Schedule
Thursday, April 21, 2016

9:00 am – 1:00 pm  Oral Presentations (Student Union Building, Vallecito Room)
1:30 pm – 6:00 pm  Performances and Oral Presentations (Jones Hall, Roshong Recital Hall)
6:00 – 7:30 pm  Poster Presentations (Student Union Building, Ballroom)
6:00 – 7:30 pm  Reception (Student Union Building, Ballroom)
2016 Undergraduate Research Symposium Presenters: You can PUBLISH your student work!

The *Metamorphosis* Review Committee at FLC will select 2 outstanding student papers to submit for online publication each semester in *Metamorphosis*, the COPLAC journal of undergraduate research. You can submit excellent student work from this symposium for consideration in the next edition of *Metamorphosis* to be published next Fall 2016. We already have many fine FLC students represented in *Metamorphosis*. You can see our website at [www.fortlewis.edu/metamorphosis](http://www.fortlewis.edu/metamorphosis) for details.

Student proposals (shorter versions of your final research papers) or your entire paper (if available) will be due via our online submissions portal by **September 30, 2016**. Our review committee will select the 2 most outstanding proposals, with the winning authors then having about 3 weeks to produce and submit a final 10-15 page (single-spaced) paper before the journal submission deadline. Your final paper will then appear in the online journal *Metamorphosis*. If you are interested in this publication opportunity, please email burke_b@fortlewis.edu for submission guidelines.
Oral Presentations
Thursday, April 21, 2016
Fort Lewis College, Vallecito Room

9:00  **Geordon Taylor.** The antiquity of language: a review of the evidence. *Anthropology*

9:15  **Sean Conte and Eric Smith.** Comparing Wavelet Techniques for Content Based Image Retrieval. *Mathematics*

9:30  **Break**

9:45  **Joseph Mason.** A Fracture Analysis to Assess the Structural History of the Equity Block at Creede, CO. *Geosciences*

10:00 **Skylyn Webb and Meredith Cook.** Locus of Control and Life Orientation in Relation to Attitudes Toward Gun Laws. *Psychology*

10:15 **Elinor Mullin.** Confirming Exoplanets using the Fort Lewis Observatory. *Physics and Engineering*

10:30 **Marquel Begay.** Tó éí liná (Water is Life): The Environmental and Social Impacts of Groundwater Mining from the Navajo-Aquifer in Black Mesa, Arizona. *Environmental Studies*

10:45 **Ryan Mullen.** Estimation of South Cascade Glacier summer mass balance derived from high-resolution satellite imagery in 2004 and 2008, Washington. *Geosciences*

11:00 **Break**

11:15 **Carlie Anderson, Rachael Sill, Robert Herman, and Phil Carter.** Oops . . . We did it Again! Honors Program

11:30 **Tyler Ozvat.** Natural Product Synthesis of Diarylether Cyclophanes. *Chemistry*

11:45 **Samuel Schnarch.** The Effect of Superfund on Post-Industrial Communities: An Analysis of Geographic Identity. *Environmental Studies*

12:00 **Andres Carlos.** *Homo in quaestio*: Discussion of the taxonomic placement of the Dmanisi hominins. *Anthropology*

12:15 **Connor Brockmeier.** Federalism and Direct Democracy: Why States Dissent Against Federal Law. *Political Science*

12:30 **Meagan Prins.** An Analysis of the Development of US Foreign Policy Attitudes toward Humanitarian Crisis and Genocide in the Post-Cold War Era. *Political Science*

Oral Presentations  
Thursday, April 21, 2016  
Fort Lewis College, Roshong Recital Hall

1:30  Melissa Hicinbothem. The Man in the Black Leather Coat: Panopticism and Historical Fiction. Honors Program

1:45  Tricia Gourley. Textiles, Natural Dyes and Sustainability. Art & Design

2:00  Eliza Finke. Determination of the secondary RNA structure and its importance to the HTLV-1 pro-pol frameshift site. Chemistry


2:30  Brianna Devore. Understanding Spring Awakening: Adolescents in 19th Century Germany. Theatre

2:45  Break

3:00  Allyson Dell’Amico, Olivia Goldberg, and Levi Kurlander. Anonymizing Medical Audio Databases Through Steganographic Concealing of Confidential Information. Mathematics


3:30  Michael Glade. The Veracity of the Historical Details in Javier Cercas’s Novel Soldados de Salamina. Modern Languages


4:00  Taylor Bennett-Begaye. Design & Beyond. Art & Design

4:15  Break

4:30  Leah Brewer. Discovering Dido: Creating a Character Through Research. Theatre

4:45  Wyatt Palmer. Call of Duty Psychological Warfare: The Link Between Video Games and Aggression. Psychology

5:00  Thomas G. Poole. Tension Releasing Exercises Reduce Perceived Stress in College Students. Exercise Science

5:15  Doss Ramsey. Pumping Profit: Postnatural Bodies and Consumer Masculinities. Gender and Women’s Studies

5:30  Mariah Starbuck, Stephanie Teaman, Craig Short, and Matt Steffens. The Role of Deep Pressure Sensory Feedback During Gait. Exercise Science
5:45  Michael Glade and Melba Njenga. Regulation of miR-132 Expression and Viral Entry in MRC-5 Cells via HCMV Infection and Ganciclovir Administration. Biology
Poster Presentations
Thursday, April 21, 2016
6:00-7:30 pm
Fort Lewis College, Student Union Ballroom

B-1 Beans-Polk, Chelsey. The Anthropological Transformation and its Relationship with Native American Peoples. Anthropology

B-2 Hampson, Daniel L. The Provenience Paradox: The Benefits of Renewed Analysis on Biological Collections without Context: A Proof of Concept. Anthropology


B-4 Wright, Hallie. Saw mark analysis on bone: Kerf measurements on Human versus Nonhuman. Anthropology

B-5 Paces, Margo; Berg, Kelsey; Wilmer, Chelsea; McGuire, Matthew. Determining Potential Glacial Refugia for Ostrya knowltonii across the Southwestern US as Inferred Through Chloroplast Haplotype Analysis. Biology

B-6 Pope, Cacia; Riser, Ethan; Stapleton, Tess; Fenster, Steven; Lehmer, Erin. Characterization of a Novel Fungal Species Found on Resident Bats in Colorado; is Pseudogymnoascus destructans here? Biology

B-7 Thulson, Jonathan; O'Brien, Ian; Sheridan, Grace; Fenster, Steven. Characterization of CD9 as an Alternative Receptor for IL-16 Signaling in Cerebellar Granule Neurons. Biology

B-8 Walker, Melanie; Wright, Lauren; Todd, Kelcy, Collins, William. Glycosylated Monoterpenoids: Miticides to Protect Honey Bee Colonies. Chemistry

B-9 Abrams, Tara; Mylroie, Elena; Sommerville, Les. Isolation and Characterization of a Membrane-Bound Pink Pigment from Acidobacterium Capsulatum. Chemistry

B-10 Absher, Nathan; Block, Cooper W.; Chavez, Marlyn; Joe, Natalie; Lindquist-Kleissler, Brent; Mylroie, Elena; Mouzakis, Kathryn D. Studying the role of RNA secondary structure in Human T-cell Leukemia/Lymphotropic Virus Type 1 (HTLV-1) gag-pro -1 programmed frameshift site. Chemistry

B-11 Caldera, Hector; Chadeayne, Devon; Eagle, Forrest W.; Martin, Evita M.; Rios, Jeovanna R.; Walker, Melanie A.; Mouzakis, Kathryn D. Ribosomal Frameshifting in HTLV-1: Examining the pro-pol frameshift site. Chemistry

B-12 Caldera, Hector; Tregillus, Zoe; Osvat, Tyler; Cooper-Sansonne, Andrew. Synthesis of Conformationally Constrained Diarylether Paracyclophanes. Chemistry

B-13 Dailey, Leandrew; Sommerville, Les. An Examination of Ferric Iron and Nitrate Reduction Activity in Acidobacterium Capsulatum. Chemistry
B-14  Harrison, Jacob A.; Wegener, Aaron; Absher, Nathan; Metze, Bryan; Rodriguez, Lydia; Chadeayne, Devon. Synthesis of Haploscleridamine and Biologically Significant Analogs. Chemistry


B-16  Salamon, Rebecca J.; Jamie, Lee; Mouzakis, Kathryn D. Minimal RNA Sequence Requirement of the HTLV-1 gag-pro RNA Frameshift Site. Chemistry

B-17  Gosney, Tori. Environmental stressors: the effects of ambient noise on child development in rural and urban areas. Environmental Studies

B-18  Haberer, James. The Potential Impact of Bark Beetles on Colorado Ski Areas. Environmental Studies


B-20  Hunt, Nicoll. The Psychology of Technology on Childhood Development: Reconnecting to Nature with Walkable Urbanism. Environmental Studies

B-21  Jackson, Duke. Great Plains Farming and the Depletion of the Ogallala Aquifer. Environmental Studies

B-22  Mike-Bidtah, Jody. Navajo Students’ Perspectives on Tribal Food Systems and Sovereignty. Environmental Studies

B-23  Ramseth, Paul. Is the Animas River Valley Prepared for a Major Flood Event?: A Look into Mitigation Strategies and Potential Consequences. Environmental Studies

B-24  Ridener, Christopher. Is Holistic Management a Suitable Strategy for the Landscape of the Western U.S.? Environmental Studies

B-25  Traylor, Lauren. Sowing the Seeds for Food Justice: A Review of Three Urban Farm and Garden Programs in Denver, CO. Environmental Studies

B-26  Finstad, Amanda; Swingle, Grayson; Rhea, Casey; Houghton, Emily. An Analysis of Wilderness First Responder Self-Efficacy. Adventure Education

B-27  Maes, Joshua; Marks, Robert; Meyer, Dr. Carrie. College Athletes’ Perceptions of Care Quality Based on Gender/Race. Athletic Training

B-28  Rambo, Mary; Meyer, Dr. Carrie. The effect of the medical model vs. the athletic model on coach satisfaction of athletic trainers. Athletic Training

B-29  Bender, Keith M; Dohm, Nicole A; Wilkinson, Alex R.; Meyer, Dr. Carrie. Shredding the Gnar and Your Body: An Analysis of Ski Injuries in the 2014-2015 Season. Exercise Science
B-30 Raica, Kiley; Wells, Ashley; Rhodes, Gregory; Simbeck, Cathy. The Effects of Different Energy Sources on Performance in the Multistage Fitness Test. Exercise Science

B-31 Ross, Kathryn A; Gillson, Alexandra; Houghton, Emily; Rhodes, Gregory. The Metabolic Costs of Steep Incline Running v. Walking. Exercise Science

B-32 Standish, Ryan; Gomez Villafane, Sofia; Troy, Meeker; Thompson, Missy. Validation of PerfectPhorm: A Motion Analysis Study. Exercise Science

B-33 Frank, Dominick. Analysis and Interpretation of Offshore Hazards in Arctic Waters of Alaska. Geosciences

B-34 Jiang, Matthew. South Fork Texas Creek Gas Seep Area Subsurface Analysis. Geosciences

B-35 Kinney, Rachel; Kenny, Ray; Gillam, Mary. Investigation of Possible Periglacial Involution Structures: Mesa Verde National Park, Colorado. Geosciences

B-36 Trippe, R. Reid; Gonzales, David; Hannula, Kimberly A. Kinematic Compatibility Analysis of the Ouray Fault, southwestern Colorado. Geosciences

B-37 Currie, Veronica; Yandell, Wayne. Detecting and Hiding Text in Images using Haar Wavelet Transform and Mathematical Morphology. Mathematics

B-38 Ellis, Weston. Convergence in Wide-Reflective Equilibrium: an indicator for objective moral truth?. Philosophy

B-39 Anderson, Jacob; Clark, Katherine; Faust, Jake; Sandoval, Joey; Tozer, Kenneth; Hall, Erik; Belcher, Brandon. Networked Autonomous Surface Vehicles for Reservoir Monitoring. Physics & Engineering

B-40 Begaye, Galveston; Aguirre-Winter, Emily; Klaseen, Ethan; Roybal, Joshua; Smoke, Carly. Mobile HazMat Emergency Facility. Physics & Engineering

B-41 Hespe, Micheal; Bogust, Pam; Carlson, Nick; Bruce, Dillon. Development of an SAE Baja Racecar. Physics & Engineering

B-42 Hensler, Ian; Seaney, Cassie; Kleinert, Matt; Salcido, Kody; Bixenmann, Michael; Garcia, Noah; Emerson, Sam. Sustainable Houses for Engagement and Discovery (SHED). Physics & Engineering

B-43 Ketchum, Remington; Slowman, Wilbert; Paciaroni, Megan. An experimental and modeled comparison of diffraction in imaging systems. Physics & Engineering


B-45 Wecker, Theodore. An Examination of Electron Field Emission from Porous Silicon. Physics & Engineering

B-46 Casey, Joseph R. Music Tonality and Mindfulness. Psychology
| B-47 | Feldhaus, Tyler; Hill, Kenzie; Burke, Brian. *The Influence of Guns on Aggressive Attitudes and Behavior.* Psychology |
| B-48 | McCormick, Meredith; Dorr, Betty. *Equine Motor Dominance and Eye Preference in Response to a Novel Stimulus.* Psychology |
| B-49 | Perry, Anne; Allen, Jessica; Burke, Brian. *Cognitive Reasoning and Decision Making in Regards to Gun Control Laws.* Psychology |
| B-50 | Pinna, Nicole; Nikitina, Katia; Burke, Brian. *The Effects of Impulsivity on Gun and Substance Use.* Psychology |
| B-51 | Thornhill, Sara; Burke, Brian. *Predictors of College Students’ Knowledge of Gun Control Laws and Statistics.* Psychology |
| B-52 | Yanito, Kelia; Pioche, Shardai; Burke, Brian. *The Effects of Media Violence on Fort Lewis College Students.* Psychology |
| B-53 | Gumbiner, Siena. *Birth Stories from La Plata County, Colorado.* Anthropology |
ISOLATION AND CHARACTERIZATION OF A MEMBRANE-BOUND PINK PIGMENT FROM ACIDOBACTERIUM CAPSULATUM

Abrams, Tara; Mylroie, Elena; Sommerville, Les

Department of Chemistry

Acidobacterium capsulatum was cultured from acid mine drainage, has optimal growth at pH 3.0 to 6.0, is a chemoorganotroph, contains membrane menaquinones and its genotypes have been identified in environments worldwide. When these organisms are grown in liquid media with glucose as the sole carbon source under aerobic conditions the cells become “pink”, allowing the culture to take on the shade of pink lemonade as the cells transition from log to stationary phase. However, when these cells are grown under the same conditions with septum-sealed vials the cells remain “white”. The key question being asked in this study is: what is the best method to extract and characterize this pink pigment? Extraction methods involving cell lysis or not, using methanol, isopropanol, diethyl ether and various combinations were tried. It was found that a methanol/diethyl ether-based extraction was the best with the key membrane components extracted in the diethyl ether phase. This phase contained three membrane pigments with characteristic UV-VIS absorbance spectra and unique elution times on a C-18 reverse phase HPLC column eluted with a linear gradient of 1% phosphoric acid to 100% acetonitrile. Final identification of each pigment will be made based on comparison of UV-VIS spectra, elution times and mass spectra analysis relative to standard compounds. This analysis will be done with both “pink” and “white” cells. The preliminary structures of each of these pigments will be completed this fall. Future, studies will look at the distribution and function of the pink pigment in A. capsulatum.
Viral infections in humans lead to various diseases, and the viral replication mechanism needs to be understood to develop therapeutics that can target a step in replication to stop the virus. Human T-cell Leukemia/Lymphotropic virus type 1 (HTLV-1) is a retrovirus that can cause cancer and translation of all the necessary viral proteins occurs through two -1 programmed ribosomal frameshifts. The slippery sequences that cause frameshifting to occur have been identified and specific RNA secondary structures have been predicted to correlate to its frameshifting efficiency. Therefore, therapeutics can be developed targeting the stability of the RNA secondary structures and these may decrease the virus’ ability to replicate. Preliminary data suggests that the first -1 programmed ribosomal frameshift site (gag-pro) has a stem-loop structure, while the second frameshift site (pro-pol) forms a pseudoknot structure. The study being conducted predicts that the thermodynamic stability of the stem-loop structure will be critical to frameshift stimulation. Several variant frameshift sites were designed to investigate this hypothesis. At this time, these constructs have not been successfully clone. This poster presents an overview of the experiments that were conducted in our attempts to complete this study. The information gained from our future experiments will contribute knowledge to the field of retroviral frameshifting, which may lead to the development of targeted antivirals.
OOPS . . . WE DID IT AGAIN!

Anderson, Carlie; Sill, Rachel; Herman, Robert; Carter, Phil
Honors Program

The cohort of scholars in the honors 223/423 class have spent the academic semester examining concepts around making mistakes and why we continuously keep making the same mistakes. The class has completed a multi-disciplinary analysis of the mistakes made within each individual scholar’s fields. Topics include Biochemistry, Biology, Political Science, Psychology, Medicine, Education, Philosophy in Gender Studies, and more. For the project, the class has done a compare-and-contrast analysis of mistakes made within their fields and synthesized the results with one another. The result is a multi-disciplinary framework that could possibly save you from making mistakes in the future.
On August 7, 2015 the Environmental Protection Agency accidentally released three million gallons of acidic mine drainage into Cement Creek near Silverton, Colorado. This catastrophe resulted in a community, state, and world-wide alarm regarding the vulnerability of the City of Durango’s water supply. A realization that this precious resource can easily be contaminated, leading to human-health concerns and significant environmental impacts rose to the forefront of concern. This event, among other notable spills, provides motivation to examine the use of autonomous robotic systems, capable of performing real-time, remote monitoring for rapid detection and alarm. To this end, this project developed a robotic system capable of performing effective and efficient persistent aquatic monitoring.

The Robotic Guidance and Control for the Observation and Monitoring of the Environment (GNOME) Lab at Fort Lewis College, as part of a senior capstone research project, designed and built a networked system of Autonomous Surface Vehicles (ASVs) to continuously monitor the water quality and quantity in the City of Durango’s water reservoir; Rogers Reservoir. The robotic system is designed for future applications and deployment in other aquatic resources in the surrounding Four Corners Region as well. This network consists of three ASVs; that enable accurate spatiotemporal monitoring of a dynamic environment. The network of ASVs provides information about the physical properties of the water that enable resource managers to assess and respond in near real time to water quality concerns. The Robotic GNOME Lab is also in collaboration with international educational institutions and local elementary schools. International collaboration is to facilitate data sharing and the development of autonomous sampling and data analysis algorithms. The local collaboration is to teach local elementary students about the physical properties of fluids, water quality, robotics, and the field of aquatic robotics.

The networked robotic system consists of three ASVs with custom hull designs optimized for local fresh-water reservoirs and the ability to withstand local weather and potentially low-pH (3-4) water. Each vessel optimizes power consumption for both sampling and operation to enable persistent, 24/7 autonomous operation. Typical weather in lakes and reservoirs in a mountainous environment include large temperature swings, wind gusts of 20 mph, various forms of precipitation such as hail and freezing conditions, which have all been considered in the design and construction. Autonomy is accomplished by on-board Arduino Mega 2560 microcontroller and navigation is performed by an Adafruit Breakout V3 GPS and IMU. Continuous power to the ASVs will be generated onboard with solar panels and battery storage to accomplish 24/7 continuous operation. Communication for data transfer and mission updates is handled over 3G cellular communication through a Particle Electron board. The water quality sensor suite is designed to be modular with interchangeable sensors to target specific sampling requirements for each deployment location. All collected data are posted in near real time to a publicly-available website. The intended uses of the data are to inform local resource managers
and policy makers, as well as to engage the public through educational outreach and citizen scientist programs.

All three ASVs are designed around a basic dual-hull catamaran design, and are roughly five feet in length, and 2.5 feet in width. ASV 1 has rectangular hulls, is heavy-duty, and impact resistant. It has a structural foam body with reinforced polyester, and hand-finished laminate. ASV 2 and 3 is cylindrical in shape, lighter, faster, and can carry more payload. These boats are made as a ribbed structure with reinforced epoxy and vacuum bag finished laminate. This second iteration of design was chosen to reduce the technicality and time of fabrication, the total weight of boat, carry more payload, and to increase stability.

For power, two 50 watt solar panels collect solar energy that is stored in two 20 Ah LiFePO$_4$ batteries. A commercial charger is used to charge both batteries and control the charging cycle. Mechanical relays are located at the grounding terminal of each battery and on the solar panels to disconnect all electrical sources if water enters the hulls or the electronics housing. The batteries are protected from a short circuit by a 15 amp fuse. The electronics for the boats are housed in a pelican case that is suspended between the hulls. An Arduino Mega was chosen to control the ASV and communicates via I2C with a Particle Electron that provides 3G cellular communication. Two Blue Robotics T200 thrusters are used to propel the boat. A thruster is mounted on the back of each pontoon to provide for differential thrust steering.

GPS waypoint navigation is being used with a geo-fence. An IMU is used to provide a magnetic tilt-compensated heading while the boat is traveling at low speeds, and the GPS provides a heading when the boat is traveling at speed greater than 0.5 meters per second. Waypoints are chosen based on a sampling algorithm within the geo-fence that provides adequate spatial coverage for optimal water quality monitoring and data collection. The user can change the sampling algorithm while the ASV is deployed through a web-interface on the website. This ability to communicate to the vehicles allows collaboration with international researchers to simultaneously test sampling algorithms with all three vehicles: one vehicle to perform ground truth and the other two vehicles for testing iterations to the sampling strategy.

The standard water quality monitoring sensor suite consist of temperature, pH and salinity. These sensors have been included because they provide a fundamental picture of the aquatic environment. Each ASV is set up to accommodate up to three additional sensors, with the possibility of extending this capacity if needed.

This network of ASVs will be deployed on Rogers Reservoir to monitor water quality at the Florida River and Animas River inlets, and at the outlet of the Reservoir. Real-time data will be posted on a publically accessible website and a database will be located on the Fort Lewis College server. Additional deployments will occur at regional lakes/reservoirs and in suitably-sized rivers to collect aquatic data of interest to researchers and scientists. The GNOME Lab will continue to develop and test planning and control of the network of ASVs for long-term deployment - requiring efficient data collection techniques, and cost-effective communications. This network of ASVs will eventually be coupled with autonomous underwater vehicles (AUVs) and unmanned aerial vehicles (UAVs) to form an aquatic robotic sensing system that can provide a means of understanding complex and dynamic aquatic environments.
THE ANTHROPOLOGICAL TRANSFORMATION AND ITS RELATIONSHIP WITH NATIVE AMERICAN PEOPLES

Beans-Polk, Chelsey
Department of Anthropology

This study explores the transformation of American Anthropology and its relationship with Native American peoples. Since its beginning in the late 1800s, the focus of American Anthropology was Native American cultures because they were viewed as primitive cultures at the time. Biological, archaeological, and ethnographic studies were done by Anthropologists not only to learn and understand Native American people, but to document and preserve as much information as possible before the last of the “pre-historic people” disappeared. Literature from both Native and Non-Native American scholars help to describe Anthropology’s past studies, and shed light on its more recent improvements. To understand the local and current perceptions of Native peoples I conducted one-on-one interviews with twelve Native students attending Fort Lewis College to help shed light on their perceptions of Anthropology today. It was found that six participants were very well-informed about Anthropology while the other six were not. It was also found that all twelve participants supported the idea of studying other cultures so long as the researcher stayed within their boundaries. This idea was emphasized most when discussing sacred traditions and NAGRPA laws governing the human remains of Native American ancestors. Altogether, these twelve individuals acknowledge Anthropology’s positive transformation, and they suggest improvements for future studies.
TÓ ÉÍ IINÁ (WATER IS LIFE): THE ENVIRONMENTAL AND SOCIAL IMPACTS OF GROUNDWATER MINING FROM THE NAVAJO-AQUIFER IN BLACK MESA, ARIZONA

Begay, Marquel
Environmental Studies Program

The Navajo Aquifer (N-Aquifer) is an important groundwater source that provides drinking water for the Navajo and Hopi tribes in Black Mesa, Arizona. In 1968, Peabody Western Coal Company, a private sector coal company, began coal strip mining operations with the usage of the N-Aquifer. Each year Peabody withdraws 1,200 acre-feet of water from the N-Aquifer and extracts 8 million tons of bituminous coal to fuel the Navajo Generating Station (NGS) in Page, Arizona. Electricity generated from NGS is then used to pump 1.6 million acre-feet of Colorado River water through a 333 mile canal system to Phoenix and Tucson. In result to Peabody’s industrial withdrawals, the N-Aquifer has dropped 200 to 400 feet.

This research is to assess the usage of the N-Aquifer in comparing withdrawal rates between Peabody mine and Navajo-Hopi communities. The study demonstrates that Peabody’s industrial withdrawal rates of the N-Aquifer has far exceeded municipal withdrawal rates of the Kayenta Well System and has caused spring discharge rates to decline among natural springs near Hopi villages. In addition, Peabody mine’s industrial withdrawal rates surpassed groundwater model predictions used in the mine’s impact assessments. Although the depletion of the N-Aquifer is evident through USGS monitoring data and residential observations, the Cumulative Hydrologic Impact Assessment (CHIA) criteria, which is assessed by the Office of Surface Mining (OSM) - fails to resolve, identify, and evaluate current and prospective impacts of material damage among the N-Aquifer because it is dependent on hypothetical computer groundwater model results rather than physical data from groundwater monitoring wells. While 62 percent of the total groundwater withdrawals continue to be used for coal mining activity, it is critical that OSM revises the CHIA criteria that will provide an informative baseline data model and resolution to vertical leakage, spring discharge, and base flow in washes on the Black Mesa basin.
MOBILE HAZMAT EMERGENCY FACILITY

Begaye, Galveston; Aguirre-Winter, Emily; Klaseen, Ethan; Roybal, Joshua; Smoke, Carly

Department of Physics & Engineering

S² Engineering is a senior design team in the Department of Physics and Engineering designing an emergency facility for hazardous material exposure. The objective of this project is to design and build an ANSI Z358.1 certified onsite safety shower to handle emergency personnel exposure to toxic propellants. This project has been specifically sponsored by Advanced Mobile Propulsion Test (AMPT), a local aerospace company. This project grants the team the opportunity to demonstrate mastery of the wide range of skills attained while completing the undergraduate program at FLC. These skills include but are not limited to fluid mechanics, heat transfer, thermodynamics, pumping technology, hazardous chemicals, general construction, electrical and flow meter analysis. Developments from this project can be used by future students as a platform from which they can gain experience in fluid analysis, thermal processes, Hazmat safety requirements, and networking with industry personnel. The end result of the project is to demonstrate ANSI certification of both shower and eyewash with flow rates of 20 GPM and 0.4 GPM, respectively. The purpose of the project was to design and build an emergency shower that will be used by AMPT when traveling to testing sites. The shower must be able to be portable, cost effective, ANSI certified, and be quickly operatable once onsite. Also, the unit must not be considered an oversized load.
SHREDDING THE GNAR AND YOUR BODY: AN ANALYSIS OF SKI INJURIES IN THE 2014-2015 SEASON

Bender, Keith M; Dohm, Nicole A; Wilkinson, Alex R; Meyer, Carrie

Department of Exercise Science

According to the National Ski Areas Association over 600,000 documented injuries occur at ski resorts in the United States each year. The goal of this study was to analyze how these injuries sort out among age, skiing ability, area of body affected, and injury type when compared to gender. 600 subjects were included in the data. The subjects were all injured and had made contact with the Taos Ski Valley ski patrol during the 2014-15 ski season. A chi-square test was the primary method of statistical analysis. The results showed that men experienced 54% more injuries overall than women, however, women had a higher number of lower extremity injuries than men ($\chi^2 (6, N=600) = 11.36, p=0.078$. Both men and women in the 31-50 age range suffered more injuries than the other age ranges recorded $\chi^2 (5, N=597) = 9.45, p=0.092$. The percentage of beginner/intermediate skier injuries was 2.5 times that of advanced skiers, $\chi^2 (2, N=595) = 33.61, p=0.000$. The results showed that men endured a higher percentage of fractures/dislocations compared to women who had a greater percentage of sprains/strains, $\chi^2 (8, N=600) = 24.23, p=0.002$. The hypothesis was accepted in regard to men experiencing a greater number of injuries overall and women suffering a higher number of lower extremity injuries. Based on the results of this study, and similar research referenced, skiers of all ages and ability levels could help reduce the number of injuries overall by engaging in more thorough preparation for this demanding sport. For future research, a larger sampling size including more skiing regions and larger resorts would be conducive as well as further investigation into the role of equipment in snow sport injury.
Upon entering Fort Lewis College, I spent previous semesters knowing I wanted to pursue a career of spreading the word and planning events. Through extensive research I found my passion: graphic design.

Design is the most unique powerful form of communication worldwide. A form of communication with the ability to link or change the client and intended audiences' perspective in the simplest way using images, words, graphics, typography, color, and styles. Together it creates the perfect.

Design also empowers people. It engages audience to a point where they want to make that change in their community. An excellent design will make someone stop in their tracks and be part of something bigger than themselves. I want to contribute. I want to change a life. I want to change my life.

Design holds a place in film, photography, drawing, building websites, and animation. Design gives me the chance to be more marketable because today, jobs in technology are skyrocketing and the more experience and skills an individual has with technology, the better off that person will be. I pursued film by obtaining the year-long Full Circle Fellowship with Sundance Institute, where I will be learning more about Production Design.

To add to my marketability, I applied my sociocultural anthropology minor to study abroad adventure in Viterbo, Italy. Living in a foreign country for a semester and immersing myself into many European cultures had a lasting impact on me, especially my views as an artist.

Graphic design is my own research that made me realize I can connect, inspire, persuade, and educate the world by breaking down problems to find the most understandable solutions. This deeper insight on the design world, current world events, and my Navajo culture led to my work over the years at San Juan Reproduction, Survival of the First Voices Festival, studying abroad, and the Sundance Institute.
“My plays are broken, jagged, filled with sharp edges, filled with things that take sudden turns, careen into each other, smash up, veer off in sickening turns. That feels good to me. It feels like my life. It feels like the world.” This is how Charles L. Mee, the playwright who created Trojan Women: A Love Story, describes his plays. Mee’s plays are grandiose collages of texts from many sources with no concern for “originality,” including but not limited to interviews from Hiroshima survivors, poetry from Sei Shonagon, and passages from the Kama Sutra. His style alone is unlike any other American playwright, but to add yet another layer of complexity, Mee also urges the artists who take on his work to cut, change, and add to his scripts as much as they choose. As a performer, his plays create endless opportunities for the actor to showcase a diversity of acting styles and stage skills.

This project entailed four months of extensive research on Mee’s original sources, in addition to over 200 hours of group rehearsals, physical work, and one-on-one meetings with my director and acting partners. Also, research included examining countless other related sources in order to obtain an informed perspective as an actor to then play actions and make choices on stage that did justice to the complexity of Mee’s script and all of the history and themes within it.
FEDERALISM AND DIRECT DEMOCRACY:
WHY STATES DISSENT AGAINST FEDERAL LAW

Brockmeier, Connor
Department of Political Science

This research examines the role of direct democracy in a federal system of government and why states choose to defy federal law. Ever since the adoption of the Constitution, America has been dealing with the issue of delineating which powers are reserved to the national government and which powers are reserved to the states. Scholars of federalism have long theorized about the nature of the relationship between the states and the federal government. While some scholars would describe the relationship of power as cooperative, this presentation continues the tradition of uncooperative federalism and establishes the theory of dissenters’ federalism. This theory depicts states as subservient to the federal government and are implementers of policy. Individual states can choose to follow federal policies or dissent against them. By creating state laws that do not conform to federal policy, states can effectively dissent against their national government. The main focus of the research is, how direct democracy within a state affects the frequency of its dissent. As previous scholars have shown, state dissent is tied directly to partisanship. Democratic states are likely to dissent against laws made during a Republican Congress and vice versa. For the purposes of this study, six Democratic states were selected for analysis during a period of a Republican controlled congress. By understanding the nature of direct democracy in a federal system, it is possible for ordinary citizens to challenge federal laws through a state’s institutions.
RIBOSOMAL FRAMESHIFTING IN HTLV-1: EXAMINING THE PRO-POL FRAMESHIFT SITE

Caldera, Hector; Chadeayne, Devon; Eagle, Forrest W.; Martin, Evita M.; Rios, Jeovanna R.; Walker, Melanie A.; Mouzakis, Kathryn D.

Department of Chemistry

Human t-cell lymphotropic virus type I (HTLV-1) was the first identified human retrovirus, identified in 1980. Infection with HTLV-1 results in adult T-cell leukemia with 5-10% incidence. An estimated 15-20 million individuals worldwide are infected with HTLV. Replication of retrovirus, such as HTLV, is dependent upon synthesis of viral structural and enzymatic proteins. Synthesis of HTLV’s enzymatic proteins (Protease (PR), Reverse Transcriptase (RT), and Integrase (IN)) is dependent upon programmed ribosomal frameshifting (PRF). PRF is defined as a programmed change in the ribosome’s reading frame during translation. HTLV-1 has been observed to have ribosomal frameshifting at two different sites. The frameshift sites gag-pro and pro-pol have been established but the efficiencies and structures of these two frameshift sites have not yet been determined. The HTLV-1 pro-pol site consists of three RNA elements: a slippery sequence (UUUAAC), a spacer, and a downstream structure. In this work, the HTLV pro-pol -1PRF mechanism is investigated. A pseudoknot structure is predicted downstream of the slippery sequence. We hypothesize the pseudoknot structure contributes significantly to the frameshift efficiency. To test this hypothesis, we designed four variant frameshift sites to test the importance of the pseudoknot structure to frameshifting. An in vitro dual-luciferase frameshift assay was utilized to determine the frameshift efficiencies for the wild-type and variant frameshift sites.
SYNTHESIS OF CONFORMATIONALLY CONSTRAINED DIARYLEETHER PARACYCLOPHANES

Caldera, Hector; Tregillus, Zoe; Ozvat, Tyler; Cooper-Sansonne, Andrew

Department of Chemistry

The syntheses of a series of macrocyclic diarylether paracyclophanes with varying length in the bridging chain are reported. Several naturally occurring biologically active cyclophanes have been described in the literature, and many of these are chiral by virtue of restricted bond rotation opposed to the presence of stereocenters. We report the first systematic study of the relationship between the bridging chain length and the barrier to racemization of these important compounds. Progress toward the synthesis of a library of diarylether paracyclophanes with varying tether lengths is described, as well as stereochemical implications.
With the discovery of the five nearly complete hominin crania at the Dmanisi site in the Republic of Georgia, the discoverers have caused some controversy by aligning them with the middle Pleistocene *Homo erectus* based on facial and cranial morphology. This classification is used to imply that both *H. habilis* and *H. erectus* belong as a single highly variable species; a classification which ignores the presence of important primitive characteristics and earlier origin date that set *Homo habilis* apart from their descendants. There is even enough evidence for some anthropologists to consider splitting these two populations into still more classifications. In an attempt to clear up the confusion of this issue, both the stature and cranial capacity of the Dmanisi sample was compared to both available *H. habilis* and *H. erectus* data. When considered as two separate taxa, these tests strongly support the idea that the Georgian hominins in question should be considered *Homo habilis*, which in itself should remain apart from the *H. erectus* hypodigm.
MUSIC TONALITY AND MINDFULNESS

Casey, Joseph R. R.
Department of Psychology

The integration of instruments designed to measure aspects of one’s physical well-being have nuzzled their way into the daily lives of many individuals. Devices, such as Fitbits and smart watches, effectively monitor the amount of physical activity one endures throughout the day; this allows individuals to gage their productivity in accord to the fitness goals the individual sets for his or her self - thus, facilitating a desired awareness of physical well-being and promoting healthier lifestyles.

However, when the concern is shifted from purely physical aspects of daily life to aspects of cognitive and emotional well-being, there are currently no available metrics that congeal with the demands and common routines affiliated with modernity. The language surrounding cognitive and emotional well-being is often colloquial and conveys abstract concepts, engendering arbitrary measurements. When one speaks of a feeling, he or she is speaking of an experience that has been processed through the Limbic region of the brain; the reason persons often find it difficult to express their feelings is because the Limbic region of the brain does not have the capacity to form language. Because of this disconnect between how people process their emotions and how they manifest into thought, individuals often fail to resolve such issues as they misattribute the cause of his or her emotional discomforts to entities that conveniently invite blame - the weather, traffic, relationships, etc.

The purpose of the current study is to explore the efficacy of an alternative method of mindfulness practice, which incorporates a specific faculty of daily life that has transcended the barriers of modernity. The proposed method analyzes music to which persons, on an individual basis, have a strong, positive emotional reaction. By investigating the relationship between the keynote and tempo of the individual’s (N=61) song choice to data collected from a 25 item, self-report, emotional well-being inventory, I intend to highlight specific song traits as they relate to specific emotional needs. Under the assumption that an individual’s song choice facilitates an emotional longing, I hypothesize that the keynote of each music sample will correlate to a specific set of emotional needs not met. The tempo, I hypothesize, will indicate the participants’ needs for increased stimulation (higher tempo) or decreased stimulation (slower tempo): tempo is measured in beats per minute (BPM).

Using a convenience sample of Fort Lewis College students, the results indicate a moderately positive relationship between keynote choice and their affiliated emotions according to previous literature - though more participants will be needed in order to increase the external validity of these findings. There was no clear relationship identified between tempo and a need for stimuli modification. However, this may be due to an instrumental error, which confounded the internal validity of the tempo analysis. Alterations will be necessary as this research continues.
COMPARING WAVELET TECHNIQUES FOR CONTENT-BASED IMAGE RETRIEVAL

Conte, Sean; Smith, Eric

Department of Mathematics

The volume of images in any given digital database is rapidly increasing as technology becomes cheaper, more accessible, and more relied upon. With a large amount of images to sift through, the value of meaningful and efficient image searches increases greatly. Wavelets are a useful tool for image processing, and specifically for the purpose of image query systems. An image query system attempts to take a given image and return similar images from the database.

This talk considers three approaches of creating an image query system. By using a discrete wavelet transform the texture as well as spatial features of an image can be analyzed. This allows us to find significant features of a specified image which then can be compared to those of the images within the database. From this technique we are able to search a given database of images to produce a set of images that are similar to a queried image. A comparison of the presented methods illustrate the value of wavelets for content-based image retrieval.
DETECTING AND HIDING TEXT IN IMAGES USING HAAR WAVELET TRANSFORM AND MATHEMATICAL MORPHOLOGY

Currie, Veronica; Yandell, Wayne

Department of Mathematics

X-rays, MRIs, and other medical images are distributed for the purposes of research and diagnosis. Often these images are distributed with critical personal information, but is it necessary to share that information? The goal of this presentation is to expand on the work of previous researchers in describing an automatable solution to hide personal information on medical images, specifically MRI images of the brain. This algorithm applies the Haar wavelet transform to color or grayscale medical images to locate text objects, embed the details within the image, and make the text illegible to unauthorized users. Application of this algorithm can produce an automated system for processing and distributing medical images which better protects the privacy of patients and relieves researchers and others from liability.
AN EXAMINATION OF FERRIC IRON AND NITRATE REDUCTION ACTIVITY IN ACIDOBACTERIUM CAPSULATUM

Dailey, Leandrew; Sommerville, Les

Department of Chemistry

*Acidobacterium capsulatum* is an acidophilic, heterotrophic, aerobe ubiquitous to soils and aquatic environments throughout the world. It is capable of growing on glucose as its sole carbon source. Comparative studies of *Acidobacteria* genomes suggest *A. capsulatum* may be capable of reducing Fe(III) and nitrite, while other *Acidobacteria* may be able to reduce nitrate. Additional *in situ* studies showed iron reduction capabilities in *Acidobacteria* is prevalent. The ability to reduce Fe(III), nitrite and nitrate allows these organisms to potentially play a significant role in carbon, nitrogen and iron cycling in soil and aquatic environments. In order to test this hypothesis and better understand these capabilities, *A. capsulatum* was grown in defined media containing an insoluble Fe(III) substrate, Goethite (FeOOH), or KNO₃ for several days, with glucose as the sole carbon source. Ferrozine was used as the indicator of Fe(II) in solution and protein concentration was used as a measure of bacterial growth. Under these conditions it was confirmed that *A. capsulatum* can reduce Fe(III), however, little evidence coupled iron reduction with cell growth. It also lacks the ability to reduce nitrate. Surprisingly, *A. capsulatum* growth was completely inhibited with 1.0% potassium nitrate. Future studies continued to define the relationship between iron reduction, nitrate toxicity, growth and glucose consumption. Other studies will focus on the putative nitrite-reducing gene (NirBD) in *A. capsulatum* to determine whether this is for dissimilatory or assimilatory nitrite reduction. Additionally, arsenic species, arsenite [As(III)] and arsenate [As(V)], reduction is being investigated. These studies will enable us to better understand *A. capsulatum*’s ability to grow in soil and provide a crucial role in soil maintenance.
ANONYMIZING MEDICAL AUDIO DATABASES THROUGH STEGANOGRAPHIC CONCEALING OF CONFIDENTIAL INFORMATION

Dell'Amico, Allyson; Goldberg, Olivia; Kurlander, Levi

Department of Mathematics

As electronic databases of sensitive medical information continue to grow in the medical industry, the necessity for maintaining patient confidentiality within these files while simultaneously making large datasets available for doctors, medical students, and researchers is quickly growing. The potential for incredible medical advancements is unlocked with the distribution of large sets of Electronic Health Records (EHRs) to researchers and the public. Of course, as files are stored in medical records along with the patient’s confidential personal information, it would be a violation of the Health Information Privacy Protection Act (HIPPA) to distribute large EHR datasets to researchers without first anonymizing each individual file. In particular, medical audio files such as echocardiograms, sonograms, and venous dopplers all have the potential to be incredibly useful to researchers, but are almost always accompanied by sensitive identifying information of the patient. By using a Discrete Cosine Transform (DCT) in combination with a form of hard thresholding, we will modify these audio files, and embed sensitive patient data into the audio file using a steganographic process. This allows us to delete obvious sensitive data and distribute the files to researchers. Should they desire to do so, patients would be able to release any sensitive information to researchers even after anonymization by disclosing the details of the steganographic processes.
UNDERSTANDING SPRING AWAKENING: THE TREATMENT OF ADOLESCENTS IN 19TH CENTURY GERMANY

DeVore, Brin

Department of Theater

This research explores how a play written in 1981 is still relevant enough in our world today to have been adapted into a Tony Award-winning stage musical in 2006. Initial research was conducted on the everyday lives of German teenagers, including topics of child-adult relationships, education, and childhood sexuality. By comparing various translations of the original Frank Wedekind script to the modern rock musical adapted by Duncan Sheik and Steven Sater, the question of relevance is answered, especially in terms of handling sexual education.

The second part of this research was the actual application of the information in the rehearsal process and in the outcome of the performance. The use of the folk rock score is used to let the audience into the character’s heads and to further the generational gap between the children and adults, highlighting the lack of understanding on either side. The adaptation of Wedekind’s play includes issues initially present in the script but also the issues of rape and child abuse.
CONVERGENCE IN WIDE-REFLECTIVE EQUILIBRIUM: AN INDICATOR FOR OBJECTIVE MORAL TRUTH?

Ellis, Weston

Department of Philosophy

How do we arrive at a set of moral beliefs that is accurate? John Rawls’s answer to this question is the method of wide-reflective equilibrium. Wide-reflective equilibrium is the process where an individual compares moral judgements about particular cases, moral principles, and moral theories to pick and choose a set that is coherent.

It is unlikely that after an individual has completed wide-reflective equilibrium that they have found an objective moral truth, as there are a multitude of different coherent ethical belief sets that are all independently valid. This makes it difficult for the individual to say that their particular belief set is the accurate one. However if it were the case that a diverse population of people started with different belief sets, went through wide-reflective equilibrium, and ended up converging on a particular belief set, then we may have a better case for saying that we have an accurate ethical belief set.

I argue that some types of convergence in wide-reflective equilibrium are evidence that we have found objective moral truth. The conjunction of convergence through wide-reflective equilibrium and the centrality of those beliefs provides some evidence that we have at least approximated a moral truth. This is because ‘central’ beliefs gain additional justification in an individual’s coherent belief set. ‘Central’ beliefs are beliefs whose denial would force the change or denial of other beliefs in a belief set. The justification provided by central beliefs is then compounded as we scale up intersubjective agreement provided by wide-reflective equilibrium. This explanation of convergence is then defended against a few plausible objections.
DETERMINATION OF THE SECONDARY RNA STRUCTURE AND ITS IMPORTANCE TO THE HTLV-1 pro-pol FRAMESHIFT SITE

Finke, Eliza; Mouzakis, Kathryn

Department of Biology

Ribonucleic acids (RNAs) are a group of macromolecules that encode genetic information. Primary RNA structures can fold into various complex secondary structures, which are important for numerous cellular functions. Many single-stranded RNAs serve as the genetic material for several viruses, such as the Human T-Cell Lymphotrophic Virus Type I (HTLV-1). Five to ten percent of the time, HTLV-1 infections result in leukemia. HTLV-1 is a retrovirus that uses cis-acting regulatory elements in RNA to prompt a frameshift during viral mRNA translation, allowing for the translation of genes in alternative reading frames that are critical to viral infectivity. The pro-pol frameshift site is the second frameshift site in the virus’ genome and is defined by two signals: a slippery sequence and an RNA structure downstream of the slippery site. In order to target HTLV-1, it is important to experimentally determine RNA structures that contribute to its pathogenic characteristics.

The RNA structure downstream of the slippery site is proposed to be a pseudoknot (a structural motif formed when the nucleotides in the loop of a stem-loop base-pair with nucleotides downstream of the structure). So far no structural evidence supporting or refuting this structure has been published. The goal of my work is to determine the RNA structure in the HTLV-1 pro-pol frameshift site. Thus far, I have designed RNA constructs containing the HTLV-1 frameshift site, predicted their structures, and successfully cloned the DNA that codes for the RNAs into a puc19 vector. I have also transcribed and purified one of these RNAs. Future experiments will include chemical modification of the RNAs using selective 2-hydroxyl acylation analyzed by primer extension (SHAPE) to determine which regions of the RNA structure are base-paired and which regions are not and secondary RNA structure prediction using SHAPE data and various computer programs.
AN ANALYSIS OF WILDERNESS FIRST RESPONDER SELF-EFFICACY

Finstad, Amanda; Swingle, Grayson; Rhea, Casey; Houghton, Emily
Adventure Education

The purpose of this study was to measure self-efficacy of Wilderness First Responders (WFRs) over time post-certification to determine the impact of time, number of re-certifications, and frequency of skill use on self-efficacy. Previous research studied self-efficacy post-certification in Wilderness First Aid students which is a much shorter version of the Wilderness First Responder certification. This study had two parts utilizing the same survey asking participants to rate their perceived self-efficacy levels of executing different WFR skills. The longitudinal study measured self-efficacy levels in the same 10 WFRs directly after certification and again at 3 months post-certification. The broad study included 65 WFRs at any point in their certification to take the survey. To analyze results, Microsoft Excel was used to run paired t-tests to compare mean scores. Statistical significance was determined at p<0.05. Results indicated a statistically significant decrease in self-efficacy in participants after 3 months of certification. The broad self-efficacy study trends indicate self-efficacy slightly decreasing over-time, but results were not statistically significant. There was also a statistically significant increase in average self-efficacy of those who had been re-certified 3 times compared to those on their first certification. Finally, those who practiced skills seasonally or never proved to have statistically significant lower average self-efficacy scores than those who practiced skills monthly. WFR self-efficacy is incredibly important to ensure the confidence of an outdoor professional in medical scenarios and these results provide insight into factors affecting the increase and decrease of this self-efficacy. Knowing how certain factors impact WFR self-efficacy can help improve the wilderness medicine field in the future.
ANALYSIS AND INTERPRETATION OF OFFSHORE HAZARDS IN ARCTIC WATERS OF ALASKA

Frank, Dominick

Department of Geosciences

Bathymetric surveys of the seafloor in search of structures, geological or manmade, that may pose a threat to maritime navigation and the construction of pipelines and platforms for oil and gas production are conducted in arctic coastal waters of Alaska. These structures, also termed ‘hazards’, vary from shallow shoals and scours, to ship wreckage. As part of my internship with TerraSond, multibeam sonar equipment was used to determine efficient navigational routes in the Bering Strait, and the occurrence and migration of strudel scours in coastal waters of the North Slope of Alaska for a proposed pipeline route. These structures known as strudel scours form from erosional processes brought on by off-coast fluvial runoff during the yearly spring flooding on arctic sea ice which surrounds arctic deltas. Surveys conducted as long as 50 years ago (McManus, 1963) are compared and analyzed with surveys conducted in 2015 (TerraSond Ltd.) to discern the movement of a massive shoal known as the Prince of Wales Shoal in the Bering Strait. TerraSond also conducted surveys in the Beaufort Sea focusing on strudel scours, which were compared and analyzed with surveys conducted in the late 1990’s (Coastal Frontiers, 1997-1999). The bathymetric data collected by TerraSond in the Bering Strait were remarkably analogous to the bathymetric data acquired by McManus in 1960, differing by only a tenth of a fathom in most sections of the shoal within the survey area. However, the strudel scour surveys conducted in the Beaufort Sea of the North Slope of Alaska yielded different findings. Average water depth of strudel scours observed from the 2015 TerraSond surveys (1.9 m) indicate the shoaling of strudel scours in the survey area relative to data from the 1997-1999 Coastal Frontiers surveys (2.3 m). Further monitoring of strudel scours in the Beaufort Sea is crucial for efficient construction and maintenance plans for a pipeline in the region, with focus on the processes of transgression.
THE VERACITY OF THE HISTORICAL DETAILS IN JAVIER CERCA’S NOVEL SOLDADOS DE SALAMINA

Glade, Michael

Department of Modern Languages

The Spanish Civil War (1936-1939) has left a wound in the Spanish population that has persisted to this day. Less than a decade ago the Spanish government passed the Historical Memory Law which facilitated the exhumation of fosas comunes - common gravesites in which tens of thousands of war victims were anonymously buried. Upwards of seventy novels have been written about the war, including ¡Otra maldita novela sobre la guerra civil! [Another damn novel about the civil war!]. However, Javier Cercas’s Soldados de Salamina (2001) stands above the rest. This critically acclaimed, award-winning narration focuses on the legend of the execution of Rafael Sánchez Mazas - the ideological founder of the fascist party that initiated and won the war. Unlike his forty-nine fascist counterparts who were executed by firing squad in a chaotic bout, Sánchez Mazas was able to escape unharmed and hide nearby. According to the legend, moments later Sánchez Mazas found himself staring down the barrel of a Republican soldier’s gun who, for an unknown reason, let him flee.

Cercas, a washed-up novelist and newspaper columnist who knows just as little about the Spanish Civil War as his naïve readers, narrates his investigation of the incident almost seventy years later. He consults various archives, books, and videos and conducts interviews with Sánchez Mazas’s family members and the people he met soon after surviving the execution. However, the metaliterary, or self-conscious, qualities of the novel complicate the authenticity of the historical details that it presents. Cercas narrates every aspect of his investigation, including phone calls that he misses and even his indecision on what to order from a restaurant during an interview. Moreover, these meticulous tendencies lead the reader to trust Cercas who, only pages later, admits to lying about some of the most essential details.

This presentation discusses some of the sources that Cercas consulted in order to determine how accurately and inaccurately the narrator depicts them. This project also juxtaposes the narrator’s and presenter’s conclusions about historical and literary truth and discusses how these two types of truth serve to aid the Spanish population in coping with the Civil War even eighty years after its final battle.
REGULATION OF MIR-132 EXPRESSION AND VIRAL ENTRY IN MRC-5 CELLS VIA HCMV INFECTION AND GANCICLOVIR ADMINISTRATION

Glade, Michael; Njenga, Melba
Department of Biology

It has been reported that 50-85% of U.S. adults have been infected with human cytomegalovirus (HCMV) by the age of 40. HCMV can cause microcephaly in newborns and symptoms in immunocompromised patients (i.e., AIDS and organ or tissue transplants). HCMV is a double-stranded DNA (dsDNA) virus that infects primary fibroblasts, including MRC-5 cells. It gains entry into the host cell via receptor-mediated membrane fusion and displays both latent and lytic replication phases. The most common anti-HCMV drug is Ganciclovir (GC), which is a DNA-dependent DNA polymerase inhibitor.

HCMV has been demonstrated to regulate expression of host cell microRNAs (miRNAs). Host miRNAs are small non-coding RNAs typically 20-25 nucleotides in length. They regulate post-transcriptional gene silencing by directing proteins to repress translation, which leads to mRNA degradation. The host miRNA, miR-132, has been shown to downregulate interferon-beta (IFNβ) in monocytes. Moreover, miR-132 is upregulated in HCMV-infected monocytes in order to hinder IFNβ expression thereby promoting viral entry. In other words, although miR-132 is a host-encoded molecule it downregulates the host antiviral process of IFNβ production and serves as an advantageous upregulation target for HCMV.

This study investigated whether HCMV upregulates host miR-132 expression in MRC-5 cells and if the presence of GC reverses this upregulation thereby hindering viral entry. Cellular miR-132 levels and HCMV entry were monitored via RT-qPCR and flow cytometry, respectively. Although not statistically significant, HCMV-infected MRC-5 cells appeared to exhibit upregulation of miR-132 in comparison to control cells and GC demonstrated a trend towards reversing this HCMV-induced upregulation 24 hours post infection. Therefore, our results support previous data that HCMV infection increases miR-132 levels in MRC-5 cells. In addition, our results suggest that GC affects later processes in HCMV’s replication cycle in order to counteract miR-132 regulation; however, to our knowledge the mechanism by which this process occurs is not yet understood.
ENVIRONMENTAL STRESSORS: THE EFFECTS OF AMBIENT NOISE ON CHILD DEVELOPMENT IN RURAL AND URBAN AREAS

Gosney, Tori
Environmental Studies Program

People typically characterize environmental issues as physical health or technological problems, but the physical environment can also have adverse psychological, physiological, and developmental impacts. This is especially evident in regards to the effects of ambient noise on developing children. Chronic exposure to environmental noise is considered a stressor because it decreases expectancies for control and increases susceptibility to helplessness, behavioral problems, cognitive issues, and other developmental concerns. Although there has been much research on the effects of noise on child development in both urban and rural environments, it is unclear whether the impacts on children are similar in the two environments. I evaluated a series of case studies from environmental psychology journals to determine whether or not there is sufficient evidence to support the theory that children from urban areas are negatively impacted by surrounding environmental stressors, mainly regarding ambient noise, in terms of their educational development. However, I found there to be some discrepancy between the case studies indicating that there are more factors than just ambient noise caused by air and road traffic that play into child development issues. Understanding what factors in the environment play into child development is vital in providing children with the ideal atmosphere to enjoy a life with limited environmental stress while allowing the child to succeed academically.
TEXTILES, NATURAL DYES AND SUSTAINABILITY

Gourley, Tricia

Department of Art and Design

Until the mid-19th century textile colors came from plants, insects and sea life. In 1856 William Perkins, a teenage English chemist, accidentally discovered a purple synthetic dye he called mauve. This discovery led to an explosion of synthetically produced colors. Today we know about the detrimental impact to our ecological systems from textile processes. For example, an article in Tech Science states:

“The wastewater from textile plants is classified as the most polluting of all the industrial sectors. The increased demand for textile products and the proportional increase in their production, and the use of synthetic dyes have together contributed to dye wastewater becoming one of the substantial sources of severe pollution problems in current times.”

Developing, refining and disseminating sustainable textile practices are presently widespread. These methods range from growing fibers such as cotton without pesticides, to the humane care of animals that provide fiber, to obtaining color from natural organic dye materials. Currently I am exploring the traditional and innovative processes of this dynamic natural dye movement as a medium for my artwork. This presentation will offer a window into the resurgence of natural dye practices and techniques. Via examples of my work as well as other textile artists I will show the beautiful palette and designs that can be accomplished with natural dyes.
In the United States there is a plethora of mass culture advice on where and how a woman should give birth, most claiming to provide the best and healthiest option. Social pressures push from all sides saying that the decisions the mother makes will define her birth. One of the most pressing questions is if and how much of our medical system to use. The decision about whether a home birth or a hospital birth is healthier is widely debated. Interviews with various women in the La Plata County has given a different view on the birth experience than seen in much of the literature written by doulas, midwives, and medical practitioners.
THE POTENTIAL IMPACT OF BARK
BEETLES ON COLORADO SKI AREAS

Haberer, James
Environmental Studies Program

Colorado is the leading ski state in North America and the industry generates approximately $4.8 billion in annual revenue within the state (Colorado Ski Country USA, 2015). Ski areas are responsible for significant portions of the state’s tourism and recreation sector, supporting more than 46,000 workers throughout the state (Colorado Ski Country USA, 2015). If the ski resorts were to suffer from a beetle infestation, such economic loss would have a rippling effect across the state’s economy, where the tourism and recreation sectors would likely suffer great losses.

In Colorado, bark beetles are leaving a visual mark on the landscape as they devastate large areas of forests, specifically ponderosa and lodgepole pine trees. While the sight of so many dead trees can be dramatic, the beetles responsible for such a high number of tree mortalities are actually a native species to this area (National Forest Service, 2015). The same species of beetles have been shaping the forests of North America for thousands of years; this time however, climatic conditions are now in favor of successful beetle populations which are occurring in epidemic proportions (NPS National Park Service, 2016).

Since beetle kill areas are currently encroaching on ski areas throughout Colorado, this may have a serious impact on how ski areas will look in the future. Without these trees, there may be no more tree runs, trees to retain the snow on steep slopes, and also to provide a wind buffer. These effects of tree loss are likely to have a dramatic impact on the quality and the amount of runs that a resort is able to maintain and offer visitors.

The study sites for this project are the four ski resorts that were determined to be the closest to current beetle kill areas based on GIS analysis of aerial survey data that was gathered during the years 2010 to 2015 by the United States Forest Service. The four sites are Breckenridge Ski Resort, Monarch Mountain, Snowmass, and Wolf Creek Ski Area. These areas were evaluated for their size of susceptible forest stand, slopes that may be reliant on the current tree cover, and vicinity to beetle kill areas.
THE PROVENIENCE PARADOX: THE BENEFITS OF RENEWED ANALYSIS ON BIOLOGICAL COLLECTIONS WITHOUT CONTEXT: A PROOF OF CONCEPT

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Department of Anthropology

Within the field of anthropology, when a collection lacks or is limited in its provenience, the research potential of the collection is generally considered to be minimal. Because of the limitations for research, some argue that it is unethical to study or publish on such collections. The counter opinion argues that it is reasonable to study and publish on these collections despite the fact that circumstances surrounding their acquisition may be less than ideal. Moreover, such collections may have the most urgent need for thorough documentation and analysis to prevent further loss of information. This debate as well as a number of other ethical problems concerning scholarship, study and publication of such collections are discussed in this paper. This study assesses the ability of a skeletal collection to convey information independent of its original context. Emphasis is placed on nonmetric methods relating to determination of ancestry in an attempt to demonstrate the value of renewed study on skeletal collections with limited provenience. The results of this study indicate that analysis of standard biological documentation can enhance research potential, even with limited contextual information. Specifically, cross tabulation analysis of age and sex data, cranial deformation, cribra orbitalia, cranial trauma, and nonmetric traits can shed light on population origins, patterns of disease, environmental conditions, and cultural practices. Using these easily observable characteristics, geographic and temporal information can be uncovered and additional areas of analysis can then be identified.
The state of California is currently in a drought and has been since 2011. With less precipitation falling and temperatures rising farmers have had to use an increasing amount of water to keep their crops sufficiently hydrated which in turn has contributed to a drop in water levels (Richman 2015). This research project looks at three different reservoirs that are all important for supplying water for either agricultural, industrial or domestic usages throughout the state. Hetch Hetchy Reservoir supplies water for the city and county of San Francisco while Shasta Lake and Lake Trinity both are the major water supplies for the Central Valley Project. The Central Valley Project helps supply water and power for the entire state and is the main irrigation water provider for agriculture in the Central Valley (U.S. Bureau of Reclamation, 2013).

Landsat satellite imagery has been geospatially manipulated to determine how the three reservoirs surface areas have changed throughout a 20 year period; 1995 - 2015. The general results concluded that the water level have been steadily dropping and that since the drought started the water levels have dropped significantly. Hetch Hetchy’s result were interesting as its surface area has not dropped nearly as much as the other two reservoirs. Prediction were then calculated and if current drought conditions continue these reservoirs could run dry in only a few years. It is unlikely that the reservoirs will fully dry up but it does put pressure on California to change and adapt to it new future climate. Whether this will be through genetically modifying crops to become drought resistant or having an increase in desalination plants to harvest water from its coast, if something does not change California is in for a shaky and dry future.
The Sustainable House for Engagement and Discovery (SHED) project constructed a new garden storage building (gardenhouse), as well as researched and detailed a new suitable geodesic dome greenhouse for the Fort Lewis College Environmental Center (EC). These new campus structures and site layout address on-campus food production, composting, and EC operations associated with the center’s campus garden, orchard, and sustainability initiatives.

Current EC facilities at the on-campus garden site are limited in terms of size (for both food production and tool storage), control (inadequate thermal regulation in greenhouse, lack of weather protection for woodchips used in campus composting operations, and rodent infestation of all facilities), and utility (accommodation of woodchip deliveries, compost maturation, and curing of vegetables). All issues are addressed through the new structures and site design.

This project went through extensive design iterations in which the SHED team coordinated with the FLC Physical Plant Services (PPS) and EC in order to determine the site, materials, and layout of the structure. A professional structural engineer assisted in the analysis of the structure’s integrity, while a licensed architect helped the SHED team to ensure the building would meet all applicable codes. These included building standards from ASTM, ACI, ASCE, AWPA, and IBC as well as the Americans with Disabilities Act. Fort Lewis’ architectural standards also had to be met by the design. This design phase ultimately created a schematic design package detailing the building as well as its materials which was used to receive a construction permit after its code compliance had been reviewed. Construction began in March 2016, and is still ongoing.
DEVELOPMENT OF AN SAE BAJA RACECAR

Hespe, Micheal; Bogust, Pam; Carlson, Nick; Bruce, Dillon

Department of Physics & Engineering

The Senior Seminar project is to design, model, fabricate, analyze, test, and manufacture a Baja racecar that will represent Fort Lewis College in a Society of Automotive Engineers (SAE) Baja Collegiate Design Series competition. The competition gathers students from universities all around the world to challenge their cars through a series of static and dynamic testing, such as overall weight, endurance racing, etc. The team objective was to produce a racecar that was safe, lightweight, cost effective, and abides by the SAE Baja 2016 Series Rulebook. The chassis was designed and fabricated to be safe, lightweight and ergonomic. The front suspension was selected and developed to have double A-arms as an independent suspension, whereas the rear was selected to have no suspensions. In competition, the lightest Baja car was recorded to weighed 296 [lb.] and heaviest weighed 931 [lb.], while our Baja car weighed approximately 325 [lb.]. In addition, the total cost to design and fabricate our Baja car was approximately $4,200 well under many competitors, while their costs ranged from $7,000 to $30,000.
THE MAN IN THE BLACK LEATHER COAT: PANOPTICISM AND HISTORICAL FICTION

Hicinbothem, Melissa
Honors Program

A panoptic analysis of Tom Rob Smith’s Child 44 Trilogy and David Benioff’s City of Thieves proved the existence of surveillance themes. This work examines the relevance of panoptic analysis to historical fiction and the Soviet Union, as well as generates an understanding of how history is understood.
THE PSYCHOLOGY OF TECHNOLOGY ON CHILDHOOD DEVELOPMENT: RECONNECTING TO NATURE WITH WALKABLE URBANISM

Hunt, Nicoll
Environmental Studies Program

Over the past two decades, the presence of many forms of technology in children's lives is increasing while time spent in natural environments is simultaneously decreasing. Overexposure to technology is resulting in negative effects towards children's physical and psychological development. More of the time children spend is indoors, and away from nature due to homework, television screens, and parental anxiety about the potential threats of strangers. The disconnect between children and nature is raising concerns about sustainable living for future generations.

The purpose of this research is to examine the cognitive, emotional, and physical importance of childhood exposure to nature. From disappearing access to natural areas due to increased population and urban sprawl to competition for television and computers, homework and other time pressures, this research analyzes the factors contributing to childhood alienation from the natural world. This research also determines what the cognitive, emotional and physical consequences are of spending a limited time in nature, including literature on the rise in obesity and attention disorders. It also proposes policy recommendations for government leaders to establish and implement principles and guidelines to promote change in the current structural and educational approaches to strengthen the development of children within elementary and middle schools. This research concludes by bringing attention to the possibilities of nature based environmental education and sustainable urban planning to promote walkable cities.

The experience of nature is a critical component of human physical, emotional, intellectual, and even moral development. Findings show that outdoor play, has been linked to increases in students’ grade point averages and more efficient classroom learning, as well as positive associations with children's physical fitness, concentration, memory, behavior, and school satisfaction. In addition, more walkable developments are beginning to offer neighborhood residents with easy access to public transportation while creating a good mix of housing, shopping and employment possibilities. Walkable communities also lead to more social interaction, physical fitness, diminished crime, and increased wellness, addressing many social and economic problems.
GREAT PLAINS FARMING AND THE DEPLETION OF THE OGALLALA AQUIFER

Jackson, Duke
Environmental Studies Program

The Ogallala aquifer is the largest source of groundwater in the U.S, and one of the largest in the world. It covers more than 450,000 square kilometers and spans across eight states including Wyoming, South Dakota, Nebraska, Colorado, Kansas, New Mexico, Oklahoma, and Texas. The aquifer is situated under the Great Plains, also known as the breadbasket of the United States. Irrigation from the Ogallala supplies 20 billion U.S dollars worth of food and fiber annually. The aquifer is currently depleted every year at the water equivalent of 18 Colorado Rivers. Since this aquifer is non-renewable on a human time-scale, the vast reliance on it for feeding the world is a cause for concern and must be addressed. The land above the Ogallala aquifer has a rich history of land use from various settlers in the area. Currently, the majority of water from the Ogallala aquifer is being used for agriculture. There exists a multitude of alternative land practices that, if applied, could help to reduce depletion and use of the Ogallala aquifer. These alternatives include government programs such as the Soil Conservation Service and the Conservation Reserve Program, more efficient water usage through dry land farming and improve irrigation, and the Buffalo Commons proposal. All of these alternatives have different implications for the environment, and for the populations which live on the land above the Ogallala.
The San Juan Basin is the most productive coal bed methane reserve in the United States (EIA, 2007). In the northern part of the San Juan Basin, there are major methane seeps near South Fork Texas Creek, about 20 miles east of Durango, Colorado. One might expect that the highest methane seepage would follow the outcrop of the Cretaceous Fruitland Formation. This seepage has been monitored and mitigated since 1994. The mitigation system appears to have an effect, but not all of the methane is being captured. The methane gas may be taking other preferred pathways to the surface. In this area, the seep pattern seems to cut across the strike of the outcrop (K. Hannula, personal communication, February 2015). One possible explanation for high methane seepage at a strange orientation is that there is a fault there. The current CGS geological map (Carroll et al., 1997) of the area does not contain a fault in the suspected area. Therefore, a three dimensional structural model was created in Move™ to test this competing hypothesis: no fault, as mapped by the Colorado Geological Survey (Carroll et al., 1997) or an unmapped fault. Two models were created based on where the ground surface contact of the Fruitland/Pictured Cliffs lies. Model one was based on the CGS geologic map, where in model two, the ground surface contact was reinterpreted based on an aerial photograph. Planar beds were extended into the subsurface created from mapped bedding orientations along the Fruitland/Pictured Cliffs surface contact. In both models, there existed an outlier plane. The outlier plane in each model expressed offset in strike and dip when compared to the surrounding planar surfaces. This supports the hypothesis of a fault perpendicular to strike. The offset perpendicular to bedding would demonstrate the preferred pathway of methane seepage. Further 3D modeling and research of the area would greatly improve the placement and design of the gas collecting and mitigating systems at South Fork Texas Creek.
CONTINUED STUDIES ON A NEW OCTAHEDRAL COBALT(III) COMPLEX AS A POSSIBLE ANTI-CANCER PRODRUG: SYNTHESIS AND CHARACTERIZATION STUDIES IN SOLID-STATE AND SOLUTION

Joe, Natalie; Morris, Aimee M.
Department of Chemistry

Small coordination complexes with redox active metal centers are of interest for their potential uses in anti-cancer research. For example, KP1019 and NAMI-A are ruthenium(III) coordination complexes that are currently in phase II clinical trials for their anti-tumor or antimetastatic properties and contain various ligands including indazole and dimethylsulfoxide, respectively. Utilizing a more abundant, less expensive cobalt metal center in place of ruthenium(III), we hypothesized that structurally similar cobalt(III) complexes could be synthesized. A new solid, isolable complex was achieved using a ligand substitution reaction via refluxing and crystallization techniques starting from the known complex trans-dichlorotetrakis(pyridine)cobalt(III) chloride. The new product is an octahedral Co(III) coordination complex that contains indazole and labile dimethylsulfoxide ligands. The proposed structure of the Co(III) complex is supported by elemental analysis and magnetic susceptibility measurements in the solid state, along with solution characterization studies of $^1$H and $^{13}$C NMR and mass spectrometry. This complex displays promise in utilizing a new metal center for expanding metal-containing prodrugs. Further studies are in progress to determine the exact speciation in the solid-state and in solution, as well as investigating the efficacy of this new compound on cancer cell lines.
AN EXPERIMENTAL AND MODELED COMPARISON OF DIFFRACTION IN IMAGING SYSTEMS
Ketchum, Remington; Slowman, Wilbert; Paciaroni, Megan
Department of Physics & Engineering

The resolution limit of imaging systems is ultimately limited by diffraction. However, diffraction is often neglected in the analysis and design of both front and back illumination imaging systems in favor of the simpler ray tracing model. In many systems, paraxial optics provides a reasonable model for the design of systems with high resolution. This is certainly true for the majority of front-illuminated imaging systems; however, in back illuminated (shadowgraphic) imaging systems resolution is very strongly affected by diffraction. We present a detailed experimental comparison of imaging resolution differences between front and back illuminated imaging systems for non-scattering and scattering environments. Additionally, modeling results of both systems are compared with the experimental results and classical optical theory. Preliminary results and calculations show that physical optics creates a stronger effect on resolution in front illuminated systems in either scattering or non-scattering environments despite original predictions.
China’s One Child Policy was put in place in attempts to slow down their growing population. Although the Policy has helped control the population size, unseen consequences and unintended cultural change has occurred. There were rewards given to families who abided by the policy, such as education for children and wage bonuses. Families who did not follow the One Child Policy were often punished with forced sterilizations and economic sanctions. As sons are valued over daughters in Chinese culture, the rewards and punishments caused a phenomenon called “missing girls”. The term “missing girls” refers to aborted female fetuses, neglected and abused daughters, as well as undocumented girls and adoptions. This has caused a skewed sex ratio in China of 115 males at birth to only 100 females at birth. Not all of the effects of the Policy are negative though. In some areas, mainly urban ones, women and girls are afforded with more opportunities than before, including higher education and better career options. It remains to be seen how the change of the One Child Policy to a Two Child Policy will affect the sex ratio and the positive aspects that the original policy created.
INVESTIGATION OF POSSIBLE PERIGLACIAL INVOLUTION STRUCTURES: MESA VERDE NATIONAL PARK, COLORADO

Kinney, Rachel; Kenny, Ray; Gillam, Mary

Department of Geosciences

Possible periglacial involution structures exposed in several road cuts within Mesa Verde National Park (MVNP) were documented and analyzed to determine whether the structures originated from periglacial processes. GIS-based surface analyses including slope, aspect, and timberline approximation were performed to favor north, northeast, and northwest facing slopes, low gradient, and timberline above 2,400 meters (7,874 feet). The suitability analysis confirmed that the MVNP area could have sustained periglacial features during the last glacial maximum. The relict soil structures found in the study area were also analyzed based on size, location within the soil layers, soil composition, degree of deformation, and the interpenetration and irregularity of the structures. Based on our analyses, we conclude that the relict structures found in MVNP likely formed by freeze-thaw processes. Other geomorphological processes that could potentially produce similar soil structures, including mass wasting, differential loading, springs, drainage channels, bioturbation, glaciation, and liquefaction, were considered. Our study suggests that these processes would not have produced the relict soil structures and we conclude that the relict soil structures are involutions. Previous studies conducted in New Mexico, Arizona, and Colorado (Blagbrough, 1994; Gillam, 1998; and Marker, 1990) suggest that a periglacial environment could have existed at the lower elevations and latitudes in southwest Colorado. The results of this study indicate that a periglacial environment capable of producing involutions existed in southwest Colorado at elevations as low as 2,400 meters (7,874 feet) and as far south as about 37°N latitude.
COLLEGE ATHLETES’ PERCEPTIONS OF CARE QUALITY BASED ON GENDER/RACE

Maes, Joshua; Marks, Robert; Meyer, Dr. Carrie

Athletic Training

Rationale & Objective: The purpose of this study was to add to the body of literature about perceptions of care quality in athletic training through the lens of race and gender, given that both are prominent issues in general health care. We hoped to see how gender and race match/non-match relationships between collegiate athletes and Athletic Trainers affect their perceptions related to quality of care. Methods: We sent out a survey designed to assess athletes’ perception of care quality with athletic trainers and demographic information to varsity coaches at NCAA DIII schools. With the 210 survey responses we received, we performed an independent t-test comparing the averages of questions relating to care quality with whether the respondent was a race or gender match/non-match with their athletic trainer. Results: We found that there was no statistically significant difference in reported quality of care between athletes who reported race (t=209; p=0.929) or gender (t=56.35; p=0.333) match/non-match. Discussion: Based on our results, we concluded that gender and race match/non-match has little to no effect on perceptions of care quality. Race and gender appears to have little effect on perceptions of care quality from Athletic Trainers. However, our study was limited due to its lack of diversity. Our respondents reported 163 White-White race matches. It would be beneficial to apply this same study design to a more diverse population.
A FRACTURE ANALYSIS TO ASSESS THE STRUCTURAL HISTORY OF THE EQUITY BLOCK AT CREEDE, CO.

Mason, Joseph; Hannula, Kimberly A.; Gonzales, David

Department of Geosciences

The Creede district in central Colorado has a mining history of nearly 150 years. During this time most of the mining has focused on Ag-Pb-Zn-Cu mineralization associated with main-stage Creede mineralization, which happened around 25 Ma in response to hydrothermal circulation on the margin of the 26 Ma Creede caldera. Exploration and mining in the northern part of the district has focused on the Equity fault. This fault represents a major mineralized structure characterized by gold mineralization. The Equity fault forms the southern margin of a major fault-bounded block known as the Equity “horst” block.

A prevailing thought was that the Equity block was uplifted about 1,300 feet prior to mineralization either by emplacement of a shallow pluton or by compressive tectonics that caused reverse displacement. An alternative hypothesis was the block had experienced normal displacement, but then underwent rotation to produce an apparent reverse displacement.

In this research project, joints that developed within and adjacent to the Equity block, as well as structural features in the Equity fault, were examined to gain insight into the origin of the block and test previous hypothesis. Stereonet plots of over 440 joint measurements reveal two distinct and dominant joint patterns. One joint set strikes at 195° and dips 80° west, subparallel to the Amethyst fault that bounds the Equity block to the west and is one the main mineralized zones in the district. The other set of joints strikes at 270° and dips ~70° north, subparallel to the Equity fault. Movement on both of the faults appears to have influenced joint development in the area.

Considering the joint data, and structural fabrics and features along the Equity fault, we propose that the structure is an extensional feature even though it has apparent reverse displacement. Our analysis suggests the possibility that the entire Equity block was tilted south during the resurgence of the 26.9 Ma San Luis caldera, changing the orientation of the Equity fault.
Prior research has shown that horses and other mammals, including humans, use the right hemisphere of the brain to process negatively associated stimuli, and the left hemisphere of their brain to process positive or neutral stimuli. This study tested the link between motor dominance, a horse’s preference for their right or left foreleg, and their eye preference for viewing a novel stimulus. This study will provide information on the hemispheric organization of horses, how this compares to humans and other mammals, and how this influences their temperament. Motor dominance was tested using pedometers attached to the forelegs of each horse participant. Horses were then grouped into left and right dominant experimental groups. Each horse was then individually exposed to a novel stimulus (i.e. a pinwheel) placed at the end of a barn aisle, with a barrier dividing the barn aisle at the center, directly in front of the stimulus. In order to investigate the stimulus, horses either walked on the left or the right side of the barrier, or they chose not to approach. Due to their monocular fields of vision, with eyes placed on the sides of their heads, horses that walked on the left side of the barrier initially viewed the stimulus with their right eye as they approached, whereas horses that walked on the right side initially viewed the stimulus with their left eye. Horses were timed during their approach to the pinwheel, and due to their similar hemispheric organization to other mammals, horses that approached using their left eye may be more inhibited, taking more time to approach. Horses that use their left eye to view the pinwheel may also have a higher increase in heart rate, due to the stress induced by the novelty of the stimulus. Results for heart rate and latency to approach were not statistically significant, but the trend in the means for the experimental groups supports the predictions of the researchers. Results for motor dominance in regard to eye preference did not reach statistical significance, however, the means in heart rate do show a difference between left and right dominant horses in response to the pinwheel.
NAVAJO STUDENTS’ PERSPECTIVES ON TRIBAL FOOD SYSTEMS AND SOVEREIGNTY

Mike-Bidtah, Jody
Environmental Studies Program

The importance of tribal food systems is strongly related to the health, land, and culture of Native American people. Therefore, I was interested in exploring the beliefs, knowledge, and perspectives of Navajo Fort Lewis College (FLC) students about tribal food systems and food sovereignty, and determining whether their access to traditional and healthy foods differed between the Navajo Nation and on campus. This study took place at FLC using an online survey (SurveyMonkey.com), which was advertised on the Fort announcement page and emailed to all the Native American and Indigenous students. The online survey included open/closed ended, multiple choice, Likert scale, and dichotomous questions. I collected 65 responses within a 7-day window.

Results showed that majority of the participants agree that local food systems, face-to-face interaction, and farm-to-school programs are great approaches for revitalization of dietary changes for Navajo people and food sovereignty - for restoring Hózhó (state of peace and harmony, Walking in Beauty). For Navajos, it is a sacred responsibility to practice with respect and reverence to our environment, as we are interrelated and interdependent as land, plants, animals, and people. Unfortunately, Navajo student participants reported feeling separated from tribal foods and culture while at FLC. One way to address this issue is to have a garden on FLC campus for indigenous students to plant and cultivate their traditional plant-based foods. Since I found out that not all students know how to grow, maintain, harvest, or prepare traditional foods; I would also suggest having a class or workshops dedicated to practicing food sovereignty and learning about the various types of traditional foods. This study provides an increased understanding of indigenous students’ perceptions of tribal food systems, and identifies ways in which colleges could improve upon delivering access to healthy, traditional foods on campus.
A technique to estimate the South Cascade Glacier summer mass balance derived from remote sensing and GIS is evaluated by comparison to a traditional field-calculated mass balance measurement. The process of transforming surficial snow into glacial ice occurs at various rates throughout the glacier surface, creating zones of accumulation (firm) and ablation (ice), visibly appearing on the glacier as the firm line. Glacial firm and ice have a unique spectral signature that can be discriminated from IKONOS and WorldView-1 satellite imagery and used to estimate an accumulation area ratio (AAR). This technique was evaluated using an established relationship between the South Cascade Glacier AAR in 2004 and a known field-calculated mass balance of the same year. The mass balance in a subsequent year (2008) was then estimated from satellite imagery. Results for the summer mass balance in 2008 estimated from satellite imagery were -3.81 mWE; results from field-calculated measurement were -3.51 mWE. The resulting error of 8.66% was predominantly due to shadows cast on to the glacier surface from adjacent outcrops and rocks on the surface of the glacier. This method produced a measurement that estimates mass balance using a ratio between pixels of glacial firm and ice more efficient relative to field-calculated data. In order for the proposed technique to be effective, high temporal and spatial resolution satellite images are needed to supplement preliminary data. The proposed technique will minimize the need for volume, density and stream discharge field measurements and provide a more efficient technique to estimate changing glacier dynamics.
CONFIRMING EXOPLANETS USING THE FORT LEWIS OBSERVATORY

Mullin, Elinor

Department of Physics & Engineering

The transit method was used to detect exoplanets at the Fort Lewis Observatory. Exoplanets are planets that orbit other stars. Using the telescope at the Fort Lewis College Observatory, eight transits were captured. The change in magnitude was determined for all eight transit stars and the transit duration was determined for six of the stars. The change in magnitude recorded by the Fort Lewis telescope was compared to the change in magnitude reported on the Exoplanet Transit Database (ETD). All eight transits had an average difference from the ETD of within 0.004 magnitude or 21%. Through this data analysis and comparison it was determined that the telescope at the Fort Lewis Observatory is capable of observing exoplanet transits having a change in magnitude of as small as 0.0087.
MODELING AND CHARACTERIZATION OF POROUS SILICON REFLECTANCE

Murray, Gabe
Department of Physics & Engineering

Porous silicon offers remarkable optical properties which have a wide range of applications. A method to predict the reflectance of arbitrarily etched porous silicon structures using a numerical thin film model is posed. Porous silicon samples were created using an anodization cell of our design and reflectance measurements were compared to the model. The theoretical reflectance curves show a promising correlation to the actual data. More samples including AC etched ones need to be created and characterized using more precise methods in order to further validate the modeling method.
NATURAL PRODUCT SYNTHESIS OF
DIARYLETHER CYCLOPHANES

Ozvat, Tyler
Department of Chemistry

Diarylether heptanoids are naturally occurring cyclophane compounds that exhibit a wide range of biological activities such as anti-cancer, anti-viral, anti-inflammatory, and antioxidant properties. The biological activities of these cyclophanes can be attributed to the strained seven-carbon tether which is largely responsible for the chirality of these macrocyclic structures. We report work towards developing synthetic strategies for a series of diarylether cyclophanes with varying degrees of conformational strain to investigate the relationship between structural integrity, barrier to racemization, and biological activity. The synthesis and characterization of both seven and eight-carbon tether cyclophanes were successful where the eight-carbon tether cyclophane is the first ever reported.
DETERMINING POTENTIAL GLACIAL REFUGIA FOR OSTRYA KNOWLTONII ACROSS THE SOUTHWESTERN US AS INFERRED THROUGH CHLOROPLAST HAPLOTYPpE ANALYSIS

Paces, Margo; Berg, Kelsey; Wilmer, Chelsea; McGuire, Matthew

Department of Biology

Knowlton Hop-Hornbeam (Ostrya knowltonii) is a small understory tree that is a member of the ancient Arcto-Tertiary flora extending across the Northern Hemisphere. According to the fossil record Ostrya once had an almost continues distribution in North America. Today Ostrya knowltonii exhibits a highly disjunct distribution across the southwestern United States and northern Mexico likely as a result of past climatic conditions. We investigated patterns of genetic relatedness and variation among populations across the region to uncover phylogeographic patterns relevant to past distribution and migration of the species.

Ten populations of Ostrya were sampled with DNA from five individuals from each population extracted. Two non-coding chloroplast DNA regions, psbA-trnH and ndhF-rpl32 were amplified using the polymerase chain reaction. The sequences from the two chloroplast DNA plastid regions were then analyzed and reduced to haplotypes projected in geographical space.

Four haplotypes were identified in psbA-trnH and five haplotypes in ndhF-rpl32. Similar geographic patterns were observed for both regions. The eastern portion of the range in SE NM and W TX shared identical haplotype structure. Similar haplotypes were also seen in the Colorado River drainage and adjacent areas of N AZ. Slight haplotype differentiation was noted into SE UT, central AZ, and Chihuahua in NW Mexico. The diversity of haplotypes is principally fixed in individual populations pointing to long-term isolation. Limited haplotype sharing in the region of highest population abundance points to persistence of ancestral haplotypes within individual refugial regions.
CALL OF DUTY PSYCHOLOGICAL WARFARE: THE LINK BETWEEN VIDEO GAMES AND AGGRESSION.

Palmer, Wyatt

Department of Psychology

There have been many studies that have looked at the relationship between video game play and aggression. There are findings that both support and discredit the notion that video games are linked to aggressive behavior. This presentation will give a brief definition of what is considered a violent video game. Also this presentation reviews and critiques articles that show correlations between video game play and aggression while at the same time reviews articles that support the opposite. Differences between these articles will be discussed along with their implications towards the relationship between video games and aggression.
THE 10 AM POLICY AND SMOKE JUMPING: SETTING THE STAGE FOR DISASTER ON AMERICA’S PUBLIC LANDS 1935-1988

Perkins, Luke

Department of History

This thesis delves into the origins of aggressive fire suppression in America and the specifics of the “10 am” policy, implemented by the United States Forest Service in 1935. It does so by piecing pieces together the events of the historically tragic Mann Gulch Fire that occurred on August 5th 1949 in Helena, Montana, with a goal of not only showing what happened, but why events unfolded as they did at the Montana fire, how the guiding policy influenced those events and how this event still effects the fire service.

Through a mixture of primary and secondary sources this project applies a micro-historical lens to Mann Gulch to show the dramatic influence of the historically aggressive “10 am” policy had on the creation of the 12 elite Smokejumpers who died there. This policy not only drastically affected the ecology of America’s public lands; it also contributed to a rise in firefighter fatalities. This thesis extrapolates an understanding of how gendered expectations with in the male dominated USFS and Smokejumping program affected the formation of this policy and the actions of the individuals on this tragic fire, and describes the eventual movement to a more accommodating fire policy after 1978. Finally it illuminates the ecological effects of such fire suppression practices and how they contributed to the catastrophic 1988 fire season at Yellowstone National Park which almost derailed the movement to inclusion of fire in management of America’s public lands.
In this study, we replicated Kahan’s (2013) two famous studies. He examined motivational reasoning and cognitive reflection and formulated a mathematical equation on crime increase/decrease in cities that did/did not ban carrying concealed handguns in public. He also created a control equation on rashes that did/did not improve on people who did/did not use rash cream. Kahan’s results showed that those who scored greater than 7 on the Numeracy scale were more likely to get the answer correct when asked to identify if the rash cream helped and that those whose Numeracy test scores were high were still more likely to answer incorrectly when asked about gun control if their political views opposed the findings.

Our research tests the validity of Kahan’s original two experiments, although we tested crime increase/decrease in regards to mental health screening in cities instead of concealed carry. It also gives us insight on how people view mental health and gun control. Since we are replicating Kahan’s original study, we decided to use two of this three hypothesis which follow: 1) subjects high in Numeracy would be more likely to get the right results in both the skin-treatment conditions; and 2) subjects higher in Numeracy would be more likely to construe the data correctly not only when it was consistent with their ideological predisposition but also when it was inconsistent with them and thus likely to display less ideological polarization than subjects lower in Numeracy.

We used 128 students from Fort Lewis, 62.5% were female and 37.5% were male. We found that in the control group, 34.3% got the wrong answer compared to 53.2% in the experimental group. We were able to confirm the first hypothesis: 1) subjects high in Numeracy were more likely to get the right results in both the skin-treatment conditions. However, we had to reject the second: 2) subjects higher in Numeracy were no more likely to construe the data correctly when it was inconsistent or consistent with their political view. Kahan also had to reject his second hypothesis. Our results show that we are all susceptible to our own biases regardless of mathematical and scientific evidence.
THE HOPI TRIBE AND PEABODY ENERGY: A HISTORY OF WATER USAGE AND CULTURAL LOSS ON TRIBAL LANDS, 1966-2010

Pierce, Erin; Gulliford, Dr. Andrew; Paul, Dr. Ellen

Department of History

The largest coal deposit in the United States, Black Mesa, rests upon the border of the Navajo and Hopi reservations in northwest Arizona. Peabody Energy gained permits to mine coal in 1966 and the subsequent mining operation shaped the history of the Southwest. The coal powered many western cities and was profitable for Peabody Energy. The Hopi reservation was not only home to the largest coal mine, its 650,000 acres are situated above the N-Aquifer. It is arguable that water is the most sacred essence to Hopi culture. Their beliefs are deeply spiritual and rooted in respect for the earth and balance. Water is not only crucial in this area for survival, but also their spiritual ceremonies. Therefore, water is a cultural resource to the Hopi.

Access to this natural resource was gained through deceptive politics and exploitation of two indigenous populations. Peabody Energy needed a way to transport the coal from remote northwest Arizona to the Mohave Generating Station, 273 miles away. The company created a slurry pipeline: the coal was crushed into small pieces, mixed with underground water, and pushed through the pipeline to the Mohave Generating Station. The water used for this slurry line came from the N-Aquifer, the only water resource in the region. Peabody Energy pumped an average of 3.3 million gallons of water a day for 35 years from this aquifer. The health of the aquifer and surrounding springs are showing declines upwards of 25 percent. Peabody Energy’s extensive use of the aquifer devastated the Hopi tribe’s sacred water resource, and thus is a cultural injustice.
THE EFFECTS OF IMPULSIVITY ON GUN AND SUBSTANCE USE

Pinna, Nicole; Nikitina, Katia; Burke, Brian

Department of Psychology

Prior research examined the correlation between impulsivity, gun and substance usage. These studies isolated two variables at a time, while there was limited research that analyzed all three of these factors. It is widely debated whether substance usage increases aggression, thus making individuals more likely to commit gun crime, or individuals commit crimes with guns in order to uphold their drug habits (Williams-Reid, 2001). Impulsivity increased with a longer drug-use habit for alcohol, opiates, benzodiazepines, cocaine, hallucinogens but not for marijuana (Bernstein et al., 2014). Positive gun views were associated with impulsive and aggressive tendencies (Martin et al., 2001). We put forth a survey which consisted of three parts: hypothetical gun use, the UPPS Impulsive Behavior Scale (Whiteside & Lynam, 2001) and a substance use screening. Our hypothetical statements examined topics such as self-defense, protection of others and proximity to crime. The UPPS Impulsivity scale is divided into four subscales: urgency, lack of perseverance, lack of premeditation and sensation seeking. We hypothesized that different substances will be correlated with individual subscales; gun use will be correlated with all subscales except for lack of perseverance. A sample of 100 students averaging 22 years of age participated in the study (56% female, 42% male). Our findings showed that gun experience and ownership were correlated with sensation seeking. Results varied throughout the hypothetical gun scenarios. The use of marijuana, depressants and stimulants was correlated with high impulsivity, while the four subscales of impulsivity were divided among substance categories. Suicidal thoughts were highly correlated with impulsivity, including 3 out 4 subscales. In the future we are interested in investigating scenarios that are based on criminal activity rather than ethical reasoning. We would also like to expand our sample to forensic and clinical populations in order further investigate correlations involving suicidality and criminal activity.
TENSION RELEASING EXERCISES REDUCE PERCEIVED STRESS IN COLLEGE STUDENTS

Poole, Thomas; Simbeck, Cathy; Frazer, Lee

Department of Exercise Science

Tension Releasing Exercises (TRE) activate natural muscular vibration to release tension and activate the parasympathetic relaxation response (Berceli, 2013). The purpose of this study was to determine if TRE affected perceived stress in college students. Participants were recruited from Fort Lewis College. Stress was measured using the Perceived Stress Scale (PSS) and Measure of Current Status Part A (MOCS), administered at the beginning and end of 5 weeks. There were 9 participants recruited to the experimental group but 4 did not continue after the initial session. The experimental group was taught TRE and asked to independently perform the exercises 3 times per week for 15-20 minutes each session. The experimental group (n=5) self-reported performing the TRE an average of 3 times and 65.5 minutes per week for 5 weeks. The control group (n=30) was asked not to begin any new stress management techniques during the 5 week period. The experimental group significantly improved their average PSS scores from pre to post (21 to 8.8) on the dependent t test (p=.002). This improvement (-12.2) was significantly better than the control group (+3.5) on the independent t test (p=0.00011) and Mann Whitney U test (p=0.000481). The experimental group significantly improved their average MOCS scores from pre to post (22.2 to 36.6) on the dependent t test (p=.018). This improvement (+14.4) was significantly better than the control group (+2) on the independent t test (p=.002) and Mann Whitney U test (p=.025). The TRE were effective in reducing stress in college students, supporting Berceli’s previous research (2009), however, the results of the present study must be viewed with caution because of the small sample size.
CHARACTERIZATION OF A NOVEL FUNGAL SPECIES FOUND ON RESIDENT BATS IN COLORADO; IS PSEUDOGYMNOASCUS DESTRUCTANS HERE?

Pope, Cacia; Riser, Ethan; Stapleton, Tess; Fenster, Steven; Lehmer, Erin

Department of Biology

White Nose Syndrome has caused the death of millions of bats throughout the eastern United States. Since the 2006 discovery of Pseudogymnoascus destructans (P. destructans) in New York, the psychrophilic fungus has been observed as far west as Oklahoma. With bat populations seeing 70% decrease in numbers after being infected with P. destructans, we sampled bats from around Crestone, Colorado in order to determine if P. destructans was affecting local bat populations. Fungal spore samples were inoculated onto agar plates and incubated at 8 °C and 20 °C. Out of 144 fungal samples ten came back as potential matches for P. destructans, identified through ITS sequence analysis, and were then sequenced for the IGS and LSU regions for further analysis. All of the sequences for the IGS region yielded an unknown species of the Pseudogymnoascus genus and the LSU sequences matched to Pseudogymnoascus pullulans and P. pannorum. Morphologically, our unknown sample shared some characteristics with Pseudogymnoascus destructans but differed enough for us to believe our fungus may be a novel species.
AN ANALYSIS OF THE DEVELOPMENT OF US FOREIGN POLICY ATTITUDES TOWARD HUMANITARIAN INTERVENTION IN THE POST COLD WAR ERA

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Department of Political Science

In the years leading up to the end of the Cold War, the United States followed along traditional realist notions of foreign policy when considering any actions taken abroad. These realist notions placed U.S. national, security, and economic interests as the priority for any involvement in the international scene. Following the fall of the Soviet Union, a new era of U.S. dominance and leadership came to light, as well as a new global order and new issues facing the world concerning humanitarian concerns.

Given this context, new questions have arisen concerning the stances U.S. foreign policy makers have made concerning the intervention of U.S. military and diplomatic forces in cases of severe humanitarian crisis. I hypothesize that since the early 1990's, a shift has occurred from realist principles of foreign relations towards more pluralist and solidarist notions, which claim the relevance of morality as a motivator and key component in humanitarian intervention.

The analysis begins with four case studies--U.S. involvement or lack thereof in Somalia (1993), Rwanda (1994), Darfur (2004), and Libya (2011). By doing a qualitative study of the independent variable of policy attitudes, as measured by a rhetorical analysis of presidential and administrative speeches and addresses, as it relates to the outcome variable of actual intervention, as operationalized by boots on the ground, humanitarian aid, and diplomatic action, I am able to see not only how policy attitudes have affected decision-making, but also how those attitudes and actions have shifted in the past 40 years of American foreign policy.

In conclusion, my hypothesis is both confirmed and complicated. Though there have been slight shifts in foreign policy attitudes in the Post-Cold War Era, this movement has been small, often case by case, and not linear in any fashion. The most pressing deduction is that the United States does not have a comprehensive or definable foreign policy framework in place - which has implications for the future of its entanglements abroad.
THE EFFECTS OF DIFFERENT ENERGY SOURCES ON PERFORMANCE IN THE MULTISTAGE FITNESS TEST

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Department of Exercise Science

Most athletes typically like to have a snack between or during competition to give them an energy boost. Do they really know if what they are consuming is beneficial to them or not? The media promotes CLIF bars and other supplement bars as such a reliable source of energy between or during competition/training. This study examined the effects of three different energy sources on the results of the Multistage Fitness Test (MFT) with female collegiate athletes. The energy sources used were Snickers, Crunchy Peanut Butter CLIF bar, and water. These energy sources were chosen based on popularity and the differences in availability. Water is readily available and free and the Snickers is less expensive than the CLIF bar. The media promotes all three of these to enhance athletic performance. It was hypothesized that the Snickers would be more beneficial to performance based on the macronutrient factor of the bars. Snickers and CLIF bars were selected because they are equal in calories (250kcals) and similar carbohydrate content (11% and 14% respectively). The bars varied in fat and protein composition with the Snickers being higher in fat and the CLIF bar being higher in protein (Snickers: 18% fat, 8% protein, CLIF bar: 9% fat, 22% protein). There were 21 female athletes from the Fort Lewis College softball, volleyball, and lacrosse teams participated in this study. Each was given a predetermined energy source 60 minutes prior to each performance test; there were a total of four testing sessions approximately one week apart. Their scores were recorded based on the level/sublevel they reached during each test. A repeated measures ANOVA was used with these scores. There was no statistical significance observed between the three energy sources and the MFT scores (p>0.05). Despite no significance, there was a trend towards a higher MFT score for Snickers consumption. Based on these findings, female athletes can be advised that there is no measurable advantage to consuming CLIF bars 60 minutes prior to complete high intensity exercise lasting less than 8 minutes.
THE EFFECT OF THE MEDICAL MODEL VS. THE ATHLETIC MODEL ON COACH SATISFACTION OF ATHLETIC TRAINERS

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Department of Athletic Training

Background: Athletic trainers (ATs) work in a variety of settings and their model of supervision can vary. The traditional and most common model is the athletic model in which an athletic department or coach supervises the AT. A newer and emerging supervisory structure is the medical model in which a medical entity such as a campus health center or team physician manages the AT. Issues within the athletic model are beginning to be publicly discussed by ATs, yet little research has been conducted on the two models. The purpose of this study was to determine the effects of the two primary supervision models of athletic training on coach satisfaction levels. Methods: All head varsity coaches were contacted from seven medical model schools and seven athletic model schools. An adapted 56-question survey was completed by coaches (27 responses from medical model and 20 responses from athletic model) and then analyzed using an independent t-test with a p value of ≤ 0.05. Results: The independent t-test found that the athletic model schools (M = 179.45 ± 26.496) reported slightly higher levels of satisfaction with their athletic trainers than medical model schools (M = 176.67 ± 6.133). However, there was no significant difference (t=0.359; p=0.721) found between the two groups. Conclusions: The lack of significant difference found on this topic may be a positive finding for the medical profession as a whole, supporting the concept that quality of healthcare is not influenced by the structure or management through which it is provided. The medical model is a newer concept that may take some time for coaches and staff to understand and become comfortable with. Further research should also be conducted that utilizes other means of comparison to determine the model’s effectiveness. This research should include patient-rated outcomes, conflict of interest, liability, cost-effectiveness, and AT job satisfaction.
IS THE ANIMAS RIVER VALLEY PREPARED FOR A MAJOR FLOOD EVENT?: A LOOK INTO MITIGATION STRATEGIES AND POTENTIAL CONSEQUENCES

Ramseth, Paul
Environmental Studies Program

Originating high in the San Juan Mountains of Colorado, the Animas River has had a century long history with acid mine runoff. The river serves as the primary water source for many downstream farm operations. As a result, the potential for soil contamination is a concern for these farmers. The objective of this study was to understand the consequences that a flooding event could have on farm operations in the Animas River Valley, examine methods used by farmers to limit soil exposure from heavy metals found in the Animas River, and evaluate mitigations tactics being implemented by La Plata County. All four commercial farms in the Animas River Valley were contacted and three responded for an interview. Along with these interviews, Darrin Parmenter, La Plata County's Colorado State University extension director for agriculture was also interviewed. Farmers were asked questions regarding flood mitigation, soil contamination, and historical events that could have contaminated their fields. Their responses varied. Two farmers were unconcerned about the threats of flooding and the possibility of soil contamination through irrigation. One farmer was very concerned about the impacts of acid mine runoff affecting his farm through irrigation and flooding.

Their polarized responses seem consistent with the community's perception of the condition of the river. Some want change and others feel that it's best to continue with the ways things have been. La Plata County seems to be on the passive side of the debate as there are no mitigation procedures in place for flooding of for lessening the effects of acid mine runoff.
Issues concerning masculinity and men’s bodies have become increasingly tied to a culture of consumerism in modern America. This research addresses the impact of postnatural physiques in media on American men's beliefs about their bodies, their definitions of what it means to “look” masculine, and how they approach embodying that definition. Why are men spending more and more money on gym fees and supplements without corresponding increases in health and fitness? By considering the evolution of idealized male bodies within American culture, the paradoxical relationship between masculine embodiment and modern consumerism are examined.
IS HOLISTIC MANAGEMENT A SUITABLE STRATEGY FOR THE LANDSCAPE OF THE WESTERN U.S.?

Ridener, Christopher
Environmental Studies Program

Holistic Management (HM) is a land management decision-making platform that may be used for the restoration of degraded lands and producing a number of ecological benefits including water infiltration and carbon storage. HM consists of a complex model that incorporates economic, social, and environmental concerns into the management process. Components of the system include items such as historical landscape assessments, setting goals and adaptability. The model also includes specific management tools of fire, land rest, and managed grazing. This paper explains whether HM be a suitable model for restoring damaged lands in the western U.S.

The ecological benefits of the HM grazing technique has been called into question. Papers for both sides of the argument provided references which enabled a snowball effect of sources. The papers in opposition to HM grazing techniques propose that experiments are not repeatable, have been anecdotal, and provided very little quantitative data.

HM is a model that is appropriate for the Western U.S., but that does not mean that all components of the model will be appropriate in areas that have different histories, climates or topography. The HM grazing method is one tool in the HM toolbox and while it sometimes plays a pivotal role in rebuilding unhealthy soils, it is not always needed, and should not be used on every landscape, such as wetter soils. Also, the grazing technique should not be isolated from the model and be seen as an all-encompassing solution to degraded soils.

HM could be beneficial for degraded soils in the western U.S if goals were set for soil restoration, practiced in watershed scales, incorporated stakeholder input, and had built-in adaptation strategies. There could be a broad range of benefits from increased soil water infiltration and carbon sequestration/storage, to more productive farmland and grass-fed beef, to an easing of the tensions between ranchers and land management agencies.
Ultra-mountain running (UMR) has seen a significant increase over the past decade. These races often exceed 15% gradients and rely heavily on an individual’s metabolic and aerobic expenditure. Thus, the purpose of this study was to examine whether running or walking a 25% grade at a set pace is more metabolically efficient on a treadmill. Eleven trained participants (6 males, 5 females, and ages 18-55) running 20+ miles a week completed three separate trials, a maximal oxygen uptake test (VO2 max), followed by two separate 1-mile running and walking trials. Both trials were performed at a 25% grade at their set pace (mean speed = 2.9 mph, sd ± 0.26). The results of the dependent paired t-test indicated that heart rate (HR) had a statistically significant difference (p<0.05) between the walking (M=148, sd ± 13.8) and running (M=158, sd ± 11.4) conditions; p=0.002. VO2 scores for running (M=40 ml/kg/min, sd ± 5.9) and walking (M=32 ml/kg/min, sd ± 13.9) showed a statistically significant difference between the two conditions; p=0.035. Relative VO2 values for running (M=10.8, sd ± 3.0) and walking (M=8.9, sd ± 2.8) did not show a significance; p=0.291. RPE values for running (M=13.3, sd ± 2.1) and walking (M=12.5, sd ± 1.4) did not show a significance; p=0.205. The overall findings did indicate that running had increased metabolic and aerobic costs compared to walking at a 25% grade and set pace. This means that power hiking up a steep incline may be more energy preserving, while still relative to the work rate as running. Though the study was focused on trained runners and energy conservation, it can be beneficial for the fitness and exercise industry as well with the results indicating that individuals seeking weight loss can effectively burn the greatest amount of energy through incline running.
Human T-cell leukemia Virus Type I (HTLV-1) was the first identified human retrovirus, identified in 1980. Infection with HTLV-1 results in adult T-cell leukemia with 5-10% incidence. An estimated 15-20 million individuals worldwide are infected with HTLV-1. Replication of retroviruses, such as HTLV, is dependent upon synthesis of viral structural and enzymatic proteins. Synthesis of HTLV’s enzymatic proteins is dependent upon two -1 programmed ribosomal frameshift (PRF) events. PRF is defined as a programmed change in the ribosome’s reading frame during translation. During a -1 PRF, the ribosome shifts one nucleotide in the 5’ direction along the RNA when it is positioned on a ‘slippery sequence’. Slippery sequences have a consensus sequence of XXXYYYYZ, where X can be any nucleotide, Y can be A or U, and Z cannot be G. This sequence of nucleotides allows favorable tRNA anticodon:codon base-pairing between the tRNAs and mRNA in both the original (0) or alternate (-1) reading frames.

In this work, the HTLV-1 gag-pro-1 frameshift site requirements are investigated. The gag-pro frameshift site consists of a heptanucleotide slippery sequence (AAAAAAC), followed by a downstream structure. A stem-loop structure is predicted downstream of the slippery sequence (3). We are investigating the minimal RNA sequence required for frameshifting. To determine the minimal sequence requirements, we designed two variant frameshift sites. The extended sequence has an additional 126 nucleotides upstream and downstream of the frameshift site. In contrast, the minimal sequence only includes 30 upstream and downstream of the frameshift site.

We used cloning techniques to ligate a DNA insert coding for each frameshift site into the p2luc vector between the regions coding for two luciferase proteins, Firefly (fluc) and Renilla (rluc). In the p2luc vector, fluc is in the -1 reading frame relative to rluc. At this time, we have cloned the extended frameshift site into the p2luc vector. In order to sequence the plasmid DNA, we amplified a 700 nucleotide section of the plasmid using a method called “Slowdown PCR”. This allowed the DNA polymerase to properly amplify the GC rich region within the frameshift site sequence. This method, used in cis with a decreased denaturation temperature of 90 degrees Celsius for the sequencing reaction, allowed us to sequence the 700 nucleotide PCR product. These results were compared to our intended plasmid sequence and we were able to verify successful plasmid DNA cloning. In future experiments, we will amplify this DNA, use it to synthesize RNA, and then measure the in vitro frameshift efficiency for the extended frameshift site in triplicate. These experiments will be repeated for the minimal frameshift site discussed above. Frameshift efficiencies will be compared to published values for the HTLV-II gag-pro frameshift site. Based on the results, the effect of the upstream and downstream sequence on frameshift efficiency can be determined.
THE EFFECT OF SUPERFUND ON POST-INDUSTRIAL COMMUNITIES: AN ANALYSIS OF GEOGRAPHIC IDENTITY

Schnarch, Samuel

Environmental Studies Program

The interactions between people and place have long been understood as producing an integrated dialogue between them. The presented paper deals the impact of the Comprehensive Environmental Response, Compensation, and Liability Act (CERCLA), or Superfund, on local communities and their sense of place in southwest Colorado.

A literature review of relevant research was conducted, revealing the economic impacts of Superfund (mean 4 - 16.26% depreciation in property values) via hedonic regression analysis. Studies of the impact of outside stigma also demonstrated the endemic capacity of negative, outside outlooks to exacerbate the challenges of post-industrial development. Case studies were also gathered from other sources, covering the sequence of events in Toluca, Illinois; Cokedale, Colorado; Picher, Oklahoma; and Berlin, North Carolina. Common trends were observed in the recounting of said case stories that impacted the evolution of their geographic identity in dealing with site designation and remediation proceedings. Trends included the homogeneity of sense of place, community involvement in remediation efforts, existing alternative economic development, motivation on the part of the government itself, and a community’s ability to cope with and combat outside stigma.

These trends were then used to generate a case study of superfund proceedings in Durango, Colorado, and the remediation of the “Smelter” site, the location of the leftover tailings of the Vanadium Corporation of America. A predictive discussion was then undertaken with regards to the future remediation of the Bonita Peak Mining District, a newly listed site near Silverton, Colorado. In the cases of both Durango, and Silverton, there was observed to be high levels of community involvement and alternative exploration, namely into tourism, which suggests a positive ultimate outcome in each case. The final impact on Silverton’s sense of place, however, would seem to depend upon the community’s desire and ability to retain the artifacts of their hard-rock mining heritage, and to what extent they prove successful at doing so.
**VALIDATION OF PERFECTPHORM: A MOTION ANALYSIS STUDY**

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Department of Exercise Science

PerfectPhorm is a recently released motion tracking system that needs to be validated before its implementation in any field of study, specially medical and sport. The purpose of this study was to see if PerfectPhorm is a valid tool for measuring joint angles when compared to a current gold standard the Vicon System. Both the PerfectPhorm and Vicon System measured lower-extremity joint angles in 21 subjects during the performance of a squat, lunge, and vertical jump. The collected data was then analyzed via paired t-tests to compare the maximum and minimum joint angles of the ankle, knee and hip from the three movements. The research showed that PerfectPhorm was not completely accurate valid tool for motion tracking. Although our study showed that PerfectPhorm is not a valid tool for lower body motion tracking, more research is needed to analyze its validity in tracking the upper body as well as more complex movements.
THE ROLE OF DEEP PRESSURE SENSORY FEEDBACK DURING GAIT

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Department of Exercise Science

It is known that patients with diabetic peripheral neuropathy (DPN) have an altered gait due to sensory deficits in the feet. Footwear is also known to alter gait due to the difference in sensory input. This study attempted to confirm that DPN patients experience a gait change due to an afferent proprioceptor deficit and provide further evidence that footwear will alter gait. Subjects (n=11) participated in two testing sessions that included a baseline testing and testing with a lidocaine induced tibial nerve block to mimic DPN. Sixteen repeated-measure ANOVA tests were conducted comparing shod and barefoot, in both the normal (BF, SHOD) and anesthetized conditions (BF_ANEST, SHOD_ANEST). Separate analyses were conducted for walking and running. Dependent variables consisted of 3D kinematics and kinetics. Significant differences were found between shod and barefoot conditions in terms of velocity during run, GRF in the vertical plane during run, and GRF in the anterior-posterior plane during walk and run. These findings are consistent with previous research comparing barefoot and shod running and support the notion that shoes influence gait and can worsen the position awareness and stability of a person’s body. Significant differences within footwear conditions (e.g. between barefoot and barefoot anesthetized) were not observed, which indicates that sensory feedback from deep pressure receptors does not play a major role in influencing gait. These results conclude that there is a significant change between barefoot and shod, but cannot support the purpose that it is the afferent proprioception deficit that causes patients with DPN to alter their gait.
THE ANTIQUITY OF LANGUAGE: A REVIEW OF THE EVIDENCE

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The holy grail of many scientific inquiries has been the discovery of the precise evolutionary progression for the faculty of modern language. It is a remarkable question that has persisted since before Charles Darwin’s publication of his theory of evolution by natural selection in 1859. Since Darwin, the popular premise that language was and is a uniquely human feature, has remained largely unchanged. However, the recent advancements in genetics and ever increasing cache of archaeological material has begged for a reinterpretation according to some scientists. Dediu and Levinson (2013) claim that modern language is phylogenetically ancient and was a part of the modern human and Neandertal lineage at least a half a million years ago, beginning roughly at the time of divergence from the last common ancestor Homo heidelbergensis. Yet, this time frame is significantly older than the typical and widely accepted assumption of 50-100,000 years as proposed by the likes of renowned linguist Noam Chomsky. Chomsky, like others (e.g. Berwick et al., 2013; Tattersall, 2010), propose that the cognitive abilities for language were overly limited or non-existent outside of Homo sapiens and therefore language must have necessarily originated with the early human species. Nevertheless, Dediu and Levinson (2013) purport that the recent amalgam of evidence supports an evolutionary history antithetic to a simple and solitary progression of modern language that is strictly confined to Homo sapiens. They suggest that the evidence articulates a diverse evolutionary history where Neandertals and ancient modern humans shared genes and culture on a wholly significant level and because of this intimate interrelatedness and common evolutionary descent, Neandertals must have also possessed the essential foundations for modern language. This paper analyzes the evidence for a revision of the antiquity of language and ultimately concurs that it is indeed convincing.
PREDICTORS OF COLLEGE STUDENTS’ KNOWLEDGE OF GUN CONTROL LAWS AND STATISTICS.

Thornhill, Sara; Burke, Brian

Department of Psychology

Many studies have shown that people have significant gaps in knowledge when it comes to gun laws and statistics (Aronow, 2016; Cooke, 2004; Filindra & Kaplan, 2015). I studied the pre-existing knowledge of gun laws and statistics within the United States using college students at Fort Lewis College. I did this through a short questionnaire asking about their experience with guns, knowledge regarding laws and statistics, and their opinions of these laws and statistics. I had 19 females and 17 males (36 total) participate in my study. I found that males actually knew more about guns than females did, politically affiliated people (Democrats or Republicans) believe in background checks more so than non-politically affiliated people, religion has no correlation with views about guns, and people with more gun experience are more likely to believe that households would be safer with more guns. It was not surprising that people with more gun experience believe households would be safer with guns in the home nor that politically affiliated people believe in more background checks. It was unexpected that, when it came to knowledge about guns, males knew more than females, fitting the stereotype, although religion did not fit into the stereotype of more conservative attitudes. When beginning this study, I hypothesized that people generally would not know very much about guns. This was proven, with an average score of 31.6% on the gun-related test.
CHARACTERIZATION OF CD9 AS AN ALTERNATIVE RECEPTOR FOR IL-16 SIGNALING IN CEREBELLAR GRANULE NEURONS

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Department of Biology

Interleukin-16 (IL-16) was initially described as a pro-inflammatory cytokine. IL-16 has diverse immunoregulatory effects in various tissues and has recently been shown to induce neurite outgrowth in cerebellar granule neurons. In neurons IL-16 binds to the CD4 receptor, which triggers a signaling pathway that upregulates the expression of c-Fos. c-Fos transcriptionally regulates genes that promote proliferation, growth, and survival of neurons (Fenster et al., 2010). In previous studies, cerebellar granule neurons isolated from CD4 knockout mice still exhibited c-Fos expression and increased neurite outgrowth when treated with IL-16 (Fenster et al., 2010). This indicates that in cerebellar granule neurons, IL-16 could be binding to an alternative receptor in order to elicit this response. We hypothesize that the tetraspannin receptor CD9 may be the alternative to CD4 in cerebellar granule neurons. In other cells throughout the body, CD9 has been identified as an alternative receptor for IL-16 signaling. For instance, human mast cells respond to IL-16 treatment in a CD9-mediated pathway (Qi et al., 2005). Using several cellular and molecular biology techniques, we characterized the CD9 receptor in cerebral granule neurons. In this study we demonstrated that CD9 is present in high concentrations in cerebellar granule neurons as well as the whole brain. In addition, CD9 is highly dispersed throughout neurons and co-localization occurs with the synaptic protein PSD-95. Also CD9 is expressed in higher concentrations in neurons in comparison to CD4. Our data provides evidence to the support the hypothesis that CD9 acts as an alternative receptor of CD4 in cerebellar granule neurons. Our analysis will lay the foundation for further studies of IL-16-mediated signaling through CD9 in neurons.
SOWING THE SEEDS FOR FOOD JUSTICE: A REVIEW OF THREE URBAN FARM AND GARDEN PROGRAMS IN DENVER, CO

Traylor, Lauren

Environmental Studies Program

Food justice is a movement that addresses the racial and economic inequalities found within the food system by empowering communities to grow their own nutritious affordable food and create culturally specific foodways. Most often food justice programs have been delivered through community gardens, farms, and greenhouses in cities where many people live in food deserts, neighborhood where the population is both low income and has limited access to fresh and healthy food. In the Denver metro area there are forty-five neighborhoods that are classified as food deserts. Several non-profit organizations in Denver have sought to develop a sustainable and just food system and eliminate food deserts in the area. Three nonprofits representing the most common types of urban agriculture organizations are Denver Urban Gardens, Greenleaf, and Growhaus. I analyzed their role in supporting food justice and community impact by evaluating their growing space, educational outreach, amount of food distributed, and whether their mission statement addressed the racial and economic inequalities within the food system. I also evaluated state and national food and agriculture policies to identify barriers to and opportunities for expansion for the food justice movement. I found that Greenleaf and Growhaus supported food justice, but could only do so for a relatively small population. I found that Denver Urban Gardens was capable of producing the most food, but their mission statement lacked the recognition of the racial and economic inequalities found within the food system and thus lacked the creation of culturally specific foodways which are essential for food justice. Through the analysis of both domestic and international food and agriculture policies, I found that the creation of an Urban Agriculture Department along with other social reforms would be ideal to achieve national food justice.
KINEMATIC COMPATIBILITY ANALYSIS OF THE OURAY FAULT, SOUTHWESTERN COLORADO

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Department of Geosciences

The Ouray fault is one of the best exposed structures in southwestern Colorado. The fault has controlled geomorphic expression and drainage evolution around the town of Ouray. Although the fault has been described in publications for over half a century, no previous research documents strike-slip or curved slickenlines. There has been speculation regarding the timing of movement, and there has not been any detailed study of the fault’s kinematics. This information is important for understanding the fault’s history and the influences of faulting on other geologic events.

In this investigation, a compatibility analysis was conducted from discretely analyzed data sets of normal and dextral slickenlines on the Ouray fault to test whether these features are linked by a common deformation source, or heterogeneous deformation. Orientation measurements of the fault surface and slickenlines provided data for stereographic paleostress analyses.

The Ouray fault is defined by a N70W general strike, steep to vertical dips, 100 meters average stratigraphic separation, dominant two-mile trace bounding the northern basement extent, and splays on its east and west extents near contact with 28-26 Ma volcanic rocks. Quartz vein surfaces confine and reasonably constrain the strike-slip component to Cenozoic Laramide events or later (approximately 70-30 Ma).

The compatibility analyses suggest these features are incompatible as indicated by the orientation discrepancy between compared normal and dextral P-T axes data sets. Discretely analyzed data sets yielded averaged shortening orientations of 48,173 for normal, and 03,144 for dextral slickenlines. It is hypothesized that incompatible principal stresses acted on the fault during the latest period of major displacement, changing the shortening and lengthening directions of the fault, and consequently slip sense. Strongly curved slickenlines documented at the fault further support interpretations of slip sense change and may also suggest a single event contributed to fault failure and reactivation. The analytical and field data in this research suggest during Cenozoic time, there was a temporal and spatial slip direction change to the Ouray fault that may have contributed to the fault’s dextral slip component.
THE INFLUENCE OF GUNS ON AGGRESSIVE ATTITUDES AND BEHAVIOR

Feldhaus, Tyler; Hill, Kenzie; Burke, Brian
Department of Psychology

The purpose of this study was to investigate the influence of guns on people’s aggressive attitudes and behaviors. We used 46 students from a small liberal arts college in Durango, Colorado. They were broken into a control and an experimental group. The experimental group was shown a video of how to safely shoot a gun, and the control group was shown a video of how to make strawberry shortcake. The dependent variable was their aggressive attitudes and behaviors resulting from the video they were shown. We found that the control group said they would act more aggressively, but they showed less aggressive behavior because they gave strangers less vile hot sauce to drink in a follow-up measure. These findings did not support our hypothesis that the participants showed the gun video would have more aggressive attitudes and behaviors. This research illustrates the importance of further research on this subject, because many people assume that guns inspire violence, but this assumption cannot be made without further evidence.
ECOLOGICAL NICHE MODELING OF THE GENUS OSTRYA (BETULACEAE): PAST, PRESENT, AND FUTURE RANGE PROJECTIONS IN THE AMERICAN SOUTHWEST AND NORTHERN LATIN AMERICA

Vecchio, Lucas; McCauley, Ross A.

Department of Biology

Ostrya is a genus of generally small understory tree which exhibits a widespread distribution throughout the Arcto-Tertiary region. In North America, the distribution of Ostrya is ubiquitous throughout the extensive deciduous forest of the east. To the west, Ostrya exhibits a highly disjunct distribution throughout the desert southwest, western Texas, and northern Mexico. The genus continues its range south through the discontinuous high elevation cloud forests through Mexico south to Honduras. The disjunct distribution of Ostrya is hypothesized to be relictual, representing the remnants of a once widespread ancient deciduous forest that has been diminished by the action of continental climate shift since the last glacial period. To evaluate this hypothesis regarding past distribution we produced a set of ecological niche models using georeferenced localities of current populations and paleoclimate projections for the last interglacial (~120,000 - 140,000 years BP) and last glacial maximum (22,000 BP). We also modeled the potential for population persistence into the near future (2070) under two distinct climate projections. The potential for refugia was observed in the (current) desert southwest region of North America during the Last Glacial Maximum while northern Latin American habitats exhibited widespread habitat suitability. This pattern closely follows the current distribution of likely refugia across the American Southwest. Future models predict that potential habitat in the western U.S. may expand however these same models predict a further reduction of suitable habitat across the cloud forest regions of northern Latin America.
PROJECT ARMEISE: AN ALTITUDE/AZIMUTHAL MULTI-CAMERA MOUNT FOR HIGH ALTITUDE ATMOSPHERIC RESEARCH

Verde, Molly; Royer, Ryan; Goetz, Scott; Chamblee, Lindsay; Henry, Demetrius; Toledo, Will

Department of Physics & Engineering

Project Armeise is an engineering design project with a goal to design, fabricate, analyze, and test an affordable camera mount to be used in the research of sprites, a high altitude electrical phenomenon. Scientific research and exploration has led to the discovery of these large scale electrical discharges in the earth’s troposphere. Sprites appear during thunderstorms as reddish-orange flashes of light traveling upwards at high speeds. Recent developments in high-speed camera technology have helped scientists find evidence of the wide-ranging effects that thunderstorms can have throughout the earth’s atmosphere. Dr. Ryan Haaland of Fort Lewis College is currently conducting sprite research and is in need of a pan and tilt mount capable of holding research cameras that are used in the field. In order to reach the requirements demanded by the field research setting, this mount must be easy to set up and transport by one individual. The mount must be capable of rotation about two axes to within 0.5 degrees of accuracy and a slew rate of 15 degrees per second. An on board power supply must be wirelessly controlled via a graphical user interface for ease of use in remote locations. The variety of pan and tilt mounts currently on the market leave a gap between prohibitively expensive high end mounts and inexpensive low end mounts. This project seeks to fill the void left by the current market by creating an affordable mount designed specifically for field research.
GLYCOSYLATED MONOTERPENOIDS: MITICIDES TO PROTECT HONEY BEE COLONIES

Walker, Melanie; Wright, Lauren; Todd, Kelcy; Collins, William

Department of Chemistry

Worldwide honey bee (Apis milifera) populations are in a state of flux, and the corresponding beekeeping profession is in economic distress. An established, primary contributor to honey bee population decline is the aptly named, ectoparasitic mite: Varroa destructor. These mites both weaken bees’ immune systems by feeding on hemolymph fluid (akin to blood), and are attributed as a vector by which viruses are transmitted between beehives. Botanically derived, naturally occurring monoterpenoids such as thymol and carvacrol (constituents of oil of thyme and oil of origanum) have recently shown promise as volatile-based acaracides against the Varroa mite. Nevertheless, efficient and selective delivery of these molecules remains a challenge. This study investigated whether glycosylated monoterpenoids could be utilized as pro-drug acaracides in honey bee hives. To this end, thymol and carvacrol were synthetically glycosylated under phase-transfer catalysis reaction conditions with protected glucose derivatives. Bulk quantities of both molecules were produced after selective deprotection. Liberation of the pro-drug was accomplished utilizing the honey bee beta-glycosidase enzyme assay. Current efforts are focused on evaluating the acaracidal efficacy of these glycosylated monoterpenoids in bee colonies.
LOCUS OF CONTROL IN RELATION TO ATTITUDES TOWARD GUN LAWS

Webb, Skylyn; Cook, Meredith; Burke, Brian

Department of Psychology

The gun debate has become controversial and prominent in today’s society. This study aimed to identify characteristics that determine whether an individual is in favor of gun rights or gun control. Specifically, we wanted to identify whether an internal or external locus of control is a predictor of attitudes toward gun laws. Locus of control refers to the degree to which individuals believe they can control events in their lives. Undergraduate students (N = 70) at Fort Lewis College were administered a survey containing the locus of control scale (Rotter, 1966) and a survey assessing their stance on gun control that was developed for this study. The results indicated that individuals with an external locus of control significantly favor stricter gun laws, while those with an internal locus are more strongly in favor of gun rights. This offers valuable insight into a popular political and cultural debate, and the motivating factors for individual attitudes on the issue.
AN EXAMINATION OF ELECTRON FIELD EMISSION FROM POROUS SILICON

Wecker, Theodore

Department of Physics & Engineering

Electron field emission from a collection of porous silicon (PSi) samples was studied in this project. This project also focused on the design of anodization equipment and the production of PSi. A numerical model was made in Matlab to describe Fowler-Nordheim electron field emission from PSi emitters. Silicon wafers were etched with different current densities and etching times. Electron field emission current measurements were taken for two of the samples. Field emission was observed from one sample which was etched for 30 seconds with a current density of 30 mA/cm² and in a 49% hydrofluoric acid and ethanol solution. This sample’s current and voltage characteristics were plotted as a Fowler-Nordheim curve and were determined to be linear, which strongly indicates field emission. In ongoing work, an atomic force microscope will be used to attempt to correlate the pore size, density of pores, and thickness of the porous layer to the observed electrical properties. The results obtained will then be correlated with the Matlab model. The main goals of this research are to produce porous silicon with favorable electron field emission characteristics and to determine which samples have the best field emission properties. This provides the possibility to maximize field emission current for a given applied voltage on a sample of porous silicon. In the future, students may continue testing the parameter space that was created and may discover the conditions which are needed to maximize field emission from porous silicon emitters.
Dismemberment of human remains usually catches the attention of the media and the public. Marks left on the bones can provide clues about the methods and tools used that contribute to an understanding of the circumstances surrounding a death. The purpose of my study is to validate the use of minimum kerf width to identify saw type used on nonhuman bones, and show that it is similar to those marks made on human bone. Using nonhuman bones and three different types of saws several cuts were made and then measured. The results of this study, when compared to the other two studies (Symes 1992, Love 2010) show that mine match the Love’s study to the thousands decimal place. Symes’ study is rounded to the hundredth place. The range between all the studies is from 0.04 inches to 0.032 inches. The differences between both Love’s (2010) study and mine when compared to Symes’ (1992) study are shown in the standard deviation. My study was one thousandth smaller than Love’s study for the Hacksaws results, and one thousandth higher when measuring the width of the electric saw. The results that I got differed from Symes’ results for the hacksaw with 18 teeth per inch, and the electric saw, possibly because he rounded to the hundredth place and, in accordance with Love’s study (2010) I rounded to the thousandth. The number of cuts used in the test could also contribute to the differences in the results. Using a box and whiskers plot the end results for the minimum kerf width of each test are displayed separately, demonstrating the similarities and differences. These results support previous studies that demonstrate minimum kerf width can be used to distinguish between hacksaws and reciprocating saws. In addition they show that cow bone can be used as a proxy for human bone in experimental studies of this type.
THE EFFECTS OF MEDIA VIOLENCE ON FORT LEWIS COLLEGE STUDENTS

Yanito, Kelia ; Pioche, Shardai; Burke, Brian

Department of Psychology

We investigated whether there was a correlation between perceived media violence and aggressive behavior. Human aggression is defined as “as any behavior intended to harm another person who does not want to be harmed” (Bushman & Huesmann, 2010). The harm can be psychological or physical. Most researchers define violence as aggression that has as its goal extreme physical harm, such as injury or death (Bushman & Huesmann, 2010). A person who verbally abuses another would not be committing an act of violence by this definition. Thus, all violent acts are aggressive, but not all aggressive acts are violent - only the ones designed to cause extreme physical harm or injury are violent (Bushman & Huesmann, 2010).

151 pre-video media violence surveys, and 151 post-video response surveys were administered. The surveys were administered to Fort Lewis College students by investigators. Students filled out the pre-video media violence survey and then were shown one of two videos. The control group watched the “The Most Heartfelt & Inspiring Commercial Ever made” video, whereas the experimental group watched the “MMA Fight Videos-knockouts, takedowns, submissions” video. Both groups filled out the post-video response survey to the video they watched. We collected the surveys and analyzed the data in the SPSS system to see whether there was any correlation between the perceived media violence and aggressive behavior.

We found overall that the Heartwarming video had a more positive emotional effect than the MMA wrestling video. A two-tailed Independent t-test was conducted and found a significant change in the effect of the film clip on the participants, emotional change, and emotions felt the most. Also participants reported that the media did not influence them to want to cause harm. A limitation of our study is that we had to use a less powerful violent film clip than we had wanted due to ethics concerns. Our study shows that prosocial videos can exert powerful influences on people’s emotions.
APPENDIX
Undergraduate Research and Creative Activities
Academic Year 2015 – 2016

Department of Adventure Education

Arguello, Ariel. Evidence of Stacking in Division II Football. (Advisor: Frazer, R. Lee)

Connolly, Devin and Wantuck, Rebecca. Nature Decreases ADHD Symptoms. (Advisor: Frazer, R. Lee)


Herrick, Andrew. The Influence of New Media on Environmental Behaviors and Consciousness. (Advisor: Frazer, R. Lee)

Muniz, Jasmine and Begay, Nicholas. Yoga and Stress Reduction: Is there a Correlation? (Advisor: Frazer, R. Lee)

Pauley, David and Shaw, Eric. Multiple Intelligences Theory: Use in the Classroom. (Advisor: Frazer, R. Lee)


Randle, Holden and Wilcox, Brooks. Intrinsic Values Motivate Youth Sport Volunteers Most. (Advisor: Frazer, R. Lee)

Department of Anthropology

Beans-Polk, Chelsey. The Anthropological Transformation and its Relationship with Native American Peoples. (Advisor: Kozak, David)

Boyd, Ashley. No Justice, No Peace: Reactions to Police Brutality and Racial Profiling Against African Americans. (Advisor: Kozak, David)

Burchell, Riley N. To Be a Good Woman: Cultural Transmission of Gender Role Through Myth, Symbolism and Ceremony. (Advisor: Kozak, David)

Caraway, Cheyenne. The Effects of Industrial Textile Production and Tourism on the Peruvian Highland Weavers. (Advisor: Riggs, Charles)


Crona, Anna. *Comparing Health in Medieval and Post-Medieval London through Bioarchaeological Analysis*. (Advisor: Jenks, Kelly)


Doenges, Meghan. *Ritual of Fire: Burning Man and Rebellion*. (Kozak, David)

Glover, Kiara. *Gender and Education in Afghanistan, Iran, and Pakistan*. (Advisor: Riggs, Charles)

Gumbiner, Siena. *Birth Stories from La Plata County, Colorado*. (Advisor: Kozak, David)


Hanson-Weller, Matthew. *Attitudes of Avocational Archaeologists within the Four Corners Area Have Changed Little since the Passing of the Antiquities Act of 1906*. (Advisors: Riggs, Charles and Jenks, Kelly)


Hite, Marjorie. *The Influences of Salt Trade in West Africa: The Economic Impacts and the Spread of Islam*. (Advisor: Riggs, Charles)


Leisner, Rebecca. *The Impact of Fairtrade International within Latin American Coffee Growing Communities*. (Advisor: Kozak, David)


McWilliams, Ross. *The Effects of Islamophobic Attitudes in the West on Syrian Refugees*. (Advisor: Riggs, Charles)


One Feather, Daisa. *Powwow Songs (Wacipi Olowan) and the History and Significance of Lakota Song*. (Advisor: Kozak, David)


**Department of Art & Design**

**Graduating Senior Art & Design Majors Exhibition**

Babovec, Jill. *Tango*, copper plate, aquatint print. (Advisor: Holmquist, Tony)

Guardians, screen print. (Advisor: Martens, Andrea)

Baldwin, Raina. *Contemplation in Desolation #1*, oil on canvas. (Advisor: Colby, Chad)

*Kept Inside*, copper plate, intaglio print. (Advisor: Holmquist, Tony)


*Wagon Wheel*, digital media. (Advisor: Meek, Shawn)


Bennett-Begaye, Taylor. *Focus*, photography. (Advisor: none)

*Lamp Smash*, lamp shade, wire, digital media. (Advisor: Meek, Shawn)

Berggren, Katelyn. *Arbor Tea Packaging*, digital media. (Advisor: Booth, Paul)


Brothers, Laura. *The Miss Use of Literally*, digital media. (Advisor: Wendland, Amy)

*Tea Travel*, digital media. (Advisor: Booth, Paul)

Carpenter, Ellie. *Man in the Moon*, oil on wood. (Advisor: Colby, Chad)

Cogswell, Sasha. *Better than Instincts*, digital media. (Advisor: Booth, Paul)

*AWP Logos*, digital media. (Advisor: Booth, Paul)

Downer, Brooke. *X*, linoleum print. (Advisor: Holmquist, Tony)

*Untitled*, screen print. (Advisor: Martens, Andrea)

Downing, Grant and Ringgold, Ashli. *Surrender*, wood, fabric, metal. (Advisor: Colby, Chad)


Latta, Daisy. *Thick Thighs*, oil on canvas. (Advisor: Colby, Chad) *Run Girls Run*, oil on canvas. (Advisor: Colby, Chad)


Nikitina, Katia. *Anima*, oil on canvas. (Advisor: Colby, Chad)


Reyes, Devyn. *Dope Lines*, digital media. (Advisor: Meek, Shawn)


Shirtz, Emily. *Laughing Lab Design*, digital media. (Advisor: Booth, Paul)


Soper, Kaycie. *Flight of the World*, mixed media on paper. (Advisor: Colby, Chad) *Of All Things Loved*, mixed media on paper. (Advisor: Colby, Chad)


Van Court, Leslie. *Eye Candy*, acrylic, collage on canvas. (Advisor: none)

Ward, Kelsey. *Never to be Finished*, mixed media. (Advisor: Colby, Chad) *Abstraction #2*, mixed media. (Advisor: Colby, Chad)

**Department of Biology**


Derksen, Austin and Pratt, Amy. *Tri-Partite Complex Formation between HDAC3, Dysbindin-1 and NIL-16 and their Impact on Learning, Memory and Schizophrenia*. (Advisor: Fenster, Steven D.)

Dunlap, Kirsten and Greenler, Scott. *Investigation of Excreted miRNA as a Bacterial Inhibitor in Lucilia sericata*. (Advisor: Blake, David)

Glade, Michael and Njenga, Melba. Regulation of miR-132 Expression and Viral Entry in MRC-5 Cells via HCMV Infection and Ganciclovir Administration. (Advisor: Blake, David)


Kelley, Fallon. The Effects of Restoration Treatments on Richness, Diversity, and Abundance of Large Mammals in Southwest Colorado, USA. (Advisor: Korb, Julie E.)

Klepfer, Nicolette and Peinado, Lacey. Genetic and Morphological Analysis of an Unknown Pseudogymnoascus Fungal Species. (Advisor: Fenster, Steven D.)

Laman, Kristoffer. An Analysis of Site Characteristics for Cottonwood Restoration. (Advisor: Dott, Cynthia)

Morris, Somer. Shifts in the Structure and Composition of Riparian Vegetation in Response to Sediment Aggradation on the San Juan River. (Advisor: Dott, Cynthia)


Pope, Cacia, Riser, Ethan, and Stapleton, Tess. Characterization of a Novel Fungal Species Found on Resident Bats in Colorado; is Pseudogymnoascus destructans here? (Advisor: Lehmer, Erin M.)

Ruedin, Simone. Quantification of miRNA-148a and PPARγ in Differentiated 3T3-L1 Cells. (Advisor: Blake, David)

Schumacher, Kate. Mycoremediation of Herbicide Residues with Oyster Mushrooms, Pleurotus ostreatus. (Advisor: Heidi Steltzer)

Scott, Kelsey. A Comparison of Riparian Bird Habitats Above and Below the McPhee Dam on the Dolores River in Southwestern Colorado. (Advisor: Dott, Cynthia)

Taylor, Cierra. Comparison of Mycological Communities on Mexican Free-tailed Bats (Tadarida brasiliensis mexicana) Based on Incubation Temperature. (Advisor: Lehmer, Erin M.)

Veenis, Sierra. Analysis of Tributary Conditions Affected by a Diversion Dam Structure Based on Abundance in Aquatic Macro-Invertebrate Communities. (Advisor: Dott, Cynthia)

Wall, Hollie and Dean, Alex. Characterization of miR-146a and miR-26a Expression with Metformin Treatment in Breast Cancer Cells. (Advisor: Blake, David)

Woodruff, Dustin. Beetle-Kill in Headwater Streams: Impacts on Aquatic Macroinvertebrate Community Structure. (Advisor: Dott, Cynthia)

Woodruff, Kallie. Heavy Metals in a Reservoir Environment and their Bioaccumulation through a Food Chain. (Advisor: Heidi Steltzer)

Yepa, Brianna. *Air Quality Comparison between Durango, CO and Shiprock, NM in Summer of 2015.* (Advisor: Heidi Steltzer)

**Department of Chemistry**

Askland, Gracie. *Lack of Functional Dystrophin Leads to Muscular Dystrophy.* (Advisor: Miller, Kenneth)

Baldwin, Darrwyn. *Cobalt (III) Schiff Base Complexes as Prodrugs for Inhibition of Zinc Finger Transcription Factors: A Halt in Tumor Metastasis.* (Advisor: Miller, Kenneth)


Charley, Kelsey. *Mitochondrial Neurogastrointestinal Encephalomyopathy (MNGIE), a Mitochondrial Disease Caused by Lack of Thymidine Phosphorylase (TP) Activity.* (Advisor: Miller, Kenneth)

Chavez, Marlyn. *The Influence of Cellular TP53 Mutation on the Metabolic Activation of Carcinogenic Polycyclic Aromatic Hydrocarbons.* (Advisor: Miller, Kenneth)

Doeren, Ryan. *The Development of a Nanosecond Pulsed Ultraviolet Light Emitting Diode (LED) Source for Fluorescent Lifetime Measurements.* (Advisor: Estler, Ron)

Drozda-Samuels, Fionna. *The Coupling of Chemical Analysis and Archeology Leads to New and Interesting Insights into Populations of the Past.* (Advisor: Miller, Kenneth)

D'Spain, Tyler. *Zirconium Dioxide Sorbents for Dispersive Solid Phase Extraction.* (Advisor: Miller, Kenneth)

Hemerda, Carsyn. *Mitsugimin 53’s Impact on Metabolic Syndrome.* (Advisor: Miller, Kenneth)


Marshall, Checkers. *From Alkynes to Indoles: Gold Yneophiles in Natural Product Synthesis.* (Advisor: Miller, Kenneth)

Primmer, Austin. *Bacteriophytochromes and their Role as Biomarkers*. (Advisor: Miller, Kenneth)

Rios, Jeovanna. *Importance of Metabolite Structure and Composition on Taste Responses*. (Advisor: Miller, Kenneth)

Smith, Andrew. *An Exploratory Look at the Chemistry of Exoplanets*. (Advisor: Miller, Kenneth)


Wright, Lauren. *Silicon based Quantum Dot Solar Cells*. (Advisor: Miller, Kenneth)


**Department of English**


Atkins, Deanna. *‘This . . . This Is Our Land!’: An Ecocritical Analysis of James Cameron’s Avatar*. (Advisor: Fullmer, Shawn)


Eversole, Tiona. *Dam It All: The Rise of Hydroelectric Dams in the United States and Why They Must Fall*. (Advisor: Cheesewright, Gordon)


Griego, JaMaurie. *Dam It!: An Ecocritical Analysis of Governmental Reels and DamNation*. (Advisor: Fullmer, Shawn)

Harvey, Soshina. *‘Mountain, Help My Heart Be Great’: An EcoNative American Understanding of Peter Pan, Pocahontas, and Brother Bear*. (Advisor: Fullmer, Shawn)

Hassinger, Nicolas. *‘I’ll Huff and I’ll Puff’: An Ecocritical Analysis of Representations of Wolves in Fairy Tales, Literature, and Popular Films*. (Advisor: Fullmer, Shawn)

Ogborn, Trevor. Ethical Dilemmas in Photojournalism. (Advisor: Cheesewright, Gordon)

Prins, Meagan. An Ecocritical Reading of Blood Diamonds and Blood and Earth. (Advisor: Fullmer, Shawn)


Solomon, Carter. Love Thy Neighbor: An Examination of War Porn. (Advisor: Cheesewright, Gordon)

Taliman, JayDiamond. The Flat Out Truth: An Ecocritical Analysis of the Flat Earth Theory. (Advisor: Fullmer, Shawn)

Volzke, Julia. ‘You Fill up my Senses, Like a Night in the Forest’: Environmental Movements within Popular Music. (Advisor: Fullmer, Shawn)

Von Fay, Emilie. An Ecocritical Analysis of the Relationship of Wolves and Moose on Isle Royale. (Advisor: Fullmer, Shawn)


Environmental Studies Program


Allen, Sam. The Ideological Roots of Environmental Destruction. (Advisor: Concilio, Amy)


Anton, Cameron. Is the Animas La Plata Project an Effective and Appropriate Use of Resources for the Ute Tribes of Colorado? (Advisor: Austin, Rebecca)

Bachrodt, Maggi. An Index for Riparian-Riverine Ecosystem Integrity and Resilience. (Advisors: Austin, Rebecca; Dott, Cynthia; Gianniny, Gary)

Begay, Amador. Human Adaptability, Environmental Biota, and Displacement from the Effects of Climate Change. (Advisor: Austin, Rebecca)

Begay, Marquel. Tó éí liná (Water is Life): The Environmental and Social Impacts of Groundwater Mining from the Navajo-Aquifer in Black Mesa, Arizona. (Advisor: McCormick, Pete)

Cooper, Steven. Climate-Driven Conflict: The Rise of Extremist Regimes in the Fertile Crescent. (Advisor: Concilio, Amy)

Derke, Sierra. Sustainable Generations: The Influence of Elementary Environmental Education. (Advisor: McCormick, Pete)

Flickner, Riley. Analysis of U.S. Food Waste Management Systems: Alternatives to Composting. (Advisor: Austin, Rebecca)

Gosney, Tori. Environmental Stressors: The Effects of Ambient Noise on Child Development in Rural and Urban Environments. (Advisor: Concilio, Amy)


Lagasca, Tate. Radicals: Does the Environmental Movement Need Them? (Advisor: Austin, Rebecca)


Mike-Bidtah, Jody. Navajo Students’ Perspectives on Tribal Food Systems and Sovereignty. (Advisor: Concilio, Amy)


Olbrich, Sarah. The Effects of Colony Collapse Disorder on Western Honeybee Populations. (Advisor: McCormick, Pete)

Pearson, Josi A. Holy Cow: A Comparative Cultural Analysis of the Uses and Value of Cattle in the United States and India. (Advisor: Austin, Rebecca)

Penasa, Russel. Not My Dirt, Not My Problem: The Effects of Persistent Herbicide Carry-over on Non-Conventional Farms in La Plata County. (Advisor: Concilio, Amy)


Ridener, Chris. *Is Holistic Land Management a Suitable Land Management Practice for the United States?* (Advisor: McCormick, Pete)


Steel, Andrew. *The Reintroduction of the Grizzly to the Selway-Bitterroot Region: Through a Conservation Biology and Environmental Politics Perspective.* (Advisor: Austin, Rebecca)

Stone, Peter. *An Assessment of the Plausibility and Social Acceptability of Wolf reintroduction in the Weminuche Wilderness area of Colorado.* (Advisor: McCormick, Pete)

Traylor, Lauren. *An Analysis of Food Justice Programs in Denver, Colorado.* (Advisor: Concilio, Amy)


Walters, Emily. *Perspectives on Environmentalism: Comparing Opinions between the Great Old Broads for Wilderness and the Colorado Department of Transportation.* (Advisor: Austin, Rebecca)

Wolman, Seneca. *Historical Mining in the Animas River Basin and Impacts of the Gold King Mine Spill on Risk Perception: Does it take a Spill?* (Advisor: Austin, Rebecca)

**Department of Exercise Science**

Bayes, Kathryn. *Coaching Philosophies of Coaches of Men's Teams vs. Coaches of Women's Teams.* (Advisors: Houghton, Emily and Simbeck, Cathy)

Becker, Yannis, Carter, Christopher and Waalani-Arroyo, Kaulana. *Social Media Use in NCAA Division III Athletic Departments.* (Advisor: Houghton, Emily)

Begay, Toby & Brown, Cynthia. *Gait Changes on Varied Terrain.* (Advisors: Houghton, Emily and Thompson, Missy)

Bhotia, Kenjok. *Comparison of Traditional Modalities and Chiropractic Care for the Treatment of ADHD.* (Advisors: Houghton, Emily and Thompson, Missy)

Blackwell, Hannah. *The Correlation between Personal Training Certifications and Injuries at Fitness Centers.* (Advisor: Simbeck, Cathy)

Claussen, Sean, Daily, Nicholas and Kloster, Cade. *The Role of Plantar Cutaneous Sensory Feedback in Joint Position Sense and Balance.* (Advisor: Thompson, Missy)


Edsall, Spencer & Horton, Rachel. *Motivational Factors of Residential Summer Camp Staff.* (Advisor: Houghton, Emily)


Finstad, Amanda, Rhea, Casey & Swingle, Grayson. *An Analysis of Wilderness First Responder Self-Efficacy.* (Advisor: Houghton, Emily)


Hoover, Kayla. *The Effects of Tart Cherry Juice on Delayed Onset Muscle Soreness.* (Advisor: Simbeck, Cathy)


Jones, Tyler. *Proprioceptive Neuromuscular Facilitation Compared To Dynamic Stretching In College Football Athletes.* (Advisor: Simbeck, Cathy)


Krizo, Jenna and Torres, Magaly. *Stress Related Factors with ATCs and ATSs in Accredited Programs.* (Advisor: Meyer, Carrie)

Long, Casey, Ryan, Brynn and Smith, Samuel. *Effects of Reduced Stride Length on Impact Accelerations in Downhill Running.* (Advisor: Thompson, Missy)

Maes, Josh & Marks, Robert. *College Athletes’ Perceptions of Care Quality based on Gender or Race.* (Advisor: Meyer, Carrie)

Milliet, Brooke, Mitchell, Natalie and Reed, Jess. *Metabolic Differences in Graded Walking vs. Ungraded Running.* (Advisors: Houghton, Emily & Rhodes, Gregory)
Poole, Thomas G. *Tension Releasing Exercises Reduce Perceived Stress in College Students* (Advisors: Simbeck, Cathy & Frazer, Lee)

Raica, Kiley & Wells, Ashley. *The Effects of Different Energy Sources on Performance in the Multistage Fitness Test.* (Advisors: Simbeck, Cathy & Rhodes, Greg)

Rambo, Mary. *The Effect of the Medical Model vs. the Athletic Model on Coach Satisfaction of Athletic Trainers.* (Advisor: Meyer, Carrie)


Starbuck, Mariah, Teaman, Stephanie, Short, Craig and Steffens, Matt. *The Role of Deep Pressure Sensory Feedback during Gait.* (Advisor: Thompson, Missy)

Standish, Ryan, Gomez Villafane, Sofia & Meeker, Troy. *Validation of PerfectPhorm: A Motion Analysis Study.* (Advisor: Thompson, Missy)

Stoddard, Kayla. *The Effects of Exercise on Body Image in Freshmen Collegiate Women.* (Advisor: Simbeck, Cathy)

Wirebaugh, Robert. *The Effects of Static and Dynamic Stretching on Maximum Leg Strength in College Soccer Players.* (Advisor: Simbeck, Cathy)

Wolfe, Travis. *Gross Motor Skill Intervention.* (Advisor: Simbeck, Cathy)

**Department of Geosciences**

Coppage, Ethan. *An Investigation of the Petrology and Geochemistry of the Specie Mesa Basalt, San Miguel County, Colorado.* (Advisor: Gonzales, David)


Frank, Dominick. *Analysis and Interpretation of Offshore Hazards in Arctic Waters of Alaska.* (Advisors: Kenny, Ray and Gianniny, Gary)

Frey, Laura. *The West Salt Creek Landslide, Grand Mesa, Colorado: A Literature Review and an Assessment of the Use of GIS to Map and Model the Landslide.* (Advisor: Kenny, Ray)

Gilbert, Adam. *Overview and Insight of the Geologic Features and History of Lone Cone Peak, Southwest Colorado.* (Advisor: Gonzales, David)


Huels, Matthew. *Nature of the Tocito Sands in the Southeastern Areas of the San Juan Basin, New Mexico.* (Advisor: Gianniny, Gary)

Jiang, Matthew. *South Fork Texas Creek Gas Seep Area Subsurface Analysis.* (Advisor: Hannula, Kim)

Juett, Miles. *A Literature Review on Highwall Stability, Monitoring Instrumentation, and Mitigating Controls Including a Case Study of the Portal Highwall at San Juan Min, Waterflow, NM.* (Advisor: Hannula, Kim)

Kinney, Rachel. *Investigation of Possible Periglacial Involution Structures in Mesa Verde National Park in Southwest Colorado.* (Advisor: Kenny, Ray)


Lybrook, Jacob. *A Review of the Geology and Updated U-Pb Zircon Age in the Red Mountain Mining District.* (Advisor: Gonzales, David)

Martinez, Rick. *Investigation of the Paleocene Ojo Alamo Sandstone Aquifer, San Juan Basin, New Mexico and Colorado, as an Analog to Predict Fluid Flow within Siliciclastic Depositional Formations.* (Advisor: Gianniny, Gary)


Mudge, Joshua. *Age, Petrology, and Clast Analysis of Volcanic Detritus in the Telluride Conglomerate, Southwestern Colorado.* (Advisor: Gonzales, David)


Parker, Adam. *Influence of Grain Texture and Composition on Depositional Porosity.* (Advisor: Gianniny, Gary)

Poisson, Kyle. *Roll-Front Deposits and the Process of Inherently Safe In-Situ Recovery of Uranium.* (Advisor: Kenny, Ray)

Routh, Derek. *A Comparison of Laramide Igneous Plutonic Complexes in Southwestern, Colorado (Ouray, Rico, and La Plata Mountains).* (Advisor: Gonzales, David)


Toczek, Emily. *Groundwater Dynamics of the Animas River Valley, located at the Oxbow Preserve, Durango, Colorado.* (Advisor: Gianniny, Gary)


Whidden, Brittain. *An Overview of Red Beryl Crystallization in Topaz Rhyolites in the Ruby Violet Claim, Beaver County, Utah.* (Advisor: Gonzales, David)

Department of History


Smith, Lynnea. *Patriarchal Systems from Western Influences Redefine Navajo Maternalism from the 1920s to the 1960s.* (Advisor: Paul, Ellen L.)


Thiele, Richard. *Nazi Germany’s War Goals and Resistance within the Wehrmacht.* (Advisor: Paul, Ellen L.)

Thues, Greg. *Forging the West: The Historical Scope and Nature of the San Juan Mountain Blacksmiths, 1880-1930.* (Advisor: Gulliford, Andrew J.)


Honors Program

Amidon, Anna. *Forgotten Fruit: Reexamining Durango’s Public Spaces.* (Advisors: Clausen, Rebecca and Dott, Cynthia)

Ratko, Kathryn. *The Cow that Died to be her Date: Objectification, Fragmentation, and Consumption of Women in Advertisements.* (Advisors: Houghton, Emily and Malach, Michele)

**Department of Mathematics**

Conte, Sean and Smith, Eric. *Comparing Wavelet Techniques for Content Based Image Retrieval.* (Advisor: Furst, Veronika)


**Department of Modern Languages**

Glade, Michael. *La veracidad de los detalles históricos presentados en Soldados de Salamina.* (Advisor: Sellin, Amy)

Herrera, José (Tony). *La historia de los homosexuales en España durante y después de Franco.* (Advisor: Sellin, Amy)

Judge, Kate. *Desafíos contra las expectativas genéricas en el cuento “En los parques, al anochecer” por Marina Mayoral.* (Advisor: Sellin, Amy)

Landry, Grace. *Dulce Chacón: Llenar el silencio con la historia.* (Advisor: Sellin, Amy)

Peterson, Kelsey. *La voz dormida por Dulce Chacón y el mercado literario emergente y globalizado en la España postfranquista.* (Advisor: Sellin, Amy)

Work, Alexis. *El hombre vestido de negro y el proceso de rememoración en El cuarto de atrás.* (Advisor: Sellin, Amy)

**Native American & Indigenous Studies Program**


Shelly-Becenti, Larraine. *The Indian Wars Have Not Ended: Settler Colonialism, Stereotypes, and Bordertown Violence in Gallup, New Mexico.* (Advisor: Boxer, Majel)

Joseph, Shalene. *Healing Historical Trauma through Native Youth Leadership.* (Advisor: Boxer, Majel)


Trujillo, Arcenio. Native American Resilience in Education. (Advisor: Boxer, Majel)


Yanito, Kelia. Mental Health and Native Americans. (Advisor: Boxer, Majel)

Department of Philosophy

Allen, Sam. Justified Coercion, Anarchy, and Rawls. (Advisor: Roberts-Cady, Sarah)


Conte, Sean. Recognizing Moral Public Reasons. (Advisor: Roberts-Cady, Sarah)


Gaffney, Caitlin. Gender Equality and the State: Addressing the Gender Crisis in the Family. (Advisor: Roberts-Cady, Sarah)

Galvin, Morgan. Defending and Expanding the Neo-Rawlsian Contract. (Advisor: Roberts-Cady, Sarah)

Granzow, Matthew. An Objection to the Original Position. (Advisor: Roberts-Cady, Sarah)

Gruszka, David. Are Economic Liberties Basic Liberties? (Advisor: Roberts-Cady, Sarah)

Kinder, Ben. John Rawls and Justice for Non-Human Animals. (Advisor: Roberts-Cady, Sarah)

Moore, Zackary. Reflective Equilibrium: The Best We’ve Got. (Advisor: Roberts-Cady, Sarah)

Payne, Clinton. Rejecting Autonomy from the Original Position. (Advisor: Roberts-Cady, Sarah)

Shepherd, Adriana. Gender Equality within the Workforce. (Advisor: Roberts-Cady, Sarah)
Sill, Rachel. *Framing Prostitution as Legal and Legitimate Labor*. (Advisor: Roberts-Cady, Sarah)

Taylor, Colin. *Every Animal is to have Justice*. (Advisor: Roberts-Cady, Sarah)

**Department of Physics and Engineering**


Bogust, Pam, Bruce, Dillon, Carlson, Nick, Hespe, Michael. *Development of an SAE Baja Racecar*. (Advisor: Leahy, Devin)

Cazier, Donovan. *Isolation of Sources of Ethane Emissions with the use of Back Trajectories*. (Advisor: Palmer, Randy)

Mullin, Elinor. *Confirming Exoplanets using the Fort Lewis Observatory*. (Advvisors: Hakes, Charles and Palmer, Randy)

Murray, Gabriel. *Modeling and Characterizing Porous Silicon Reflectance*. (Advvisors: Crawford, Jerry; Jessings, Jeff; Palmer, Randy)

Seaney, Cassie, Kleinert, Matt, Hensler, Ian, Emerson, Samuel, Garcia, Noah, Bixenmann, Michael, Salcido, Kody. *Sustainable House for Engagement and Discovery (SHED)*. (Advisor: Williams, Laurie)


Wecker, Theodore. *An Examination of Electron Field Emission from Porous Silicon Emitters*. (Advvisors: Crawford, Jerry; Jessings, Jeff; Palmer, Randy)

**Department of Political Science**

Agens, Trey. *Term Limits and Executive Legitimacy*. (Advisor: Dichio, Michael)

Alawi, Maram Ashe. *Invisible Dominoes*. (Advisor: Dichio, Michael)


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Robinson, Jacob. *Systemic Conflict and Polarization.* (Advisor: Dichio, Michael)

**Department of Psychology**

Casey, Joseph. *The Effect of Gender Diversity on Creative Harmonic Expression.* (Advisor: Kraus, Sue)

Casey, Joseph. *Music Tonality and Mindfulness.* (Advisor: Anziano, Michael)

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McCormick, Meredith. Equine Motor and Emotional Lateralization. (Advisors: Dorr, Betty and Anziano, Michael)

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Perry, Anne and Allen, Jessica. Cognitive Reasoning and Numeracy in Gun Control Decisions. (Advisor: Burke, Brian)

Pioche, Shardai and Yanito, Kelia. Effect of Media Violence on Aggression. (Advisor: Burke, Brian)

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Thornhill, Sara and Armstrong, Chad. Predictors of College Students’ Knowledge of Gun Control Laws and Statistics. (Advisor: Burke, Brian)

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Webb, Skylyn and Cook, Meredith. Locus of Control and Life Orientation in Relation to Attitudes toward Gun Laws. (Advisor: Burke, Brian)

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Department of Theatre

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DeVore, Brianna. Frank Wedekind Then and Now: Creating SPRING AWAKENING. (Advisor: Ginny A. Davis)


Libouban-Gundersen, Camille. Cassandra in a World of Despair. (Advisor: Ginny A. Davis)

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