<table>
<thead>
<tr>
<th>Time</th>
<th>Event</th>
<th>Location</th>
</tr>
</thead>
<tbody>
<tr>
<td>12:30-5:15 pm</td>
<td>Oral Presentations (Student Union Building, Vallecito Room)</td>
<td></td>
</tr>
<tr>
<td>1:30-4:45 pm</td>
<td>Performances and Oral Presentations (Jones Hall, Roshong Recital Hall)</td>
<td></td>
</tr>
<tr>
<td>6:00-7:30 pm</td>
<td>Poster Presentations (Student Union Building, Ballroom)</td>
<td></td>
</tr>
<tr>
<td>6:00-7:30 pm</td>
<td>Reception (Student Union Building, Ballroom)</td>
<td></td>
</tr>
</tbody>
</table>
2014 Undergraduate Research and Creative Activities
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 2014. We already have many fine FLC students represented in Metamorphosis. You can see our website at 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 email to Michael Martin (martin_m@fortlewis.edu) by September 30, 2014 (or your can send it now). 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, please email martin_m@fortlewis.edu for submission guidelines.
<table>
<thead>
<tr>
<th>Time</th>
<th>Presenter/Co-Presenter(s)</th>
<th>Title</th>
<th>Department</th>
</tr>
</thead>
<tbody>
<tr>
<td>12:30</td>
<td>Howard Grotts and Risa N. Pearson</td>
<td>Applications of Fourier Analysis and Permutation Representations on Ranked Datasets.</td>
<td>Mathematics</td>
</tr>
<tr>
<td>12:45</td>
<td>Justin Myers</td>
<td>Assessment of Picket Use and Standard Operating Procedures in a Continental Snowpack.</td>
<td>Adventure Education</td>
</tr>
<tr>
<td>1:00</td>
<td>Christopher L. Leach</td>
<td>Investigation of the Mineral Assemblages and History of Skarn at Diorite Peak, La Plata Mountains, Colorado.</td>
<td>Geosciences</td>
</tr>
<tr>
<td>1:15</td>
<td>Baley Springmeyer</td>
<td>Factors Relating to the National Curation Crisis: A View from Fort Lewis College.</td>
<td>Anthropology</td>
</tr>
<tr>
<td>1:30</td>
<td>Jessica Dudash</td>
<td>A Cat, a Fish, and a Flower: Endangered Species and Urban Development.</td>
<td>Environmental Studies</td>
</tr>
<tr>
<td>1:45</td>
<td>Joshua McDowell</td>
<td>The Effects of Pulmonary Hypertension on Athlete Performance in Cyclists at High Altitude.</td>
<td>Exercise Science</td>
</tr>
<tr>
<td>2:00</td>
<td>Ashlee Robison</td>
<td>Synthesis of Glycosylated Essential Oils: Potential Protective Agents for Honey Bees.</td>
<td>Chemistry</td>
</tr>
<tr>
<td>2:30</td>
<td></td>
<td>Break</td>
<td></td>
</tr>
<tr>
<td>3:00</td>
<td>Caitlyn M. Reese</td>
<td>Overexpression of the Klotho Protein in Human Epithelial Lung Cells and the Effect on AKT and p38 MAPK Concentrations in the IGF-1 Signaling Pathway: Investigating the Mechanisms of COPD.</td>
<td>Biology</td>
</tr>
<tr>
<td>3:15</td>
<td>Hannah Watts</td>
<td>Feminists in the Bloggernacle: How the Internet is Changing the Way Mormon Women Talk About Themselves.</td>
<td>Anthropology</td>
</tr>
<tr>
<td>3:45</td>
<td>Amanda Raso</td>
<td>Terror Management Theory’s Effect on Athletic Performance.</td>
<td>Psychology</td>
</tr>
<tr>
<td>4:00</td>
<td>Thomas Miszkiel</td>
<td>Investigating the Source of Copper in the La Plata Mountains using Copper Isotopes.</td>
<td>Geosciences</td>
</tr>
</tbody>
</table>
4:15 Amanda Broad, Determining the Secondary Structure of the HTLV pro-pol Frameshift Site Using SHAPE Chemical Probing. Chemistry


4:45 Shane Brooks, Design of a Fluid Level Indicator for Hazardous, High Temperature Liquids. Physics and Engineering

5:00 Hunter Mallinger. Food Waste Co-Digestion: The Potential Benefits of Utilizing Existing Infrastructure at Durango Wastewater Treatment Facility. Environmental Studies
Oral Presentations and Performances  
Arts, Humanities, and Social Sciences  
Thursday, April 24, 2014  
Fort Lewis College, Jones Hall, Roshong Recital Hall

1:30 Cooper Travis. *Blade* by Benjamin T. Finley (multiple percussion) Music

1:40 Kyle Hollerbach. *Spanish Dance* by Kai Stensgaard (marimba). Music

1:50 Adam Swanson. *Scherzo No. 3 in C-Sharp Minor, Op. 39* by Frederic Chopin (piano) Music

2:00 David Alkire. *Largo al Factotum from Il Barbiere di Siviglia* by Gioachino Rossini (vocal). Music

2:15 Christina N. Kinslow. *Reed Library’s Art in the Library Student Art Competition: Nesting.* Art & Design

2:30 Lindsay Macdonald. *What do Picasso, Stage Lights and Color have in Common?* Theatre


3:00 Caleb Ontiveros. *Nonhuman Animals and Political Philosophy.* Philosophy

3:15 Break

3:30 Hari Baumbach. *Web Design and the Creative Process.* Art & Design

3:45 Kelly Avant. “I love giving head. Simple. As. That.”: *How College Hook-up Culture Challenges and Upholds Oppressive Ideologies of Gender and Sexuality.* Gender and Women’s Studies

4:00 Kaley Carmichael. *The Morality of Factory Farming.* Philosophy


4:30 Dakotah Watson. *Bully Experiences.* Theatre
<table>
<thead>
<tr>
<th>Poster Presentations</th>
<th>Thursday, April 24, 2014</th>
<th>6:00-7:30 pm</th>
<th>Fort Lewis College, Student Union Ballroom</th>
</tr>
</thead>
<tbody>
<tr>
<td>B-1</td>
<td>Clark, Casey; Lehmer, Erin M.; Simbeck, Cathy. <em>Can Spending Time in the Outdoors Reduce Stress?</em></td>
<td></td>
<td></td>
</tr>
<tr>
<td>B-2</td>
<td>Adams, Kimberly L. J. <em>Preserving the York Minster Cultural Heritage Site: An In Depth Look at the Complex Issues that are Threatening to Undermine Historical Preservation in York, England Today.</em></td>
<td></td>
<td></td>
</tr>
<tr>
<td>B-3</td>
<td>Austin, Rita. <em>The Sum of Their Parts: Assessing Drifting and Double Zonal Osteons within Medieval Kulubnarti, Nubia.</em></td>
<td></td>
<td></td>
</tr>
<tr>
<td>B-5</td>
<td>Strawn, David M. <em>Experimental Gardening for Insight to Ancestral Puebloan Life.</em></td>
<td></td>
<td></td>
</tr>
<tr>
<td>B-6</td>
<td>Hattman, Emma. <em>Investigating Simvastatin as a Treatment for Polycystic Ovary Syndrome.</em></td>
<td></td>
<td></td>
</tr>
<tr>
<td>B-7</td>
<td>Quimby, Parker; Penry, Garrett. <em>The Role of Inflammatory Signaling Mediated Through NF-κB in Metformin Induced Apoptosis of MCF-7 Cells.</em></td>
<td></td>
<td></td>
</tr>
<tr>
<td>B-8</td>
<td>Rodgers, Jacob; Miller, Mason; Lavengood, Kathryn; Lehmer, Erin M. <em>Implications of Chronic Hantavirus Infection on the Immune System Function of Wild Deer Mice (Peromyscus maniculatus).</em></td>
<td></td>
<td></td>
</tr>
<tr>
<td>B-9</td>
<td>Walters, Drew; McCauley, Ross A.; Havran, J. Christopher. <em>Phylogeny and Evolutionary Distribution Patterns in the Endemic Hawaiian Genus Charpentiera (Amaranthaceae).</em></td>
<td></td>
<td></td>
</tr>
<tr>
<td>B-10</td>
<td>Wampler, Matthew; Korb, Dr. Julie. <em>Ground-dwelling Arthropod Community Diversity in Populus tremuloides Stands Affected by Sudden Aspen Decline in Southwestern Colorado, USA.</em></td>
<td></td>
<td></td>
</tr>
<tr>
<td>B-11</td>
<td>Atene, Antonia; Dayish, Kolette; Warriner, Marcus; Yeager, Daniel; Mouzakis, Kathryn. <em>Determining the Secondary Structure of HTLV-1 pro-pol Frameshift Siten using NMR and Native Gel Analysis.</em></td>
<td></td>
<td></td>
</tr>
<tr>
<td>B-12</td>
<td>Davis, Summer; Greyeyes, Shawn; Knewitz, Allison; Stelmaszek, Jordan; Mouzakis, Kathryn. <em>Does Pseudoknot Formation Play a Role in HTLV-1 pro-pol Frameshift Efficiency?</em></td>
<td></td>
<td></td>
</tr>
<tr>
<td>B-13</td>
<td>Garcia, Mario; Hart, Kaila F.; Joe, Natalie; Nopah, Matthew; Padilla, Thomas; Morris, Aimee M.</td>
<td>Synthesis and Characterization of Cobalt(III) Complexes with Nitrogen-Containing Heterocyclic Ligands as Possible Anti-Cancer Pro-Drugs.</td>
<td>Chemistry</td>
</tr>
<tr>
<td>B-14</td>
<td>Lake, Melvina; Lee, Audrianna; Mancha, Serena; Mouzakis, Kathryn.</td>
<td>The Effects of Local and Global RNA Stability on Frameshift Efficiency in the HTLV-II gag-pro Frameshift Site.</td>
<td>Chemistry</td>
</tr>
<tr>
<td>B-15</td>
<td>Reese, Caitlyn; Askeland, Gracie; Caldera, Hector; Chavez, Marlyn; Baldwin, Raina; Miller, Kenneth A.</td>
<td>Preparation of Drugs to Selectively Kill Cancer Cells.</td>
<td>Chemistry</td>
</tr>
<tr>
<td>B-16</td>
<td>Brown, Kimberlie J.</td>
<td>A Bright Future: Feasible Solar Energy for Fort Lewis College.</td>
<td>Environmental Studies</td>
</tr>
<tr>
<td>B-17</td>
<td>Kiklis, Beau.</td>
<td>Acequia and Pueblo Water Rights Adjudications In Northern New Mexico: Legal Inadequacies and the Benefits of Negotiation.</td>
<td>Environmental Studies</td>
</tr>
<tr>
<td>B-18</td>
<td>Kirks, Max.</td>
<td>Room to Grow: Improving Farmer Livelihoods through Increased Quinoa Production in Colorado.</td>
<td>Environmental Studies</td>
</tr>
<tr>
<td>B-21</td>
<td>Davis, Javis; Kenny , Ray.</td>
<td>Fire History of the Turkey Spring Watershed: Fort Apache Reservation, AZ.</td>
<td>Geosciences</td>
</tr>
<tr>
<td>B-22</td>
<td>Dias, Shirleen.</td>
<td>Hydrothermal Dolomitization of Mississippian Leadville Limestone, Southwest Colorado: A Literature Review.</td>
<td>Geosciences</td>
</tr>
<tr>
<td>B-23</td>
<td>Kuhn, Kiefer; Gianniny, Dr. Gary L..</td>
<td>Reservoir-Scale Sequence Stratigraphy and Facies Variation Within the Mississippian Leadville Limestone, Southwestern San Juan Mountains, Colorado.</td>
<td>Geosciences</td>
</tr>
<tr>
<td>B-24</td>
<td>Kunz, Brody J.; Gianniny, Dr. Gary L..</td>
<td>Characteristics of Cretaceous Tidal Rhythmites in the Menefee Formation; Durango, CO.</td>
<td>Geosciences</td>
</tr>
<tr>
<td>B-26</td>
<td>Holland-Gray, Heidi; Starbuck, Hannah.</td>
<td>The Shapes of Numerical Ranges of Matrices.</td>
<td>Mathematics</td>
</tr>
<tr>
<td>B-27</td>
<td>Thorne, Taylor.</td>
<td>An Analysis of Attainable Patterns in Alien Tiles.</td>
<td>Mathematics</td>
</tr>
</tbody>
</table>
B-28 Hullinger, Luke; Bock, Kevin; Watkins, Scott; O'Malley, Steven; Shafer, Brendan. *The Design of a Helmet Impact Tester*. Physics and Engineering

B-29 Hurcomb, Wesley. *Supernovae Classification by the Observation of Light Curves*. Physics and Engineering


B-31 Ogle, Jonathan; Naglak, John; Blue-Eyes, Isaac; Miller, Collin; Baumbach, Aleph; Prentis, Peter; Smith, York R.; Smith, Ryan N. *Design and Development of a Sampling Platform to Study Long Distance Seed Dispersal*. Physics and Engineering


B-33 Cunningham, Taylor. *The Effect of Exposure on Perceptions of Adolescent Self Harm*. Psychology


B-35 Loera, Sandra. *Lower Levels of Depression in Self-Compassionate Individuals in U.S. and Mexican Populations*. Psychology

B-36 Mears, Taylor. *TMT in the Court Room*. Psychology

B-37 Rogers, Rachel; Sears, Sharon. *Immediate Effects of the Emotional Freedom Technique or “Tapping” on Stress Symptoms*. Psychology


B-39 Coggins, Jennie; Wasserman, Robert. *School Climate and Relational Bullying: Effecting Student Behavior Through a Restorative Justice Model*. Sociology

B-40 James, Anthony. *The Rape of Women and Men’s Violence*. Sociology

B-41 Smith, Matthew. *Bullies Beware; Benefits of the Boys and Girls Club*. Sociology

B-42 Speas, Caleb. *Our Capitalist Society Makes Mentoring Necessary*. Sociology

B-43 Myers, Christine; Emmons, Nichlas; Austin, Rebecca. *The Political Ecology of Cultural Revitalization: A Tribal Economic Policy Analysis for Outdoor Recreation & Ecological Restoration*. Student Constructed Major
In recent years, heritage sites all over the world have come under threat of destruction. From Afghanistan’s Bamiyan Buddhas to Cornwall’s 15th-century church, St. Stephen-by-Saltash, few heritage sites seem to be immune to the turmoil of our world. As a result of this sad fact, communities worldwide are facing the loss of cultural history brought about by the destruction of sites that have united them for years behind a shared sense of pride, identity, and belonging. My research focuses on one such threatened site, York Minster, a Norman age gothic cathedral located in York, England, that is suffering everything from acid rain erosion of its limestone structure to severe cuts to the funding for restoration. To prevent further deterioration of this site, local citizens have, ironically, been forced to resort to “salvage” methods that may be even more destructive than the passage of time. For example, a fundraiser called the York Minster Stone Auction recently took place, where original stones from the Minster were sold in order to raise money for preservation efforts. In order to understand why such desperate measures have been taken, I examine through library research, online consultation of websites, and email queries placed to museum personnel, various causes behind the negative preservation environment that is plaguing York Minster, ranging from the global and the national to the very local. By focusing on York Minster I hope to not only reach a better understanding regarding the factors negatively affecting that iconic site, but also to provide a resource for those who wish to help prevent the destruction of other heritage sites around the world.
LARGO AL FACTOTUM FROM IL BARBIERE DI SIVIGLIA BY GIOACHINO ROSSINO

Alkire, David P; Turner, Veronica

Department of Music
Alkire, David and Turner, Veronica

In an endeavor to master Largo al Factotum from Il Barbiere di Siviglia by Gioachino Rossini, a post-capstone continuation of my voice instruction and technical development, I was faced with many challenges despite a vast amount of familiarity with this art form. Being an extraverted and even boisterous person with a booming voice and a tendency to overblow my sound, I found that I would quite frequently hurt my vocal cords resulting in over-exhaustion, straining, and an inability to complete big arias from start-to-finish. Through repetition of mistakes, I was eventually able to learn how to circumvent this bad habit via an application of good technique. With a heightened skill level and new perspectives, I am now able to perform full-fledged operatic passages among other traditional and contemporary genres easier than ever.

My methods focus on tension-free and well-supported breathing and articulation in concert with an emphasis on posture and musicality. My approach is to perform with the utmost concentration on all of these facets, bringing high quality tone, dynamics, color, and natural resonance to the voice but even more importantly to the music.

In order to execute this piece properly, I had to essentially become Figaro. By reading not only the character descriptions but also the detailed play synopses from both operas Il barbiere di Siviglia and Le nozze di Figaro, I was able to characterize Figaro into a tangible persona that I related to and understood as well as my own tendencies and desires. In Il barbiere di Siviglia, which happens 3 years before the marriage of Figaro, he demonstrates his role as not only a clever and resourceful servant but also as an admirable common man without nobility. Throughout the operas his trickster personality is reflected in both the libretto and in the music. In this way I was able to provide context to the Italian language in the libretto. Each word has a unique meaning relevant to the story and a unique expression assigned to it within the musical parameters of the phrase.

My key findings from this trial-and-error based experiential research are that good quality singing is stress free, unobstructed, and understatedly phenomenal. The humility of the voice is self-evident and needs no idiosyncratic attempts at embellishment. Good quality technique is harnessing healthy, athletic, diaphragmatic energy that appears effortless and organic when executed properly. Through the combination of good, consistent instruction, an open mind, and at least ten thousand hours of dedicated practice, anybody can become a professional opera singer.
DETERMINING THE SECONDARY STRUCTURE OF HTLV-1 PRO-POL FRAMESHIFT SITE USING NMR AND NATIVE GEL ANALYSIS

Atene, Antonia; Dayish, Kolette; Warriner, Marcus; Yeager, Daniel; Mouzakis, Kathryn

Department of Chemistry

Human T-lymphotropic virus type 1 (HTLV-1) is a retrovirus that targets CD+ T-cells in humans. Within its RNA genome, it has two open reading frames that are only accessed through programmed ribosomal frameshifting (PRF). PRF is defined by a directed change to the ribosome’s reading frame during the process of translation. Each PRF sites consist of two RNA elements: a heptanucleotide slippery sequence followed by a downstream RNA structure. In retroviral frameshift sites, this RNA structure is typically a pseudoknot. The frequency of frameshifting is specific to the frameshift site. Additionally, this frequency is important for maintaining appropriate molar ratios of proteins translated from the original and alternative reading frames.

HTLV-1’s second frameshift site is located within the pro and pol overlap. This site contains a slippery sequence, spacer region, and a RNA structure. The RNA structure is predicted to be a pseudoknot. Pseudoknot structures occur when nucleotides in the loop segment of a stem loop base-pair with nucleotides downstream from the base of the stem.

The goals of this work were to use nuclear magnetic resonance (NMR) and native gel analysis to determine the pro-pol frameshift site RNA structure. In addition to the wild-type RNA, three other constructs were used to evaluate the secondary structure and folding of the predicted pseudoknot. Two of these constructs have mutations in the loop and downstream nucleotides that eliminate base-pairing in the pseudoknot formation.

Currently, the stem loop RNA has been purified and its purity and folding examined. Additionally, template and non-template sequences for the three pseudoknot RNAs (WT, PKM1, and PKM2) were cloned into the Puc19 plasmid and transformed into E. coli.
THE SUM OF THEIR PARTS: ASSESSING DRIFTING AND DOUBLE ZONAL OSTEONS WITHIN MEDIEVAL KULUBNARTI, NUBIA

Austin, Rita

Department of Anthropology, Fort Lewis College

Histological studies of bone represent an effective means of reconstructing health and estimating age in ancient populations through the analysis of the frequencies and sizes of discrete remodeling events. Although secondary osteons have been studied extensively, drifting and double zonal osteons are atypical osteons that are not entirely understood. Previous research suggests that drifting osteons may be related to age and double zonal osteons may be associated with periods of physiological stress. The purpose of this study is to determine whether either of these variables varies predictably with age or differs between the sexes and consider the possible implications for understanding health. In this study, rib thin sections from individuals interred at a medieval cemetery from Kulubnarti, Nubia (n=51), were used to assess how drifting and double zonal osteon frequencies relate to age and sex. It was hypothesized that both drifting and double zonal osteons would relate to age, that osteon frequencies would differ between the sexes, and that aspects of growth, development, and health could be inferred for the Kulubnarti population.

Thin sections were observed using a compound light microscope. Results show only a weak negative correlation between drifting osteon frequency and age (Spearman’s rho = -0.210). Double zonal osteon frequency shows a strong inverse correlation with age (Spearman’s rho, p= -0.572). There was no statistically significant difference between the sexes (Mann-Whitney U, p=0.118). These data suggest homogeneity and continuity between the sexes at Kulubnarti and a strong negative correlation between these osteon types and age. Previous research on the Kulubnarti sample has demonstrated the presence of generalized stress. In this sample, double-zonal osteons decrease with age supporting the hypothesis that these atypical osteons represent periods of growth arrest, as individuals with more double zonal osteons appear to have a higher risk of dying. Previous studies suggesting drifting osteons decrease with age may be supported by the current study, although further research into the cause of this osteon type is needed, whether for mineral absorption or as a reaction to strain gradients. However it is unclear whether the patterns suggested by this study are always present, specifically for double zonal osteons. Future histological studies should note the negative correlation between both drifting and double zonal osteons to age.
In this project I interpret how the ideas of gender performativity and compulsory heterosexuality can inform our understanding of college hook-up culture. I focus on the following questions: How do we use these hetero-gendered roles to make meaning of our experiences in hook-up culture? To what extent does the dominance of this script limit our ability to imagine alternatives to the hook-up? Through this analysis we can begin to address the problematic realities visible in hook-up culture, as well as recognizing the increased agency provided through these new social scripts. I utilize an untapped academic resource, analyzing posts from “FLC Confessions,” a website allowing students to write anonymously about their experiences within hook-up culture. I code all posts describing sexual encounters for terms and concepts relating directly to gender, heterosexuality and the dominance of the hook-up script. I organize data into groups reflecting the three most prevalent types of relationship referenced: long-term monogamous partners, long-term non-monogamous partners, and short-term non-monogamous partners. I find these encounters to provide a wide diversity of experiences both challenging and upholding hegemonic ideologies of gender and sexuality. I argue that the hook-up script has in many ways increased sexual agency, but its dominance veils alternative scripts, severely limiting the choices of participants.
Understanding our processes as we set out to do our work or to accomplish goals can teach us a lot about ourselves and help us improve our craft. Whether our field is creative in nature or not, we all engage in processes that we can learn from. Oftentimes the outcomes become the sole focus of our endeavors and we forget that sometimes the journey can be as important as - or even more important than - "the destination.

Designers often deal with being labeled as "creatives" or "artists," while design tends to be a process that focuses more on problem solving than on sole artistic expression.

Web design is a field in which problem-solving especially comes into play. To address a given problem, a web designer must work within a given set of constraints (both creative and technical) in order come up with an appropriate solution.

In this presentation I will be addressing the creative process through the lens of web design and my experience working on an independent research project where I researched, planned, designed, and developed my portfolio website.

My project encompassed researching current web design and web development best practices, current trends in web design, and best practices in content strategy for the web. After gathering information and acquiring new knowledge, I proceeded to plan how to apply it to my project.

The planning and research stage included determining which goals the website should meet and how the content and wireframe should be structured. I then proceeded to designing the user experience and user interface of the website, which culminated into the ongoing development of the design.
THE COMMODIFICATION OF FOOD & ITS IMPACTS ON FOOD SECURITY AND STRATEGIES FOR CHANGE

Bowser, Angie

Department of Sociology

Food insecurity is a problem that affects nearly a billion people around the world. This problem takes different form depending on economic, regional, and political factors. In developing regions of the world, it can take on the form of mass famine, undernourishment, and chronic hunger resulting death. In developed regions of the world, food insecurity appears as a lack of access to nutritious foods for certain populations, which often results in obesity, diabetes, and many other health problems. Although the problem of food insecurity is complex, this problem can ultimately be traced back to the commodification of food.

The commodification of food has created an industry of selling food for profit, rather than viewing food as a human right which all populations should be granted equal access. This food system and worldview has not only affected food security for many people, but also the organizations, governments, and strategies which work toward eliminating food insecurity. The strategies for eliminating food insecurity are often limited to direct and emergency intervention for communities, rather than working toward systematic changes that would promote community food security.

In La Plata County there are numerous organizations who provide food assistance to food insecure families and individuals. These organizations employ a variety of services and strategies to provide emergency food assistance and to improve food security in La Plata County. Despite their efforts, in La Plata County and elsewhere, food insecurity is still a chronic problem and the strategies for reforming our current food system are limited. For sustainable change to take place, it is imperative that we begin to treat food as a human right, rather than a commodity for profit.
WHY A COMES BEFORE B: APPLYING AN ANTHROPOLOGICAL LENS TO BUSINESS AND UNDERSTANDING CULTURAL INFLUENCES IN THE WORKPLACE

Brickle, Tyler
Department of Anthropology

National and regional cultures can hinder or enhance a company and its productivity. This paper looks at how culture at the local, regional, and national level can influence business practices. Of special interest is how Durango’s culture affects the corporate culture of Mercury Payment Systems and the symbiotic relationship that is formed. Building on critical ethnographic research that has been done at the national level, the investigator examines how local culture intersects, influences and even conflicts with the internal corporate culture of Mercury Payments Systems.
DETERMINING THE SECONDARY STRUCTURE OF THE HTLV PRO-POL FRAMESHIFT SITE USING SHAPE CHEMICAL PROBING.

Broad, Amanda; McKenzie, Jason; Mouzakis, Kathryn

Department of Chemistry

Human T-cell Leukemia virus (HTLV) is a retrovirus that infects adult CD4+ T-cells. Production of infectious virions is dependent on two programmed changes in reading frame during translation. These changes are triggered by specific sequences and structures within the HTLV ribonucleic acid (RNA) genome. In the context of retroviruses, frameshifting is frequently used to initiate the translation of viral enzymatic proteins.

HTLV’s second frameshift site is positioned within the overlap of the pro and pol open reading frames. This site contains two RNA elements: a slippery sequence, UUUAAAC, and a predicted pseudoknot structure. Pseudoknots are composed of stem-loops that have their loop nucleotides base-paired to downstream RNA. To date, no experimental evidence has confirmed the stable formation of the HTLV pro-pol frameshift site pseudoknot structure.

The goal of this work is to use chemical probing methods to determine the pro-pol frameshift site RNA structure. Specifically, selective 2’-hydroxyl acylation and primer extension (SHAPE) will be used to identify areas of base-pairing within the frameshift site RNA. During these experiments, the N-methyl-isatoic anhydride (NMIA) chemical does not acylate nucleotides involved in stable base-paring interactions. Therefore, the pattern of RNA modification will reveal which nucleotides within an RNA are base-paired or single-stranded. Computational programs can be paired with SHAPE data to predict the secondary structure.
DESIGN OF A FLUID LEVEL INDICATOR 
FOR HAZARDOUS AND HIGH 
TEMPERATURE LIQUIDS

Brooks, Shane; El-Hossari, Megan; Flores, Alexa; Romero, Arturo; Roseberry, Jesse
Department of Physics and Engineering

Generator IV and other nuclear fast reactors have historically used liquid sodium as a coolant. The choice of coolant determines the main design approaches and the technical and economic characteristics of a nuclear power plant. Coolant fluids, such as liquid sodium, are often hazardous and exothermically reactive with oxygen and water which require them to be sealed in an oxygen free environment because liquid sodium burns when exposed to air releasing toxic aerosols and liquid sodium exposed to water undergoes an exothermic reaction generating sodium hydride and sodium hydroxide. It is desired to be able to measure the fluid level of liquid sodium without opening the vessel containing pyrophoric or anaerobic compounds. Argonne National Laboratory in Lemont, Illinois, is building a Mechanisms Engineering Test Loop (METL) with liquid sodium coolant (shown in appendix: Figure 1) which is the largest single sodium testing facility in the world. The METL system contains a sodium volume of 800 gallons and the design constraints for the system include a maximum operating pressure of 100 psig and a temperature of 600°C. At the desired temperature, sodium vapor becomes a major issue for measuring devices. Sodium has a minor, but non-negligible, vapor pressure that increases as temperatures increase and can re-condense to form pockets of solid or liquid sodium.

A practical method used for measuring high temperature fluid levels can be accomplished by using a pressure transducer which will allow for the device to reach the desired temperature and pressure constraints. Conducted research and relevant evaluations found that the limiting constraint for measuring the fluid level using a pressure transducer are the possibilities of plugging and corrosion. In order to combat these issues, the design utilizes enlarged tubing and 316 stainless steel material which is sodium compatible. The experimental outcomes resulted in an accuracy within 0.60% for continuous level measurement. Due to the danger and inability to acquire liquid sodium, testing was conducted with water because of the viscosity and density similarities to sodium. These accurate level measurements will aid in the advancements for the nuclear and solar industries in developing efficient heat transfer mediums used to produce energy for various applications.
The Earth’s climate is warming due largely to the anthropogenic release of greenhouse gases into the atmosphere. Carbon dioxide is the primary greenhouse gas emitted by human activities. Energy production accounts for 38% of all carbon dioxide emissions in the United States, and these could be reduced by increasing renewable energy production. Fort Lewis College has a total of 662,136 square feet of rooftop and parking lot space suitable for photovoltaic solar panels. If all available square footage were utilized, 6,621 kilowatts of electricity could be generated, replacing 33% of Fort Lewis’ annual electricity purchases with renewable, locally-produced solar energy. This research paper proposes that Fort Lewis College enters into a solar power purchase agreement to avoid the large upfront costs of purchasing photovoltaic solar panels. By implementing large scale solar arrays on campus, Fort Lewis College can reduce annual energy costs and visually display commitment to the environment.
THE MORALITY OF FACTORY FARMING

Carmichael, Kaley
Department of Philosophy

In this project I present one approach for arguing that the factory farming industry acts in ways that are unethical. The focus of my argument is the factory farming industry acts unethically due to the way in which non-human animals are treated in these conditions. First, I will argue that it is morally wrong to cause unnecessary harms to sentient beings. Then, I demonstrate ways in which the factory farming industry causes unnecessary harms to sentient beings. Finally, I will arise at the conclusion that humans have moral obligations to refrain from consuming factory farmed goods.
The purpose of this study was to investigate if salivary cortisol levels decrease, indicating lower stress levels, when humans are in an outdoor environment compared to an indoor environment. Salivary cortisol is routinely used as a biomarker of psychological stress and related mental or physical diseases. Most studies consider salivary cortisol levels a reliable measure of hypothalamus-pituitary-adrenal axis (HPAA) adaption to stress (Hellhammer, Wust, Kudielka, 2009).

To examine the differences in stress levels this study used a Salimetrics expanded range high sensitivity salivary cortisol enzyme immunoassay kit. Participants were from two Fort Lewis college classes, a testing and statistics class for the indoor group and a top rope climbing class for the outdoor group. There were 14 students from each class. The participants were given a cup of water to rinse their mouths out to alleviate any foreign particles in the saliva. Then they tilted their head forward to let the saliva collect and pool in the mouth, and drooled the saliva into a test tube. The collected test tubes were placed in a cooler and then immediately put into a freezer. Each saliva sample was placed into 2 wells on the plate that was part of the Salimetrics expanded range high sensitivity salivary cortisol enzyme immunoassay kit. Getting the average from the two wells validates the cortisol score for each participant. Standards and controls (high and low) provided in the assay kit were put into wells to use as a guide. The wells were incubated then put into a plate reader to get the calculations. Unfortunately the assay kit didn’t work, producing all blank results. The saliva samples were re-frozen for future use. The researcher re-thawed the saliva samples and used a new assay kit, following the same steps stated above. The only difference was that the new assay kit had only enough room to put each sample into 1 well, reducing validity. A regression equation was used to find the Optical Density (OD) and cortisol scores for the unknowns, participants’ saliva.

The results showed that stress levels were significantly lower (p=.008) in the outdoor class. These findings were further supported by the results of a classmate’s (Erika Behler) study that used the Perceived Stress Scale to measure stress levels with the same population at the same time (p=.002). In conclusion, the students in the outdoor class had lower cortisol levels (and perceived stress levels in companion study) indicating that they may be less stressed in an outdoor classroom setting in comparison to the traditional inside lecture classroom setting.
SCHOOL CLIMATE AND RELATIONAL BULLYING: EFFECTING STUDENT BEHAVIOR THROUGH A RESTORATIVE JUSTICE MODEL

Coggins, Jennie; Wasserman, Robert

Department of Sociology

Bullying at school causes enormous stress for many children and their families, has long-term effects, and has been identified as a risk factor associated with antisocial and criminal behavior. Bullies are more likely to drop out of school and to engage in delinquent and criminal behavior. Victims have a propensity towards higher levels of stress, anxiety, depression and other illnesses, and there is shown to be a strong link between bullying and suicide.

Discipline in schools has the potential to help young people learn to take responsibility for their own behavior while offering classroom management and control. However, many schools have imparted more punitive disciplinary sanctions that do not educate students or resolve conflict, and may even make schools less safe and cause further harm. We intend to show how a restorative model and a healthy, inclusive school climate can reverse this trend.

Restorative justice is a philosophy based on a set of principles that guides the responses to conflict and harm, and is based on practices that have been used for centuries in indigenous cultures and religious groups. These practices and policies can offer an alternative to other more punitive responses used by schools. Handling conflict and misbehavior (such as bullying) in a restorative way, allows students and staff to actively make amends and repair harm. In addition, restorative practices in schools can promote positive feelings, rather than resentment and alienation within the school setting. Restorative discipline can provide opportunities to socialize youth and teach them how to be productive members of society.

Along with restorative disciplinary practices within schools, we believe there needs to be social-emotional learning modeled through an individual, family, school and community partnership that allows for a shared interest in the responsibility for students, with “caring” as a core concept. By initiating healthier communication, interactions, and exchanges, it is our hope that our youth will see the need to keep the learning environment safe, through strategies that build relationships and empower the school and its students, while promoting a safe, non-threatening, learning environment.
THE EFFECT OF EXPOSURE ON PERCEPTIONS OF ADOLESCENT SELF HARM

Cunningham, Taylor
Department of Psychology

A large number of adolescents struggle with self harm, and due to the sensitive nature of the topic it is often overlooked. Although, this is a major problem it is largely misunderstood and many adolescents won’t seek help for the behavior due to the fear of judgment from misconceptions. In response to this, the study examined the effects exposure to self harm has on perceptions of self harm. Contrary to the hypothesis, there was not a significant difference between those who were exposed to self harm, and those who weren’t; however, the findings still implied that participants agreed with about half of the misconceptions. This shows this is still a negative connotation and stigma surrounding the behavior. This could lead to increased judgment.
The Turkey Spring (TS) watershed (approximately 0.27 mi²) is located in east-central Arizona south of the Mogollon Rim escarpment on the Fort Apache Indian Reservation. The 2002 Rodeo-Chediski wildfire burned over 280,000 acres of woodlands on the reservation, disrupted hydrologic systems, and triggered increased runoff and stream channel incision in the watershed. The channel incision exposed well-preserved, soil horizons, paleo-debris flow deposits and multiple charcoal layers. The purpose of this study was to: (1) measure a stratigraphic section within the TS watershed; (2) determine radiometric age dates from charcoal exposed in the channel cut; and, (3) establish a fire history for the watershed.

Charcoal samples were collected from a 2.4 meter section (elevation 1855 meters, 572555E, 3780785.5N, Z12N) in the TS watershed. The channel cut exposed: (1) cobble-rich sandy loam to sandy loam soils; (2) four spatially distinct charcoal layers; and (3) angular, poorly-sorted, gravels interpreted as debris flow, flood deposits. The soil and alluvial deposits overlie the Corduroy member of the Supai Formation. The upper section of the Corduroy member consists of fine-grained sandstone and siltstone; the lower section is composed of siltstone, gypsum, and limestone. Three of the four charcoal layers are interbedded with or occur stratigraphically below, angular to sub-rounded gravel to boulder-sized clasts.

Organic material and excess soil were removed from the charcoal samples in the Fort Lewis College research lab, and three prepared samples were sent to the University of Arizona, Accelerator Mass Spectrometry (AMS) lab for 14C analysis. 14C dates from the AMS lab were converted to calendar age dates using the OxCal software, which yielded calendar age dates of: BC 6,235 ± 140; AD 623 ± 48; and AD 722 ± 56. Because the charcoal samples were either within or below the coarse alluvial material, we suggest that wildfires likely induced the debris flow events. Two of the three 14C age dates (AD 623 ± 48 and AD 722 ± 56) correlate well with known drought conditions in the southwestern USA (Frechette, 2009). The oldest 14C sample (BC 6,235 ± 140) is associated with a major debris flow event, and correlates with a transition between high and low effective moisture in southern Arizona, documented by Walters and Haynes (2001).
DOES PSEUDOKNOT FORMATION PLAY A ROLE IN HTLV-1 PRO-POL FRAMESHIFT EFFICIENCY?

Davis, Summer; GreyEyes, Shawn; Knewitz, Allison; Stelmaszek, Jordan; Mouzakis, Kathryn

Department of Chemistry

The translation of the Human T-cell Lymphoma Virus Type-I (HTLV-1) pol gene is dependent on a programmed -1 ribosomal frameshift. The HTLV-1 frameshift site consists of a heptanucleotide slippery sequence (UUUAAC) followed by a spacer region and a downstream pseudoknot. During translation, the pseudoknot is thought to pause the ribosome over the slippery sequence. At that time, the tRNAs can repair in the -1 reading frame. This study focuses on investigating whether or not pseudoknot formation affects the rate of HTLV-1 pro-pol frameshifting. We hypothesize that the pseudoknot structure will affect the frameshift efficiency.

To test this hypothesis, three variant pro-pol frameshift sites were designed so their frameshift efficiencies could be compared to that of the wild-type frameshift site. Pseudoknot mutant 1 (PKM1) has sequence changes in the loop that eliminate base-pairing between the loop region and downstream RNA sequence. Pseudoknot mutant 2 (PKM2) has sequence changes in the downstream sequence that eliminate base-pairing between the loop region and downstream RNA sequence. Finally, the downstream sequence involved in pseudoknot base-pairing was eliminated in the third frameshift site, creating the stem-loop (SL) structure. Using molecular cloning techniques, these variant frameshift sites were inserted into a dual-luciferase reporter plasmid between the rluc and fluc genes. Two plasmids (experimental and control) were created for each frameshift site (WT, PKM1, PKM2, and SL). In the experimental plasmid, the fluc open reading frame is in the -1 reading frame relative to rluc. In the control plasmid, the slippery sequence is mutated so frameshifting cannot occur and rluc and fluc are in the same reading frame. At present, seven of the eight plasmids have been successfully cloned, each verified by DNA sequencing. Once all of the plasmids have been successfully cloned, in vitro transcription of the DNA will be used for RNA synthesis. This RNA will be purified and utilized in an in vitro frameshift assay to determine the frameshift efficiency for each frameshift site.
HYDROTHERMAL DOLOMITIZATION OF MISSISSIPPIAN LEADVILLE LIMESTONE, SOUTHWEST COLORADO: A LITERATURE REVIEW

Dias, Shirleen
Department of Geosciences

The Mississippian Leadville Limestone is a Paleozoic deposit (354-323 Ma) in the Paradox Basin with exposed outcrops in Montezuma County, Dolores County, and La Plata County of southwest Colorado. In the greater Paradox Basin, hydrothermal dolomites have been identified in the Leadville Limestone of the Lisbon Field (Chidsey, 2009) and the Aneth Field (Chidsey, 2009) with excellent hydrocarbon reservoir properties. This literature review discusses hydrothermally altered dolomites in SW Colorado and expands on a recently published initial study in La Plata County completed by Johnson et al., 2014.

The hydrothermal dolomites of McElmo Dome and the Doe Canyon CO₂ fields are areas of high potential reservoir rock that have yet to be fully investigated. Five primary hydrothermal dolomitization (HTD) controlling factors have been identified through a literature review of numerous regions. These include: 1) burial history; 2) tectonic setting; 3) heat and fluid controls; 4) facies and associated mineralization; and, 5) controls on fluid migration. These five controlling factors provide insight into the potential of hydrothermal dolomites of the Leadville Limestone as effective reservoir rock in southwest Colorado. Specific applications towards the McElmo Dome and Doe Canyon fields are central to this literature review.
A CAT, A FISH, AND A FLOWER: ENDANGERED SPECIES AND URBAN DEVELOPMENT

Dudash, Jessica
Environmental Studies Program

The Endangered Species Act (ESA) is one of the most recognizable pieces of environmental policy. Despite the act’s widespread reach, many species are still facing the threat of extinction, particularly due to development. One out of every three endangered species in the United States faces extinction due to urban development. This project examines the Florida panther (Puma concolor), coho salmon (Oncorhynchus kisutch), and Navasota ladies tresses (Spiranthes parksii) as examples of organisms who face continual threats from urban development despite their listing status as endangered species. I find that the ESA has not adequately prevented habitat from becoming fragmented, considered metapopulation dynamics, and most importantly, protected critical habitat in the cases of these three examples. I discuss and recommend that designating critical habitat for these three species may better prevent them from future threats of urban development as well as provide protection for greater ecosystems as a whole.
DESIGN OF A HYDRAULIC INTAKE STRUCTURE FOR STREAM DIVERSION

Fleming, Jane; Bishop, Victoria; Cunningham, Devin; Harmon, Dallas; Williams, Forrest
Department of Physics and Engineering

More than 3.4 million people die each year from a water related disease, and 99% of these cases occur in the developing world [1]. Implementing a water system that provides safe, potable water to communities in the developing world can decrease the occurrence of water-related diseases. The water intake structure is a critical component of a water system. It is used to divert water from a source into the system. Because of the difficulties associated with using a stream as a water source, there is no universally standard design for the intake structure. Difficulties include: sedimentation and the effects associated with the large variations in seasonal rainfall.

The purpose of this project is to design and test a stream diversion intake structure for a gravity fed water system appropriate for rural communities in the developing world. In order for the structure to be appropriate for developing rural communities, it must provide enough water to meet the peak daily demand of the community, be low cost, low maintenance, and easily constructed with limited skilled labor in remote locations.

Two variations of the intake structures were designed for the project. Preliminary laboratory testing was performed to analyze components and establish an optimum design suitable for field testing. Both designs were then constructed and tested in streams located in La Plata County. The intake structures were allowed to continuously run for 3 - 5 weeks in order to assess constructability, functionality, maintenance requirements, and potential failures. Both of the structures met all design requirements and project objectives.

Having two designs allows for more versatility when selecting a site. This is especially important for implementations in remote, developing communities which frequently exhibit a wide range of stream types. The long-term goal of the project is to publish these designs along with their construction documents for use by nonprofit organizations working with water supply in the developing world.
SYNTHESIS AND CHARACTERIZATION OF COBALT(III) COMPLEXES WITH NITROGEN-CONTAINING HETEROCYCLIC LIGANDS AS POSSIBLE ANTI-CANCER PRO-DRUGS

Garcia, Mario; Hart, Kaila F.; Joe, Natalie; Nopah, Matthew; Padilla, Thomas; Morris, Aimee M.

Department of Chemistry

Research into better cancer treatments has been a progressively growing field. Metal containing coordination compounds offer unique chemistry that could prove useful. A ruthenium(III) compound with two indazole and four chlorine ligands, KP1019, is currently in phase III clinical trials as a pro-drug for the treatment of cancer. Our research delved into creating similar compounds to KP1019 but with cobalt centers instead of ruthenium, and with various nitrogen-containing heterocyclic ligands.

Starting with cobalt(II) chloride and ligands including: imidazole, pyrimidine, indazole, pyridine, pyrazole, L-histidine or L-tryptophan, we attempted to oxidized the metal center and attach the desired ligands. Each ligand presented its own unique aspects and binding properties. A 4:1 metal to ligand ratio was most commonly used, however this ratio was altered based on the denticity of the specific ligand and our desired binding sites.
Consider a finite topological space $X$. By using the relationship between digraphs and finite topological spaces, a corresponding digraph, $G_X$ can be found. Then, completing the adjacency matrix for $G_X$ can be used to determine the complexity class (defined via Turing machines) of problems involving $G_X$, and therefore of $X$ as well. This talk will examine the complexity classes of problems in deciding whether spaces are self-complementary finite topological spaces, deformation retracts, and if a finite topological space is a $T_0$-space.
Applications of Fourier analysis and permutation group representations on ranked data sets will be explored. For large data sets this analysis simplifies data processing. Examples of ranked data sets include certain voting data and customer preference rankings.
DEATH AND REACTIONS TO ACTS OF INTOLERANCE

Haley, Mackenzie
Department of Psychology

This research examines the effects of terror management theory (TMT) and individual reactions to scenarios of acts of intolerance, in the form of LGBT (lesbian, gay, bisexual, and transgender) hate crimes, occurring nationally vs. foreign. The mortality salience hypothesis within TMT suggests that when an individual is confronted with thoughts of their own death their need to either invest in or defend their own worldview will increase. Previous research has focused on how differing political worldviews effect how mortality salience is handled and it has been concluded that those with a more conservative worldview will be more likely to defend their worldview more vigorously, in the form of hostility or aggression, when confronted with mortality salience. Upholding a liberal worldview has been shown to be much less predictable in terms of defense of one’s worldview. With the assumption that liberals hold a worldview which emphasizes the core value of tolerance, I sought to investigate how liberals would react to instances of intolerance in their own culture versus worldwide with the expectation that those with a liberal ideology would react most strongly to such instances, especially when the cause is within one’s own nation. Each participant was either primed with mortality salience (MS) or a control, followed by a short delay, before proceeding to rate their reactions to 12 scenarios of hate crimes according to how distressing the act was, the severity of the act, and the recommended severity of punishment to the perpetrator. Results will be discussed and directions for future research are offered.
Polycystic Ovary syndrome is a disorder associated with numerous clinical, endocrine and metabolic complications, such as menstrual dysfunction, hyperandrogenism and insulin resistance. The relationship between hyperandrogenism and insulin resistance is a highly studied aspect of PCOS, and, a current target for treatment. High levels of testosterone interfere with the insulin receptor and its substrates to compromise a cell’s ability to translocate GLUT4 to the cell membrane to allow for the entry of glucose. To investigate the potential of the emerging drug simvastatin, cultured C2C-12 myoblast cells were treated with the drug for 24 hours followed by insulin stimulation for 2 hours. Phosphorylation ratios of IRS-1(Ser612) to total IRS-1 along with GLUT4 translocation were measured to detect how the drug interacts with the insulin pathway. There was no significant difference between treatment with and without simvastatin regarding the relative level of IRS-1(Ser612) phosphorylation. Flow cytometry results measuring the translocation of GLUT4 to the plasma membrane indicate that treatment with simvastatin increased GLUT4 translocation by 7.5%, but without experimental repeats there is no way to know if these results represent a significant difference. Overall these results show that treatment with simvastatin for 24hr does not change insulin signaling or GLUT-4 translocation in a mouse muscle cell line.
We will discuss numerical ranges of matrices, primarily focusing on the shapes they can take. We will present an in depth proof of the Elliptical Range Theorem, the Toeplitz-Hausdorff Theorem and several others. We are particularly interested in normal and almost normal matrices. Much of our research came from papers written by Rudolf Kippenhahn, Chi-Kwong Li, Karl Gustafson, Tyler Moran and Ilya Spitkovsky.
Using a helmet during high-risk activities, when it is possible to sustain an impact to the head is one way to prevent traumatic brain injuries. Because helmets play such a vital role in protection, it is important that their quality is improved where possible.

The purpose of this project is to design an apparatus that is capable of testing helmets to aid in the research of helmet design. This apparatus will simulate impact conditions to which different kinds of helmets are exposed. It will also record the reaction of the helmet to these different conditions.

This helmet impact tester uses energy from gravity to initiate an impact. The helmet is fastened to a head-form the same way it would be attached to a human head. This head form is attached to a carriage arm that has its drop guided by two linear high precision bearings that slide down two rods. The helmet, head-form, and block carriage arm’s drop is guided to an impact surface at the base of the tester. This impact surface is interchangeable and impact speed is variable to simulate different types of impacts.

By testing helmets and simulating different types of impacts, a greater understanding of how they fail can be gained. With knowledge of the way these helmets fail, suggestions to how to improve them can be made including different geometries and materials.
A supernova explosion will exhibit a light curve distinct to each type after it fades away from peak irradiance. Supernovae are thus categorized by observable characteristics, namely, their light curves and spectrum. By carefully observing a supernova’s light curve over a period of about two months, the type can be deduced. Using the Fort Lewis observatory, I attempted to formulate light curves for a few recently observable supernovae to see if the types could be gathered.
MINING FOR TOURISM: CONNECTIONS BETWEEN MOAB, UTAH'S URANIUM INDUSTRY AND THE CREATION OF CANYONLANDS NATIONAL PARK: 1948-1964

Jackson, Jane E.; Gulliford, Andrew

Department of History

In the 1950s, many towns across the Colorado Plateau were affected by the Cold War and subsequent uranium boom. Moab, Utah is a particularly interesting case study on the effects of mining on small communities in that it managed to survive past its boomtown phase and continue on as a tourist destination through the second half of the 20th Century. What ultimately saved the town’s economy and to some extent, its “soul”, was tourism stimulated by the establishment of Canyonlands National Park. This transition from a mining-based to tourism-based economy can be seen in cultural changes in the town itself. The ways in which the local population and the nation at large viewed the landscape also changed; the most sought after resources in Canyon Country changed from minerals that could be extracted to tourism that could generate revenue. These cultural and economic changes can be seen in local newspapers, personal stories, and cultural artifacts. Uranium prospectors and government-sponsored mining companies established many of the roads that are now used as access points to Canyonlands National Park. Political documents and correspondences relating to the establishment of Canyonlands also show the importance of economics in matters of wilderness preservation. This provides another link between the two industries as politicians convinced mining advocates that tourism, through preservation, could be an equally productive industry. All of this information comes together to show that the uranium boom and the establishment of Canyonlands National Park are closely connected historical events. Mineral prospecting and exploration revealed the landscape that would eventually become Canyonlands, while the park’s creation and associated tourist industry replaced the uranium industry as the foundation for Moab’s cultural identity.
THE RAPE OF WOMEN AND MEN’S VIOLENCE

James, Anthony
Department of Sociology

The purpose of this research is to explore the underlying causes and contributory factors associated with violence and sexual assault committed against women. What attributed to men’s propensity to commit acts of violence against women to include sexual violence? As part of my research, the following areas are examined in order to grasp an understanding of rape: the historical context of rape, myths and stigmas associated with rape, the use of alcohol and drugs to coerce and manipulate rape, and rape culture. Finally, my research concludes by focusing specifically upon the violence and sexual assault of Native American women in Indian Country. I provide a comparison of how Native American women are victimized and impacted by rape as opposed to women in mainstream America.
ACEQUIA AND PUEBLO WATER RIGHTS ADJUDICATIONS IN NORTHERN NEW MEXICO: LEGAL INADEQUACIES AND THE BENEFITS OF NEGOTIATION

Kiklis, Beau

Environmental Studies Program

The State of New Mexico established a water law system based on Prior Appropriation in 1848 through the signing of the Treaty of Guadalupe Hidalgo. This allocation system conflicted with the then current system of Equitable Apportionment. In 1907, the Acequia Act, which created unique bylaws for the Spanish acequia communities, helped to reduce the conflict. Acequias are gravity fed irrigation ditches used primarily by the Spanish population of Northern New Mexico. Further complicating the water adjudication process in New Mexico are the rights of Pueblo Native Americans who possess water rights established in 1693, prior to the Doctrine of Prior Appropriation, the Winter’s Doctrine, and the Acequia Act. As water has become more scarce in the region and the development of major water projects, such as the San Juan-Chama Diversion Project, have begun moving water across basins, the need to account for all water rights became a necessary evil for the New Mexico State Office of the Engineer. This report assesses two legal case studies, known as the Aamodt case and the Abeyta case to argue for fundamental changes in the process of water rights adjudications involving Pueblo and acequia communities. Currently, adjudications are settled through litigation. This report argues that water rights adjudications involving Pueblos and acequia communities should be resolved through negotiation, therefore alleviating legal inadequacies, decreasing financial and time costs, protecting the cultural heritage, and playing to such cultural strengths of conflict and resolution.
That age old question “What do you want to be when you grow up?” has stalwartly remained to be the same I gave in my original adolescent answer, “I want to be an artist!” Though I create art for myself, my intention is to arouse others’ inspiration using my knack for unedited imagination. A robust affection for utilizing exploratory techniques by way of whatever materials may be in my hands has developed over time. Methods include raw unorthodox applications of paint, poetry, printmaking, collage, drawing and sculpture. Current predilections involve public art, where a smorgasbord of materials are used to transform spaces by revealing layer-upon-layer of my unfiltered textural introspections.

“Nesting” began with a project where I employed a traditional basket coiling technique to create 35 grapefruit sized nests out of rope and yarn. It was during this process that I thought to myself, “Wouldn't it be enjoyable to shrink down small enough to climb inside of one of these nests?” Upon seeing Reed Library’s - Art in the Library Student Art Competition I found an opportunity to turn my idea into actuality.

The ending result is not only intended to be an enticing space but more importantly a place for individuals to slow down, get comfortable, and recoup the energy needed to get through the day.
Quinoa, a pseudocereal traditionally cultivated in the Andean highlands of South America, has gained recent global recognition for its high nutritional content and ability to grow in areas characterized by low precipitation and poor soil quality. Keen to health food circles in North America and Europe, demand for this super food has skyrocketed in recent years. While some producers of this lucrative crop are experiencing increased profits from the demand, many of the poor farmers in Bolivia, Peru, and Ecuador who produce the majority of the world’s supply are experiencing a slew of negative impacts. This paper examines the impacts of greater quinoa consumption ex situ on Bolivian farmers and argues that an increase in the production of quinoa in the United States is necessary to relieve some of the negative impacts. Interviews and background data collection concerning the past and current efforts of quinoa cultivation in the Rocky Mountain region of Colorado (the most feasible region in the United States to produce quinoa) provide insight into the possibilities of increasing production. It was found that high elevation basins in the Colorado Rockies with summer temperatures not exceeding 95°F have the right environmental requirements for successful quinoa production. It was also found that quinoa prefers nitrogen-rich soils, making it a good rotation crop for nitrogen-fixing legumes and grains. Additionally, as climate change and drought continue to challenge agriculture in the region, an examination of the adoption of organic farming techniques will be used in order to emphasize the importance of drought-resistant crops in current organic farming operations in order to increase overall profit and productivity. Due to the information-intensive nature of organic farming practices, adoption can be spread more efficiently through external agencies promoting the practice. Externally sponsored demonstration gardens that teach organic farmers how to grow quinoa could be an effective adoption strategy.
AMBUSHED: COMPARING STRATEGIES FOR MITIGATING INVASIVE PLANT SPECIES ON THE ANIMAS RIVER IN DURANGO, COLORADO

Klemperer, Colton
Environmental Studies Program

On the Animas River in Southwestern Colorado, invasive plant species saltcedar tamarisk (*Tamarix ramosissima*), Russian-olive (*Elaeagnus angustifolia*), and Siberian elm (*Ulmus pumila*) have become abundant throughout the river corridor. These invasive species have a range of negative effects on the river’s ecosystem, including the suppression of native species and altered natural habitats. This research examined the efforts of local land management experts in the town of Durango, Colorado, a municipality which relies on the river for water, recreation, and other benefits. Through interviews I found that a variety of mitigation efforts have been put into practice to manage these invasives, including chemical treatments and manual removal efforts. The ‘cut-and-treat’ management technique, utilizing herbicidal treatment and manual removal, was the most widely discussed method by all experts. However, biological control methods should be further explored as a technique for invasives species management in this area due to the success of treating saltcedar tamarisk on other riparian ecosystems, including the Colorado River.
RESERVOIR-SCALE SEQUENCE STRATIGRAPHY AND FACIES VARIATION WITHIN THE MISSISSIPPIAN LEADVILLE LIMESTONE, SOUTHWESTERN SAN JUAN MOUNTAINS, COLORADO

Kuhn, Kiefer; Gianniny, Dr. Gary L.
Department of Geosciences

Based on observations from seven measured stratigraphic sections and 230 thin sections over 37.3 kilometers, we recognize two sequences that encompass six parasequences and six distinct facies.

The facies include bioturbated peloidal packstones, containing ostracods, rare occurrences of planar laminations, plane tabular cross bedding, microbial laminations and fine grain silt and sand. This facies is inferred to have been deposited in a semi-restricted lagoon environment. Interbedded microbial boundstones and finely crystalline dolomitic mudstone facies contain dolomitic microbial laminitations, rare stromatolites, rip-up clasts, mudcracks, and soft sediment deformation. This facies was likely deposited in a supratidal setting. The medium grained, well-rounded quartz arenites and sand-rich packstone facies range from 5-40 cm thick and can be traced throughout the study area which may be marginal marine to eolian.

There are three variations of grainstones. First, peloidal grainstones containing planar laminations, plane tabular cross bedding, ostracods and discontinuous lenses of black chert and gray chert. This is interpreted to have been deposited in a shallow beach/tidal flat setting. A second variety includes skeletal/peloidal grainstones containing bi-directional current ripples, crinoids and other skeletal fragments. This indicates deposition in an open marine tidal setting. Crinoidal grainstones contain rugose corals, brachiopods, one-meter thick sets of plane tabular cross bedding, and grey chert. This facies was deposited in an open-marine shoal environment.

Within this reservoir-scale study, lateral variations of facies thicknesses were larger than lateral variations of parasequence thicknesses. Grainstone facies thicken towards the northern sections, whereas thicker dolomitic mudstones/microbial boundstones dominate in southern sections. Similar facies variations may occur in the subsurface where total thickness may not vary significantly, but younger, grain-rich facies prograde to fill in depositional lows. When this sequence-scale facies variation is synthesized with the susceptibility of facies to diagenesis and fracturing, reservoir characterization and predictability should be significantly enhanced.
CHARACTERISTICS OF CRETACEOUS TIDAL RHYTHMITES IN THE MENEFEE FORMATION; DURANGO, CO

Kunz, Brody J.; Gianniny, Dr. Gary L.

Department of Geosciences

Late Cretaceous (Campanian) tidal rhythmites are documented in the upper Menefee Formation at the Cliff House Sandstone transition near Durango, Colorado, USA. These tidal rhythmites are records of daily tidal cycles and also indicate the presence of diurnal or mixed diurnal tides in this portion of the Cretaceous Western Interior Seaway. The tidal rhythmites occur within beds at the base of lateral accretion surfaces in a fluvially connected deltaic meandering tidal channel. The occurrence of *Skolithos* and rare *Teredolites* confirm a marine influence in this deposit. Tidal channels at the transition of the fluvial Menefee Formation to the overlying marine Cliff House Sandstone are well documented in the region (Olsen et al., 1999). The tidal channel filling deposits have a modern day analogue of the Brahmaputra River Delta.

These Cretaceous tidal rhythmite thickness patterns occur in both planar laminations and bidirectional ripples. Alternating sandstone and shale planar lamination are inferred to be deposits from tidal flood and ebb events. Bidirectional ripples with shale “mud drapes” also have thickness patterns consistent with tidal rhythmites. Both types of tidal rhythmites show evidence of a semidiurnal or semidiurnal mixed paleotidal system as they lack a distinct linear trend between flood and ebb lamina (Archer et al., 1995). Fifty-four planar laminations are preserved that represent 27 tidal cycles. Thirty six separate ripples with opposing slip face directions represent 36 tidal cycles. The cyclic variation in thickness patterns of both planar laminations and bidirectional ripples are similar to modern asymmetrical tidal patterns (flood dominant or ebb dominant). The thickness patterns are consistent with neap/ spring cycles and may be records of synodic half months, several tropical half months, and one anomalistic month. The thickness and recorded duration of the tidal rhythmite cycles was limited due to truncation of bidirectional ripple deposits by either storm surges or fluvial floods. Migrating channel deposits have been previously documented for having a robust tidal rhythmite record, but with a limited number of preserved cycles (Coueffe et al., 2004).
THE EFFECTS OF LOCAL AND GLOBAL RNA STABILITY ON FRAMESHIFT EFFICIENCY IN THE HTLV-II GAG-PRO FRAMESHIFT SITE

Lake, Melvina; Lee, Audrianna; Mancha, Serena; Mouzakis, Kathryn
Department of Chemistry

Ribosomal frameshifting is defined as a shift in reading frame. During translation, a ribosomal frameshift (FS) can occur when the ribosome encounters a slippery sequence followed by a stable secondary structure. A slippery sequence specifically allows for the opportunity for tRNA repairning with the codons in the A- and P- sites of the ribosome. Retroviruses include programmed ribosomal frameshift (PRF) sites within their RNA, which increase viral genomic coding capacity by allowing translation of multiple reading frames from a single RNA. Human T-cell leukemia virus type-II (HTLV-II) uses PRF sites to translate its enzymatic proteins. These proteins are encoded in the pro and pol open reading frames.

The first HTLV-II PRF site is located at the end of the gag open reading frame and is described as the gag-pro PRF site. This FS site contains a heptanucleotide slippery sequence (AAAAAAC) followed by a stem-loop structure. Recently, a study showed that local stability of the secondary structure was correlated to frameshift efficiency in HIV-1. We hypothesize that local stability has greater control of frameshift efficiency than global stability in the gag-pro PRF site in HTLV-II. To test this hypothesis, five variant stem-loops were designed to decouple local and global stability. These variant frameshift sites were inserted into a dual-luciferase reporter plasmid using molecular cloning techniques. Successful cloning was verified by DNA sequencing. These plasmid DNAs will be used for in vitro transcription of RNA. The resulting RNAs will be purified and utilized in an in vitro translation assay to determine the frameshift efficiencies for each variant frameshift site. Finally, the frameshift efficiencies will be compared to each other to determine if local or global stability has a stronger effect on frameshift efficiency.
SELF-EFFICACY, SOCIAL SUPPORT, AND PHYSICAL ACTIVITY AMONG PEOPLE WITH SPINAL CORD INJURY

Landes, Leah; Frazer, Lee

Department of Exercise Science

Previous studies show that people with spinal cord injury (SCI) are less likely than the average American to meet physical activity recommendations, and they face more preventable disease as a consequence. If health and fitness professionals are to effectively increase physical activity among people with SCI, a logical first step is to understand some of the variables related to physical activity in this population. The purpose of this study was to examine the relationship between self-efficacy, social support, and physical activity among adults with SCI living in the United States. Previous studies suggest that self-efficacy moderates the relationship between social support and physical activity in other populations. This study hypothesized that the same moderating effect could be found among people with SCI. Fifty-two American adults with SCI took an online survey to measure self-efficacy, social support, and physical activity. Moderated multiple regression analysis showed a significant correlation between self-efficacy and heavy-intensity physical activity. This is consistent with findings from previous studies on other populations. However, self-efficacy did not moderate the relationship between social support and physical activity, so the hypothesis was rejected. Health and fitness professionals should focus on improving clients’ exercise self-efficacy to increase exercise behavior, and future research should use more representative samples and more objective physical activity measures to look again for the potential moderating effect of self-efficacy.
INVESTIGATION OF THE MINERAL ASSEMBLAGES, AND HISTORY OF SKARN AT DIORITE PEAK, LA PLATA MOUNTAINS, COLORADO

Leach, Christopher

Department of Geosciences

Skarns found within a small study area in the Cutler and Dolores formations contain unique mineralogies due to intruding monzonite-monzodiorite dikes and sills. The high-grade skarn mineralization was found to be commonly controlled by individual layers within bedding planes that contain carbonate and are more chemically reactive under elevated temperatures. Skarn minerals found in the study area include diopside, epidote, adularia, chlorite, scapolite, hornblende, zoned garnet, calcite, quartz and specular hematite. Overall metamorphic history for the outcrop is complex, however, a clear progression of the timing of when individual minerals crystallized from protolith can be seen during different stages of cooling. Crystallization history was interpreted using the petrographic microscope and the peragenetic sequence is as follows: diopside, garnet, calcite, scapolite, hornblende, chlorite, and finally adularia. Minerals that are at equilibrium with one another as well as individual minerals can be used to acquire temperature data due to their chemical stabilities under specific temperatures and pressures. A lower maximum temperature threshold can be set at around 500°C due to the formation temperature for diopside. Due to a previous study by Dr. David Gonzales, an upper maximum threshold has also been set at 650°C due to the lack of reset detrital zircons. Simple lithostatic pressure calculation was completed for the outcrop, which falls within 0.062 Gpa-0.078 Gpa. This indicates the rocks within the study area were buried no more than a few kilometers and were relatively shallow during magmatic emplacement.
LOWER LEVELS OF DEPRESSION IN SELF-COMPASSIONATE INDIVIDUALS IN U.S. AND MEXICAN POPULATIONS

Loera, Sandra
Department of Psychology

Self-compassion has three interrelated components. They are (a) self-kindness as opposed to self-judgment, (b) common humanity versus isolation and c) mindfulness rather than over-identification or avoidance. Research evidence has linked self-compassion to psychological well-being and low levels of psychopathology. The present study was conducted to investigate the relationship between self-compassion and depression and whether or not, such relationship differs among diverse populations. Fifty-four individuals residing in the United States and 31 individuals from Mexico completed both, the Beck Depression inventory (BDI) and the Self Other Four Immeasurables (SOFI) scale. The hypotheses that lower levels of depression were going to be found in self-compassionate individuals and that there will be no difference between both samples were supported. In both samples, the results indicate a statistically significant negative correlation between self-compassion and depression. Our findings suggest that regardless of culture, high levels of compassion might protect against depression. Future studies using experimental or longitudinal design should examine how these relationships unfold over time, which variable may be causal.
INVESTIGATION OF A FUNCTIONAL OVERHEAD SQUAT IN PREDICTING ATHLETIC INJURY IN DIVISION II BASKETBALL PLAYERS

McDermott, Matt; Jewell, John; Meyer, Carrie

Athletic Training

This prospective cohort study was performed to analyze the use of the functional overhead squat (OS) in predicting athletic injury in division II basketball players. A total of 26 basketball players participated in the study and were examined while performing a functional OS. Using the video analysis software Spark Motion by Spark Motion LLC, an anterior and lateral view of the squat was analyzed. A Receiver Operating Characteristic (ROC) curve was done comparing lower extremity injury with range of motion of the ankle, knee and hip individually. The results indicated that the area under the curve for the ankle was 0.559, 0.448 the knee, and 0.451 for the hip. This study showed that the OS was not effective in predicting athletic injury for basketball players, and for male and female players individually. Analyzing the range of motion (ROM) of the OS alone is not effective in predicting injury, thus, the studies hypothesis is rejected.
COLORFUL WORLD: WHAT DO PICASSO, STAGE LIGHTS AND COLOR HAVE IN COMMON?

Macdonald, Lindsay
Department of Theatre

The theater needs to be a place to be creative and allow for the audience to enjoy the time they spend in shows. By connecting subconsciously through color this process can be made easier. By studying Picasso’s use of color we can have a deeper sense of emotional interaction with the paintings. By applying this knowledge to theater lighting we can subconsciously connect to the action and characters on stage. So by analyzing color we can connect to a show more deeply. That is what Picasso, lighting and color have in common, emotion.
FOOD WASTE CO-DIGESTION: THE POTENTIAL BENEFITS OF UTILIZING EXISTING INFRASTRUCTURE AT DURANGO WASTEWATER TREATMENT FACILITY.

Mallinger, Hunter; Austin, Rebecca
Environmental Studies Program

Communities around the U.S. are beginning to see the ill-effects of traditional methods of waste disposal. Landfill sites are filling to the brim with wasted materials that have the potential to be re-used in non-traditional, sustainable practices of disposal. More than 25% of U.S. waste being buried and forgotten about is composed of organic material material that is not only biodegradable, but material that has the potential to be used as a source of renewable energy.

For the City of Durango, CO, harnessing this potential energy for the benefit of its residents is not an improbable idea. Durango Wastewater Treatment Facility (DWTF) is in possession of the primary infrastructure needed for capturing this energy, a technology called an Anaerobic Digester. Anaerobic Digestion (AD) is a process which breaks down organic content such as food waste and sewage sludge in an environment free of oxygen. After complex stages that continuously break apart the organic contents take place, a by-product of biogas and digestate are left-over, both with beneficial attributes. To fully understand this process, I have conducted interviews with the DWTF manager of operations Larry Clinton. Further secondary resources have also been used throughout my research, including case studies of community treatment facilities that already utilize AD for a source of renewable energy.

DWTF is currently “energy-independent” as a result of the energy its Anaerobic Digester produces, meaning it relies on no outside resources for energy/electricity to heat and operate the facility. In fact, there is nearly a forty percent over-production of energy necessary to operate the facility on a daily basis. For the City of Durango, I suggest in this thesis that utilization of the existing Anaerobic Digester at DWTF could further maximize the capture of renewable energy from organic waste. Through the integration of additional organic contents (co-digestion) and the installation of a second methane turbine, the community can then make efficient use of locally generated food waste. A final analysis of the collected data will allow for a recommendation of the necessary steps to apply this source of renewable energy to Durango’s power grid.
THE EFFECTS OF PULMONARY HYPERTENSION ON ATHLETE PERFORMANCE IN CYCLISTS AT HIGH ALTITUDE

McDowell, Joshua; Andrea, Bruce; Knight-Maloney, Melissa

Department of Exercise Science

The adverse effects of high altitude on the performance level of endurance athletes is widely recognized, yet under researched. The purpose of this study was twofold. Firstly, to identify significant changes in power output (watts) and pulmonary vascular resistance (PVR) between medium (1,981m) and high (3,139m) altitude. Secondly, to determine if a correlative relationship existed between changes in PVR, and power output (watts), when endurance cyclists performed a VO2max test at medium and high altitudes. Elevated PVR values are indicative of pulmonary hypertension, which reduces right ventricular outflow tract velocity, and may decrease O2 exchange rate. The validated model utilized to calculate PVR was as follows: PVR (dynes-cm-sec-5) = 1.2 x 80 x (PASP/right ventricular outflow tract VTI). Doppler measurements were taken prior to the VO2max test and were repeated immediately post exercise prior to acquiring two-dimensional image and again after two-dimensional image acquisition at the tricuspid valve to assess peak regurgitation velocity. The cohort included 8 subjects with a PVR of 190.41 +/- 48.64(dynes-cm-sec-5) at medium altitude and a PVR of 177.38 +/- 24.59(dynes-cm-sec-5) at high altitude. The cohort demonstrated a Power Output of 354.38 +/- 51.51(watts) at medium altitude and a Power Output of 311.88 +/- 43.75(watts) at high altitude. The paired T-test for two sample means demonstrated a statistically significant decrease in power output (p = 0.054-2), and no significant changes (p = 0.169) in relative PVR. There was a moderate correlation between max Power Output and PVR (r = 0.48) at medium altitude as well as a weak correlation between max Power Output and PVR (r = 0.27) at high altitude. This research aims to extend high altitude cardiopulmonary physiological research from medical to elite athlete populations.
Mankind has just over 1,000 operational satellites in orbit around the earth. Aside from those, people are tracking 15,000 chunks of space debris in orbit about the earth. There is an estimated 500,000 marble size or larger chunks of space debris in orbit about the earth, that are moving at roughly 20,000 mph. These operational satellites are vital to our modern economy, so it is essential that we can track all the space debris possible, in order to avoid catastrophic collisions. My senior research project explored the feasibility, of a simple, single camera system, as a means to track space debris and uniquely define the debris’ orbit via Gauss’s method.
This research examines the effects of terror management theory (TMT) and social influences on sentences given to persons convicted of a criminal act. TMT states that humans defend themselves against the awareness of their own mortality (mortality salience; MS) by investing in cultural worldviews; meaning that when reminded of their own mortality, a person will more closely identify with similar others, and in the case of this study, against those labeled as criminals. I investigated to see whether a person would be more inclined to give a more harsh sentence to someone convicted of a crime after being confronted by the idea of their own mortality, more specifically if the influence of a peer designated to a “protector” role or “nurturer” would affect the sentence given. Each participant was primed with either the mortality salience (MS) or a control salience. Participants then read through a brief story explaining the scene, what crime had been committed, and were given one of two conditions. One condition in which the “protector” role voted to give a higher sentence, and one condition in which the “nurturer” role voted to give a higher sentence. Results of the experiment and possible directions for future research will be offered.
INVESTIGATING THE SOURCE OF COPPER IN THE LA PLATA MOUNTAINS USING COPPER ISOTOPES

Miszkiel, Thomas

Department of Geosciences

The La Plata Mountains formed about 65 Ma when magmas were emplaced into older sedimentary rocks creating a dome-shaped mountain range. Some of the intrusive rocks are spatially related to copper mineralization. The greatest concentration of copper-bearing ore deposits in the La Plata Mountains occur within and around the Allard Stock. The Allard stock, one of two major syenite stocks, is cross cut with numerous veins and zones of chalcopyrite and other copper-bearing minerals. Although these deposits have been mined and explored, the source of the copper has never been constrained.

In this investigation petrographic analyses and copper isotopes were used to characterize the copper minerals and determine if they originated by melting of the crust or mantle. The results of this investigation demonstrate the copper minerals are dominated by chalcopyrite and minor bornite that are associated with magnetite, hematite, and late-state Au-Ag-PGE tellurides. Copper isotope values of -0.079 ‰ to 2.7 ‰ are consistent with a mantle source of copper with minor modification of signature from fractionation of copper isotopes during crystallization. Prior geochemical and U/Pb zircon studies establish that the intrusive rocks and chalcopyrite originated from melting of lithospheric mantle.
Native Americans are the original land stewards of North America. Historical devastation brought on by colonization had major impacts on Indigenous communities, creating issues which linger unresolved to this day. Attempts were made to disconnect tribes from their traditional homelands, restricting them to reservations, and subjecting them to assimilation policies meant to eliminate their language, culture, and traditional economics. Actively recreating connections to landscapes, through language and culture, by developing analog modern economies provides opportunities for resolution.

Structural hindrances exist in chronic underfunding of both BIA and tribal programs. This complex situation inhibits the ability for governing structures to adapt innovative approaches to address social, ecological, or economic issues. I propose that to achieve the goal of cultural revitalization, we develop a Southern Ute tribal (or Tri-Ute intertribal) demonstration project for outdoor recreation and environmental restoration based on the human-in-ecosystem approach to socio-ecological resilience under 25 U.S. Code § 4305 - Intertribal tourism demonstration projects. The path to economic stability, social equity, and dignity depends on the recognition of human interdependence with the ecological community.

A new generation educated in the sciences, natural resource management, and cooperative business skills will relate their traditional teachings, language, and values to landscape stewardship strategies. This will facilitate cultural revitalization and economic rejuvenation complimenting oil and gas development and gaming in current economic development strategies. Combining cultural knowledge with skills for natural resource management, tribes can collaborate across private and federal land management agencies required to consult with tribes. Federal mitigation policies now use a landscape-scale approach in management decisions. Synergizing the indigenous human-in-ecosystem approach to socio-economic development with the landscape-scale approach to land management will encourage ecological and cultural resiliency. This benefits tribes, helping to address climate change challenges in the ecological community, while providing benefits to the broader American society.
The standard operating procedures (SOP) for the use of snow pickets were developed in maritime snow. The conditions created by continental snows differ greatly and require that the standards be evaluated. The purpose of this study was to evaluate the effectiveness of the SOP for the use of snow pickets as anchors and make recommendations for safer snow anchor systems that utilize snow pickets. We tested pickets in a variety of anchor systems according to the SOP's written in the Freedom of the Hills text book by loading the system with a static force applied with a pulley configuration. The snow pack at each location was fully described as well as the amount of static load the system was able to support. We found that the standard picket placements were highly unsatisfactory, holding almost no load at all. This led us to test further modifications to the SOP that greatly increased the effectiveness of the anchor systems.
DESIGN AND DEVELOPMENT OF A SAMPLING PLATFORM TO STUDY LONG DISTANCE SEED DISPERSAL

Ogle, Jonathan; Naglak, John; Blue-Eyes, Isaac; Miller, Collin; Baumbach, Aleph; Prentis, Peter; Smith, York R.; Smith, Ryan N.

Department of Physics and Engineering

Recent theoretical research has shown that ocean currents and wind interact to disperse seeds over long distances among isolated landmasses. Dispersal of seeds among isolated oceanic islands, by birds, oceans and man, is a well-known phenomenon, and many widespread island plants have traits that facilitate this process. Crucially, however, there have been no mechanistic vector-based models of long-distance dispersal for seeds among isolated oceanic islands based on empirical data. Here, we propose an experimental methodology and present a novel sensor platform to circumvent these limitations and directly estimate a mechanistic, vector-based model of seed dispersal in the ocean. We have developed seed analogues, or pseudoseeds, outfitted with wireless sensor technology that will enable high-fidelity tracking as they disperse across large distances in the ocean. The pseudoseeds are precisely designed to mimic actual seed buoyancy and morphology enabling realistic and accurate, vector-based dispersal models of ocean seed dispersal over vast geographic scales.
POLITICAL PHILOSOPHY AND NONHUMAN ANIMALS

Ontiveros, Caleb

Department of Philosophy

In this work I consider two arguments for the conclusion that nonhuman animals are not owed justice. Some argue that justice is solely a matter of distributing material goods and that this excludes nonhuman animals from the sphere of justice. This argument fails for two reasons. First, even if it's true that justice is solely a matter of distributing material goods, it's not clear that it follows that nonhuman animals are not owed justice. Second, the claim that justice is solely a matter of distributing material goods is false. Some argue that the recipients of justice can be determined by some contractarian theory—and that contractarian theories exclude nonhuman animals. Against this, I note that many contractarian theories have implausible consequences and that the most plausible forms of contractarianism don't exclude nonhuman animals. I then explore briefly what including nonhuman animals in the sphere of justice would look like.
THE EFFECTS OF SOIL MOISTURE AVAILABILITY ON NECTAR PRODUCTION IN THREE SUBALPINE PLANT SPECIES OF THE FAMILY RANUNCULACEAE

Ortega, Anna C; Inouye, David W; Steltzer, Heidi

Department of Biology

In some semi-arid regions, including the Rocky Mountains of western Colorado, climate change is predicted to cause a decrease in annual precipitation and increased temperatures. Climatic variations, including soil moisture availability, could have adverse effects on plant and pollinator communities. During the summer 2013 at the Rocky Mountain Biological Laboratory, Gothic, Colorado, I investigated the effects of soil moisture availability on nectar production (i.e., nectar volume, percent sugar concentration) and floral display characteristics (i.e., nectar spur length) in three subalpine species - *Delphinium nutallianum*, *Aquilegia coerulea*, and *Delphinium barbeyi*. Additionally, I investigated how nectar volume varied across time and how such variations could be explained by patterns in precipitation and mean temperature. All three focal species produced higher averages of nectar volume and had higher mean nectar spur lengths in response to increased soil moisture availability. Percent sugar concentration was lower for watered *A. coerulea* and higher for watered *D. barbeyi*. Nectar volume across time appears to be associated with precipitation and mean temperature. Drier conditions negatively affect nectar production, limiting the nectar reward availability and potentially affecting the survival, fitness, and distribution of plant and pollinator communities.
THE ROLE OF INFLAMMATORY SIGNALING MEDIATED THROUGH NF-κB IN METFORMIN INDUCED APOPTOSIS OF MCF-7 CELLS
Quimby, Parker; Penry, Garrett
Department of Biology

The common AMPK-activating diabetes drug Metformin has received considerable attention from the research community as a potential apoptosis causing agent for certain breast, prostate, pancreatic and colon cancers. Upon Metformin’s activation of the cell’s chief energy sensing factor, AMPK, many downstream pathways elicit apoptosis-favoring responses. In this study the goal was to investigate the relative contribution of AMPK’s inhibition of the inflammatory pathway to apoptosis in breast cancer cells. Specifically, Metformin prevents the inflammatory pathway’s chief transcription factor, NF-κB, from trans-locating into the nucleus. To test this a western blot was performed following differential centrifugation to determine if Metformin could prevent NF-κB translocation to the nucleus as well as testing whether the inflammatory activator Prostratin could preserve NF-κB’s translocation, despite Metformin treatment. Apoptosis was quantified via flow cytometry to determine if the combined treatment of Prostratin and Metformin was different from Metformin treatment alone. The combined treatment of Metformin and Prostratin displayed significantly greater translocation than Metformin treatment alone. However, Metformin or Prostratin treatment alone displayed no significant difference relative to the control. In addition there was a statistically greater extent of apoptosis in Metformin treatment alone than the combined Metformin and Prostratin treatment. Since there was no statistical difference between control and Metformin as well as Prostratin treatments in NF-κB translocation, the observed differences in apoptosis cannot be attributed to differences in inflammatory pathway activation. Additional pathways activated through Prostratin’s side activation of Protein kinase C could also be implicated in reducing apoptosis in cells that were also treated with Metformin.
TERROR MANAGEMENT THEORY'S EFFECT ON ATHLETIC PERFORMANCE

Raso, Amanda

Department of Psychology

This research examines the effects of terror management theory (TMT) and athletic performance. TMT states that humans defend themselves against the anxiety stemming from death awareness (mortality salience; MS) by investing in cultural worldviews, which often results in identification with similar others as well as harsh denigration of anyone with opposing views. I sought to investigate whether participant’s athletic performance would be affected by mortality salience. Participants included varsity lacrosse players, varsity women soccer players, men soccer players, and a mixed population of undergraduate students. Each participant was asked to complete as many push-ups as they could and then asked to complete a self-esteem survey. They were then exposed to the mortality salience or control and then asked to repeat the push-up test. The goal was to determine if the participants exposed to the MS had a greater number of completed push-ups the second go around.
OVEREXPRESSION OF THE KLOTHO PROTEIN IN HUMAN EPITHELIAL LUNG CELLS AND THE EFFECT ON AKT AND P38 MAPK CONCENTRATIONS IN THE IGF-1 SIGNALING PATHWAY: INVESTIGATING THE MECHANISMS OF COPD

Reese, Caitlyn M
Department of Biology

Introduction: Chronic obstructive pulmonary disease (COPD) is the 3rd leading cause of death in the U.S., with symptoms that include worsening cough and shortness of breath, followed by successive lung damage. Recently, the klotho gene has gained attention for exhibiting anti-aging properties at the cellular level. This gene encodes a soluble and a secreted form of the protein, which inhibit the AKT transduction pathway. Activation of AKT prevents transcription of vital detoxification genes that encode proteins to neutralize reactive oxygen species (ROS) produced during cell metabolism. Accumulation of ROS induces the activity of p38 MAPK, a kinase that promotes inflammation and apoptosis. KLOTHO inhibition of the AKT pathway may be the key to future efforts to prevent lung damage in smokers. We hypothesize that cells, which overexpress klotho will have significantly lower levels of AKT and p38 proteins versus unaltered cells.

Methods: Human epithelial lung cells that overexpress klotho as well as control cells were treated with 200 µg/mL CSE for 6, 12 and 24 hours. RNA was isolated, and the klotho gene was amplified and quantified using RT-qPCR. Proteins were isolated and subjected to Western Blot. AKT and p38 levels were quantified using densitometry.

Results: klotho mRNA levels were significantly higher in CSE treated cells versus controls at 12 hours post-CSE exposure. Basal levels of AKT and p38 were significantly increased in klotho overexpressing cells. AKT and p38 protein levels were significantly higher in CSE treated cells versus controls in cells that overexpress klotho only. Future experiments should focus on quantifying levels of active (phosphorylated) AKT and p38 proteins. This would provide more insight into whether activities of AKT and p38 are lowered, despite increased levels of total proteins, in response to klotho overexpression.
PREPARATION OF DRUGS TO SELECTIVELY KILL CANCER CELLS

Reese, Caitlyn; Askeland, Gracie; Caldera, Hector; Chavez, Marlyn; Baldwin, Raina; Miller, Kenneth A.

Department of Chemistry

Rottlerin is a natural product isolated from the fruit of the kamala tree. Previous studies have shown that it is a potent inhibitor of protein kinase C delta, an enzyme that is critical for the survival of many types of cancer cells. However, treatment of non-cancerous cells with similar doses of rottlerin has no effect. Thus rottlerin, or compounds similar in structure, could find use as selective drugs to kill cancer cells without harming healthy cells. The goal of this project was to synthesize a palladium catalyst that could be used in future experiments to synthesize rottlerin analogs.
SYNTHESIS OF GLYCOSYLATED ESSENTIAL OILS: POTENTIAL PROTECTIVE AGENTS FOR HONEY BEES

Robison, Ashlee; Park, Jasmine; Checkers, Marshall; Collins, William
Department of Chemistry

Currently, the most devastating pest to the Western Honeybee (Apis mellifera) is the Varroa Mite (Varroa destructor). This mite attacks honeybees by both extracting the hemolymph from their bodies and by passing hemolymph-based viruses between colonies. The most common methods employed in the treatment of the Varroa Mite are pyrethroid derivatives. However, the Varroa mite is increasingly displaying resistance to these synthetic acaricides, which drastically limits their overall efficacy. Recently, essential oils such as Thymol have been shown to be effective acaricides for pest management in honeybee colonies. Unfortunately, it is difficult to control dosage of thymol-based treatments as they are currently applied to colonies in a vapor-phase. Preventing resistance to essential oils such as thymol is of the utmost importance to ensure the long term health of the western honeybee. This research focused on controlling the dosage of essential oils by synthetically creating a glycosylated thymol molecule that will be orally administered and will only become activated upon ingestion by the honeybees. This synthetically created molecule will undergo conversion from the inactive to active form within the hemolymph system of the honeybee and potentially make them resistant to the attack of the Varroa mite with a more controlled and effective dosage.
The objective of our research was to determine the role that immunocompetence plays in the susceptibility of wild mammals to simultaneous infection with multiple pathogens. As part of this research, we determined 1) the extent to which maintaining a chronic infection with Sin Nombre virus (SNV) affected immune system function of wild deer mice and 2) the extent to which immunocompetence influenced the susceptibility of deer mice to co-infection with the bacterial pathogen, *Bartonella*. We conducted a field and lab-based study in which we compared the innate, inflammatory and virus-specific immunity of SNV-infected deer mice to their uninfected counterparts. Likewise, the immunity of deer mice who were co-infected with both *Bartonella* and SNV were compared to individuals who were either uninfected or infected with only 1 of these pathogens. Our results show that deer mice chronically infected with SNV have a long-term increase in the inflammatory immune response, and this reduction in innate immunity is most pronounced during the acute stage of infection. Collectively, these results indicate that costs to innate immunity may differ over the course of SNV infection. In addition, we found that SNV infected deer mice are more susceptible to secondary infection with *Bartonella* during the acute phase of SNV infection, as this represents a period when their innate immunity is greatly reduced. Our results provide much needed information regarding the regulation of both bacterial and viral pathogenesis in wild animals, ultimately improving our ability to predict patterns of zoonotic disease transmission among animals and from animals to humans.
THE ROOTS OF EUGENICS: KEY SHIFTS IN THE EARLY DEVELOPMENT OF EUGENIC IDEOLOGY, 1869-1883

Rodriguez, Chelsea
Department of History

This thesis attempts to establish a distinct timeline in the development of the idea of Eugenics, which is the theory that a superior race of humans can be created through the manipulation of marriage, reproduction, and genetics. The most important changes in eugenic ideology occurred not in the 1900’s, but between 1869 and 1883, the years between which Francis Galton published his theories on Eugenics. In 1869, Eugenics was simply a theory on how human traits, such as intelligence and morality, might be hereditary; however, by 1883, the idea had already evolved into a radical philosophy, due to the influence of Darwinism, scientific racism, and Progressive Era activism. This research was conducted by analyzing the works of early Eugenicists and contemporary scholars such as Cesare Lombroso, Ernst Haeckel, and Ludwig Büchner; secondary sources analyzed the existing scientific and social environments that influenced these scholars. Significant changes occurred between 1869 and 1883, leading to a new understanding of Eugenics before it came to prominence in the 20th Century.
The purpose of this study was to measure the immediate effects Tapping or the Emotional Freedom Technique (EFT) had on stress. Addressing the issue at hand and showing self-compassion, then tapping on certain points, or meridians, while repeating positive affirmations sends signals to the amygdala, creating a calming effect. The participants (N = 56) were randomly assigned to an experimental or control group. In the experimental group, participants went through the tapping process and repeated positive affirmations. In the control group, the participants tapped on non-amygdala stimulating points and repeated the same script in order to see if there was a placebo effect. In both groups, pre and post stress tests were distributed. I hypothesized that tapping/EFT would cause a more significant reduction in the experimental group than the control group. The results indicate that tapping will reduce stress symptoms more significantly than tapping on points that are not connected to meridians though there was a minor placebo effect in some participants as well.
APPLICATION OF THE TRANSIT METHOD FOR EXOPLANET DETECTION

Rymer, William S.
Department of Physics and Engineering

Data was collected on the star WASP-43 in order to verify the presence of an expected orbiting planet, WASP-43 b, using the Photometric Transit Method. SuperWASP data was used to predict the transit time of the exoplanet, which was observed several times throughout the course of 5 months. Due to time and equipment constraints, only verification of the differential change in magnitude was possible. To accomplish this project, the coordinates for a star in the SuperWASP field of view that was predicted to dim in brightness at a time and date between November 2013 and March 2014 was acquired. The star was observed at the time and date predicted by the SuperWASP data using the telescope at the Fort Lewis College Observatory. The transit was recorded with a series of images that were taken with a CCD camera through the telescope as the planet traversed the star. The images were processed and the relative brightness of the star was recorded for each image during the transit. From these values for relative brightness, a light curve was created to visually show the starting and ending times of the transit and the magnitude of the change in brightness during the transit. The observed average change in brightness of the transit matches the data predicted by the SuperWASP program within a margin of uncertainty.
This paper examines the history and positive impact of the Boys and Girls Club of America. By empowering youth with leadership skills, academic achievements, and development of respect, members at Club are involved in a nurturing environment. This gives members the opportunity to acquire pro social skills while being in a safe environment. Youth involved in community after school programs are able to better navigate social skills of society and be less likely to be isolated and or manipulated by bullies. Members of the LaPlata Boys and Girls Club incorporate positive communication and interactions between themselves and leaders. The leaders realize bullying incidences must be identified and diminished before they are able to escalate. Opening in 2006, LaPlata BGC began sponsorship with United Way, LaPlata Electric, and local individuals providing members with the resources to develop leadership and academic skills. The Club also encourages members to develop respect and empathy for others and respect for themselves. Partnering with Sears has allowed the BGC to be involved with the national Stop Bullying program. Membership in The Club, gives youth the feeling of ownership of their facility, sense of security, and skills to enlist help if and when they experience bullying. In 2012, 270 members were involved in programs to promote good character and citizenship. At the end of the year, surveys were conducted and revealed; 75% felt they had gained leadership, and 93% reported treating others with respect was important. These results reveal members ability to incorporate positive behavior, leadership skills and positively impact lives with the end goal of reducing those being bullied and bullying occurrences.
OUR CAPITALIST SOCIETY MAKES MENTORING NECESSARY

Speas, Caleb
Department of Sociology

My project and research this semester has been focused on the inequalities within capitalism that have led to struggles within the family, specifically in the United States. I wanted to explore what has happened in our culture that has led to there being a need for non-profits that provide a mentoring component for youth. Many kids are not getting the close adult interaction they need from home, and I wanted to show how capitalism has made it difficult for parents to give their children what they need.

The commodity culture and income inequality inherent within capitalism has led to a strained home life, and a lot of non-profits have been started to help manage some of those struggles and give our young population much needed attention.

I have worked closely with Big Brothers Big Sisters of Southwest Colorado (BBBS) for the last two years, and this semester I was able to intern for them as well. From my internship and research I have learned a lot about the non-profit world and the history that has led us to where we are today. I researched the correlation of income as it relates to the family, and the percent of kids who are utilizing the social resources provided in our community.

By working with BBBS I was able to see how important positive adult relationships are for children. My research shows that children with close positive adult relationships are less likely to use drugs and alcohol early on, less likely to drop out of school, and less likely to be violent. There are many benefits to mentoring. Young people that engage in one to one mentoring relationships have a higher self-esteem, more educational success, and closer relationships with their families and communities.

I have also been able to create a brochure offering information about mentoring/youth services in our own community. The brochure is organized by price, similar to a dining guide. My experience this semester has been extremely fulfilling, and I was able to get a job through my internship. Big Brothers Big Sisters of Southwest Colorado has hired me as their Community Program Specialist and I start full time once this semester is over.
FACTORS RELATING TO THE NATIONAL CURATION CRISIS: A VIEW FROM FORT LEWIS COLLEGE

Springmeyer, Baley

Department of Anthropology

In this study I examine the causes of a national curation crisis that results, among other things, in the inability to care well for artifact collections, particularly in college and university museum repositories. The research I conducted was based on two sets of data. First, I conducted a survey-based pilot study given to staff associated with collection management at other institutions. Second, I conducted a participant observation-based case study of the archaeological collections housed in the Center for Southwest Studies at Fort Lewis College. I conclude that some possible factors contributing to the curation crisis are 1) a lack of proper research design before archaeological excavations take place; 2) an emphasis on archaeological practice to the detriment of that of conservation; 3) the emergence of the cultural resource management field in response to a plethora of national and state laws; and 4) a separation between personnel involved in caring for cultural resources, such as archaeological and museum professionals and the ever dwindling staff who carry out necessary work. Finally I propose a few recommendations regarding how we might deal with the curation process, at least at the local level.
In the prehistoric Southwest, subsistence practices connect the exploitation of natural resources with the production of food and commodities. To recognize the importance of *Zea mays*, *Phaseolus*, and *Cucurbita* (corn, beans and squash) to subsistence, this paper explores wild and domesticated plants used during the 12th and 13th century occupations of Aztec Ruins. Research carried out on experimental plots starting in September 2013 was designed 1) to determine which resources were being exploited, 2) for what purposes, and 3) make analogies, using experimental archaeology, for the productivity of prehistoric subsistence resources. It was found that domesticated plants were integrated into the agricultural complex and subsistence was augmented by wild foods like beeweed and pricklypear fruit, and additionally that some wild resources (e.g. yucca) were cultivated for fiber. A diverse mix of plants were necessary to satisfy the demands for fiber, food, and shelter as well as art and aesthetics among the Ancestral Puebloans who occupied Aztec Ruins.
I'll be performing Frederic Chopin's Scherzo No. 3 in C-Sharp Minor, Op. 39, as one example of the type of music that will be featured in my Senior Recital on April 27. Polish-born Chopin was one of the greatest pianistic innovators of all time, evidenced by this brilliant composition, with fast running octaves and beautiful cascades arpeggios. Chopin wrote this scherzo while living in Majorca with novelist George Sand around 1839. I have done research for several classes on Chopin, particularly his famous polonaises, which were written around the same time.

Chopin’s designation of Op. 39 as a “scherzo” (or “joke”) is hard to believe, as it is incredibly virtuosic and beautiful. My wonderful piano teacher, Dr. Lisa Campi, introduced me to the piece because it has long been a favorite of hers. I instantly fell in love with it as well. Dr. Campi’s teacher from the Eastman School of Music, Rebecca Penneys, once studied with legendary pianist Arthur Rubinstein, who was known as a great interpreter of Chopin. In fact, when referring to this scherzo, Rubinstein said it “takes more strength out of me than any other work I know.”
AN ANALYSIS OF ATTAINABLE PATTERNS IN ALIEN TILES

Thorne, Taylor
Department of Mathematics

Alien Tiles is a puzzle solving game played online in which the player creates colorful patterns in a grid. By clicking a square in the grid, each square in the chosen row and column changes colors. The objective is to transform the starting board of all red tiles to a given pre-established pattern. This project will analyze the paper by Peter Maier and Werner Nickel, “Attainable Patterns in Alien Tiles.” Specifically, we determine whether or not a pattern can be created, and give an algorithm for finding a series of clicks that creates the pattern. Next, a method is introduced which calculates the number of all possible attainable patterns on a playing board of any size.
FIELD EVIDENCE FOR CYCLIC SUBSURFACE ERUPTIONS DURING DIATREME EMPLACEMENT, CATHEDRAL CLIFF, NAVAJO VOLCANIC FIELD

Walter, Sterling
Department of Geosciences

Diatremes in the Navajo volcanic field were emplaced in steep pipes or dome-shaped “blind” eruptions. Aprons of bedded and stratified deposits envelope some of these complexes, providing insight into their eruptive histories.

The pyroclastic apron at Cathedral Cliff diatreme preserves deposits and bedforms indicative of high energy emplacement of gas-charged magma. Field studies document multiple (18+) eruptive cycles from distinct, episodic discharges of gas and pyroclastic material at depths of 1500 to 2000 feet. Erupted material in each cycle is 6 to 15 feet thick and contains three main deposit types. Basal deposits in each cycle are unbedded, matrix to clast supported, heterolithic tuff breccia with angular to subrounded fragments of essential, cognate and accidental material up to 30 cm in maximum dimension. This is overlain by thin bedded, crudely-graded tuff breccia with similar types of pebble-sized fragments. Cycles are usually capped by thinly-laminated to thin-bedded ash-rich tuffs that preserve cross stratification, impact structures, and erosional surfaces. Each cycle thus transitioned from highly explosive and chaotic deposition of material to finer ash-rich material dominated by transport bedforms. The tops of most cycles are scoured and truncated by basal deposits of the next cycle. Beds in the pyroclastic apron dip steeply toward the center of the diatreme. Cross lamination, scour surfaces, "bomb" sags, and graded bedding indicate that the oldest deposits are on the outer margin of the pyroclastic apron with successive deposits inward.

The results of this investigation provide evidence for multiple and discrete subterranean eruptions during diatreme formation. This is consistent with models that involve the rise and expansion of gas-rich “bubbles” that ultimately exceed lithostatic pressure and erupt. These “bubbles” expand and release gas upwards, and then collapse in subsurface chambers, depositing subvertical masses of pyroclastic material. Our results, however, indicate a progression in each cycle from clast-laden material to low-density gas-rich and clast-poor material. The data lends support for multiple eruptive pulses during diatreme formation related to magmatic-gas decompression, as opposed to periodic interaction with groundwater reservoirs.
PHYLOGENY AND EVOLUTIONARY DISTRIBUTION PATTERNS IN THE ENDEMIC HAWAIIAN GENUS CHARPENTIERA (AMARANTHACEAE)

Walters, Drew; McCauley, Ross A.; Havran, J. Christopher
Department of Biology

Phylogenetic analysis of the nr ITS region indicates that several species of the genus Charpentiera, C. australis of French Polynesia and C. obovata populations of Kaua’i and Moloka’i, have historically hybridized with Achyranthes mutica, endemic to Hawai’i and Kaua’i. Analysis of the plasmid psbA-trnH region suggests that Achyranthes served as the pollen donor and Charpentiera as the seed donor in the hybridization event likely occurring on Kaua’i. Other C. obovata individuals from Maui and Lana’i show no signs of hybridization, indicating separate dispersal events of hybrid and non-hybrid forms to the Maui Nui Complex. Morphological analysis paired with phylogenetic results indicates that non-hybridizing Charpentiera species likely founded moist habitats and radiated to dryer habitats. These results also support founder event speciation of Charpentiera originating on Kaua’i and dispersing to the younger main islands of the Hawaiian archipelago.
GROUND-DWELLING ARTHROPOD COMMUNITY DIVERSITY IN POPULUS TREMULOIDES STANDS AFFECTED BY SUDDEN ASPEN DECLINE IN SOUTHWESTERN COLORADO, USA.

Wampler, Matthew; Korb, Julie

Department of Biology

Sudden aspen decline (SAD) has become a recognizable issue among aspen (Populus tremuloides) stands on the Colorado Plateau and throughout the Western US, and Canada. Increasing temperatures coupled with drought in the early twenty-first century predisposed aspens to SAD and caused a loss of aspen overstory cover and inhibited aspen regeneration. The Intergovernmental Panel on Climate Change predicts global temperatures to continue to increase 0.2°C per decade, which will continue to perpetuate SAD. Recent studies have shown that as the intensity of SAD increases the composition of the understory changes as well, usually with an increase in grass abundance. To our knowledge, how SAD affects ground-dwelling arthropod communities has not been previously studied. Research in other habitats shows ground-dwelling arthropod diversity is most affected by disturbance and understory plant diversity. We conducted a study investigating the effects of three levels of SAD (healthy, moderate, and high) and a coppice harvest treatment (N=7/SAD level or treatment) on ground-dwelling arthropod diversity in the San Juan National Forest, southwestern Colorado. We established two pitfall traps every ten meters along a 50m transect (N=12 Traps/site x7 sites/SAD level or treatment). Collecting occurred twice during the peak growing season, once in mid-June and once in mid-July. In addition, we quantified overstory aspen stand characteristics and understory vegetation biomass by functional groups to correlate with ground-dwelling arthropod richness and abundance. We found that the ground-dwelling arthropod community was directly affected by the variable stand structure created by SAD. We found significant differences between the four aspen categories in the mid-summer collection (F=5.41, P=0.0004) and in the late summer collection (F=2.56, P=0.0076). Arthropod family diversity decreased and abundance of individuals increased as the SAD level increased. Multiple indicator families were found and could be explained by niches they fill and how the SAD has impacted the environment. It is important for land managers to understand the ecological impacts of SAD and coppice harvesting of SAD on ground-dwelling arthropods as this group constitutes a large proportion of biodiversity in aspen stands and thus the uniqueness of this vegetation type.
EVERYTHING AFFECTS EVERYTHING: A NEW WAY TO COMBAT BULLYING

Watson, Dakotah

Department of Theatre

Bullying plagues schools across the United States. Day after day thousands of kids stay home from school, avoid people in the halls, and go home in tears because of kids in their school classified as a bully. There are many types and varieties of bullies and bullying but they all have the same outcome, a torn down individual. The biggest trouble with bullying is that it is different for every individual which is why schools have had such a hard time combating it. How can you stop bullying when every kid has something different happening to them to various degrees of intensity. The anti-bullying tactic - showing bullies the voice of their victims - utilized by the character Hannah, in Jay Asher’s “Thirteen Reasons Why” is a highly effective strategy to combat bullying through the use peer theatre. Through a performance, using true stories collected from victims, bullying can be combatted by showing the true voice and effects on the victim.
FEMINISTS IN THE BLOGGERNACLE: HOW THE INTERNET IS CHANGING THE WAY MORMON WOMEN TALK ABOUT THEMSELVES

Watts, Hannah
Department of Anthropology

In this autoethnographic study I will explore the diverse views about female priesthood ordination within the LDS community. I also will discuss the role of the internet in initiating changes within the church. Currently in the Mormon community there has been a great deal of discussion about the role of women in the church, particularly regarding priesthood ordination and access to leadership positions. In this research I surveyed 150 church members and asked them a variety of questions about their views concerning the role of women, the processes of change within the church, and their participation in online discussions of this topic. I compounded my interviews with discourse analysis of several Mormon blogs and library research. I found that changes within the church and opinions about female ordination are influenced by the online discussions that take place on blogs. The changes evident in Mormon culture regarding women’s roles are reflective of the changing position of women within a broader social context.
Department of Anthropology

Adams, Kimberly L. Preserving the York Minster Cultural Heritage Site: A Look at the Complex Issues Threatening to Undermine Historical Preservation in York, England Today (Advisors: Fine-Dare, Kathleen and Jenks, Kelly)

Austin, Rita M. An Assessment of Stress in a Medieval Nubian Population Observing Drifting and Double Zonal Osteons (Advisors: Mulhern, Dawn and Fine-Dare, Kathleen)

Beamer, Cameron. The Creative Process in Performing and Composing Hybrid Musical Genres: The Tension between Structure and Agency (Advisor: Fine-Dare, Kathleen)

Blair, Jeremy A. What’s New? What’s Changed? Ongoing Experiences and Reflections of the Ferdinand Marcos and Cory Aquino Era in the Philippines (Advisors: Austin, Rebecca and Fine-Dare, Kathleen)

Brickle, Tyler A. Why A comes before B: Applying an Anthropological Lens to Business and Understanding Cultural Influences in the Workplace (Austin, Rebecca and Fine-Dare, Kathleen)

Cooper, Jane M. Khat and the International War on Drugs: Causes and Consequences of Anti-Khat Campaigns and Legislation (Advisor: Fine-Dare, Kathleen)

Greubel, Christopher W. Tracing Patterns of Neanderthal and Modern Human Interactions: Problems and Potential in Evidence (Advisors: Mulhern, Dawn and Fine-Dare, Kathleen)

Ignacio, Natasha R. Exploring the Relationship between Body Mass Image, Body Mass Index, and Diabetes Awareness among Navajo Adults in the Ignacio and Eldridge Family Units (Advisors: Kozak, David and Fine-Dare, Kathleen)

Lark, Amber V. Verifying the Classification of Rosa Black-on-White Ceramics Using Trace Element Analysis (Advisors: Riggs, Charles and Fine-Dare, Kathleen)

Mehl, John H. Music in Affirmation of Diné Identity (Advisors: Fine-Dare, Kathleen and Kozak, David)

Molle, Carl J. Native American Experiences at Fort Lewis College: An Analysis of Perceptions (Advisor: Fine-Dare, Kathleen).
Neff, Nadia C. *Sexual Dimorphism of the Ankle Bones: Applications Within Forensic Anthropology* (Advisors: Mulhern, Dawn and Fine-Dare, Kathleen)

Phair, Michelle D. *The Forgotten Cemetery: A Cultural Landscape Analysis of a Late-Contact Historic Ute Cemetery in Ignacio, CO* (Advisors: Mulhern, Dawn; Jenks, Kelly; and Fine-Dare, Kathleen)

Rogers, Rachel C. *Tuberculosis and the West: A Case Study of Glenwood Springs, Colorado* (Advisors: Fine-Dare, Kathleen and Mulhern, Dawn)

Schrimmer, Bryan W. *The Concept of Moral Economy in Comparing Peasant Responses to Globalization* (Advisors: Fine-Dare, Kathleen and Kozak, David)

Smith, Hillary F. *Maternal Health and Mortality in Tanzania* (Advisors: Kozak, David and Fine-Dare, Kathleen)

Smith, Madeline M. *Cranial Nonmetric Variation & Estimating Ancestry in Regards to Modern Caucasian Remains: A Comparison to the Work of Dr. Joseph T. Hefner* (Advisors: Mulhern, Dawn and Fine-Dare, Kathleen)

Springmeyer, Baley A. *Factors Relating to the National Curation Crisis: A Case Study from Fort Lewis College* (Advisors: Fine-Dare, Kathleen and Jenks, Kelly)

Stokes, Joseph O. *Musculoskeletal Interpretation of Labor Induced Stress on Ancient Andean Populations from Hualcayán (Ancash, Perú)* (Advisors: Mulhern, Dawn and Fine-Dare, Kathleen)

Strawn, David. *Experimental Gardening for Insight into Ancient Puebloan Life* (Advisors: Riggs, Charles and Fine-Dare, Kathleen)

Sturek, Mirka A. *Roller Derby: Female Stereotype or a New Wave of Feminist Empowerment?* (Advisors: Fine-Dare, Kathleen and Juergensmeyer, Erik)

Ward, Rebecca L. *Interpreting Ambiguities of Sex, Gender, and Sexuality in the Archaeological Record* (Advisors: Fine-Dare, Kathleen and Jenks, Kelly)

Watts, Hannah. *Feminists in the Bloggernacle: How the Internet is Changing the Way Mormon Women Talk About Themselves* (Advisors: Fine-Dare, Kathleen and Jenks, Kelly)

Wirth, David M. *Cultural-Based Strategies in Substance Abuse Treatment: A Study of Practice and Perspective* (Advisors: Fine-Dare, Kathleen and Kozak, David)
Department of Art & Design

53rd Annual Student Juried Exhibition
Student Participants

Bolsinger, Chad. *Nelson Mandela*, powdered graphite on cardstock. (Advisor: Martens, Andrea)

Bolsinger, Chad. *Luna*, oil on wood panel. (Advisor: Colby, Chad)

Catlin, Lauren. *Ram*, cardboard, newsprint and paper towel. (Advisor: Dougan, Jay)

Courtney, Shea. *Sutrashti*, found objects, mixed media.


Dallas, Spencer. *Social Dynamic*, collage, acrylic, yarn and glue. (Advisor: Colby, Chad)


Duval, Kaleigh. *Geometric #3*, collage, acrylic on wood panel. (Advisor: Colby, Chad)

Duval, Kaleigh. *The Yellow Blob*, recycled foam. (Advisor: Colby, Chad)

Elford-White, Cedar R. *Facial Relations*, paper collage and matchbooks.

Elford-White, Cedar R. *Untitled*, tracing paper, crayon and stencil.

Fabian, Brooke. *Az Anya (Mother of Time)*, solar plate etching.

Frederking, Taylor. *Festival Campaign*, digital media. (Advisor: Booth, Paul)


Hamilton, Dawn. *Cyclical Prayers*, ink and graphite. (Advisor: Martens, Andrea)

Hamilton, Dawn. *How are You Today?*, monotype print. (Advisor: Holmquist, Tony)


Hudson, Ursala. *Interconnectedness*, monoprint.

Hudson, Ursala. *Real Men*, oil on canvas. (Advisor: Colby, Chad)


Cerda, Adreana. *The Crucifixion*, mixed media. (Advisor: Colby, Chad)

Cerda, Adreana. *Letter from Panama*, collage and mixed media. (Advisor: Colby, Chad)

Mirner, Westin. *7 Deadly Zins*, digital media. (Advisor: Meek, Shawn)


Rayburn, McKenzie. *Consumerism*, mixed media. (Advisor: Meek, Shawn)


Schlau, Nick. *Untitled*, porcelain. (Advisor: Dougan, Jay)

Scrubby, Will. *Sno-Cat*, polymer plate intaglio print. (Advisor: Holmquist, Tony)


Smith, Kevin M. *Mené Pés*, mixed media. (Advisor: Dougan, Jay)

Tapia, Morningstar. *Untitled*, paper collage. (Advisor: Colby, Chad)

Tapia, Morningstar. *Untitled*, paper collage. (Advisor: Colby, Chad)

Tso, Patrick. *Martin Yazzie King*, acrylic on board. (Advisor: Colby, Chad)

Tso, Patrick. *Mrs. Harvey Yazzie*, pencil on board. (Advisor: Colby, Chad)

Department of Biology

Senior Theses


Catlin, Lauren. *Pollinator Diversity at Low and High Elevations, Southwest Colorado.* (Advisor: Korb, Julie)

Claw, Heather. *Loss of Culturally Significant Plants on the Western Navajo Reservation in Arizona.* (Advisor: Steltzer, Heidi)

Corley, Cameron. *The Effects of Sudden Aspen Decline on Understory Shrubs, Southwestern Colorado.* (Advisor: Korb, Julie)

Dahlmann, Elizabeth. *Microsatellite Analysis of Type A/B Postaxial Polydactyly in a Single Family Unit.* (Advisor: Byrd, Shere)

Davila, Brittany and Bell, Kristina. *The Effects of Guided Imagery on Salivary Cortisol Levels Related to Student’s Test Anxiety.* (Advisors: Sears, Sharon and Byrd, Shere)

Dina, Meghan. *Effects of Early Season Senescence on Black Bear Foraging Behaviors in Southwestern Colorado.* (Advisors: Steltzer, Heidi & Johnson, Heather)

Duran, Mallorye. *Klotho Expression within Epithelial Lung Cells treated with Allergens.* (Advisor: Blake, David)


Flippin, Tia; Riley, Nate; Schmidt, Garrett; Garchar, Krista. *Surface Greenness across Elevation from Subalpine into Subnival in the San Juan Mountains.* (Advisor: Steltzer, Heidi)

Garchar, Krista; Riley, Nate; Schmidt, Garrett; Flippin, Tia. *Plant Available Soil Nitrogen in Early July across Elevation in Alpine Tundra, San Juan Mountains, CO.* (Advisor: Steltzer, Heidi)

Garcia, Mario. *Klotho Overexpression in Human Lung Epithelial Cells decrease Sensitivity to Cigarette Smoke induced Cell Death.* (Advisor: Blake, David)

Gelzer, Emily R. *Effects of Long-term Leaf Litter Reduction on Leaf Litter Decomposition and Macroinvertebrate Communities.* (Advisors: Steltzer, Heidi & Rosas, Keysa & Torres, Pedro)

Giles, Jimi. *Growing Season Warming Effects on Plant-Pollinator Relationships in Two Elevations in Southwestern Colorado.* (Advisor: Korb, Julie)
Harvey, Audrey. Comparing Methodologies in Pollinator Sampling at Two Elevations in Southwest Colorado. (Advisor: Korb, Julie)

Hattman, Emma. Investigating Simvastatin as a Treatment for Polycystic Ovary Syndrome. (Advisor: Byrd, Shere)

Hooper, Zachariah. The Search for Antibacterial and Anti-inflammatory Properties in Plant Compounds. (Advisor: Blake, David)

Hum, Richie and Haefner, Emily. Survey of the Vascular Flora of the Pine Gulch Area, Old Fort Lewis Property in Hesperus, Colorado. (Advisor: McCauley, Ross)

Malik, Nicholas K. Breast Cancer Migration Is Increased by an Aqueous Extract of the Medicinal Herb Ocimum Gratissimum in MCF-7 Cells. (Advisors: Byrd, Sherell K. & Ekunwe, Stephen I.N.)

Ortega, Anna. Assessing How Variations in Soil Moisture Availability Affect Nectar Production of Three Subalpine Plant Species in the Family Ranunculaceae. (Advisors: Steltzer, Heidi & Inouye, David)

Pate, Taylor. Cynipid Gall Abundance and Diversity on Parental Species Quercus gambelii, Quercus turbinella, and Hybrid Species Q. X undulata with a Comparison of Two Separate Sites in Durango, CO, and San Juan Co., NM. (Advisor: McCauley, Ross)

Penry, Garrett and Quimby, Parker. The Role of Inflammatory Signaling Mediated Through NF-κB In Metformin Induced Apoptosis of MCF-7 Cells. (Advisor: Byrd, Shere)

Reese, Caitlyn. Overexpression of the Klotho Protein in Human Epithelial Lung Cells and the Effect on AKT and p38 MAPK Concentrations in the IGF-1 Signaling Pathway: Investigating the Mechanisms of COPD (Advisor: Blake, David)

Riley, Alex. The Effects of Cissus quadrangularis on LPS-Stimulated RAW 264.7 Macrophage Cells. (Advisor: Byrd, Shere)

Riley, Nathan; Garchar, Krista; Flippin, Tia; Schmidt, Garrett. Alpine Tundra Soil Characteristics along an Elevation Gradient in the San Juan Mountains, CO (Advisor: Steltzer, Heidi)

Salganek, Skye and Cowley, Sarah. Macroinvertebrate Colonization and Decomposition Rates of Homogeneous and Heterogeneous Riparian Leaf Litter in Junction Creek. (Advisors: Kendall, Deb and Byrd, Shere)

Schmidt, Garrett Lane; Flippin, Tia; Garchar, Krista; Riley, Nate. Changes in Alpine Plant Abundance and Plant-nutrient Relationships across an Elevation Gradient. (Advisor: Steltzer, Heidi)

Sockpick, Ashley and Myers, Dakota. Does Interleukin-15 Activate T cell-dependent Production of TNFa in PBMCs derived from Rheumatoid Arthritis Patients? (Advisor: Blake, David)
Succo, Diedra. *The Effect of Hyperosmotic Stress on the Insulin Receptor Substrate-1 Complex and Glucose Transporter Type 4 Translocation in Mouse Myoblast (C2C12) Cells.* (Advisor: Byrd, Shere)

Vosler, Logan and Hodgekiss, Porter. *Staphylococcal Quorum-Sensing Inhibitors, and Inflammatory Cytokine Production in Mouse Monocytes.* (Advisor: Blake, David)

Walters, Drew J. *Phylogeny and Evolutionary Distribution Patterns in the Endemic Hawaiian Genus Charpentiera (Amaranthaceae).* (Advisor: McCauley, Ross)


**Independent Studies**

Garchar, Krista. *Production of TNF-alpha by Raw 264.7 Macrophage Cells as a Result of Exposure to Porphyromonas gingivalis.* (Advisor: Byrd, Shere)


**Department of Chemistry**

**Research Projects**

Askland, Gracie, Gaffri, Codie, Landing, Samuel, McKenzie, Jason, and Riedberger, Rebekah. *Progress Toward the Synthesis of Rottlerin, an Anticancer Natural Product.* (Advisor: Miller, Kenny)

Atene, Antonia, Dayish, Kolette, Warriner, Marcus, and Yeager, Dan. *Determining the Secondary Structure of the HTLV pro-pol Frameshift Site Using NMR and Native Gel Analysis.* (Advisor: Mouzakis, Katie)

Broad, Amanda. *Determining the Secondary Structure of the HTLV pro-pol Frameshift Site Using SHAPE Chemical Probing.* (Advisor: Mouzakis, Katie)


D'Spain, Tyler, Gaffri, Codie, and Riedberger, Rebekah. *Divergent Synthesis of Several Antiviral Indole Alkaloids from a Common Intermediate.* (Advisor: Miller, Kenny)

Girton, Margie. Design and Fabrication of Paper-based Sensors Using a Wax Printer and Polyethylene-based Wax Cartridges. (Advisor: Milofsky, Rob)


Hatathlie, Francine. Modeling Hindered Rotation in the Peptide Bond. (Advisor: Estler, Ron)


Joe, Natalie and Allen, Kayla M. Development of a New Synthetic Pathway for the Formation of the Coordination Complex trans-dichlorotetrakis(pyridine)cobalt(III) chloride. (Advisor: Morris, Aimee)

Knewitz, Allison, GreyEyes, Shawn, Davis, Summer, and Stelmaszek, Jordan. Does Pseudoknot Formation Play a Role in HTLV-1 pro-pol Frameshifting Efficiency? (Advisor: Mouzakis, Katie)


McLain, Katherine, Brinkmann Saje, and Martin, Evita. Acidobacterium capsulatum Metabolism: Characterization of an Alternative Glycolytic Pathway. (Advisor: Sommerville, Leslie E.)

Reese, Caitlyn, Askland, Gracie, Caldera, Hector, Chavez, Marlyn, and Baldwin, Raina. Preparation of Drugs to Selectively Kill Cancer Cells. (Advisor: Miller, Kenny)


Wall, Hollie, Trujillo, Pariss, and Broad, Amanda. The Role of Transaldolase in Glucose Metabolism in Acidobacterium capsulatum: Cloning Putative Transaldolase Genes and Determination of Transaldolase Activity in Cell Lysates. (Advisor: Sommerville, Leslie E.)
Senior Seminar Titles

Allen, Kayla. *Accelerator Production of Alpha Radionuclides.* (Advisor: Miller, Kenny)

Atene, Antonia. *Propofol: Early Mechanism Theories Lay the Foundation for the Discovery of the Binding Site on Mammalian GABAA Receptors by Photolabeling.* (Advisor: Miller, Kenny)


Davis, Summer. *A Non-amyloid Based Approach to Treat Alzheimer's Disease Utilizing Phosphodiesterase Inhibition.* (Advisor: Miller, Kenny)

Doty, Trevor. *Complexation-Ultrafiltration: The Removal of Heavy Metals from Water.* (Advisor: Miller, Kenny)

Goffinett, Quinton. *Metamaterials Synthesized via DNA-Programmed Self-Assembly.* (Advisor: Miller, Kenny)

GreyEyes, Shawn. *Highly Ordered Silica Polymer Synthesis Through Enzymatic Catalysis.* (Advisor: Miller, Kenny)


Hatathlie, Francine. *Trichloroethylene Induces Parkinson Disease.* (Advisor: Miller, Kenny)

Huffman, Spencer. *A Manifestation of the Law of Moore: Integrating Organic Switches into Molecular Electronics.* (Advisor: Miller, Kenny)

Hurd, Nathaniel. *Ionizing Radiation and You: Ionizing Radiation Induced Pathways that Cause DNA and RNA Strand Breaks.* (Advisor: Miller, Kenny)

Knewitz, Allison. *Bone Augmentation Materials used in Orthopedics with Implementation of Newer Bone Cements.* (Advisor: Miller, Kenny)


Riley, Nick. *Optimizing Metal Organic Frameworks for Carbon Dioxide Adsorption.* (Advisor: Miller, Kenny)

Stelmaszek, Jordan. *Roundup: A Safe or Poisonous Herbicide?* (Advisor: Miller, Kenny)

Trujillo, Pariss. *Calcium Overload Surrounding Aβ Plaques May Be an Aberrant Promoter for Progressive Dementia in Alzheimer Disease.* (Advisor: Miller, Kenny)

Yeager, Dan. *Innovative New Genetic Therapy Methods Involving Viral Vectors for the Treatment of Type I Diabetes*. (Advisor: Miller, Kenny)

**Department of English**


Berman, Riley. *Western River Nomadic Philosophy*. (Advisor: Gordon Cheesewright)


Harriman, Garrett. *Once Upon a Renaissance: Recontextualizing Disney/Picar Dynamics and Defining the Third “Disney Renaissance”.*

Kelly, Ericka. *Alice and the Chrysalis: How Criticism and Different Interpretations Reshaped the Image of Alice’s Adventures in Wonderland*. (Advisor: Gordon Cheesewright)

McCue, *The Wonderful World of Disney*. (Advisor: Gordon Cheesewright)

Ott, Courtney. *The Lost Culture of American Food: Returning to the Food of Our Land*. (Advisor: Gordon Cheesewright)


Ripe, Megan. *America’s Killer Craving*. (Advisor: Gordon Cheesewright)


**Environmental Studies Program**

**Senior Theses**


Dudash, Jessica. A Cat, a Fish, and a Flower: Endangered Species and Urban Development. (Advisor: Hilimire, Kathy)


Grady, Brendan. The End of an Era: The Transition from an Industrial Agriculture Paradigm to a Sustainable Food Production System. (Advisor: Hilimire, Kathy)

Helvie, Maggie. The True Price of Gold: Constructed Wetlands as an Acid Mine Drainage Solution for Silverton, Colorado. (Advisor: Hilimire, Kathy)


Jircik, Allen. Fort Lewis College Multimodal Transportation Assessment. (Advisor: Austin, Rebecca)


Kirkks, Max. Room to Grow: Improving Farmer Livelihoods through Increased Quinoa Production in Colorado. (Advisor: Austin, Rebecca)


Larson, Drew. The Realities of Green Business. (Advisor: Austin, Rebecca)

Lesjak, Stephen. Re-wilding the Fort Lewis College Landscape. (Advisor: Hilimire, Kathy)

Luneau, Oliver. Organic Food Purchasing Behavior: A Community Study of Fort Lewis College Students of Durango, CO. (Advisor: Austin, Rebecca)

Mallinger, Hunter. Food Waste Co-Digestion: The Potential Benefits of Utilizing Existing Infrastructure at Durango Wastewater Treatment Facility. (Advisor: Austin, Rebecca)

Meneghin, Carolyn. Comparing Drivers of Sustainability: Fort Lewis College & Copenhagen School of Business. (Advisor: Hilimire, Kathy)


Newman, Sara. Undamming the West: Environmental and Social Implications of Removing Dams in the Western United States and the Benefits of River Restoration. (Advisor: Hilimire, Kathy)
Owens, Laura. *Reversing Prohibition: The Promise of Industrialized Cannabis Sativa L. Production Following the Agricultural Act of 2014.* (Advisor: Austin, Rebecca)

Rezabek, Jay. *Three Gorges Dam: Can Turbines of Trouble Lead to Funding of Fairness?* (Advisor: Hilimire, Kathy)


Stewart, Kelly. *Nature Deficit Disorder: Tragedy of the Children and a Call for Alternative Treatment of ADHD.* (Advisor: Austin, Rebecca)


Vasquez, Nathaniel. *More than Human: beyond Anthropomorphism, an Analysis of Human-Environment Relationships through Art.* (Advisor: Austin, Rebecca)

Weston, Alexander. *Earthships versus Sustainable Housing.* (Advisor: Austin, Rebecca)


**Colloquium Projects**


Hunter, Kala, Owens, Laura, Kirks, Max, Taylor, Rachael, Luneau, Oliver. *Regional Food Hub for LaPlata County, Colorado.* (Advisor: McCormick, Pete)


Weston, Alex, Nash, Josh, Keeler, Nick, Yazzie, Trish. A Water Conservation Plan for Fort Lewis College. (Advisor: McCormick, Pete)

Department of Exercise Science

Baker, Kim. Exercise Intervention to Improve Mobility in Older Adults. (Advisor: Meyer, Carrie)

Behler, Erica. A Study of Participation in Outdoor Class Time and Psychological Stress Levels Among Fort Lewis College Students. (Advisor: Simbeck, Cathy)

Benjamin, Joshua A. The Difference Between the Levels of Group Cohesion of FLC Adventure Education Immersion Semester Students and FLC Physical Education Backpacking Class Students. (Advisor: Simbeck, Cathy)

Bode, William Doyle. A Correlation Analysis Between the Success Rate and the Expenses of Division II Football Programs in the Rocky Mountain Athletic Conference (RMAC) and the Great Lakes Intercollegiate Athletic Conference (GLIAC). (Advisor: Simbeck, Cathy)

Calderwood, Brandi. Longevity Effect of Dynamic Stretching on Hip Range of Motion. (Advisor: Meyer, Carrie)


Clark, Casey. Can Spending Time in the Outdoors Reduce Stress? (Advisor: Simbeck, Cathy)

Clawson, Brittany and Murphy, Erin. Effects of Sprayable Energy on Blood Caffeine Level Concentrations Compared to a Caffeine Pill on College Students. (Advisor: Knight-Maloney, Melissa)

Crank, Merlyna, Exercise Intervention to Improve Strength in Older Adults. (Advisor: Meyer, Carrie)


Deutsch, Whitney. EMG Muscle Activity of Elbow Flexion in Isotonic and Isometric Exercises. (Advisor: Frazer, Lee)

Hacker, William. The Effect of Caffeine and a Pre-workout Supplement on 1RM Testing. (Advisor: Meyer, Carrie)

Harrison, Porsha. The Effect of an Exercise Program on Blood Glucose. (Advisor: Frazer, Lee)


Hoosein, Aranka. Physical Activity Preferences of US and International Students Studying at Fort Lewis College. (Advisor: Frazer, Lee)
Jackson, Katygene. Middle School Students and their Preferred Motivation Type. (Advisor: Knight-Maloney, Melissa)


Jim, Brittany Dawn. The Effects of an Aerobic and Resistance Exercise Intervention on a Native American Population’s Body Composition. (Advisor: Simbeck, Cathy)

Kinzer, Jenna, Kvidera, Ally, Richards, Erika, and Willard, Jenessa. Fluid Balance and Hydration Status of Division II Female Basketball Players Before and After Practice. (Advisor: Knight-Maloney, Melissa)

Kurtz, Sebastian, Elimination of Bacteria by Use of Disinfectants. (Advisor: Meyer, Carrie)

Kvidera, Abigail and Camisa, George. How Gender of Coaches Impact the Implementation of Sportsmanship Amongst Division II Athletes. (Advisor: Knight-Maloney, Melissa)


Masayesva, Marshall. Participation in Adventure Recreation by Native American and Non Native Students at Fort Lewis College. (Advisor: Knight-Maloney, Melissa)

McCutchen, Eliza. Experiential Nutrition Education: Effects of a School Garden Program on Fruit and Vegetable Consumption. (Advisor: Knight-Maloney, Melissa)

McDowell, Joshua, Allen, Jesse, Kilman, Alex and Kruger, Maddie. Effects of Pulmonary Hypertension on Athlete Performance in Cyclists at High Altitude. (Advisor: Knight-Maloney, Melissa)

McLaughlin, Nick. Longevity Effect of PNF Stretching on Hip Range of Motion. (Advisor: Meyer, Carrie)

McMorrow, Seamus. The Impact of New Leader Confidence on Outdoor Leadership Style. (Advisor: Frazer, Lee)

Medici, Katarina. The Effects of Strength Training on Running Performance in Distance Runners. (Advisor: Simbeck, Cathy)

Mele, Serae and King, Aaron. High Intensity Interval Training vs. Endurance Training and its Effects on Resting Heart Rate, Blood Pressure, and VO2. (Advisor: Knight-Maloney, Melissa)


Myers, Justin and Moody, Derrick. Assessment of Picket Use and Standard Operating Procedures in Continental Snow. (Advisor: Knight-Maloney, Melissa)
Myers, Nicholas. *Comparing Sense of Community in Experiential Oriented and Traditional College Classrooms: Is There a Difference?* (Advisor: Frazer, Lee)


Neal, Tre, Dunlap, Matt and Howick, Jack. *Effect of Corrosive Chemicals on the Breaking Strength of Nylon Cord.* (Advisor: Knight-Maloney, Melissa)


Overton, Amanda. *The Effects of Rock Climbing on Ankle Strength.* (Advisor: Simbeck, Cathy)

Pallat, Nathan. *The Effects of Caffeine and Water on Repeated Anaerobic Sprint Test Performance.* (Advisor: Simbeck, Cathy)

Ryburn, Clancy, Weiner, Griffin and Porter, Shannon. *Levels of Stress and Self Esteem in the Various Majors at Fort Lewis College.* (Advisor: Knight-Maloney, Melissa)

Sander, Johannes. *The Preferred and Perceived Coaching Leadership Behaviors of Fort Lewis College Student-Athletes.* (Advisor: Simbeck, Cathy)

Schumacher, Nicole. *Surface Type Effect on Disinfection.* (Advisor: Meyer, Carrie)

Schwab, Liz. *Determining the Effect of a Diet Absent of Genetically Modified Foods on Participants with Gastro-Esophageal Reflux Disease (GERD).* (Advisor: Knight-Maloney, Melissa)


Simpson, Dustin. *The Impact of Protein on the Blood Pressure of Male Fort Lewis College Students.* (Advisor: Frazer, Lee)

Striedel, Megan. *Q-Angle as a Contributing Factor to ACL Injuries Among Women.* (Advisor: Frazer, Lee)

Thompson, Brian. *A Comparison of Anchored Putting to Traditional Putting.* (Advisor: Simbeck, Cathy)

Wathen, Jamie. *Comparison of the Perceived Social Support of Fort Lewis College’s Freshmen in the Peak Experience Program and Freshmen in a Learning Community.* (Advisor: Simbeck, Cathy)

Weiner, Griffin, Ryburn, Clancy and Porter, Shannon. *Levels of Stress and Self Esteem in the Various Majors at Fort Lewis College.* (Advisor: Knight-Maloney, Melissa)
Whitehair, Marcus. *The Effects of Intramural Sports Participation and its Relationship to College Students’ Academic Success as Determined by Midterm Grade.* (Advisor: Simbeck, Cathy)

Wilson, Daniel. *Exercise Preference and Frequency of US and International Students at Fort Lewis College.* (Advisor: Frazer, Lee)


**Gender and Womens Studies Program**


Sullivan, Brittani K. *The Feminization of Homelessness in Durango, Colorado.* (COPLAC/Teagle Mentor: Rogalsky, Jennifer)

**Department of Geosciences**

Cowan, Phil. *Regional Diagenesis of the Mississippian Leadville Limestone: Southwestern Colorado.* (Advisor: Gianniny, Gary L.)

Davis, Javis. *Fire History of the Turkey Spring Watershed: Fort Apache Reservation, AZ.* (Advisor: Kenny, Ray)

Dias, Shirleen. *Hydrothermal Dolomitization of Mississippian Leadville Limestone, Southwest Colorado: A Literature Review.* (Advisor: Gianniny, Gary)

Dougi, Delilah. *Carbon Sequestration at USACE Reservoirs on the Upper Missouri River System.* (Advisor: Kenny, Ray)

Eastep, Garrett. *Rain Shadow Forests of the Ancestral Rockies; In Situ Burial of Calamites Groves, Pennsylvanian Hermosa Group SW Colorado.* (Advisor: Gianniny, Gary)

Ellis, Matthew. *Mineralogical, Petrographic and Geochemical Study of the Jackson Mountain Intrusion, southwestern Colorado.* (Advisor: Gonzales, David)


Geraci, Emily. *Induced Seismicity: Understanding Hazards and Colorado’s Laws and Regulations.* (Advisor: Hannula, Kimberly)

Gould, Autumn. *An Investigation of mid-Cenozoic Faulting in Disappointment Valley, Colorado: Potential Insight into mid-Cenozoic Structural History in the Western San Juan Mountains.* (Advisor: Gonzales, David)
Green, Kalyn. Petrographic Analysis of Possible Shear Zone between the Irving Formation and the Vallecito Conglomerate on Middle Mountain, Durango, CO. (Advisor: Hannula, Kimberly)


Klink, Alex. Regional Sequence Stratigraphy and Thickness Patterns of the Mississippian Leadville Limestone, Southwestern San Juan Mountains, Colorado. (Advisor: Gianniny, Gary)

Kuhn, Kiefer. Reservoir-Scale Facies Variation of the Mississippian Leadville Limestone, Southwestern San Juan Mountains, Colorado. (Advisor: Gianniny, Gary)

Kunz, Brody. Characteristics of Cretaceous Tidal Rhythmites in the Cretaceous Menefee Formation; Durango, CO. (Advisor: Gianniny, Gary)

Leach, Christopher. Investigation of the Mineral Assemblages and History of Skarn at Diorite Peak, La Plata Mountains, Colorado. (Advisor: Gonzales, David)

Miszkiel, Thomas. Investigating the Source of Copper in the La Plata Mountains using Copper Isotopes. (Advisor: Gonzales, David)

Moller, Miriam. Petrographic and stable isotope analysis on a speleothem from Surprise Cave: southern San Juan Mountains, CO. (Advisor: Kenny, Ray)

Norby, Jessica. The Development and Implementation of the Chloride Reduction Outreach Program (CROP) for Rochester, MN. (Advisor: Kenny, Ray)


Vokorokos, Spencer. Geochemistry of the Snowdon Rock Glacier Outflow Stream, Southern San Juan Mountains, CO: Implications for Ice-Core Degradation. (Advisor: Kenny, Ray)

Walter, Sterling R. Field Evidence for Cyclic Subsurface Eruptions during Diatreme Emplacement, Cathedral Cliff, Navajo Volcanic Field. (Advisor: Gonzales, David)

Department of History

Belin, Kevin. Diné Migration: A Unique Navajo Historical Perspective on the Migration Route of the Navajo, Comparing Modern Archeology to the Oral Traditions of the Navajo. (Advisor: Gulliford, Andrew)


Holt, Aaron. *Was it the Shoes?: What Michael Jordan did to Create the Larger than Life Sporting Environment.* (Advisor: Baranski, John)

Hopkins, Courtland. *The Savage Stereotype: The Lakota Sioux as the Native American Ideal, 1890-1941.* (Advisor: Gulliford, Andrew)


Ludwig, Johnny. *Hey! Bracero Get Over Here…No Wait!* (Advisor: Baranski, John)


Smith, Tucker. *The Man of Legend: Billy the Kid, the Lincoln County War, and the Evolution of a Western Myth, New Mexico, 1874-1882.* (Advisor: Gulliford, Andrew)


White, Garrett. *A Blueprint for Empire: Mongol Intelligence Network, 1160-1283.* (Advisor: Allen, Darrell)


Department of Mathematics


Houser, Caitlin. *Generalizing the Card Game SET using Affine Geometry.* (Advisor: Scull, Laura)

Thorne, Taylor. *An Analysis of Attainable Patterns in Alien Tiles.* (Advisor: McCarthy, Anne)

Rice, Conor. *A Conjecture about Identifying Planar Graphs using Matroid Theory.* (Advisor: Scull, Laura)

Department of Philosophy

Carmichael, Kaley. *What Do We Owe Non-Human Animals?*

Cheadle, Evan. *Intuition and the Achievement of Philosophical Goals.*

Colle, Tyler. *Can We be Free in a Determined World?*

Jones, Josh. *Metaphilosophy.*

Lloyd, Sam. *Pragmatic Ontology.*

Maddox, Dylan. *Deduction.*


Newkirk, Randy. *Nietzsche’s Uncanniest of Guests: Confronting Nihilism in Postmodernity.*

Ontiveros, Caleb. *Non-Human Animals and Political Philosophy.*

Rader, Mark. *Philosophical Methods to Undermine Utilitarianism.*

Vielehr, Caylon. *Philosophical Methodology and the Problem of Determinism.*
Department of Physics & Engineering

Burnham, Lars. Physical Characterization of a Cancer Fighting Molecule. (Advisors: Morris, Aimee (Chemistry) and Palmer, Randy (Physics))


Hurcomb, Wes. Supernovae Classification by the Observation of Light Curves. (Advisors: Hakes, Charles and Palmer, Randy)


Montoya, Cody. Applications and Control of MR Fluids for an Active Suspension System for Off-road Motorcycles. (Advisor: Smith, Ryan N.)

Naglak, John, Baumbach, Aleph, Blue-Eyes, Isaac, Miller, Colin, and Ogle, Jonathan. Design of a Pseudo Seed for Long-Distance, Ocean Seed Dispersal tracking. (Advisors: Smith, Ryan N.; Prentis, Peter; and Smith, York R.)

Rymer, Will. Application of the Transit Method of Exoplanet Detection. (Advisors: Hakes, Charles and Palmer, Randy)

Department of Political Science


Department of Psychology

Bell, Kristina, and Davila, Brittney. Effects of Guided Imagery on Cortisol Levels Related to Test Anxiety. (Advisor: Sears, Sharon)


Carter, Nicholas. Attitudes and Dynamics of Play Therapy. (Advisor: Sears, Sharon)

Chamberlain, Madison, Dilacovo, Natalia, Jackson, Owen, and John Ericka. Gender Differences in Helping Behavior. (Advisor: Templeton, Janice L.)


Crespo, Hope, Johnson, Chanetel, and Mimmack, Kendall. Effect of Type of Emotional Venting on Recovery from Negative Mood. (Advisor: Chew, Beverly)

Cunningham, Taylor. The Effects of Exposure on Perceptions of Adolescent Self Harm. (Advisor: Sears, Sharon)

Funner, Victoria, Nichols, Hunter, and Smithson, Callie. Effects of Thin versus Plus-Suze Female Models on Women’s Self-Esteem. (Advisor: Chew, Beverly)

Gulick, Ashley, Richmond, Zachary, and Swartz, Samuel. Effect of Music Distraction on Immediate and Delayed Memory. (Advisor: Chew, Beverly)

Haley, Mackenzie. A Terror Management Approach to Understanding Attitudes Toward Hate Crime Perpetrators. (Advisor: Burke, Brian L.)

Hanning, Rolf, Henthorn, Erin, and Opp, Eric. Effect of Video Game Perspective on Empathy and Aggression. (Advisor: Chew, Beverly)

Hechter, Rolf, Palmer, Wyatt, and Smith, Hannah. Effect of Type of Music on Slasher Test Performance. (Advisor: Chew, Beverly)

Howlett, Pamela, Stout, Emily, and Watel, Adèle. Effect of Signs on Recycling Behaviors. (Advisor: Templeton, Janice L.)

Hutchins, Amber. Death & Birth (Control): Terror Management’s Imprint on Attitudes Towards Women’s Health. (Advisor: Burke, Brian L.)

Kuchar, Ashley. Overcoming Fear of Failure: Self-Compassion in Sports Psychology. (Advisor: Kraus, Sue)

Liessman, Nicholle. Examining Strengths in Native American College Students. (Advisor: Kraus, Sue)

Leora, Sandra. Levels of Depression in Self-Compassionate Individuals: A United States and Mexico Sample. (Advisor: Sears, Sharon)

Lucy, Nathan, and Sundblom, James. Public Perceptions of Medical Information. (Advisor: Sears, Sharon)

Mears, Taylor. What Affects Juror Sentencing. (Advisor: Burke, Brian L.)
Murphy, Elizabeth. *Walking in Beauty: The Role of Self-Compassion in Easing Historical Trauma in Native American College Students.* (Advisor: Kraus, Sue)

Pruitt, Jacquelyn, H. *The Cultivation of Psychological Resilience.* (Advisor: Kraus, Sue)


Redmond, Caitlin. *Friendly Behavior: How Terror Management Affects Mental Health Discrimination.* (Advisor: Burke, Brian L.)

Rogers, Rachel. *EFT/Tapping and Coping with Stress and Anxiety in College Students.* (Advisor: Sears, Sharon)

Rogers, Rachel, Coker, Jessica, Lee, Lynnea, Garcia, Oscar, Sakizzie, Roberta. *The Effect of Personal Background Information on Perception and Emotion.* (Advisor: Sears, Sharon)

Sooter, Dusty. *Investigating Social Influence and Ethnicity on Body Image and Esteem.* (Advisor: Templeton, Janice L.)


Sundblom, James, Northcutt, Michele, Lucy, Nathan. *Medical Authority: East vs. West.* (Advisor: Sears, Sharon)

Traversie, Paige, Anderson, Savanna, Benally, Leayh, Gallaher, Megan. *The Effects of Gender on Mate Selection Variables.* (Advisor: Sears, Sharon)

**Self Constructed Major**


**Department of Sociology**

Alicea, Antonio. *Incarcerated Youth and the Cure for Recidivism.* (Advisor: Clausen, Becky)


Bowser, Angie. *The Commodification of Food and Its Effects on Food Security.* (Advisor: Seis, Mark)

Brandarius, Johnson. *Getting At Risk Youth on the Path to Success.* (Advisor: Clausen, Becky)

Catlin, Kayla. *The Dynamics of the Courtroom.* (Advisor: Seis, Mark)

Coggins, Jennie.  *Social Climate as Contributor to Relational Bullying.*  (Advisor: Seis, Mark)

Cooper, Kelsey.  *Empowering Girls: Scouting in the Southwest and Beyond.*  (Advisor: Clausen, Becky)

Evans, Bryttnie.  *Our Fossil Fuel Dependency: An Analysis of the Social Structures That Enable the Dependency and How to Move Beyond it.*  (Advisor: Seis, Mark)

Foden, Tom.  *Happiness: A Universal Language.*  (Advisor: Seis, Mark)

James, Anthony.  *Men’s Violence.*  (Advisor: Clausen, Becky)

Johnson, Heather Rose.  *Native American Women and their Struggle with Domestic Violence.*  (Advisor: Seis, Mark)

Kellinger, Joshua.  *Legalization of Marijuana and the Affects on Society.*  (Advisor: Clausen, Becky)

Knife Chief, Michael.  *A Look into the Star People, the Fawnee.*  (Advisor: Seis, Mark)

Lewis, Aleah.  *Bear Smart Durango: Follow The Bear Tracks.*  (Advisor: Clausen, Becky)


Speas, Caleb.  *Befriending Youth: The Work of Big Brothers and Big Sisters.*  (Advisor: Seis, Mark)

Stelhecht, Liz.  *Why She Doesn’t Leave.*  (Advisor: Seis, Mark)


**Department of Theatre**

Faulkner, Julie.  *Imagination Engagement.*  (Advisor: Davis, Ginny)

Macdonald, Lindsay. *What do Picasso, Stage Lights and Color have in Common?* (Advisors: Moller, Kathryn and Elkins, Dennis)

Watson, Dakotah. *Bully Experiences.* (Advisors: Moller, Kathryn and Elkins, Dennis)