the world, and they have taught me so much. I am extremely grateful to Colorado College for funding my internship experience this summer. <https://www.volunteersuitup.com>

P10 University of Maryland, College Park, MD

Student Intern: Davidson Cheng '23

Majors: Computer Science and Mathematics

University of Maryland is a public research university located in College Park, Maryland. The research program that I was a part of started in 2013 with a focus in algorithms and combinatorics, and over the years incorporated artificial intelligence into their area of focus. My program consisted of 22 students working on 8 projects spanning over the fields of quantum computing, hilbert geometry, Ramsey theory, post-quantum cryptography, AI-bias, machine learning and auction theory. I worked on the auction theory project which takes a different perspective from classical auction design paradigm and focus on the credibility of the auctioneer in a revenue-maximizing auction. I am extremely grateful to Colorado College for funding this internship. <https://www.cs.umd.edu/projects/reucaar/highlights-2022.html>.

P11 Franklin Templeton, San Francisco, CA

Student Intern: Talia Cloud '23

Major: Mathematical Economics

This summer, I had the wonderful experience of interning with Franklin Templeton, a global investment firm based out of San Mateo, CA. I had the opportunity to work with their newest and most innovative team: Digital Assets. My team looked at the growing potential of investing capital and operating within the Web3 framework that is endorsed by the growing presence of cryptocurrencies and digital asset ownership. I was able to observe and participate in their creation of their own trading platform and databases regarding crypto-based portfolios. Additionally, I gained experience working in data analytics as I was able to use an AI platform called H2O to create a model that used past and present data pieces regarding borrower characteristics in order to predict defaults on loans. Franklin Templeton was an incredible company to intern with as they truly are able to impact the goals of individual and corporate investors. My favorite part of my internship was getting the opportunity to engage with individuals across the team and learn extensively about Franklin Templeton's goals and presence in areas like Venture Capital, market research, and marketing. This unique opportunity created an incredible summer of learning and growth for me, both professionally and in my overall knowledge of banking. I am so lucky to have gotten financial support from CC in order to pursue this incredible internship. <https://www.franklintempleton.com/>

P12 EvMatch, Redwood City, CA

Student Intern: Michael Cooper '23

Major: Mathematical Economics, **Minor:** Environmental Studies

EVmatch is a peer-to-peer EV charging solution, so working as a product and customer research intern was a perfect way to combine my math econ major and environmental studies minor. I learned a lot about how a relatively new small company operates remotely. EVmatch is an entirely remote company, so I also learned how to work effectively with coworkers across the US. I hope to continue to use my mathematical skills in an environmentally forward way throughout my career. [EVmatch.com](https://www.evmatch.com)

P13 The Center for Applied Nonviolent Action and Strategies (CANVAS), Belgrade, Serbia

Student Intern: Mary Duggan '23

Major: Race, Ethnicity, and Migration Studies, **Minor:** Religion

The Center for Applied Nonviolent Action and Strategies is an organization based in Belgrade and serves to give guidance to current revolutionaries on how to effectively resist their oppressive governments. The organization is co-run by a visiting professor at Colorado College, Srdja Popovic (a Serbian activist), and after taking his course on social media activism, I knew I had to get involved with this organization. Through this internship, I have been able to explore the nonprofit world, to learn about the principles of nonviolence and collective resistance through my research and through learning from activists in Burma and the Ukraine today. We conducted collaborative research projects about other revolutions that have happened throughout history and location, to inform these current activists about their movements' potential victories and failures. By taking a nonviolent approach, the Center for Applied Nonviolent Action and Strategies aimed to guide activists to widespread collective resistance within their own campaigns. This internship was extremely meaningful to me; not only was I able to explore the beautiful city of Belgrade, Serbia, but I was also able to learn how to become an effective organizer in any campaign. I plan to apply this work to the activism work I have been involved in at Colorado College thus far. <https://canvasopedia.org>

P14 **Lale, Hamburg, Germany**

Student Intern: Fargol Yeganeh Fathi '24

Major: Psychology

Lale is a support organization which supports women who go through domestic violence or are in danger. The professionals at Lale work with people over 14 years old and connect them to appropriate resources. Other than working on crisis projects, Lale also focuses on empowering women by holding sessions and workshops. Lale organization offers support to mostly immigrants who have a harder time connecting to the right resources, therefore, the organization operates with many languages as well. The staff members that I worked with were incredibly loving and passionate about their jobs. The job requires a high level of empathy and resilience because of all the stories that people bring to you; you need to learn to be open and appreciative of being a part of a larger support system. I was able to have the opportunity to work with the women, be trained and learn how to be a social worker to the extent that I could. I also got to do administrative work, learn German that helped me with the administrative work, and be a part of empowerment workshops. I learned a lot about how to deal with trauma having read relevant texts during my trainings and shadowing my supervisors in action. I am very grateful for being able to have this experience and it could not have been done without the fund that Colorado College provided me with. <https://ikbev.de/ueber-lale/>

P15 **Representative Jay Livingstone, Massachusetts State House, Boston, MA**

Student Intern: AJ Fabbri '25

Major: International Political Economy (Intended)

Working as an intern for Rep. Jay Livingstone at the Massachusetts State House of Representatives gave me valuable insight into local politics and everything that makes state governments run. Jay represents the 8th Suffolk district, which consists of 47,000 people across several neighborhoods in downtown Boston and Cambridge. Through constituent correspondence assignments, crafting tweets, designing social media infographics, and attending and reporting on briefings, I learned that representing a small, localized constituency necessitates a personal touch. For internal documentation, I created several in-depth research and analysis projects for topics that Rep. Livingstone wanted to know more about and gave my personal recommendations for next steps. I watched and took notes for the office about what happened on the House floor, learned to navigate the maze of the Massachusetts State House, and strategized with friendly legislators and aides on how to pass critical bills on tenant protections and abortion rights. Having a direct impact, however small, on changing my home state's laws for the better was an extremely rewarding experience. I left this internship with a greater desire to pursue future jobs with a focus on analytics and consultation. <https://www.jaylivingstone.com/>

P16 **Office of Colorado Public Defender, Colorado Springs, CO**

Student Intern: Julia Fenn '24

Major: Mathematical Economics

My work with the Colorado State Public Defender helped me to better understand the law, office etiquette, and courtroom behavior. Throughout my time at the public defender's office, I learned valuable skills such as how to conduct interviews with witnesses, how to organize evidence, and how to explain complex legal matters to our clients. This experience highlighted to me that to be a great lawyer, you have to know the law but also the people you're working with. I greatly enjoyed watching trials at the El Paso County courthouse. This experience allowed me to become more familiar with how attorneys carry themselves in court. I enjoyed watching cross examinations, direct examinations, and closing arguments. I learned the importance of how to carry yourself in front of a jury and a judge. I also visited crime scenes, delivered clothes to our clients in jail, and served subpoenas. Overall my experience at the public defender's office has pushed me to want to be a lawyer and advocate with my career. <https://www.coloradodefenders.us/>

P17 Heritage Management Organization, Athens, Greece

Student Intern: Chloe Fontenelle '24

Major: History-Political Science

Over the summer I had the opportunity to intern for the Heritage Management Organization (HERITAGE), an international nonprofit based in Athens, Greece. During this experience, I worked as an assistant to HERITAGE's Press Officer, helping prepare press releases and maintaining the organization's media presence. I also edited course material for the HERITAGE Summer Field School Programs and helped facilitate a "Teach for Future" program conference, co-funded by the European Commission's Erasmus + initiative and held in cooperation with the Global Libraries–Bulgarian Foundation and the Romanian National Association of Librarians and Public Libraries alongside HERITAGE. This internship has given me the chance to further develop my media editing, research, and intercultural communication skills, as well as allowed me to gain practical experience working in an office setting. I've also developed invaluable insight into careers in both the mass media and nonprofit sectors, which will no doubt influence my future professional trajectory. <https://heritagemanagement.org/>

P18 Illinois Prison Project, Chicago, IL

Student Intern: Emma Fowkes '24

Major: Sociology

I had the opportunity to join Illinois Prison Project as an intern in the Education Department. Illinois Prison Project (IPP) is a nonprofit organization that aims to reduce the prison population through direct legal representation, public education, and advocacy. The mission of the Education Department is to center and support individuals directly impacted by the prison system. Their main projects consist of outreach to currently incarcerated people, advocacy training fellowship programs for formerly incarcerated people, and broader community education. In my role as an Education Intern, I created and presented content for community education events, drafted and disseminated legal and procedural toolkits to currently incarcerated people, created materials for the fellowship program, and processed correspondence and documents. Working with IPP was indescribably valuable in my development as a person, hopeful change-maker, student, and soon-to-be professional. I gained lifelong mentors, concrete skills, knowledge of the current criminal legal system, and an understanding of the impact that is possible. This experience cemented in me both *why* I want to commit myself to decarceration efforts and *how* I can turn this passion into a career. <https://www.illinoisprisonproject.org>

P19 South Suburban Parks and Recreation, Littleton, CO

Student Intern: Lila Galinkin '24

Major: Environmental Science

Working as an intern for South Suburban Parks & Recreation at South Platte Park was an experience like no other. I began my internship seeking clarity in future career paths surrounding my major, but the summer evolved into much more. In working with nature and teaching others its joys, I found myself taking on new roles of leadership and making unforgettable connections. I was primarily responsible for leading and assisting in educational programs, but I was able to work in many different aspects of the park, too. From weeding out invasive species in the park to tubing down the Platte River, this summer internship was one worthwhile! <https://www.ssprd.org/>

P20 **Center for Applied NonViolent Actions and Strategies (CANVAS), Belgrade, Serbia**

Student Interns: Denise Geronimo '24

Majors: International Political Economy

CANVAS is a nonviolent, pro-democracy organization based out of Belgrade, Serbia, that focuses on building a responsible and just society through international training and consulting. Founded in 2005 by former student activists, the nonprofit organization has worked with renowned and grass-roots activists from over 50 countries around the world. I had the pleasure of working as a Research Analytic Intern. One of my favorite parts of the job was conducting extensive research on fairly new democracies in the global arena. I also enjoyed speaking with experienced activists from various areas, which exposed me to non-Western issues and various ways of thinking. Indeed, this summer has completely changed my life by giving me direction and expertise. I am grateful to Colorado College for giving me the means to pursue this internship. <https://canvasopedia.org/who-we-are/>

P21 **University of Montana, Bureau of Land Management, Lander, WY**

Student Intern: Greg Gillman '23

Major: Organismal Biology and Ecology

This summer the University of Montana gave me the opportunity to complete plant and soil surveys contracted by the Bureau of Land Management. I spent hours in the field assessing canopy cover, vegetation height, species richness, species distribution, soil stability, and soil layers on randomly generated points throughout central Wyoming. The high-quality data provided numerous benefits to the BLM such as grazing pressures, invasive species spread, and overall ecosystem health. The work was challenging, but rewarding, and gave invaluable experience in my field as well as the opportunity to meet and learn from people conducting interesting field research.

P22 **The Colorado Springs Gazette, Colorado Springs, CO**

Student Intern: Maeve Goodrich '23

Major: Creative Writing

At the Colorado Springs Gazette, I was the acting Arts & Entertainment (A&E) section intern. My introduction to professional daily journalism was short, maybe 30 seconds in duration. This is to say that I was thrust directly into the fray. At one point my delightful boss, the A&E section editor, announced that he “forgot I hadn’t been working here for the past fifteen years,” and that was why I never got the primer on how to write news stories– I took this as a compliment. I wrote anywhere from 3-5 pieces a week, primarily for the newspaper’s GO! Section, but also for breaking news, OutThere Colorado, and others. The interviews I conducted for my articles were far and away the most enjoyable part of my internship. <https://gazette.com/>

P23 Jewish Social Services, Madison, WI

Student Intern: Ella Gotzler '23

Major: Anthropology

This summer I had the opportunity to intern in refugee resettlement at Jewish Social Services in Madison, Wisconsin. Jewish Social Services assists refugee and asylee clients by connecting individuals and families to a variety of resources and services. Through their three programs - Reception and Placement, Refugee Support Services, and Preferred Communities - Jewish Social Services promotes self-sufficiency. After studying abroad in Jordan last semester with SIT's Refugees, Health, and Humanitarian Action program, I was extremely excited to learn about refugee experiences in the United States. My internship with Jewish Social Services allowed me to observe the step-by-step process of the resettlement process, refugee case management services, and the extensive systems of referrals and networking. I am incredibly grateful to have created close connections not only with my coworkers but with clients as well. In the face of language and cultural barriers, I developed my patience, flexibility, and genuineness. My summer internship experience has encouraged me to continue working in refugee resettlement after I graduate from Colorado College. <https://jssmadison.org/>

P24 Save-A-Suit, Bethel, CT

Student Intern: Andrew (Drew) Greeley '24

Major: Business, Economics and Society

Save-A-Suit is a non-profit organization whose mission is to supply veterans with professional attire as they transition out of the United States Military and into the professional world. This summer I worked as an E-Commerce Marketing Intern primarily focusing on raising funds to help support the organization's initiatives. Over the course of the summer, I was able to contribute directly to a 34.5% increase in sales. Although the majority of my daily schedule was dedicated to applying and mastering the marketing strategies I was taught, the rest of my time was allotted to playing a supportive role in the office. This often meant that I would be asked to help assist in the shipping process for sold items and veteran packages and the sorting process for newly donated clothing. This is where I learned a lot of useful techniques that eventually helped me develop and start to expand my sweatshirt brand. As I became more competent and successful in my main role, I began to recognize opportunities that I thought Save-A-Suit could benefit from. Towards the end of the summer, and through direct coordination with the Executive Director, I individually developed and successfully launched a new revenue stream for the company. This development has the ability to quickly increase their cash flow while reducing the amount of items that were deemed unusable and began to show promising signs of success before the end of my internship. <https://www.saveasuit.org/>

P25 Yale School of Medicine, New Haven, CT

Student Intern: Lily Guo '23

Major: Neuroscience

Yale School of Medicine is a well-known medical school on the northeast side of the United States. There are awesome people who are working together for years and years to strive for a better understanding of human health and science and to provide better health care for people. My favorite part of the job was working with cells and that really interested me: from not knowing anything about them which is a part of ourselves to getting to treat them as a little baby to care about them. With full of passion throughout the whole summer, I enjoyed every moment I work with things that I love, working with people that I love, and the process of knowing more about what I would like to do in the future. I am super grateful to those people, the community, and our awesome Colorado College for funding this internship. CC gives me support in different aspects and always has my back, letting me experience various things and life. <https://medicine.yale.edu/lab/schwartz/>

P26 IPG Health, New York City, NY

Student Intern: Maddie Heynen '23

Major: Psychology

IPG Health is a healthcare marketing company with over 45 agencies across 6 continents. Their “Bold Beginners” internship program is offered as a hybrid opportunity, for those based in the NYC area, as well as virtually. This 9-week program aims to provide aspiring marketing professionals with real-world experience and information about healthcare advertising and the network. While working from home as an art direction intern, I collaborated on projects, attended meetings, and built relationships with staff members and other interns. I was assigned to the Emgality (migraine treatment medication) team at their Area23 agency, where I made corrections to brand books, created website mockups, and attended both client and team meetings. <https://ipghealth.com/>

P27 HealthFinders Collaborative, Northfield, MN

Student Intern: Elsa Hoff '24

Major: Molecular Biology

HealthFinders Collaborative is a nonprofit healthcare organization that provides free and reduced dental, medical, and mental health services. This organization serves under and uninsured folks in three different communities in southern Minnesota. In addition to providing healthcare services, there is also a team of community health workers and advocates that provide education and guidance surrounding diabetes, exercise, insurance, nutrition, and much more. One aspect of the internship that taught me the most, and connected me to the community, was shadowing and doing intake for one of the volunteer providers. In a more academic sense, I learned how to have a medical dialogue in Spanish and English as well as communicate effectively and efficiently with my medical supervisor. On a personal level, I was shown the importance of compassion and providing a sense of safety to the patients because they must be honest and vulnerable with healthcare providers in order to get the care they deserve. I feel a deep sense of gratitude toward HealthFinders for bringing me on this summer and toward Colorado College for funding this internship. <http://healthfindersmn.org>

P28 San Francisco District Attorney's Office, San Francisco, CA

Student Intern: Meaghan Hohman '23

Major: Political Science

The District Attorney's Office provides innovative and efficient solutions to protect victims, holds offenders accountable, and resolves the underlying causes of crime. During my internship, I worked under one of the most innovative parts of the office: the Restorative Justice Unit. Restorative justice is an approach that focuses on the harmed persons when a crime has been committed and determines ways to repair the harm. Restorative justice promotes community safety by focusing on accountability between a person who has caused harm and the people affected by the harm. It also reduces recidivism by addressing the root causes of harm while upholding the dignity of those who have caused harm. I am so grateful to have been given the opportunity to participate in a unit that is doing such important work everyday. This internship not only gave me incredible exposure to the criminal justice system and legal field, but also honed my writing, critical thinking, and researching skills. I can't wait to take the skills and lessons I have learned with me in both my academic and career endeavors. <https://www.sfdistrictattorney.org/>

P29 **Dzanc Books, Ann Arbor, MI**

Student Intern: Pumehana Holmes '24

Major: English

"Never judge a book by its cover." While this may be true conversationally, in the publishing sense, I disagree. Through Dzanc Books, a non-profit with a mission to promote literacy and publish daring books, I was able to experience the ins and outs of the publishing world. Through this experience, I have learned that the execution of a book contains a multitude of concurrent processes, each important to the final product. For a single book's publication, it must go through typesetting, copyediting, proofreading, developmental editing, and creating a cover. Through my internship with Dzanc Books, I was able to read through submissions, provide personal feedback, create editorial letters, copyedit incoming publications, and create a publishing plan. This internship provided me with the opportunity to get my foot in the door within the industry, getting inside knowledge of publishing's work-culture, and potential progress ahead. I was able to build my own ability and confidence, creating a foundation for whatever is next. I am grateful to Colorado College and specifically the Career Center for giving me the funding to be able to pursue this internship. <https://www.dzancbooks.org/>

P30 **Life on the Edge Lab, University of Florida, Gainesville, FL**

Student Intern: Fer Juarez Duran '23

Major: Astrobiology

In the summer of 2022, I was a Research Assistant continuing research that was conducted on stromatolite (lithified microbial mat; made from layers of cyanobacteria remains) samples in the El Tatio Geyser region in Chile. The Life on the Edge Lab is a group that focuses on Astrobiology through the lens of geologic biosignatures. Previously, chemical analysis had revealed the presence of Fatty Acid Methyl Esters (volatilized derivative of 'fatty acids' or 'lipids'; these molecules are ubiquitously present among all domains of life) in the previously mentioned Chilean samples. However, in the summer of 2022, I employed different chemical reactions to derive recalcitrant biosignatures such as Cyclic Fatty Acids and GDTGs from the same stromatolite extraction. Both CFAs and GDTGs are associated with life abundance and archaeal/bacterial life (respectively), making them a prominent target for biosignature detection. All analyses are able to expand our understanding of what may be a biosignature and what life detection on other places in our universe may look like. <https://people.clas.ufl.edu/amywilliams1/>

P31 **University of Michigan, Department of Ecology and Evolutionary Biology, Tapachula, Mexico**

Student Intern: Yushin Kaneko '23

Major: Organismal Biology and Ecology

I conducted a small part of a long-standing research project underway by two professors from University of Michigan in a remote coffee plantation down in Chiapas, Mexico. My original research topic was a study of noxious weed species and insect diversity, as an aid to a grad student from University of Michigan's School of Sustainability. Much of my day to day would be hiking to remote locations of the plantation and taking sweep samples of the insect population and running analytics on said results. The findings would be notable because the site, a 40ha coffee farm that utilizes agroecological methods, keeps almost the same amount of biodiversity seen in an untouched jungle, and the study would be a study of how jungle insects react to disturbances/invasive species. While my experience was interrupted by issues with my tourist visa, the experience was immensely beneficial to my personal growth, and I was able to transition the rest of my summer to pursue biological research back at home. Another huge thank you to Colorado College for funding this internship. <https://lsa.umich.edu/eeb>

P32 Pierce Conservation District - Harvest Pierce County, Tacoma, WA

Student Intern: Soumya Keefe '23

Major: Environmental Studies

This summer I had the opportunity to work for Pierce Conservation District as the Harvest Pierce County (HPC) Intern. In this role my main responsibility was to support the HPC Community Garden program. This program is home to 90 community gardens across the county. My job was to reach out to the leaders in these gardens and set up site visits with each one. At each visit I gathered information on what support/events/resources the gardens would like to see from HPC. My work culminated in a report I gave to the HPC team in which I shared my observations and recommendations. My internship experience was extremely positive, I was exposed to aspects of our food system that I had never seen. In this role I developed my skills in listening to community needs, and met many amazing people along the way. I am grateful to have had this experience with Pierce Conservation District, and feel more prepared to pursue work in this area. <https://pierced.org>

P33 Graypants, Inc., Seattle, WA

Student Intern: Bella Scola '23

Major: Art: Architecture and Integrative Design Concentration

This summer I spent my time as a production and marketing intern. Every day was an exciting new activity as I got to work with both the custom and standard product, and also the brand team. This included working on a custom project that held 120 pendants on a single canopy, working on all orders for one line of lights called Kerflights, and also producing marketing material like lookbooks and press releases. As the summer went on, my coworkers acknowledged that I was more than just an intern and would give me more responsibility. This kindness allowed me to gain a lot of confidence in both myself and my craft. Also, in my conversations and observations of the business team, I learned a lot about how medium businesses can create sustainable growth. It is currently a really exciting time to work at Graypants, as the business is growing and they are getting more and more custom projects. I am really glad I got the opportunity to learn from the people who make Graypants as special a design studio as it is. <https://graypants.com/>

P34 Cult 9 Records, Houston, TX & Relevnt Inc., Jacksonville, FL

Student Intern: Peyton Wright '23

Major: Peyton Wright '23

Cult 9 Records is an independent record label that produces and promotes hip-hop, R&B, and rap music. Cult 9 Records works to inspire passion and develop talent from quality musicians who holistically represent the label. The label takes time to cultivate strong relationships with their musicians in order to create a unified culture that prioritizes expressions of love and truth. As a Marketing and Copywriting intern, I was incredibly grateful to work alongside our CEO and artists in developing promotional content for their music through emails, website blogs, advertisements, and social media campaigns. Working for Cult 9 Records allowed me to learn the importance of earning artists' trust, and understanding marketing's role in the hip-hop industry. <https://cult9records.com>

Relevnt Inc. is a "conversational journalism" app where users can share news and opinions regarding the sports and teams they love through chat rooms and "live podcasting". Relevnt owns the news site ProSportsFanatics.com, which shares traditional-style digital news stories. Working as a Global Soccer Contributor, I wrote articles covering the USL, Premier League, Champions League, and the 2022 FIFA World Cup. On the app, I hosted a weekly podcast covering rumors surrounding the European transfer market. Relevnt Inc. allowed me to grow as a writer and gained valuable insight on sports reporting. <https://relevnt.com>

INTERNSHIP PRESENTATIONS, SUMMARIES P35-P68

P35 KRCC, Colorado Springs, CO

Student Intern: Eli Jaynes '23

Majors: Political Science, **Minor:** Journalism

Student Intern: Will Taylor '23

Majors: Sociology, **Minor:** Journalism

Colorado Public Radio (CPR) is an NPR affiliate station based in Denver. CPR operates KRCC, based in Colorado Springs. KRCC, was founded by Colorado College students, began broadcasting in 1951. As news interns at KRCC, we developed reporting skills for both on-air radio stories and written articles for the KRCC website. We were able to work closely with the news team at KRCC, including managing editor Andrea Chalfin, and reporters Abigail Beckman, Shanna Lewis, and Dan Boyce. It was particularly valuable to learn from these reporters and observe their process, day-in and day-out. After no more than a few days in the newsroom, we were both reporting out stories over the air, and after a few weeks we were regularly contributing our own reporting to the station. We covered a variety of local stories from southern Colorado, with topics ranging from inflation, to new trail systems, to potato farming in the San Luis Valley. We got a true sense of what it's like to work in a public radio newsroom, while contributing some reporting of our own to the local news ecosystem in Colorado. You can check out reporting from Eli and Will at krcc.org.

P36 Project Alianza, Matagalpa Region Nicaragua

Student Intern: Oliver Kraft '23

Major: Economics

This summer, I interned for Project Alianza as the Business Partnerships Lead. Project Alianza is working to close the rural education gap in Central America through community-led solutions. In short, Alianza hires and trains local women to be community educators; then provides the infrastructure and support for education to take place. Alianza has founded 40+ community education programs, built nearly 20 schools, continues to provide a stable income for dozens of female educators, and has impacted approximately 19,268 lives. My role at Alianza was to build and maintain partnerships with our coffee partners and to support CRM, website, and rebranding transitions. <https://www.projectalianza.org/>

P37 Monument Lab, Philadelphia, PA

Student Intern: Sydney Lau '23

Major: Sociology

Monument Lab is a small nonprofit public art and history studio based in Philadelphia, PA that engages in conversations about the past, present, and future of monuments. Founded in 2012 by Paul Farber and Ken Lum, Monument Lab is at a transitional point in its history, having officially become a 501(c)3 as of July, 2022. My favorite part of the internship was participating in conversations with the Monument Lab team and my fellow interns about public art, collective memory, and reimagining what monuments are and have the potential to be. I loved researching artists who are incorporating their positionality and elements of social justice into their art and creating slide decks to share these artists and their incredible work with the Monument Lab team. Working with Monument Lab was an incredible experience and by far one of the most academically stimulating and collaborative environments I have ever been in. I learned a lot about centering self-care and rethinking what a culture of care can look like; the power, presence, and implications of monuments and public art; and the day-to-day workings of a nonprofit that has recently and quickly come into the public eye. I am incredibly grateful to Colorado College for funding my internship and allowing me to join the Monument Lab team for the summer. <https://monumentlab.com/>

P38 Mote Marine Laboratory & Aquarium, Sarasota, FL

Student Intern: Pike Li '23

Major: Organismal Biology and Ecology

Mote Marine Laboratory specializes in research of marine organisms. The division in Summerland Key specializes in corals. With climate change, coral has experienced significant challenges including ocean acidification, algae competition, predation and disease. The lab in Summerland Key has multiple departments including Coral Health and Disease, Coral Reproduction and Coral Restoration. I spent most of the time in Coral Health and Disease, where I conducted experiment monitoring, DNA extractions, physiology measurements and lab maintenance. This summer we conducted experiments regarding the efficiency of coral disease treatment, the effect of nutrient enrichment on coral disease and coral 3D modeling. I have learned enormously about the experiment design and method, tools for bioinformatic analysis and met a lot of inspirational people who are all about coral. I learned the gravity of novel disease to coral health and potential solutions for prevention. <https://mote.org/research/internships>

P39 The Emotion, Health, & Psychophysiology Lab, University of California, San Francisco, CA

Student Intern: Ann-Claire Lin '23

Major: Contemplative Neuroscience

Where the body meets the mind—this is the study of psychophysiology. During my time as summer research assistant at UCSF's Emotion, Health, and Psychophysiology (EHP) Lab, I worked on the “front lines” of research, applying sensors to people's bodies, acting in research scenarios, debriefing and paying participants, and scoring physiological data. Outside of work hours, I picked the brains (no, not literally) of several researchers and post-doctoral scholars to gain a better understanding of what it means to pursue a career in psychology academia. Lastly, interns gained professional experience by individually presenting a novel study idea to the entire lab's faculty and staff. It was doubtless an invigorating and horizon-broadening summer; I am eager to continue exploring a possible trajectory into psychology academia. <https://www.wendyberrymendes.com/>

P40 Prosono, Denver, CO

Students Intern: Daniel Lo '23

Majors: Sociology

This summer, I interned at Prosono, a consultancy based in Denver, CO. I worked primarily with the R & D team to research and pursue innovation in the field of Social Return on Investment: from planning and coordinating administrative items to managing the project work, and from conducting extensive research across sources to meeting with experts. I utilized the research skills I acquired through my sociology classes, such as literature reviews, interviews, and data analysis, to conduct research for the project and I summarized and synthesized all project work into a final deliverable to present to the company. After the internship, I gained a deeper understanding of the function of business development and what it is like being a young professional and working in a rising company.

P41 One Drop, New York, NY

Students Intern: Sharmely Lopez '23

Majors: Romance Languages

One Drop, founded in 2015, is a biotech company in the digital healthcare space with an app that provides resources for members to cope with chronic health conditions. The company was named after the single drop of blood required to measure glucose levels. One Drop started as a diabetes app, however, today they have grown into a platform for 1.4 million members to manage various health conditions. For two summers, I was an intern on One Drop's People Operations team. I had the opportunity to learn about remote work culture, as well as the different roles and responsibilities it takes to run a successful People Ops team, particularly in a tech start-up space. These roles ranged from talent management, to payroll, to DEI, to recruiting and recruiting coordinator. My favorite part of this internship was working closely with my team, getting to know them well, and finally getting to meet my supervisor and the VP of People Ops/Talent in person at the end of my time with the company after two summers of remote interaction. Lastly, I developed and facilitated my first corporate DEI event which has inspired me to pursue a career in this field. I am grateful to Colorado College for funding this experience. <https://onedrop.today>

P42 Peiro Lab, Cincinnati Children's Hospital, Cincinnati, OH

Student: Alek Malone '23

Major: Molecular Biology

The Peiro Lab is a research lab that researches novel techniques and therapies in fetal surgery and therapy. The lab was founded to investigate basic physiopathologic mechanisms of pediatric and fetal surgical congenital malformations and to discover solutions or therapeutic strategies for unresolved problems in the treatment of these anomalies. My favorite part of the job was being able to be a part of every stage of the process for this field of study. I was able to contribute to research into drug therapy, surgical technique research, and be present when it was implemented in the operation room. During this, I was able to become friends with and tap into the brains of doctors and researchers from around the world. Being a part of the Peiro Lab this summer confirmed my choice of what field to pursue in my future. The comradery and the conversations that came with it along with the work the work that we were conducting will stick with me as my journey continues. I am grateful for the opportunity that the Peiro lab gave me and to Colorado College for funding this experience.

<https://www.cincinnatichildrens.org/research/divisions/c/fetal-placental-research/labs/peiro>

P43 Law Office of Carmen Ramirez, Atwater, CA

Student Intern: Amanda Martín '23

Major: Political Science

This summer I interned for Carmen Ramirez, an estate planning attorney in my hometown. She is an incredible litigator who owns her own firm of all female staff and emphasizes having a healthy work life balance. Additionally, she serves on the California Central Valley Water Board and is on the board of trustees at a community college. During my internship period, I learned much about how the legal world operates and gained valuable professional communication skills. About half of her clients were Spanish speakers, so I felt fortunate to be able to directly connect with them. My community unfortunately faces a shortage of legal assistance, especially bilingual attorneys, so I felt grateful for the opportunity to interact and learn first-hand about "legal deserts" and access to fair representation. My favorite aspect of the job was accompanying her to court and witnessing litigation in action. I loved to see how hours of research and preparation with clients translated to victories. I will forever remember a court case in which a Spanish speaker was misled to believe that she was refinancing her home when in reality the crook changed the title of her property to his name. It seemed so despicable, and I felt happy to have contribute to her getting the title of her home fixed. The internship helped me decide to become a rural lawyer and defend those who are most marginalized in society. <https://www.carmenramirez.com/>

P44 Massachusetts Women’s Political Caucus, Boston, MA

Student Intern: Annie McCauley '23

Major: Political Science

The Massachusetts Women’s Political Caucus (MWPC) is a nonpartisan organization committed to increasing the number of women elected to public office and appointed to public policy positions. I interned with the MWPC as a political analyst this summer and worked primarily with the Political Action Committee (PAC). The importance of electing more women to office is something I’ve always learned about in my political science courses at CC and applying that knowledge to my internship this summer was extremely rewarding. I had the chance to work directly with candidates from across Massachusetts and I gained an understanding of effective political advocacy, non-profit organizational structure, and the PAC endorsement process. I was connected to a huge network of people in Boston who are committed to the success of women in the political arena and for that I am so thankful! <https://mwpc.org/>

P45 Steve Simon for Secretary of State (MN), St. Paul, MN

Student Intern: Logan McCloskey '23

Major: Urban Studies

This summer I worked for Steve Simon for Secretary of State where I was on the communications and finance teams for the duration of my summer. My responsibilities were quite diverse. I was responsible for organizing and coordinating outreach and fundraising events, prospective donor research and database entry and updates, and social media strategy, monitoring, and content production. <https://www.sos.state.mn.us/>

P46 U.S. Chamber of Commerce Foundation, Washington, DC

Student Intern: Maddie Mollerus '23

Major: Political Science

My internship with the U.S. Chamber of Commerce Foundation was filled with new experiences and projects. My main responsibilities were researching and reporting on emerging issues; making recommendations for Fast Forward topics; writing the scripts, speaker briefings, and questions for speakers; and helping produce Fast Forward promotional materials. Other projects included doing a news presentation each Monday, helping with speaker tech checks and calls, and creating a Foundation NFT for Tech Forward. I also helped organize and run the Private-Public Partnership conference. I learned several important things that I’m definitely going to take with me as I go further down my career path. One of them is that people are nicer than you expect, and being friendly and open to conversation goes a long way. I’ve also learned a lot of good networking tips (like to never open with “So, what do you do?” and instead ask a thought-provoking question). I’ve realized what makes a good boss, and what qualities to look for in leadership. Work is more enjoyable when you collaborate with your coworkers and make an effort to be friends with them; it’s definitely the people around you that make the experience. <https://www.uschamberfoundation.org/>

P47 Mile High Youth Corps, Colorado Springs, CO

Student Intern: Sydney Morris '24

Major: Organismal Biology and Ecology

Interested in the field of conservation, I decided to work as a sawyer with Mile High Youth Corps (MHYC) this summer. After receiving S-212 Wildland Fire Chainsaw training and a MHYC felling certification, my sawyer crew headed out into the field for 12 weeks. We camped for 4 days a week and helped with numerous conservation projects in Colorado’s Southern Front Range. Most of our days were spent cutting regeneration trees, thinning dense forests, and creating fire breaks to prevent potentially detrimental wildfires that have plagued forests in the West due to fire suppression. Mile High works to emphasize the importance of conservation, create a work environment with a shared passion for land conservation, and connect interns with USFS and conservation groups around the state. <https://www.milehighyouthcorps.org/>

P48 **The Evans Lab, The Wellman Center for Photomedicine, Massachusetts General Hospital, Boston, MA**

Student Intern: Izzy Nagle '23

Major: Biochemistry, **Minor:** Education

This summer I had the amazing opportunity to participate in the translational research being conducted within the Wellman Center for Photomedicine at Massachusetts General Hospital. I worked in the Evans Lab under the advisement of Emmanouil Rousakis, PhD, an accomplished chemist and Harvard Medical School instructor. A division of the Evans Lab develops oxygen-sensing technologies using phosphorescent molecules called porphyrins. My project goal was to synthesize two types of hydrogel coatings to be overlaid on top of the oxygen sensing materials. These coatings act as a barrier to prevent direct contact between the porphyrin molecules and the bodily fluids or buffers involved in the technology's clinical applications. Not only did my research skills improve tremendously, but I am also grateful for my encouraging and inspiring coworkers who fostered this valuable experience of working in an academic setting outside of Colorado College. I feel confident and excited to continue both my academic and professional career in biochemistry after my summer internship at the Wellman Center.
<https://wellman.massgeneral.org>

P49 **Overseas Briefing Center, Washington, DC**

Student Intern: Sebastian Olson '23

Major: International Political Economy

The Overseas Briefing Center is a branch of the US State Department that prepares foreign officers for global travel. As a Creative Visual Design intern, I created digital branding for a complete rehaul of the department's image. For the first month of my internship, I worked on a new logo. I had daily meetings with various people within the department to get a sense of who they were and what they do. We discussed fonts, shape, and symbols at length, and had the eventual goal of creating a simple but meaningful modern logo for the department. I thoroughly enjoyed going through this creative process with so many people. After this more communal effort, I worked on researching countries with US embassies and creating binders for each one. I got to conduct a different form of research than in classes, which was interesting. Working from the perspective of the US government is not quite the same as being a student. I really enjoyed the work I did and all the people I met. I am proud to have created the new logo for the department for years to come. <https://www.state.gov/overseas-briefing-center-obc/>

P50 **One Colorado, Denver, CO**

Student Intern: Luke Ortiz-Grabe '25

Major: International Political Economy

For the summer of 2022, I had the opportunity to participate in a hybrid position as a Development Fellow at One Colorado, the state's leading advocacy organization dedicated to advancing equality for LGBTQ+ Coloradans and their families. They effectively advocate for LGBTQ+ Coloradans and their families by lobbying the General Assembly, executive branch, and local governments on issues like safe schools, transgender equality, relationship recognition, and LGBTQ+ health and human services. My role at One Colorado was as a Development Fellow, where I learned about the current donor layout of the organization and played a crucial role in the success of multiple fundraising efforts. In particular, I organized volunteers and set up at the Pink Party in June, and managed the Silent Auction and AV Program for the Prism Awards in August. I also assisted with One Colorado's Food Access project in Pueblo, Colorado, and was a member of the review committee for the 2022-23 GSA Leadership Council. I gained essential skills and knowledge for non-profit development, such as customer relations management systems and donation solicitation, and strengthened my skills in communications. Overall, this fellowship strengthened my desire to explore a possible career in non-profit work in the future, and gave me some essential clarity as to the opportunities I would like to pursue for the rest of college.

P51 Legal Services for Prisoners with Children, Oakland, CA

Student Intern: Clare Quinn '23

Major: Political Science, Race Ethnicity & Migration Studies

Legal Services for Prisoners with Children (LSPC) is a nonprofit that works to help currently and formerly incarcerated people advocate for themselves to get resources during and after serving time, reunify families, advocate for release, and increase public awareness of structural racism and how it permeates our criminal legal system and policing. This summer, I worked with the policy and legal staff at LSPC to respond to prisoners' letters, provide them with accurate and helpful manuals and advice, provide support for bills being heard in the state senate in Sacramento, organized registration information for the annual Quest for Democracy event in early August, and talk to members of the community during outreach events. I learned an invaluable amount from the people I worked with - both the two other student interns and the staff. Most of the staff at LSPC are directly impacted by the criminal system and have been formerly incarcerated, and they demonstrated what genuine help looks like in a system that is built to exploit and work against incarcerated peoples' future success. <https://prisonerswithchildren.org>

P52 Allergan Data Labs, Irvine, CA

Student Intern: Tedy Reed '23

Major: International Political Economy

Allergan Data Labs (A-DL) is a digital marketing firm within the second largest pharmaceutical company in the world, Abbvie. Headquartered in Orange County, CA, A-DL utilizes data and analytics to create the most innovative and personalized marketing strategies within the medical aesthetics industry. The company was founded in 2018 and has completely transformed doctor and patient experiences through their inhouse app Alle. During my time at A-DL, I had the opportunity to pilot a marketing test throughout the summer that led to very promising results. While A-DL has primarily focused on email marketing in the past, I was in charge of incorporating SMS, Push Notifications, and In App messages within the previously created consumer journeys. It was eye opening to see how many different individuals within different departments of the company are needed to make a project launch. In order to get the tests up and running, I had to lean on people from the analytics, creative, engineering, and legal teams which allowed me to see first hand what all the various sects of the company do on a day to day basis. In addition to working on the company's marketing Personalization team, I was lucky to spend a day in the field with a Business Developer Manager where I spent time in meetings with customers and saw how all the work done within A-DL impacts these practices. <https://www.allergandatalabs.com>

P53 Didit, New York, NY

Student Intern: Susie Renehan '23

Major: Psychology

Didit is a knowledge sharing marketplace. They enable expert creators to monetize their following through 1:1 on-demand video engagements. Users have access to personalized advice and solutions from a validated network of expert creators. Didit is a startup that is in the process of being launched in the coming month. This summer was a critical time for me to help out because of the large workload the two founders had. I was able to be on the forefront of their current process of beta launching their app and doing rebranding. I got a walk through of their financials, and marketing plan as well as their communication with investors. One of my favorite tasks was going through the app design on Adobe XD and editing the design to make the app user friendly and consistent. I worked closely with the COO who has an incredible background in technology and furniture design. Didit was an incredible learning experience for me and continues to be as I continue to work for them through the fall. I really find working with Didit to be inspiring and not only work that sparks my interest, but an environment of innovation and passion. I am extremely grateful for Colorado College funding this important experience. <https://didit.com/>

P54 Cheyenne Mountain Zoo, Colorado Springs, CO

Student Intern: Alondra Reyes Diaz '23

Major: Environmental Science Chemistry Emphasis

This summer, I had the opportunity to intern in the Rocky Mountain Wild and Asian Highlands areas of the Cheyenne Mountain Zoo. I worked with the zookeepers of these areas to help them with their daily tasks, like diet preparation, creating enrichment, and recordkeeping. Since the animals we cared for ranged from porcupines to grizzly bears to leopards, I learned about exotic animal husbandry as it applied to a variety of species with varying needs. My favorite part was watching the animal training sessions and learning about animal behavior. The zookeepers trained different husbandry behaviors to allow the animals to participate in their healthcare, such as voluntarily receiving injections or getting their blood drawn. During this internship, I was exposed to different career paths within the field of animal care, from veterinary medicine to conservation work. I also gained practical skills and knowledge of exotic animals that will help me achieve my goal of working with wildlife in the future.
<https://www.cmzoo.org/>

P55 University of Minnesota, the Life Course Center, Minneapolis, MN

Student Intern: Hannah Scott Dec. '22

Major: Sociology

Located in the Institute for Social Research and Data Innovation at the University of Minnesota, the Life Course Center is an interdisciplinary research center that studies population dynamics and disparities contextualized over the lifetime. This summer, I worked as a Research Assistant for Dr. Phyllis Moen, the director of the Life Course Center and a Sociology professor. I primarily worked on a mixed-method study looking at the effects of a reduced work schedule on employee health and wellbeing. My favorite part was developing an interview set of questions and then conducting interviews with the employees to check in and see how the reduced work schedule was going for them. It was impactful to meet the participants in the study and hear how profoundly the trial impacted their lives. It was also meaningful to be trusted by my research team to generate core data for the project independently. It has been such an incredible opportunity to learn about social science research and career trajectories through immersion and connection-building, and I am so grateful to Colorado College for helping make this experience possible.

P56 Dixie Landscape, LLC, Miami, FL

Student Intern: Flynn Seckinger '23

Major: Environmental Science

This summer I had the opportunity to intern at a landscape company that focuses on creating sustainable outdoor spaces. Dixie Landscape is a company that specializes in the maintenance, design, installation, irrigation and growth of trees. It started 30 years ago and has a range of scales and locations such as community development, luxury private residential, public streetscapes, urban and commercial development throughout South Florida. I took this internship because I was interested in the business methods and practices that were used in a landscape company. Additionally, I care about the environment and thought that the company would teach me about the importance of landscaping and green spaces in a large city such as Miami. As an intern I learned a lot about the process of growing trees and plants, estimating the cost of jobs, how contracts and sales were made, and working in an office environment. I specifically worked in the estimating department with 6 other employees. Overall, the internship allowed me to exercise different skills I have learned at Colorado College and taught me new skills that I can bring back to the community and my future career.
<http://www.dixielandscape.com/>

P57 Fred Hutchinson Cancer Research Center, Seattle, WA

Student Intern: William Shea '23

Major: Molecular Biology

Fred Hutchinson Cancer Research Center is an interdisciplinary cancer research institute that strives to assist in the elimination of cancer as a threat to human health. The institute was originally founded in 1956 in dedication to the study of heart surgery, cancer, and diseases of the endocrine system. Now, the center studies cancer, infectious disease, and many other disciplines in human health. My work at The Hutch was in the Vaccines and Infectious Disease Division, specifically with the Herpes Simplex Virus (HSV) Vaccine Group. I was tasked with the production and functional testing of antibodies produced by B cells in and around herpes lesions. Through my work, our group was able to identify over 20 different antibodies with specificity to HSV. Previous to my time at the Hutch, no antibodies with HSV specificity had been identified by the HSV Vaccine Group. While the work was often difficult and tedious, my coworkers provided an engaging and amusing environment. This environment fostered a greater sense of responsibility for both the crucial work we performed and for each other. Everyone at The Hutch I spoke with was capable of providing knowledgeable and useful insights into my work and learning experience. I have developed much better laboratory techniques in several areas and my critical thinking abilities have improved immensely due to this opportunity. I want to thank Colorado College for sponsoring this experience, and Fred Hutch for teaching me invaluable lessons and enhancing my knowledge of molecular biology. <https://www.fredhutch.org/en.html>

P58 Olympia Snowe Women's Leadership Institute, Portland, ME

Student Intern: Sarah Spizzuoco '23

Major: Psychology

This summer I had the unique opportunity to work for a non-profit organization called the Olympia Snowe Women's Leadership Institute, a three-year high school program for Maine girls who show leadership potential. Through programming and mentoring from women in their community they complete the "My Values," "My Voice," and "My Vision" years to give them the tools needed to successfully advocate for themselves and gain confidence. I hoped to gain valuable professional skills, better understanding of non-profit work, and apply knowledge from my liberal arts education. My internship was separated into three categories: networking, development, and data consolidation. Throughout the summer I called and corresponded with hundreds of program alumni, learning about their experience and future. I contacted all major donors of the Institute and attended a networking Founder Reception where I spoke about my experience working for the Institute. My largest project this summer was creating, developing, and establishing an Alumni Council. I wrote the charter, choose the founding members, and established a timeline for their programming. This project was the most important to me as it gave me the opportunity to connect with Colorado College alumni who are currently on the Alumni Association. Finally, the last aspect of my internship was logging and accounting for all data used by the Institute to help them apply for grants, pitch to the development board, and dictate the programming for the upcoming academic year. Overall, I am incredibly excited to use all my newfound skills and knowledge to help me guide both my academic and professional career! <https://snoweleadershipinstitute.org/>

P59 Changing Directions Films, LLC, Portland, OR

Student Intern: Frances Thyer '23

Major: Film and Media Studies, **Minors:** Journalism and Art Studio

This summer I had the opportunity to work with documentary filmmaker Courtney Campbell, director of wildfire focused documentary film "Built to Burn". I initially worked as a research and production assistant for his upcoming film, which will focus on the legalization of therapeutic psilocybin in Oregon and the roll-out of facilitator training programs. I also helped with an ongoing promotional project for a Portland based non-profit, assisting with interviews and sound in Klamath Falls, Oregon. I assisted with both preproduction and postproduction work and feel as though I learned valuable skills that will carry into my work as a film and journalism student. I look forward to utilizing this new knowledge in my daily work as well as future career opportunities. <https://builttoburndoc.com>

P60 **Girls Health Ed, Washington, DC**

Student Intern: Alexis Travers '23

Major: Psychology and Human Biology & Kinesiology

This summer and over the past year, I have been an intern at Girls Health Ed (GHE). Girls Health Ed is a non-profit organization that provides comprehensive health and sexuality education to girls and young women in underprivileged areas. Its mission is to advance gender equality by fostering empowered, healthy, and informed decision-making. As the Communications Intern, I created graphics and captions for all of the social media platforms and assisted with community outreach and grant writing. Additionally, I became a certified Teaching Fellow, which allows me to teach the GHE curriculum to girls and young women during our workshops at different schools and community centers. I also created a Teaching Fellow manual that will be provided to all Teaching Fellows during their workshops in the near future. It has been a privilege to work with individuals whose passion is to help educate those who may not otherwise have access to comprehensive health and sexuality material. To be a part of a non-profit that's goal is to teach girls and young women to advocate for themselves and their bodily autonomy is something that I will always be grateful for. I will take the knowledge I have gained over this past year and continue working towards a more equitable world. <https://www.girlshealthed.org/>

P61 **Colorado Rocky Mountain School Garden, Carbondale, CO**

Student Intern: Carly Valerious '23

Major: Environmental Science

This summer I was a garden intern at Colorado Rocky Mountain School (CRMS), an experiential outdoor school for highschoolers. Over the summer we grew fresh food on about 4 acres for the students and staff at CRMS. Unlike my past experiences on small scale organic farms, CRMS uses its farmland as a teaching tool and the food it produces for the school itself. Because the school does not need to profit off of the garden program, it serves as a unique educational opportunity for teaching the garden interns more in-depth understandings of organic growing practices. Throughout the summer I was able to deepen my understanding of how to grow food responsibly. <https://www.crms.org/>

P62 **gWell Health, Boston, MA**

Student Intern: Dafna Williams '23

Major: Economics

I interned at the startup gWell as a marketing intern. gWell is a genomics and musculoskeletal health focused app that uses DNA to provide personalized medical information and recommendations that are easy for the average person to understand. The subject matter of the company and my position in marketing was a perfect intersection of my economics major and human biology and kinesiology minor. I focused a lot on building the video and visual components of the gWell app and helping launch, produce, and edit, the *Be Well with gWell* podcast. With a barebones startup staff, I was also involved in B2B marketing, SEO, and other projects. The startup nature of gWell allowed me to have a very visible impact and high levels of responsibility. <https://www.gwellhealth.com/>

P63 Team Clean, Philadelphia, PA

Student Intern: Ja'Sion Woods '24

Major: Ja'Sion Woods '24

Team Clean is a commercial, janitorial service company centered in Philadelphia. The business was started by Donna Allie (an African American woman) in 1983. Donna started off by answering ads in the newspaper for cleaning services, until eventually one day she began hiring other cleaners which then became Team Clean, Inc. Team Clean is now over 300 employees, who all play a key role in providing the GOLD standard of cleaning on each site. During my time at Team Clean, I've met many of the employees who love their job and are happy in the cleanliness they provide to the communities they serve. My favorite thing about Team Clean is that it is a small company which gave me direct access to the CEO, COO, and other higher ups. Being able to sit in on meetings, make business memos, create spreadsheets to collect data, and taking inventory showed me some important elements of running a business. I learned that good health, good people skills, good teamwork, and good leadership leads to a successful career in business. I am forever grateful for the funding that Colorado College provided me this Summer. <https://team-clean.com/>

P64 Onebody ENT, Hillside Advisory Team, & Concrete Couch, Colorado Springs, CO

Student Intern: Gabriel Wright '23

Major: Film

This summer, my work consisted of working for a partnership between these three non-profit organizations in Colorado Springs as part of an Oral Histories documentary project led by Shawn Womack. The mission of the project was to highlight the stories and lives of pillars of the Colorado Springs community located in the Hillside neighborhood, one of the most impoverished neighborhoods in the city and a historically black community. I worked closely alongside co-owner of Onebody ENT DeAndre Smith as a videographer for events that the nonprofit organized, as well as working as a main camera operator for a documentary series project that Dee is pitching to Netflix in the spring titled *Men Of Influence*. I also worked as a camera operator for a Concrete Couch event that introduced a group of seniors that Shawn had been working with to choreograph an awesome performance based on their own oral histories. With the Hillside Advisory Team, I led a team of high school and early college students from Hillside in documentary training and interviewing June Waller, one of the seniors from Shawn's class and an incredibly influential woman in the history of Colorado Springs. Because I was working on many projects at once this summer, I decided to create a mini documentary of my own to talk about my experience this summer and how oral histories are impactful to me in my life. I thank Colorado College for this opportunity, it's been a truly awesome summer!

<https://www.onebodyklcc.org/>

<http://www.concretecouch.org/>

https://www.instagram.com/hillside_neighborhood_team/?hl=en

P65 Spectrabotics, Colorado Springs, CO

Student Intern: Luca Espinosa '23

Major: Environmental Science, **Minor:** Computer Science, Mathematical Biology

My internship at Spectrabotics was an incredible experience and allowed me to get a taste of the environmental tech world. I worked on a project that had the goal of developing a drone-mounted hyperspectral sensor capable of detecting hazardous materials in the soil. The project was a collaboration between a private company (Spectrabotics), UCCS academia, and government officials at the Air Force Academy. It was fascinating to see how the vastly different organizations worked with one another. In addition to assisting on this project, Tim Haynie, the owner of Spectrabotics, personally introduced me to the world of drones. Under his guidance, he taught me not only how to fly drones, but how to troubleshoot them, and how to use them for business purposes rather than just recreation. The overlap between technology and helping the environment is on the rise, and this internship gave me a great overview of what I might expect if I choose to pursue a career in this field.

<https://www.spectrabotics.com/>

P66 Flying Pig Farm, Manitou Springs, CO

Student Intern: Tyler Yung '24

Major: Environmental Studies

Flying Pig Farm is a 1-acre urban farm which seeks to build strong relationships between the land and humans of all ages by engaging them in working with the plants and animals on the farm. My internship, even though primarily based at Flying Pig, focused on connecting and working with the local Colorado Springs Food Shed. For the month of June, I was working on a rotating schedule between working at the Mountainsong Community Garden, helping out at the New Roots Farm Stand, Ellen's Flowers (a 4-acre flower production farm) in Cañon City, Smokebrush Farm in Manitou, and Flying Pig. In July, we transitioned into working at Flying Pig full-time, where I was a camp counselor for their Farm Camp, which is a one-week camp with two sessions open to elementary and middle schoolers. We also split time working at Flying Pig and Ellen's Flowers during the off-weeks of Farm Camp. Overall, I had an amazing experience this summer and learned a lot, not only about the local food shed, but about agriculture in general. My previously conceived romantic notions of farming were gradually deconstructed as I talked to the people that I worked for and was exposed to the realities and hardships of young farmers. Additionally, I learned that there are varying ways that farmers work the land as they try to balance efficiency and environmental impact. <https://www.facebook.com/flyingpigmanitou/>

P67 Gaianè Kevorkian, Cremona, Italy

Student Intern: Oliviero Zanalda '25

Major: International Political Economics

Gaianè Kevorkian specializes in discovering, contacting, and booking artists for various concerts and festivals around Italy. Additionally, her job involves attending the concerts and festivals she books. This involved ordering food for the artists, setting up the backstage areas, and taking care of the artists. My role in this was to be her assistant. Since Ms. Kevorkian books concerts around Italy, I was able to travel to places like Bologna for the internship. Furthermore, I spent most of my time interacting around the artists. I was able to gain fascinating insight from the artists regarding their process for writing, recording, and performing music. Most of the artists were Italian, but there were a few foreigners, such as Marky Ramone, and Shingai. This internship has not only shown me how much work goes on behind the scenes at concerts and festivals, but it has also helped me understand an artist's creative process on a deeper level.

P68 Johannes Gutenberg University Mainz, PRISMA+ Cluster of Excellence, Mainz, Germany

Student Intern: Anni Zettl Dec. '22

Major: Physics and Mathematics

For my internship I was working with Prof. Hans Jockers in mathematical physics on String Theory. In particular, I have looked at the harmonic functions on a toroidal complex manifold. The structure of the solutions are isomorphic to the corresponding de Rahm and Dolbeaut cohomology and thus it suffices to describe the moduli space of the complex structure of the cohomology. To describe this parameter space, we are interested in computing so-called periods. Periods couple topological information with the complex structure from the manifold's Dolbeaut cohomology. In two-dimensional complex projective space, we can embed the zero locus of a cubic elliptic curve, which is isomorphic to a torus with the matching parameter, and construct a holomorphic one form. Using the properties of the Hodge filtration, it is then possible to derive a certain second order ordinary differential equation. The two solutions to this equation form a basis for the Dolbeaut cohomology and match up to a linear factor the periods. The ratio of the periods describes the moduli space of the complex structure on the torus and can be related to the structure of the harmonic solutions. <https://www.prisma.uni-mainz>



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