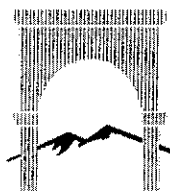


THE NEW MEXICO HIGHLANDS UNIVERSITY
FACULTY RESEARCH COMMITTEE PRESENTS

10TH ANNUAL RESEARCH DAY

THURSDAY, APRIL 5, 2012
SALA DE MADRID

*CELEBRATING THE RESEARCH AND SCHOLARLY
ACCOMPLISHMENTS OF FACULTY AND STUDENTS*



NEW MEXICO
HIGHLANDS
UNIVERSITY®

President's Statement

Learning and the advancement of knowledge represent the *raison d'être* for any university. Here at New Mexico Highlands University, this is represented by faculty and students alike through a wide array of research, scholarship, and other creative activities. Research Day is an opportunity to share and disseminate the results of one's work with the broader community and for everyone to learn more through the reactions and interactions that result. I want to applaud and congratulate everyone who is sharing their work on this 10th annual Research Day and to thank all those responsible for pulling it together.

Jim Fries
President



PRESIDENT'S STATEMENT.....	1
WELCOME.....	4
ACKNOWLEDGEMENTS.....	4
2012 RESEARCH DAY SCHEDULE OF EVENTS.....	5
ABSTRACTS.....	6
FACULTY ORAL PRESENTATIONS.....	6
MECHANISTIC BIOCHEMISTRY OF ANTIEPILEPTIC DRUGS	6
"NO OBSERVAN UNA CONDUCTA MUI AJUSTADA": CLERGY & SOCIETY IN NINETEENTH CENTURY MARACAIBO PROVINCE.....	6
HOME RANGE OF THE GREEN ANACONDA (<i>EUNECTES MURINUS</i>).....	7
LADY MAFIA: SAVIANO'S <i>GOMORRA</i> AND BEYOND	7
THRIVING IN A MARXIST SOCIETY OR: DAVE CHAPPELLE RIDES GROUCHO'S CLAWHAMMER COATTAILS ..	7
SCARING THE DICKENS OUT OF BATMAN	8
DEVOURING SHAKESPEARE: CUBA, CANNIBALISM, AND CALIBAN.....	8
STUDENT ORAL PRESENTATIONS	9
THE EFFECTS OF ENVIRONMENT ON TEST SCORES	9
TRANSLATING EXPERIENCE THROUGH SCULPTURE	9
IS THE EMOTIONAL MEMORY EFFECT INFLUENCED BY TYPE OF ENCODING AND DELAY?	9
BURN SEVERITY MODELING AND FIRE SEVERITY ACROSS DIFFERENT LAND-COVER TYPES IN THE LAS CONCHAS FIRE; JEMEZ MOUNTAINS, NM	10
ONE WITHOUT THE OTHER: FAILURE OF SCHOOL CONSOLIDATION IN LAS VEGAS, N.M.....	10
FACULTY POSTER PRESENTATIONS	11
A STATISTICAL EXAMINATION OF INSTRUCTIONAL METHODS.....	11
U-Pb ZIRCON GEOCHRONOLOGY OF GRANITE PHASES IN THE HERMIT'S PEAK BATHOLITH: CONSTRAINING THE TIMING OF GRANITIC MAGMATISM IN NORTHERN NEW MEXICO	11
PRELIMINARY ROCK MAGNETIC AND GEOCHEMICAL DATA BEARING ON THE SERPENTINISATION PROCESS, MAGNETITE PRODUCTION, AND PRECIOUS METAL CONCENTRATIONS.....	11
PRELIMINARY MAGNETOSTRATIGRAPHIC ANALYSES OF THE NEOGENE OGALLALA FORMATION IN SOUTHWESTERN KANSAS AND NORTHEASTERN NEW MEXICO FOR THE HIGH PLAINS-OGALLALA DRILLING PROGRAM.....	12
GRADUATE POSTER PRESENTATIONS.....	12
SCALING UP CHIRAL HPLC: 2-PHENYLBUTYRAMIDE.....	12
PRELIMINARY RESULTS FROM A LATE PLEISTOCENE TO HOLOCENE PALEOCLIMATE STUDY OF THE LAKE SEDIMENT CORES, NORTHERN NEW MEXICO.....	13
SYNTHESIS AND X-RAY STUDIES OF TRIENE CHROMOPHORES CONTAINING THE CYCLOHEXENE RING STRUCTURE FOR NON LINEAR OPTICAL APPLICATION.....	13
NEW MEXICO HIGHLANDS GEOLOGY: INTERNATIONAL EXCHANGE PROGRAM IN COLLABORATION WITH THE UNIVERSITÉ BLAISE PASCAL, CLERMONT FERRAND, FRANCE	14
UNDERSTANDING THE COMPLEXITY OF CINDER CONE VOLCANOES USING PALEOMAGNETIC, ROCK MAGNETIC AND STRUCTURAL ANALYSIS; A CASE STUDY FROM THE CIENEGA VOLCANO, CERROS DEL RIO VOLCANIC FIELD, NEW MEXICO	14
A JOURNEY THROUGH GEOLOGICAL TIME: NEW MEXICO, COLORADO, UTAH, IDAHO, MONTANA, AND WYOMING, MAY 2012	14
THE EFFECTS OF BIOCHAR AMENDMENTS TO ARID SOILS (ARIDISOLS) ON WATER RETENTION AND MICROBIAL ABUNDANCE.....	15
THE EFFECTS OF INDUSTRY ON TRADITIONAL FOOD PRACTICES.....	15

EFFECTS OF BISON GRAZING VS. CATTLE GRAZING ON BIRD DIVERSITY IN NORTHEASTERN NEW MEXICO	16
SEASONAL VARIATIONS AND PHYSIOCHEMICAL PARAMETERS INFLUENCING THE MOBILIZATION/ADSORPTION AND REDOX STATE OF ARSENIC AND IRON IN VALLES CALDERA STREAMS	16
PREPARATION AND X-RAY STUDY OF NOVEL MATERIALS FOR NLO APPLICATIONS.....	16
PROTEOMIC ANALYSIS OF GENE EXPRESSION IN <i>GOLGA3^{REPRO27}</i> MALE INFERTILITY MICE.....	17
ANISOTROPY OF MAGNETIC SUSCEPTIBILITY, ROCK MAGNETIC, AND PALEOMAGNETIC DATA FROM MAFIC DIKES IN THE ESPANOLA BASIN, RIO ARriba COUNTY, NEW MEXICO.....	18
FOG OF DECEIT.....	18
CHIRONOMID BIO-ACCUMULATION OF COPPER AND HEAVY METALS: PETERSON RESERVOIR, MONTEZUMA, NEW MEXICO.....	19
UNDERGRADUATE POSTER PRESENTATIONS.....	19
FROM THE POOR MAN'S SHANGRI-LA TO FERNANDOMANIA: HISPANICS IN CHAVEZ RAVINE.....	19
INVESTIGATION OF S1P2 GENE EXPRESSION IN BREAST CANCER TISSUE	19
ALLOMETRIC GROWTH OF SPECTACLE CAIMAN (<i>CAIMAN CROCODYLLUS CROCODYLLUS</i>) IN THE VENEZUELA LLANOS	20
NON-INVASIVE PROTOCOL FOR DNA EXTRACTION AND PCR AMPLIFICATION FROM BIGHORN SHEEP FECES	20
BROADBAND INTERNET RADIOS: CREATING SAFE CONDITIONS FOR WILDLAND FIREFIGHTERS.....	21
THE EFFECTS OF THE LAS CONCHA'S FIRE, ON AQUATIC INVERTEBRATES, VALLES CALDERA NATIONAL PRESERVE, NORTH CENTRAL NEW MEXICO	21
ALLOMETRIC GROWTH IN LLANOS SIDENECK TURTLE (<i>PODOCNEMIS VOGLI</i>) AS A CONTRIBUTION FOR FIELD STUDIES IN NORTHERN SOUTH AMERICA.....	21
MIDDLE CEREBRAL ARTERY BLOOD VELOCITY DURING RUNNING: INTERACTIONS OF HEART AND STRIDE IMPACT RATES	21
PALEOLIMNOLOGICAL STUDY OF SEDIMENT CORES: USING CHIRONOMID HEAD CAPSULES TO DETERMINE PAST CLIMATE EVENTS	22
ECONOMIC VIABILITY OF BIOCHAR IN NEW MEXICO SOILS BASED ON WATER RETENTION AND COST	22
THE USE OF COPPER RESISTANT BACTERIA AND BIOCHAR AMENDMENTS FOR BIOREMEDIATION OF COPPER CONTAMINATION IN THE PIT LAKE NEAR CUBA, NM.....	23
FIRE HISTORY AND STAND STRUCTURE OF PINYON-JUNIPER WOODLANDS ON ROWE MESA, NEW MEXICO	23
CHARACTERIZATION OF COPPER RESISTANCE IN BACTERIAL ISOLATES FROM THE PIT LAKE OF NACIMIENTO COPPER MINE IN CUBA, NEW MEXICO	23
ANTIMICROBIAL RESISTANCE LEVELS IN <i>ESCHERICHIA COLI</i> ISOLATED FROM NORTHERN NEW MEXICO WILD ELK, DOMESTIC CATTLE, AND HUMANS	24
ERUPTION CHARACTERISTICS OF THE CIENEGA CINDER CONE, CERROS DEL RIO VOLCANIC FIELD, NEW MEXICO.....	24
ARSENIC ACCUMULATION IN AQUATIC VEGETATION FROM STREAMS INFLUENCED BY HYDROTHERMAL SPRINGS IN THE JEMEZ MOUNTAINS.....	24
X-RAY STRUCTURAL STUDY OF HALIDE AND ACYL-DERIVATIVES OF (DI) CARBONYL-BRIDGED TRICYCLIC ACCEPTORS	25
HOW DO METAL IONS AFFECT DEPOSITS FORMED IN ALZHEIMER'S DISEASE?.....	25
IDENTIFYING PROTEINS IMPORTANT FOR SPERMATOGENESIS USING <i>GOLGA3^{REPRO27}</i> MICE.....	25
BULLFROG IMPACTS ON AQUATIC INVERTEBRATES IN MORA RIVER ON WIND RIVER RANCH	26
BIO-ASSESSMENT OF THE SANTA FE RIVER BETWEEN MCCLURE AND ARMIJO PARK.....	26
INDEX OF NAMES.....	27

Welcome

Welcome to the Tenth Annual New Mexico Highlands University Research Day.

Highlands University in 2012 marks a decade of showcasing the passion for scholarship, research excellence and the phenomenal creativity of our faculty and students. Much of the faculty research presented today represents work that was funded through the Faculty Research Funds. Research and travel grants are awarded each term to faculty members through a rigorous review and selection process. In addition, faculty members may apply for time away from teaching duties to pursue grants and awards from outside NMHU. The Faculty Research Committee congratulates all grant recipients and encourages *all* faculty members to apply for research funds, conference travel support, and grant-writing release time.

Many of the student presentations represent work that was funded through the Student Research Fund of the NMHU chapter of Sigma Xi, the Scientific Research Society. We congratulate them on their accomplishments and applaud all of our student participants from every discipline for their hard work and dedication to research, creativity and academic advancement. The New Mexico Highlands University Sigma Xi chapter's mission is to enhance the health of the research enterprise, foster integrity in science, and promote the public's understanding of science for the purpose of improving the human condition. The society is a diverse, chapter-based organization dedicated to the advancement of science and engineering through outstanding programs and services delivered in a collegial and supportive environment. For more information about the NMHU chapter and its activities, please visit nmex.net/sigmaxi.

For more information about the Faculty Research Funds, please contact Richard Plunkett (2011-12 Faculty Research Committee Chair) at 505-426-2118 or rplunkett@nmhu.edu. You are also invited to visit the Faculty Research Committee's web page at:

www.nmhu.edu/FacultyStaff/research/committee.aspx.

Acknowledgements

The Faculty Research Committee wishes to thank New Mexico Highlands University for its continued recognition and support of the research and scholarly activities of its faculty and students. In particular, we thank President Jim Fries and Vice Presidents Linda LaGrange, and Gilbert Rivera for their continued support of faculty research. We recognize Richard Plunkett, Chair of the Faculty Research Committee, for coordinating this event, including the faculty and student oral presentations, and student poster presentations. We thank the NMHU Sigma Xi chapter for judging the student poster competition, and extend our gratitude to the NMHU Graduate Student Senate for sponsoring the poster sessions. We kindly acknowledge Ms. Germaine Alarcon for her enthusiastic assistance and continued support of the Faculty Research Committee and its grant awardees.

Additional financial support for this event is provided by the Faculty Research Committee.

2012 Research Day Schedule of Events

All scheduled events will take place in Sala de Madrid

8:00	Poster Setup
8:30	Poster Display (ongoing until 4:00) Coffee, Tea and Snacks
8:45	Introduction & Opening Remarks
9:00	Richard Plunkett, Ph.D. , (Biology) <i>Hybrid Antimicrobial Peptides Combining Insect & Amphibian Structural Motifs</i>
9:30	José Ramón Lopez (Honors) <i>One Without the Other: Failure of School Consolidation in Las Vegas, N.M.</i>
9:45	Angel De Nieves Arellano (Honors) <i>The Effects of Environment on Test Scores</i>
10:00	Donna Woodford-Gormley, Ph.D. (English) <i>Devouring Shakespeare: Cuba, Cannibalism, and Caliban</i>
10:30	MORNING COFFEE BREAK
10:45	Arcadius Krivoshein, Ph.D. (Chemistry) <i>Mechanistic Biochemistry of Antiepileptic Drugs</i>
11:15	Jesús Rivas, Ph.D. (Biology) <i>Home range of the green anaconda (<i>Eunectes murinus</i>)</i>
11:45	William Jaremko-Wright (Natural Resource Management) <i>Burn Severity Modeling and Fire Severity across Different Land-Cover Types in the Las Conchas Fire; Jemez Mountains, NM</i>
12:00	LUNCH & Poster Session – Authors will be present from 12:00 – 1:30 for judging
1:30	Rachelle Bonnet (Fine Arts) <i>Translating Experience Through Sculpture</i>
1:45	Peter Linder, Ph.D. (History) <i>"No observan una conducta mui ajustada": Clergy & Society in Nineteenth Century Maracaibo Province</i>
2:15	Verónica Saunero-Ward, Ph.D. (Languages & Culture) <i>Lady Mafia: Saviano's Gomorra and Beyond</i>
2:30	Tyler Broderick (Social & Behavioral Sciences) <i>Is the emotional memory effect influenced by type of encoding and delay?</i>
2:45	AFTERNOON COFFEE BREAK
3:00	Benjamin Villarreal (English) <i>Scaring the Dickens Out of Batman</i>
3:30	Eddie Tafoya, Ph.D. (English & Philosophy) <i>Thriving in a Marxist Society or: Dave Chappelle Rides Groucho's Clawhammer Coattails</i>
4:00	Poster Awards & Closing Remarks
4:15	Poster Pick-up

Abstracts

Listed alphabetically by author (presenter indicated by asterisk)

Faculty Oral Presentations

Mechanistic Biochemistry of Antiepileptic Drugs

Arcadius Krivoshein*, Ph.D., Visiting Assistant Professor, Chemistry

Epilepsy is a neurological disorder involving recurrent seizures that affects about 50 million people worldwide. Understanding of molecular mechanism of action of existing antiepileptic drugs (anticonvulsants) would be of great help in developing new, better drugs. Such an understanding is lacking for many anticonvulsants. Dr. Krivoshein will discuss his research that uses cutting-edge biophysical and bioorganic chemistry approaches to understand the molecular basis of anticonvulsant activity.

"No observan una conducta mui ajustada": Clergy & Society in Nineteenth Century Maracaibo Province

Peter Linder*, Ph.D., Associate Professor, History

In April of 1857, the inhabitants of the region around Gibraltar staged a vigorous and sustained protest. An initial outbreak of violence resulted from a very public dispute between a prominent local resident, José Antonio Padrón, and the parish priest of Gibraltar, Padre José Joaquín Lizardo. Padrón was both a plantation owner and a local official, occupying the posts of *procurador* and municipal secretary of the *cantón*, and an apparently somewhat obnoxious personality. For some time, tension had been building between the two; the original cause of their animosity is unfortunately not reflected in the historical record. The two had, however, exchanged hard words on numerous occasions. By the end of the confrontation, Padrón had been driven out of the community by force, in support of the priest.

One of the issues of moment to surface in Venezuela after independence had to do with the roles to be played by the Catholic Church and its representatives in the new republic. Perhaps inevitably, members of the clergy would be drawn into disputes and conflicts over resources and political influence. In the province of Maracaibo, members of the Catholic clergy sometimes found themselves embroiled in local politics. Their authority was subject to frequent challenges, both from emerging local elites and from their humbler parishioners. The clerics themselves were often controversial figures, engaging in numerous roles in the emerging region.

Hybrid Antimicrobial Peptides Combining Insect & Amphibian Structural Motifs

Richard Plunkett*, Ph.D., Assistant Professor, Biology

Antibiotic resistant infections are an increasing global problem, which left unaddressed will result in ever-higher costs in both human and economic terms. Creative solutions will include new antibiotics from novel sources. Organisms from all domains of life use potent antimicrobial peptides (AMPs) as part of their innate defenses against pathogens; cecropins are structurally simple (two short α -helices) and are among the best-studied AMPs. We propose that by using cecropin as a model and combining functional parts (e.g. α -helices) from known naturally occurring AMPs in novel configurations we can create hybrid AMPs (hAMPs) effective against pathogens with low host toxicity and with target specificity different to the parent molecules. To this end we have designed several cecropin-like hAMPs incorporating α -helices from cecropin molecules of insects and temporin and brevinin (skin AMPs) from amphibians. Synthetic hAMPs were tested for activity against several bacteria, and for hemolytic activity against mammalian red blood cells. Incorporation of vertebrate AMP motifs produced hAMPs with broader activity spectra and lower minimum inhibitory concentrations compared with insect-only hAMPs, however, greater hemolytic activity was observed. One hAMP (HC₍₁₋₂₄₎-B1PRa₍₁₋₁₃₎) containing the N-terminal helix of *Hyalophora cecropia* cecropin A linked to the alpha helix of brevinin-1PRa from *Rana pirica* was effective in micromolar concentrations against all bacteria tested including *Staphylococcus aureus*, but was highly hemolytic. This peptide may have potential as a topical antimicrobial. These results help

inform our understanding of structure/function relationships in AMPs. Planned studies include altering the sequences of candidate hAMPs to retain antimicrobial action while reducing hemolysis.

Home range of the green anaconda (*Eunectes murinus*)

Jesús Rivas*, Ph.D., Assistant Professor, Biology

During the 1992 dry season in the Venezuelan llanos we began an integral study of the ecology of the green anaconda (*Eunectes murinus*). As part of this study eight adult females and four adult males, ranging from 2.8 m and 7.8 kg to 5.3 m and 82.5 kg, were used in a radio telemetry study to assess home range and habitat preferences. The devices for radio tracking were implanted subcutaneously. Nine hundred fifty locations were recorded during 14 month (419 days). During the dry season the anacondas gathered in the few remaining bodies of water. In the wet season, males and non-pregnant females performed migrations toward other areas (around 1700 m from the dry-season home ranges) using the flooded savannah. The home ranges used in dry season were about the same size as those used during the wet season (mean = 37.1 ha.). Typically, anacondas used shallow water (mean depth = 16.1 cm) and preferred to stay near the edge of the water, hiding frequently in the bushes of the shore and caves. Pregnant females, however, did not migrate and had a total home range comparable with non-breeding animals in a given season (mean = 40.3). Pregnant females preferentially used the banks associated with rivers and roads.

Lady Mafia: Saviano's *Gomorra* and Beyond

Verónica Saunero-Ward*, Ph.D, Associate Professor, Languages & Culture

This essay explores the changing role of women within systems of organized violence such as the Camorra, N'dragheta, and Cosa Nostra. As micro-societies, these highly misogynistic criminal organizations uphold a construct of female sexuality in reference to the male sign and according to their own mores. That is, women's sexuality and subjectivity as well as their representations are defined by language and culture. Within the criminal system, they are objects defined by sexual difference. Recently, however, some women have achieved certain subjectivity; they can hold the power over people's lives and million-dollar operations, a role once assigned only to the patriarch of the clan. These women achieve the status of "boss" at the cost of denying their own sexuality which, one can say, is the inverse of the position afforded to women in Berlusconi's world where they are reduced to representations of their sexuality even when they hold positions of power.

Does the access to a marginal power imply that these organizations have repudiated gender roles based in sexual difference, even if it is only for economical gain? Does it signify progress? These questions have received significant illumination recently through the works of Roberto Saviano. This analysis will also draw on the writings of, R. Siebert, G. Fiandaca, O. Ingrassi, J. Lacan, and others.

Thriving in a Marxist Society or: Dave Chappelle Rides Groucho's Clawhammer

Coattails

Eddie Tafoya*, Ph.D., Associate Professor, English & Philosophy

Between the time they first appeared on Broadway in their review "Fun in Hi Skule" and their release of the 1946 film "A Night in Casa Blanca," the Marx Brothers reformulated the way Americans laugh and what Americans laugh at. For the century before the Brothers and their particular kind of madcap, saturation comedy became popular, three modes dominated American comedy: the minstrel show, Yankee humor, and frontier humor, all of which relied on the comedian celebrating a certain "insider" status founded upon an attitude of privilege inherited from the Puritans. By adopting the personas of reviled American immigrant stereotypes (namely the avaricious Jew, the conniving Italian, and the dumb Irishman), the Marx Brothers implicitly announced and illustrated that these so-called "outsiders" were not only ubiquitous in American society but also integral to the American experience. Unlike their comedic contemporaries, the Marxes tended to venture into dangerous territory by relentlessly and unabashedly suggesting that the nation's worst nightmares were indeed coming true: the influx of the non-Protestant immigrant would indeed reduce the great American experiment to chaos. With their constant reversing of power paradigms, celebration of the plight of the "little man" (or "little woman"), and merciless swipes at Puritan-Americans and the cultural elite, the brothers would, in the decades to come, so profoundly reshape American comedy that the likes of Mort Sahl, Lenny Bruce, Godfrey Cambridge, George Carlin, Whoopi Goldberg, and Dave Chappelle could not help but follow their lead.

Scaring the Dickens Out of Batman **Benjamin Villarreal*, Instructor, English**

Lee Bermejo's *Batman: Noel* retells Charles Dickens' iconic *A Christmas Carol* using characters and settings belonging to the DC Universe. While the practices of writing a comic based on a work of literature or adapting Dickens' Christmas story aren't particularly new, that Bermejo chose this work and this comic should be noted.

A Christmas Carol is the most famous work of a long forgotten genre. Christmas Crawlors were Gothic stories published around the holiday as a chilling and entertaining way to pass the season. They date back to Horace Walpole's *The Castle of Otranto*, a ghost story published on Christmas Eve 1764, and include the works of other prolific writers such as Robert Louis Stevenson.

Knowing this, does Bermejo's November adaptation qualify as part of a lost, 19th century literary genre simply because of its source material? Or is *Batman: Noel* a spectre of Christmas future?

Devouring Shakespeare: Cuba, Cannibalism, and Caliban **Donna Woodford-Gormley*, Assistant Professor, English**

In *Constellation Caliban* Natalie Lie and Theo D'haen note that the Roberto Fernandez Retamar's 1971 essay *Caliban* started a whole new discipline, Calibanology. Retamar and others have attempted to redeem and reclaim Caliban, and have called for an examination of literature and culture from Caliban's perspective. They have both pointed out that the cannibalism associated with Caliban is a fiction and embraced the idea of the cannibal, choosing to devour their source text and the colonial and imperial powers with which it is associated. In the wake of Caliban's emergence from the background of Shakespeare's play, other, even more marginal or suppressed characters have begun to surface. Sycorax, only a brief mention in *The Tempest*, is, for instance, raised to the level of a goddess in Flora Lauten and Raquel Carrió's *Otra Tempestad*, a more recent Cuban adaptation of *The Tempest*. In this paper I will examine the portrayals of Caliban and Sycorax in Retamar's *Caliban* and in Carrió and Lauten's *Otra Tempestad*. I will explore both the ways that these characters have allowed Cuban writers to devour Shakespeare, and the ways in which Cuban writers have found themselves consumed by these characters or by Shakespeare.

NOTES:

Student Oral Presentations

The Effects of Environment on Test Scores

Angel De Nieves Arellano*, Undergraduate Honors Student

The research I have conducted will answer the question, "Do urban environments or natural environments have an effect on an individual's personal test taking abilities?" If your scores of any test depended on the environment you were surrounded by, would you take five minutes of your time to sit down and watch a five minute movie clip of nature to improve your test scores? I will address these questions by conducting an experiment with volunteers who will randomly be placed in one of two groups. Each group will watch a video on either an Urban or Natural environment. Then they will take a test and their scores will be evaluated. A similar study has already been conducted and found that urban environments can affect stress levels. It is known that stress can cause an individual to score lower on a test. For example in one related study, views of nature have been shown to change particular psychological problems including stress in urban areas. My anticipated findings will be that stressful environments (such as Urban environments) can affect individuals' test scores. Therefore the natural environment is projected to have a positive affect on an individuals performance.

Translating Experience Through Sculpture

Rachelle Bonnet*, Undergraduate Student, Fine Arts

Growing up and living in Southeast Alaska, surrounded by majestic landscape and influential regional culture and art forms, has influenced my life and the content of my art. Being close to nature is important to me and has been evident in my artwork since I first began painting and drawing landscapes during my first two years in college. Upon arrival to NMHU, I began combining human figures with elements from the natural world to translate my fascination of landscapes into sculpture.

Not just landscape, but also NWC totem poles have been a driving force in the construction and concept of my sculptures; allowing each to be unique but relatable. Like totem poles, within each of my sculptures is a story of a different experience I've had in the natural world. My figures manifest in totem pole shape and form: erect and reaching upward. Emily Carr, a modern artist known for her paintings of totem poles and the forest in British Columbia, is also an inspiration to my work in this context.

Choosing to make sculpture in clay and metal is important because I prefer to use natural materials to express my experiences. Physically using the earth's crust and core to build figures and cast forms lets the material speak about the natural world through my art. I make decisions about form and size in order to solve problems and address challenges associated with making sculpture in clay and metal.

Is the emotional memory effect influenced by type of encoding and delay?

Tyler Broderick* (Graduate Student), Maura Pilotti, Ph.D. (Assistant Professor), Tiffany Abeyta* (Undergraduate Student), Jennifer L. Bochenek, Jose L. Griego* (Undergraduate Student), and Elizabeth C. Long, Social and Behavioral Sciences

In the present research, guilt, a threat to one's moral purity, was elicited by asking participants to remember personal actions that resulted in harm to others and that had yet to be repaired. The aim was to examine whether heartfelt guilt could influence not only memory of threat words, but also evaluation and actual choice of products that could remove metaphorically one's moral impurity. When the experience of guilt was accompanied by enhanced arousal (as measured by both self-reports and skin conductance responses), greater recall of threat words, and biased evaluation of cleansing products, but not effects on choice behavior, were observed. It was concluded that heartfelt guilt may activate concepts describing both hazards (as illustrated by the recall of threat words) and defensive reactions (as illustrated by the evaluation of cleansing products), but that the latter may be limited to stated preferences rather than actual choices.

Burn Severity Modeling and Fire Severity across Different Land-Cover Types in the Las Conchas Fire; Jemez Mountains, NM

William Jaremko-Wright*, Undergraduate Student, Natural Resource Management

The 2011 Las Conchas fire was the largest in New Mexico's recorded history. Burning for 18 days, the fire spread over 156,000 acres and burned through many different vegetative communities. Due to the large size and nature of the fire, restoration work in watersheds and severely burned areas began immediately after the fire was contained. To locate areas of greatest need for post-fire restoration, federal land management agencies utilize the Burn Area Reflectance Classification (BARC) method. Fires with large spatial extents, that burn across many vegetation types, provide an opportunity to analyze fire severity across a gradient of dominant vegetation types. The Las Conchas fire was modeled using BARC protocol in an ERDAS Imagine GIS environment. Land-Cover vegetation types were used as a template to clip a burn severity raster. Burn severity percentages for each dominant vegetation type were calculated. Further analysis investigated if there was a relationship between potential annual direct incident radiation and burn severity. Results fit with observed fire behaviour across the different vegetative communities. Forest and woodland types were highly variable and had significantly different responses to the same fire. The modeling process may underestimate some vegetation types, such as Piñon-Juniper woodlands where there is significant mortality of the dominant overstory trees, but due to high grass and bare ground percentages are recorded as low severity. Predicting fire behavior in adjacent but contrasting ecosystems can aid resource managers in restoration efforts as well as landscape level treatments aimed at reducing risk of catastrophic fire.

One Without the Other: Failure of School Consolidation in Las Vegas, N.M.

José Ramón Lopez *, Undergraduate Honors Student, History

This presentation is a review of the legislative history of the failed attempt to consolidate Las Vegas' two school districts between the years 1966-1972. I am currently working to contextualize that story within the larger narrative of the struggle for civil rights in the United States and the struggle within New Mexico for political reform. Civil rights are central to the research paper because the two school districts in Las Vegas were divided along ethnic lines prior to and during the 1960s. Like many in America's battle for desegregation, Las Vegas' school systems wanted equality but did not want to be forcibly integrated for fear of losing their separate identities. The story of political reform in New Mexico is also relevant to the story. In the 1960s, New Mexico politics at the state level were being reformed by direction of the federal government in order to eliminate the machine politics of the traditional *patrón* system. San Miguel County was one of the last bastions of *patrón* control to exist in New Mexico, and as Dr. Maurilio Vigil pointed out in his book, *The Hispanics of New Mexico*, *patrones* shifted their political control to county, municipal, and school district governments that were beyond federal reform. My task then is to compile a comprehensive narrative on the failure of Las Vegas' school districts to consolidate despite the consolidation of the separate municipal governments of East and West Las Vegas during that same time period.

NOTES:

Faculty Poster Presentations

A Statistical Examination of Instructional Methods

Cathryn Brooks-Williams, MSW*

*Instructor, School of Education

Institutions of higher learning offering distance education opportunities question the comparability of instruction between in-house students and distance education students. This study examines whether there is consistency between instructional methods and whether instructional methods have an effect on students' grades of (N=56) graduate students who attended GNED 605: Statistics for Educators courses during Spring and Summer 2011 semesters. Of these students, 39% attended face-to-face or Interactive Television (ITV) and 61% attended Internet courses. The results indicate that the methods of instruction are fairly equal between the face-to-face, ITV, and online classes for the course of GNED 605, and the three analyses showed no statistical significance between the types of instruction. Small differences in scores could be a result of several factors, including students' computer literacy skills and educational ability. While consistency of instruction is one key component in education, other dynamics require further investigation.

U-Pb Zircon Geochronology Of Granite Phases In The Hermit's Peak Batholith: Constraining The Timing Of Granitic Magmatism In Northern New Mexico

Jennifer Lindline, Ph.D. *

*Professor, Geology

The southwestern U.S. consists of a series of Proterozoic provinces – Mojave (2.0-1.8 billion years in age (Ga), Yavapai (1.80-1.70 Ga), and Mazatzal (1.70-1.60 Ga) – that formed and amalgamated to North America in a series of collisions bearing the same names. The region also records a younger 1.40 Ga episode of granitic magmatism that has been explained by conflicting models. Anorogenic models, supported largely by geochemical characteristics, hypothesize an extensional tectonic setting. In contrast, orogenic models, based on structural evidence for crustal shortening synchronous with pluton emplacement, hypothesize a transpressional intracratonic setting. The Hermit's Peak batholith, a Proterozoic metamorphic-plutonic massif, contains several phases of granite. The relation between magmatism and deformation in the Hermit's Peak batholith has been unknown, as no age determinations have ever been reported. We conducted zircon geochronology at the University of Arizona's LaserChron Center on two Hermit's Peak granite phases – a foliated granitic gneiss and a cross-cutting non-foliated granite. Two analyses (core and rim) of more than 20 zircon crystals were incorporated into a final age calculation for each sample. The granitic gneiss yields a weighted mean $^{207}\text{Pb}/^{206}\text{Pb}$ age of 1.705 ± 0.017 Ga and is assigned to the Yavapai terrane. The non-foliated granite yields a weighted mean $^{207}\text{Pb}/^{206}\text{Pb}$ age of 1.448 ± 0.012 Ga and is assigned to Mesoproterozoic plutonism. The 1.4 Ga granite shows no mineral alignment or chemical segregation that typically accompanies deformation. Our findings indicate that Hermit's Peak is comprised of Yavapai basement and support an anorogenic model for the emplacement of 1.4 Ga granite.

Preliminary Rock Magnetic and Geochemical Data Bearing on the Serpentinisation Process, Magnetite Production, and Precious Metal Concentrations

M.S. Petronis¹*, J. Lindline¹ and B. O'Driscoll²

*Associate Professor, Geology

¹Natural Resource Management Department, Ivan Hilton Science Technology Bldg, New Mexico Highlands University, Las Vegas, NM 87701

²School of Physical and Geographical Sciences, Keele University, Keele ST5 5BG, UK

Serpentinization is a low-temperature metamorphic process involving heat and water by which ophiolites, relic sections of oceanic crust, are oxidized and hydrolyzed into serpentinite and thus preserves a record of the fluid chemistry. Magnetite and rare metal alloy formation associated with seafloor serpentinization are accompanied by hydrogen and strongly reducing conditions. Such conditions support microbial activity in hydrothermal vents

close to mid-ocean spreading ridges and have been considered modern day analogues for those under which life originated. Here we present the preliminary results from an integrated rock magnetic and geochemical study of serpentinizing fluids in ocean floor hydrothermal environments preserved in the Leka Ophiolite sequence, central Norwegian Caledonides, Norway. We tested the relationship between the degree of serpentinization and the nature and production of Fe-Ti oxide mineral phases and associated metals. We employed petrography, rock and mineral chemistry, and a suite of rock magnetic experiments to fingerprint the production of magnetite and other metals during different stages of the serpentinization reaction. By applying this research to the variably serpentinized Leka Ophiolite, magnetite, metal production, and timing during different stages of the serpentinization reaction will be fingerprinted. Preliminary results are encouraging and should allow us to fulfill our research objectives. This work offers a rare opportunity to gain physical and chemical insight into the dynamic interface between the ocean floor and hydrosphere.

Preliminary Magnetostratigraphic Analyses of the Neogene Ogallala Formation in southwestern Kansas and northeastern New Mexico for the High Plains-Ogallala Drilling Program

Kate E. Zeigler^{1*}, M.S. Petronis¹, J. Smith², G. Ludvigson², J. Doveton²

***Postdoctoral Research Scientist, Geology**

¹*Natural Resource Management Department, Ivan Hilton Science Technology Bldg, New Mexico Highlands University, Las Vegas, NM 87701*

²*Kansas Geological Survey, The University of Kansas, 1930 Constant Ave, Lawrence, KS 66047-3726*

The High Plains aquifer has come under increasing stress with growth of urban and agricultural areas and developing the best groundwater management policies will depend on the most accurate characterization of the aquifer, the aquifer materials and their stratigraphic and geochronologic framework. The High Plains-Ogallala Drilling Program (HPODP) has been developed to advance scientific understanding of sedimentary facies, stratigraphic framework, and chronostratigraphy of the Ogallala Formation and overlying units of the central High Plains aquifer. In northeastern New Mexico and southwestern Kansas, the Neogene Ogallala Formation represents sediment accumulation as a clastic apron shed to the east from the Rocky Mountains. Although mammalian faunal assemblages and volcanic ash bed tephrochronology provide a basic geochronologic framework for the Ogallala Formation, better precision in terms of correlation is needed in order to understand formative processes and depositional histories for the primary water-bearing units and confining strata. In order to develop this framework, six drill cores are currently being extracted from southwestern Kansas that captures most of the Ogallala Formation and overlying units. Additional sampling of surficial outcrops of the Ogallala Formation in Union County, northeastern New Mexico, is also being performed. The first drill core was recovered from Kansas in summer 2011 and samples collected for bulk magnetic susceptibility, magnetostratigraphic and rock magnetism analyses. An understanding of the Ogallala Formation is critical in terms of developing groundwater flow models and management policies for communities relying on aquifers in heterolithic sequences around the globe.

Graduate Poster Presentations

Scaling Up Chiral HPLC: 2-phenylbutyramide

Samuel Bentum* and Arcadius V. Krivoshein

***Graduate Student, Chemistry**

Epilepsy is a neurological disorder that affects about 50 million people worldwide. Existing antiepileptic drugs possess many side effects and cannot adequately control seizures in about 30% of patients. Therefore, the search for new, safer and more efficient anticonvulsants continues.

2-Phe-butyramide is a new, promising experimental anticonvulsant. We previously tested racemic form of this compound in vitro (patch-clamp electrophysiology) and in vivo (in mice). In this study, we conducted a systematic optimization of chiral high-performance liquid chromatography (HPLC) of 2-Phe-butyramide on

Chiralcel OD stationary phase. The optimized, cost-effective procedure can be used to prepare enantiomers of this anticonvulsant in quantities needed for animal tests in mice and rats.

Preliminary Results from a Late Pleistocene to Holocene Paleoclimate Study of the Lake Sediment Cores, Northern New Mexico

Adam Brister* and M.S. Petronis

*Graduate Student, Geology

The geography of the Las Vegas National Wildlife Refuge (LVNWR) and surrounding region has changed dramatically since the late Pleistocene in response to the expansion and contraction of alpine glaciers activity and associated climate change. During the late Pleistocene, we hypothesize that the area just east of the Sangre de Cristo Mountains at the latitude of Las Vegas, NM consisted of several or a network of interconnected lacustrine systems. Following the end of glacial activity, these lacustrine systems shrank to their current condition of minor low-volume isolated lakes and numerous playas and pluvial bodies. Preliminary data from an integrated, paleoclimatic study of sediment cores collected from three playa lakes provide insight into late Pleistocene to Holocene paleoclimatic variations in northeastern NM. Rock magnetic data acquired from the sediment cores is used to characterize the materials, identify stratigraphic changes, document shifting lake levels, assess temperature changes, and infer paleoclimate conditions. An environmental magnetism study of sediment from the LVNWR and surrounding plays can help provide invaluable and untapped record of late Pleistocene to Holocene climatic change. Additional data are being collected which will aid with interpreting the evolution of the lacustrine system. We postulate that concurrent with alpine glacial activity during the Pleistocene, the LVNWR and the transitional Great Plains region to the northeast was an expansive single lake or interconnected lake system, analogous to the Pleistocene lakes of the Estancia Basin (Lake Estancia) and the Tularosa Basin (Lake Otero) of central and southern NM.

Synthesis And X-Ray Studies Of Triene Chromophores Containing The Cyclohexene Ring Structure For Non Linear Optical Application

Rene Ebule*, Carlos Ordonez and Rodolfo Martinez

*Graduate Student, Chemistry

The syntheses of a series of donor-acceptor triene systems with non-linear optical capabilities have been realized. These systems have incorporated into them a central unsaturated cyclic-ketone, a donor amine group and an acceptor dicyanomethylidene group. There is however a major challenge of simultaneously achieving acceptable processibility, nonlinearity, transparency and thermal stabilities for similar chromophores. Some compounds of this type have been synthesized and need to be characterized for decomposition temperature, nonlinearity and transparency.

Our research will dwell on the synthesis and characterization of other analogues of the type with a central cyclohexene ring structure but varied amino donor groups.

Synthesis of the target compounds have been achieved in two steps;

1. Synthesis of an amino derivative of 5-bromo-2-thiophene carboxaldehyde by simple nucleophilic substitution of the bromo with a secondary amine and
2. The One pot synthesis of the conjugated pi system containing the hexatriene bridge between the dialkylamino electron donor and the dicyanomethylidene electron acceptor.

We have synthesized and characterized two of such compounds and they have successfully shown acceptable thermal stabilities, they are non-Centro symmetric and have an acentric crystal packing. Other parameters like hyperpolarizabilities and absorption wavelengths will be obtained subsequently. The compounds so far done include;

- I. 2-(5,5-dimethyl-3-((E)-2-(5-(pyrrolidinyl)thiophene-2-yl)vinyl) cyclohex-2-enylidene) malononitrile
- II. 2-(5,5-dimethyl-3-((E)-2-(5-(morpholidinyl)thiophene-2-yl)vinyl) cyclohex-2-enylidene) malononitrile

New Mexico Highlands Geology: International Exchange Program in collaboration with the Université Blaise Pascal, Clermont Ferrand, France

***Foucher M.¹, R. Trujillo¹, M.S. Petronis¹, B. van Wyk de Vries²**

***Undergraduate Student, Biology**

¹*Natural Resource Management Department, Ivan Hilton Science Technology Bldg, New Mexico Highlands University, Las Vegas, NM 87701*

²*Laboratoire Magmas et Volcans, Université Blaise Pascal, 63038, Clermont-Ferrand, France.*

The opportunity to travel abroad is extraordinary but the chance to study in a foreign country provides an invaluable experience. In the summer of 2011, I (R. Trujillo) was awarded with an International Exchange honor to study at the Université Blaise Pascal, in Clermont Ferrand, France for a month. I explored a famous chain of volcanoes called the Chaîne des Puys, with concentration on lava flow mechanics. I spent some days at the university among several types of geologists from all over the world and had the opportunity to learn of new instruments and methodologies that are being used in Europe. The majority of my time spent was in the field observing lava flows. Also, while in France I was appointed to aide with a series of classes that are taught to French speaking, minimally English speaking professors who are taking on the challenge of teaching in English in their classrooms. This was a highlight of the trip because of the friendships built and networking I did will last a lifetime. The journey was not only an educational adventure, but also the chance to awaken all five of my senses in the most invigorating way imaginable.

Understanding the complexity of cinder cone volcanoes using Paleomagnetic, Rock Magnetic and Structural analysis; a case study from the Cienega Volcano, Cerros del Rio volcanic field, New Mexico

Foucher M.^{1*}, M.S. Petronis¹, J. Lindline¹, B. van Wyk de Vries²

***Graduate Student, Geology**

¹*Natural Resource Management Department, Ivan Hilton Science Technology Bldg, New Mexico Highlands University, Las Vegas, NM 87701*

²*Laboratoire Magmas et Volcans, Université Blaise Pascal, 63038, Clermont-Ferrand, France.*

The Cerros del Rio volcanic field, west of Santa Fe, NM, is situated on the La Bajada constriction, between the Espanola and the Santo Domingo basins of the Rio Grande Rift. Pliocene to Pleistocene volcanism resulted in about 60 volcanoes mainly cinder cones; including the La Cienega volcano. Cinder cone volcanoes are generally envisioned as a loosely consolidated pile of pyroclastic materials formed by ascension of magma through simple feeder conduit geometry. Recent field and laboratory studies, however, reveal that the magma follows numerous pathways during the emplacement process resulting in more complex and variable feeder geometries. We investigate the excavated cinder cone La Cienega, that exposes in near three-dimensions the magma plumbing system. We inspected the magmatic plumbing system using different field (mapping) and laboratory methods (thin section petrology, paleomagnetic and anisotropy of magnetic susceptibility (AMS) data). To evaluate magma emplacement and subvolcanic magma feeder system evolution, we collected samples across the feeder system. The paleomagnetic results indicate that the sampled dikes were emplaced quickly relative to secular variation of the geomagnetic field and provide constraints on the relative emplacement sequence. The AMS data show magma flow patterns that support the field observation of macroscopic structures with flow towards and away from the vent. Preliminary paleomagnetic and AMS results indicate that the cinder cone plumbing systems are more complicated than common models predict and that the magma uses different pathways as it flows through the volcanic edifice.

A Journey through geological time: New Mexico, Colorado, Utah, Idaho, Montana, and Wyoming, May 2012

Highlands University Geological Society (H.U.G.S)*

M.S. Petronis, Faculty Advisor

Highlands University Geological Society's mission is to introduce as many people as possible to the natural phenomena, the history of the earth, and to understand the processes that formed our surroundings. There will be a group of 8-10 students, one videographer from Media Arts, and two Geology professors taking a journey from New Mexico, through Colorado, Utah, Idaho, Montana, and Wyoming. In each state we will take some time

to visit some established national parks and explore the splendid geology while, the professors explain the natural splendors of each national park that we visit. The journey will end at Yellowstone National Park where the group will spend four days investigating the geothermal features of the park. In Yellowstone lies a supervolcano that has erupted and was three times more powerful than the eruption of the Mount St. Helens in 1980. The mission of this poster is to share the educational experiences that each student and professor will gain on the expedition. All funds to support this endeavor were raised by the Highlands University Geological Society and via grants secured from NMHU undergraduate and graduate student senate.

The Effects of Biochar Amendments to Arid Soils (aridisols) on Water Retention and Microbial Abundance

Reyna Montaña*, Craig Conley, Cesar Alvizo, Octavio Ayala and Richard Plunkett

*Graduate Student, Biology

This pilot study tested the ability of biochar addition to local aridisols to enhance water retention and consequently alter microbial abundance. Microbial activity is critical for both the drought tolerance of crops as well as nutrient cycling in agro ecosystems. We tested the following hypotheses: 1) Addition of relatively little biochar (0, 1, 3, and 5% by weight) will increase microbial abundance, and 2) Higher biochar content will have a greater effect. Biochar was added to soils from two locations (Santa Fe and Torrance, NM) at 1, 3 and 5% by weight with untreated soil (0%) as a control, and incubated in 1/2 gallon pots in the NMHU greenhouse. Microbial abundance was assessed at the beginning, after 25 days, and at the end of the study (40 days) by plate count on tryptic soy agar (bacteria) or Sabaroud's dextrose agar (fungi). During this time constant measurements of soil moisture were recorded. In order to replicate drought conditions all samples were watered once at the beginning of the experiment. Soil moisture decreased in all samples, but the 5% biochar samples retained the most water. No correlation was observed between bacterial abundance and biochar or soil moisture content in either soil type. Likewise, there was no correlation between fungal abundance and biochar. However, in both soil types as water decreased the abundance of fungi also decreased. Because of the importance of diversity as well as abundance, future studies will determine the diversity of microbes in the different concentrations of biochar.

The Effects of Industry on Traditional Food Practices

Crystal Montoya*

*Graduate Student, Sociology

Currently a significant amount of evidence exists implicating various industrial enterprises for their negative impacts on local communities including health complications, environmental destruction and disruption of culturally specific foodways. For instance, Leathermana (2005) found that dependency increased on nutrient poor commercialized snack foods, such as Coca Cola, that lead to obesity and the stunted growth in Mayan children among four Yucatan communities. Other studies documented how market integration and crop commercialization brings about a shift in meaning ascribed to traditional food crops (Finnis, 2008). Finnis (2008) argues that food policy and regulations can lead to ethnic identity crisis, due in part to the disappearance of specific material cultures associated with the production of certain foods (Finnis, 2008).

The consumption, preparation, and preservation of food can be understood as cultural products whereby unique food practices are designed through the interaction of people situated within a given culture (Douglas 1972; Mäkelä 2001). Kalcik (1994) explains that for both new and recent ethnic groups in America, the pattern of what is eaten, when, how, and what it means are closely tied to individual and ethnic identity. Food remains one viable aspect of the folkways of American ethnic groups and a significant way of celebrating ethnicity and group identity. It is through food that the first layers of culture are formed and therefore, food practices are the last aspect of culture to erode (Kalcik, 1994). This research explores the effects of oil-industry-production on traditionally Hispanic food practices in the San Juan Basin. Very little research examining how local, social, and symbolic meanings are affected by the loss of traditional food practices as a consequence of certain industrial practices exists (Finnis, 2008). Given the lack of research, the current focus on natural gas as an alternative energy source, and the recent activities in the San Juan Basin makes the research project especially timely and significant.

Douglas, M. (1972). Deciphering a Meal. *Daedalus—Journal of the American Academy of Arts and Sciences*, Winter: 61–81.

Finnis, E. (2008). Economic Wealth, Food Wealth, and Millet Consumption. *Food, Culture & Society*, 11(4), 463–485.

Kalcik, S. (1994). Ethnic foodways in America: Symbol and the performance of identity. In L. Keller-Brown & K. Mussell (Eds.), *Foodways in the United States: The Performance of Group Identity* (p. 39). Knoxville, TN: The University of Tennessee Press.

Leathermana, T. L., & Goodman, A. (2005). Coca-colonization of diets in the Yucatan. *Social Science & Medicine*, 61(4), 833–846.

Mäkelä, J. (1991). Defining a Meal. In E. L. Furst, R. Prättälä, M. Ekstrom, L. Holm and U. Kjaernes (eds) *Palatable Worlds: Sociocultural Food Studies*. Oslo: Solum, pp. 87–93.

Effects of Bison Grazing vs. Cattle Grazing on Bird Diversity in Northeastern New Mexico

Jennifer Runnels, Jesús Rivas and Edward Martinez

*Graduate Student, Biology

Large ungulate grazing has played a significant role in shaping grassland habitats of the Great Plains in North America. American Bison (*Bos bison*) once roamed the plains in herds estimated to be around 30 million, playing a major role in maintaining abundance and diversity of plain's biota. Today most of these areas are primarily grazed by cattle. Although bison and cattle are functionally similar as large grass-feeding herbivores, differences exist in grazing behavior that suggests bison may be a key species for maintaining diversity in grasslands. Because grassland birds are some of the most threatened birds in North America, this study compared bird diversity on two neighboring ranches, one bison grazed, and the other cattle-grazed. Bird diversity was measured in riparian and grassland habitat using point-count surveys during 2011. Chi-square (χ^2) analysis was used to detect differences in bird diversity between the two ranches. We found statistical evidence that bird diversity was higher in grassland habitat on the bison grazed ranch. We also found that bird diversity was higher in grazed vs. nongrazed grassland on the cattle grazed ranch. These results suggest that low-intensity to moderate grazing by both cattle and bison supports grassland biodiversity, and further suggests that native grazers (bison) can help restore grassland plant communities and structures, reestablishing important habitat for birds and other wildlife.

Seasonal Variations and Physiochemical Parameters Influencing the Mobilization/Adsorption and Redox State of Arsenic and Iron in Valles Caldera Streams

Timothy Sanchez, Lorraine Garcia, Daryl Williams, Sebastian Medina and Edward Martinez

*Graduate Student, Natural Resource Management

Stream flow variability influenced by local snowpack and geothermal groundwater inputs in the Jemez Mountain's, and Valles Caldera National Preserve (VCNP) are evident. Dynamic interactions encompassed in climate change have and continue to alter many ecological and geological systems. Natural systems and processes influencing mobilization/adsorption of elements, such as arsenic and iron will potentially be disrupted. Understanding these interactions in geothermal sources is crucial because of the high contributions of arsenic added to surface waters.

Historically, Arsenic has been viewed as a highly toxic element; toxicity is compounded by high concentrations, found in natural waters worldwide. Arsenic being a highly reactive element gains or loses electrons in redox reactions, resulting in a variety of redox states. Seasonal variations influence physiochemical parameters impacting redox state, thus affecting mobilization and/or adsorption of arsenic to reactive iron oxides. Mobilization of arsenic is highly dependent on physiochemical parameters influencing arsenic redox state. We hypothesize that high affinity of iron oxides to arsenic, found in sediment, is an indication that mobilization of Arsenic in water has decreased. Inversely, high arsenic concentration found in water, is an indication of high mobility, thus concentrations found in sediments will be decreased. Water and sediment samples were collected at the headwaters, geothermal springs and effluent sites, located on the VCNP and Jemez River. Samples were analyzed by Graphite Furnace Atomic Absorption Spectrometry for total metal composition. Results will allow us to identify periods of time, seasons, where high mobilization/adsorption of arsenic exists.

Preparation and X-ray Study of novel materials for NLO applications

Draguta Sergiu^{1*}, Joel Zazueta¹, Marina S. Fonari^{1,2}, Tatiana V. Timofeeva¹

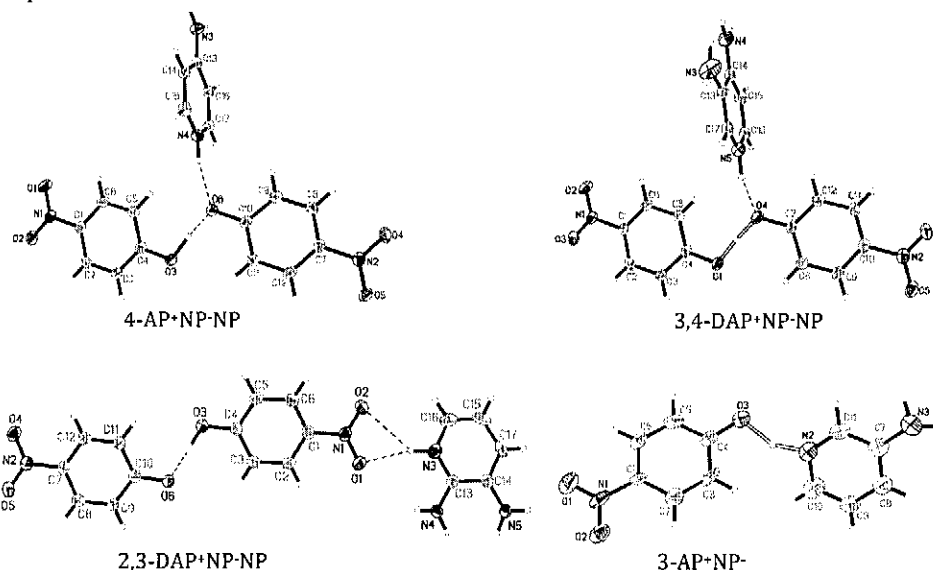
*Graduate Student, Chemistry

¹Department of Biology and Chemistry, New Mexico Highlands University, Las Vegas, NM 87701, USA

²Institute of Applied Physics ASM, Chisinau, Moldova

The directed design of acentric materials for NLO applications still remains a challenge in spite of the several fruitful approaches that have been developed for generation of novel non-linear optical materials. One of the few quadratic nonlinear optical chromophores which form a large number of noncentric cocrystals/salts without the

assistance of chirality is 4-nitrophenolate; hence it is an ideal candidate to explore new avenues to noncentric lattice formation. Using the useful facilities of 4-nitrophenol for the acentric lattice formation four novel organic salts ionic co-crystals composed of a phenoxide anion of a 4-nitrophenol NP⁻, a pyridinium cation of a 4-aminopyridinium (AP⁺), 3,4-diaminopyridinium (DAP⁺), 2,3-diaminopyridinium (DAP⁺) and 3-aminopyridinium (AP⁺) and a neutral molecule of nitrophenol (NP). Cocrystals were prepared by slow evaporation at room temperature.



Crystal structure analysis reveals noncentrosymmetric structures in all cases, made up of achiral molecular units. All compounds crystallize in the same acentric $P2_1$ space. 4-aminopyridinium 3,4-diaminopyridinium, 2,3-diaminopyridinium and 3-aminopyridinium are shown to form ternary cocrystalline salts with 4-nitrophenol. Extensive H-bonding interactions of the pyridinium ions and 4-nitrophenol along with pendant 4-nitrophenolate groups are observed in the four crystals.

Proteomic analysis of gene expression in *Golga3*^{repro27} male infertility mice

Rahul Sigdel^{1*}, Charlotte Mobarak², and Carol C. Linder¹

*Graduate Student, Biology

¹Department of Biology and Chemistry New Mexico Highlands University

²Dept of Chemistry and Chemical Biology, University of New Mexico

Golgin subfamily A member 3 protein, GOLGA3, is a Golgi apparatus associated protein required for spermatogenesis. The absence of GOLGA3 protein in *Golga3*^{repro27} mice leads to a partial block in meiosis, germ cell death, and abnormal formation of the sperm head and tail causing complete male infertility. GOLGA3 is implicated in protein targeting, vesicular trafficking, and apoptosis but its role in sperm development has not been determined. The objective of this study was to use a proteomics approach to identify proteins whose expression patterns have changed in *Golga3*^{repro27} mice to unravel the role of GOLGA3 in spermatogenesis. 2-D gel electrophoresis was performed on testicular protein (14 dpp) isolated from C3HeB.6-*Golga3*^{repro27} mutant mice (congenic strain that is ~99.8% C3HeB/FeJ; n=3, pooled,) and C3HeB/FeJ controls (n=3, pooled). Several protein spots showed lower or absent expression in mutants compared to controls. The spots were excised, subjected to trypsin digestion, and analyzed by MALDI mass spectrometry including peptide mass fingerprinting and MS/MS analysis on the five most intense peptides in each protein spot. Some differentially expressed proteins include valosin containing protein (VCP), caldesmon 1 (CALD1), tubulin beta-5 chain (TUBB5), phospholipase C- α (PDIA3), peroxiredoxin 6 (PRDX6), alpha fetoprotein (AFP), ubiquitin carboxyl-terminal hydrolase PGP 9.5 (UCH-L1), D-3-phosphoglycerate dehydrogenase (3-PGDH), T-complex protein 1 subunit beta (CCT2), alpha-enolase (ENO1), stress-induced phosphoprotein 1 (STIP1) and transferrin (TRF). VCP is presumed to act as cellular sensor protein that detects abnormal protein accumulation and promotes its degradation through Endoplasmic-reticulum-associated protein degradation (ERAD). CALD1 is an actin-linked regulatory protein responsible for actin-myosin interaction and stabilizing actin filaments. TUBB5 is a

regulatory cytoskeletal protein that has a GTP binding domain. PRDX6 is involved in preventing oxidative stress. AFP is a serum glycoprotein responsible blocking spermiogenesis in cryptorchid mice. UCH-L1 is associated with proliferative activity of sperm and degradation of abnormal protein in sertoli cells. 3-PGDH is the oxidative protein whose deficiency causes embryonic lethality. CCT2 is the subunit of chaperoning containing t-complex and its expression is up regulated during G1/S transition. ENO1 is a glycolytic enzyme and disruption causes embryonic lethality. STIP1 supports the ability of germ cells to survive in the stress condition. TRF plays a critical role transporting iron in Sertoli cells. Confirmation of these proteins with an additional biological replicate and future experimentation will lead to an increased understanding of the role of GOLGA3 in spermatogenesis.

Anisotropy of Magnetic Susceptibility, Rock Magnetic, and Paleomagnetic Data From Mafic Dikes in the Espanola Basin, Rio Arriba County, New Mexico

R. Trujillo*, Petronis, M.S., and Lindline, J.

*Undergraduate Student, Biology

This study characterizes a suite of Miocene mafic dikes in the Española Basin, north-central NM using paleomagnetic, rock magnetic, and field observations. Paleomagnetic data provided constraints on potential components of vertical-axis rotation across structural blocks, between separate dikes, and along strike variations. Anisotropy of magnetic susceptibility (AMS) data and field observations provided information on magma flow patterns within each dike and document of any variation in magma flow patterns within the swarm. We tested the following hypotheses: 1) the mafic dikes experienced some degree of vertical axis rotation associated with Rio Grande rifting and 2) the magma flow pattern within the dikes reflects lateral emplacement with flow directed away from the magma ascent location. Rock magnetic data provided constraints on the magnetic mineralogy responsible for carrying the AMS and the remanence directions. Low-field susceptibility versus temperature experiments yielded a spectrum of results with Curie point estimates ranging from ~ 100°C to 575°C indicating a range of moderate to low Ti- titanomagnetite compositions as well as the presence of a Fe-sulfide phase. These experiments, as well as other data, indicated that the remanence is likely a primary thermoremanent magnetization acquired during cooling and is thus geologically stable. The AMS fabric data reveal a combination of both prolate and oblate susceptibility ellipsoids. Susceptibility values are high and consistent with a ferromagnetic phase. Preliminary results indicate that the group mean is discordant in a counter-clockwise sense to the expected Miocene field direction.

Fog of Deceit

Robert Vazquez*

*Graduate Student, Sociology

In recent years the immigration issue has received national attention whereby several states implemented immigration policies ranging in severity. This includes policies that extended authorization to agencies not traditionally nor directly involved in enforcement of immigration oversight. Traditionally news media represented the main source for public information and in turn fostered healthy democratic dialogue about societal issues and policy. More specifically, media rhetoric regarding immigrants and immigration issues impacts public understanding and in turn creates opposition or support for immigration policy. This is an important consideration for understanding the type of policies states adopt. This research will determine whether a correlation exists between the content and tone of the media's dialogue and the severity of state policy adopted regarding immigration.

The media has played a major factor in creating perceptions about issues surrounding immigration and immigration policies. Given the shift in the news media's organizational structure, i.e. profit oriented and highly concentrated corporate ownership, a concern emerges about the agenda setting consequences, particularly for this study, around issues of immigration. The focus is on local media's representation of immigration in relation to the severity of that state's policy. Specifically the research will focus on two border states that are considered to be at different points on the spectrum of severity: California and Arizona.

Chironomid Bio-Accumulation of Copper and Heavy Metals: Peterson Reservoir, Montezuma, New Mexico

Daryl Williams*, Jason Martinez, and Edward Martinez

*Graduate Student, Natural Resource Management

Copper sulfate, a naturally occurring inorganic salt, is commonly used as an algaecide in municipal drinking water reservoirs. The United States EPA has classified copper sulfate as a Class I toxic substance with the potency inversely related to alkalinity and pH of water. Copper can accumulate indefinitely and bind to reservoir sediments until disturbances favor its release into the environment. The study sought to determine the levels of copper, cadmium, lead, and arsenic in water, sediments, and chironomids in Peterson Reservoir near Las Vegas, New Mexico as an indicator of reservoir water quality. Over a one year period, chironomid, sediment, and water samples were collected seasonally at four sites in the reservoir. Secchi disk, temperature, pH, dissolved oxygen, conductivity, turbidity, light intensity, and chlorophyll-a were collected in the field and water was analyzed for alkalinity and total phosphorus in the lab. Chironomids, sediment, and water were analyzed for copper, arsenic, cadmium, and lead using Graphite Furnace Atomic Absorption Spectrometry at NMHU labs. Reservoir sediment results showed relatively low levels of As and Cd and high levels of Cu and Pb (As: 0.1-1.7 ppm, Cd: < 0.2 ppm, Cu: 18-343 ppm, Pb: 6-44 ppm). Invertebrate concentrations were typically much higher than sediments (As: 7.5 ppm, Cd: 6 ppm, Cu: 1600 ppm, Pb: 55 ppm) and copper approximately 4.5 times higher than sediment concentrations. However, due to the high pH (9+) and alkalinity levels (200+) in the water column, concentrations of metals in the water (As: < 1.7 ppb, Cd: < 0.2 ppb, Cu: < 6 ppb, Pb: < 0.45 ppb) were typically below US EPA drinking water standards even during seasonal turn-over events. Further study is needed to account for the low numbers of chironomids in the reservoir (< 600 individuals per square meter).

Undergraduate Poster Presentations

From the Poor Man's Shangri-La to Fernandomania: Hispanics in Chavez Ravine

Joseph A. Aragon*

*Undergraduate Student, History

This poster proposes to tell the story of how the Hispanic residents of Chavez Ravine in Los Angeles were forced out of their homes to make way for a housing project that never got built and was then replaced by Dodger Stadium. Today the Dodgers have a large Hispanic fan base. But that was not always the case. When on May 8, 1959, the Los Angeles County sheriff forcibly evicted the Archigas, the last remaining Hispanic family, from their Chavez Ravine home, the Mexican-American community vowed never to return to their beloved old neighborhood. It took an unlikely hero from a tiny village in Mexico to bring the former residents back to Chavez Ravine and into Dodger Stadium. Through historical narrative and the reproduction of archival photographs, this poster will demonstrate how Fernandomania inspired the Hispanic population to reconnect to their former home and become enthusiastic and loyal Dodger fans.

Investigation Of S1P2 Gene Expression In Breast Cancer Tissue

Angelina Boampong*, Yapeng Gu and Jody Rosenblatt

*Undergraduate Student, Biology

Epithelial apoptotic cells release Sphingosine-1-Phosphate (S1P), which signals neighboring cells to initiate the formation and contraction of actin and myosin ring via the Sphingosine-1-Phosphate receptor 2 (S1P2). The contraction results in the extrusion of the apoptotic cell from the epithelium (Rosenblatt, et al., 2001). Blocking of S1P2 signaling in zebrafish epithelium resulted in reduced cell death and epithelial cell accumulations, suggesting that S1P2 is necessary for maintaining homeostasis of epithelia (Tanya Forostyan, 2011). In addition, expression of S1P2 is reduced in MCF-7 breast cancer cells when compared with MCF-10A normal human mammary cells (Yapeng Gu, 2011). I hypothesize that reduced expression of S1P2 contributes to the tumorigenesis of breast cancer. In this study, I used indirect immunofluorescence staining and reverse-transcriptional (RT) PCR to investigate if expression of S1P2 is reduced in primary breast cancer cells. The result of S1P2 expression levels in the cancer tissues was consistent with previous findings of comparing cancerous and normal breast cancer tissue in zebrafish.

Allometric Growth of Spectacle Caiman (*Caiman crocodillus crocodillus*) in the Venezuela Llanos

Adrian C. Carter*

*Undergraduate Student, Biology

Allometric studies have proven useful to identify growth patterns in multiple species. Some animals grow isometrically while others grow allometrically. By measuring one attribute such as snout vent length and weight it is possible to predict the other with a simple linear regression. In this study I took measurements of caiman on snout vent length, weight and scale dimensions to build a regression relating weight and snout vent length to scale size. I found that caiman grow allometrically. I built regressions that can best predict snout vent length from scale length, and logarithmic regressions that can predict weight from scale length. In previous studies caiman have been found to be a major diet of the green anaconda. Often the only remains of caiman are their scales. So it would be beneficial, in future studies, to determine caiman size from scales in anaconda's feces. This contribution also adds knowledge useable for future field studies.

Geomagnetic Investigation of Sandstone Dikes of the Colorado Front Range, for Determination of Age and Mode of Emplacement

D. Freedman^{1*}, Siddoway, C.¹, Petronis, M.S.²

*Undergraduate Student, Department of Geology

¹Department of Geology, Colorado College, 14 E. Cache La Poudre, Colorado Springs, CO 80903

²Natural Resource Management Department, Ivan Hilton Science Technology Bldg, New Mexico Highlands University, Las Vegas, NM 87701

Clastic dikes hosted by Proterozoic crystalline rocks of the Colorado Front Range present a long-pondered geological enigma (Cross, 1894, GSAB, 5, 525). due to their size, spatial extent, and uncertain age, sediment source, and mode of emplacement. The sub-vertical to vertical dikes strike NW-SE, attain widths >10m, and outcrop along ~70 km near the trace of the Ute Pass fault. The dikes consist of sub-rounded sand-sized quartz, detrital magnetite, and angular feldspar (<5%). Cements include minimal and varying amounts of hematite. We present paleomagnetic, rock magnetic, and anisotropy of magnetic susceptibility (AMS) results from twelve sandstone dike localities. Characteristic remnant magnetization of the dikes should provide a lower age limit on our estimate of dike emplacement or remagnetization by means of a paleomagnetic pole position. Laboratory unblocking temperatures are >600°C, with an indication of magnetization carried by magnetite and hematite. Preliminary paleomagnetic results reveal a thermoremanent magnetization carried by magnetite that yields a NW magnetic declination with shallow inclination, similar to results obtained from remagnetized Precambrian and Paleozoic rocks in the region (Geissman & Harlan 2002 EPSL, 203, 905). AMS results for three dikes yield strongly prolate magnetic ellipsoids. The magnetic lineation (K1) trends NW with moderate plunge, and average bulk susceptibilities (Km) are low (6.39E-5 SI). The AMS characteristics point to instantaneous emplacement due to elevated pore- fluid pressures arising from high lithostatic or tectonic loads. We introduce the hypothesis that overpressure was induced by ice loading in a glaciogenic setting. A seismogenic trigger cannot be ruled out.

Non-Invasive Protocol for DNA Extraction and PCR Amplification from Bighorn Sheep Feces

Steven L. Garcia* and Richard Plunkett

*Undergraduate Student, Biology

The goal of this study is to create a general protocol for the non-invasive isolation of genomic DNA from large animals, e.g. Bighorn sheep (*Ovis canadensis*). The long-term goal is to use PCR based methods to characterize MHC Class II genes for population genetics studies. We developed a protocol for the extraction of DNA from fecal pellet material from domestic sheep, and for the amplification of the MHC Class II DRB1 gene. We compared DNA extracted from domestic sheep (*O. aries*) blood with *O. aries* sheep fecal pellet material as targets for PCR using conserved DRB1 primers. We manipulated PCR conditions and primers used to optimize our results. Changing from the general DRB1 and DRB2 primers to more specific LA31 and LA32 primers. PCR products fecal pellet DNA were in the 200 to 300 bp range, which corresponds to the expected fragment size, and similar results to products from blood DNA. This DNA extraction method may be applicable to many herbivores.

Broadband Internet Radios: Creating Safe Conditions for Wildland Firefighters

Ben Gonzales * and Sara Brown

*Undergraduate Student, Forestry

Wildland firefighter fatalities have increased during the past 70 years of fire suppression in the US, despite expensive safety efforts and numerous regulations. The National Center for Landscape Fire Analysis at the University of Montana has developed a system utilizing broadband Internet radios that aid in communication during fire events. This radio technology has been incorporated into fire suppression on the Wenatchee and Bitterroot National Forests. The success of this technology encouraged us to investigate other regions where it had been used, and to determine whether or not there had been a reduction in wildland firefighter fatalities associated with this equipment. By conducting phone and Internet interviews, as well as online research, we determined that these radios are a viable option in certain scenarios that may increase firefighter safety and potentially reduce fire-associated fatalities. The main issues preventing standardization of broadband internet radios are budget constraints and lack of satellite coverage in large wilderness areas. Increases in U.S. population and "Urban Sprawl," combined with dependency on natural resources, will eventually create the need for technologies that reduce firefighter risk while protecting our natural resources.

The effects of the Las Concha's fire, on Aquatic invertebrates, Valles Caldera national Preserve, North central New Mexico

Juan Guaba*, Lorraine Garcia, Clint West, Tim Sanchez, Daryl Williams and Edward Martinez

*Undergraduate Student, Geology

The Valles Caldera National Preserve (VCNP), located in Northern New Mexico is being affected by climate change. The most pronounced effects on the region are the increasing temperatures and decreasing snowpack. Climate change is expected to increase wildfire severity. Following large wildfires, the potential for soil erosion during precipitation events is also increased, therefor potentially degrading the aquatic system. The purpose of this study is to determine the impact of the Las Conchas had on diversity and populations of aquatic macro invertebrates. Samples were collected from various parts of the stream pre and post fire. The macro invertebrates will be sorted, counted, and identified to family. This is preformed to determine the effects of large wildfire on the aquatic macro invertebrate ecosystem. Future research will be conducted to determine the length of time need it for aquatic macro invertebrates to increase in numbers.

Allometric growth in Llanos sideneck turtle (*Podocnemis vogli*) as a contribution for field studies in Northern South America

Jennie Guilez*, Adrian Carter, Ana Caudillo, Jesús Rivas

* Undergraduate Student, Biology

Allometric growth is used by biologists to relate the ratio of body size, mass, and other morphological variables of an animal. This method will help this particular study by allowing us to determine approximant body mass, length, width as well as overall body size, with limited findings of turtle remains. In this study I took measurements on the sideneck turtle (*Podocnemis vogli*) to be able to build linear regressions as a model for future studies. The importance of the study on the side-neck turtle is derived from the interest in the life history of the green anaconda (*Eunectes Murinus*). In a long term study of green anaconda's natural history, it has been documented that reptiles including the side-neck turtles (*Podocnemis vogli*) are part of their main diet. Scales of the turtles can be found in the feces of the snakes and can be measured to determine the size of the consumed turtle from these findings.

Middle cerebral artery blood velocity during running: interactions of heart and stride impact rates

Gutierrez DC^{1*}, Maestas JN¹, Wasson EM², Harper CT³, Subudhi AW⁵, Roach RC⁵, Schneider SM⁴, Green ER^{1,2,4}

*Undergraduate Student, Biology

Departments of ¹Biology, NMHU, Las Vegas, NM 87701; ²Mechanical Engineering; ³Internal Medicine; ⁴Health, Exercise, and Sports Science; UNM Albuquerque, NM 87131; ⁵Attitude Research Center, UCD, Aurora, CO 80045

Vertical movement during running or treadmill exercise generates complex aortic blood pressure waveforms that are developed by the interactions of the cardiac and foot impact pressure pulses ($>120\text{bpm}$). Heart rate (HR) and stride rate (SR) can be synchronized in and out of phase with beat frequencies (difference in the HR and SR). Large variations in phasic aortic pulse pressure ($40\text{--}120\text{mm Hg}$) occur during running. Transcranial Doppler (TCD) measures dynamic middle cerebral artery blood velocity (CBFv), an index of hemispheric cerebral blood flow. Due to technical limitations, CBFv during running has not been reported. We hypothesized that running would significantly modulate CBFv. We used a 2 MHz TCD and a form fitting headset to minimize motion artifact in 5 healthy subjects ($26\pm 8\text{SD}$) during: upright rest; walking (4mph , no vertical motion); and running (7mph , $4\text{--}5\text{inch}$ vertical motion). The resting and walking waveforms were similar to reported ergometer waveforms. Running CBFv waveforms were similar to reported pressure waveforms and exhibited beat frequencies with a range of maximal and minimal CBFv. During in phase HR and SR periods, CBFv was $78\pm 8\text{cm/s}$. Out of phase CBFv was $56\pm 6\text{cm/s}$ ($p<.05$). Preliminary data suggests that CBFv is significantly modulated by the convolution of HR and SR during running. Dynamic cerebral blood flow may depend on the mode of exercise, and it could be optimized by timing of stride rate.

Paleolimnological Study of Sediment Cores: Using Chironomid Head Capsules to Determine Past Climate Events

Rene Juarez*, Clint West, Ben Gonzales and Edward Martinez

*Undergraduate Student, Natural Resource Management

Las Vegas NM is located in an arid region of the southwest. Due to drought and climate change water availability has fluctuated widely from year to year. One method of determining past precipitation and drought events is through tree ring analysis. Paleolimnological data have also been used to determine past climate change. Paleolimnological data reconstruct environmental patterns before humans impacted the earth, and can be used to reconstruct lake histories and past climate by analyzing sediment profiles. The goal of this study was to determine past climate change using chironomids as a proxy. Sediment cores were collected from playa lakes located on the eastern side of the Sangre de Cristo Mountains, at the Las Vegas Wildlife Refuge. These playas are believed to have existed at least since the last ice age. Sediment cores were processed and chironomid head capsules were separated and identified from $2.2\text{--}4.0\text{ cm}$ sections from each core. Preliminary results indicate that out of three taxa found (Chironomini, Tanypodinae, and Orthocladinae) Chironomini dominated for all sections. However in a Surface Sample from McCallister Lake, Orthocladinae was the dominant taxa. This is an ongoing project, however data presented indicate, chironomini to be the dominant taxa, which are associated with warmer temperatures. Further work will use specific chironomid species to determine water temperature. In addition, sediment core sections will be dated and temperature will be related to each date.

Economic Viability of Biochar in New Mexico Soils Based on Water Retention and Cost

Brian Kuntz and Craig Conley

*Undergraduate Student, Natural Resource Management

Agricultural soils have been enhanced by biochar (known as terra preta) for thousands of years in the Amazon basin. Biochar is an organic soil amendment that can be used to enhance a variety of soil properties including water holding capacity. This characteristic may have agricultural value in the semiarid southwest as climate change progresses. These benefits, however, depend on the combination of soil and vegetation or crop type. There have been limited studies on the efficacy of biochar application in different soil types and climates, especially in the semiarid southwest. The primary purpose of this study is to evaluate the economic efficacy of biochar use in New Mexico by determining the value of agricultural water saved after applying biochar to agricultural topsoil. By measuring the differences in water holding capabilities of biochar amended soils, we can estimate how much water this soil management practice might save over time. Biochar was added to sandy loam and clay loam soils at different amounts (0% , 1% , 3% and 5%), saturated with water and allowed to dry over a period of 8 weeks. Differences in soil moisture between the treatment samples were measured over time. Our preliminary analysis shows that biochar applications are not economically viable in a short-term time frame based on the current, low cost of water. However, its value in dryland farming applications that have limited or no supplemental irrigation available may be far higher.

The Use of Copper Resistant Bacteria and Biochar Amendments for Bioremediation of Copper Contamination in the Pit Lake Near Cuba, NM

Rachael Lucero* and Richard Plunkett

*Undergraduate Student, Biology

I investigated the effects of copper resistant bacterial strain 12B2 from the pit lake of the abandoned Nacimiento Copper mine near Cuba, NM, on copper contamination in water. Copper is a naturally occurring element that has been used by humans for many centuries in different parts of the world. Mining of copper has resulted in environmental contamination, requiring remediation efforts, many of which are very costly. While copper is toxic to most organisms when it is present in large quantities, some bacteria are able to survive in contaminated environments. The effects of these bacteria on concentrations of copper sulfate (CuSO_4) were the subject of these investigations. Copper sulfate solutions were passed through gravity columns containing a matrix of sterile sand with or without added biochar, and with or without 12B2 bacteria; the column flow-through was assessed by uv/vis spectroscopy for changes to copper concentration. Columns containing bacteria decreased the amount copper in solution, as did columns containing bacteria and biochar. These results support the goal of this research to develop novel strategies for *in situ* bioremediation of copper contamination.

Fire History and Stand Structure of Pinyon-Juniper Woodlands on Rowe Mesa, New Mexico

Adele Ludi* and Sara Brown

*Undergraduate Student, Natural Resource Management

The extent and density of pinyon-juniper (*Pinus edulis* Engelm.)-(*Juniperus* spp.) woodlands has increased over the past 130 years, prompting the need for additional information on the age structure and historical role of fire in this system. We sampled within three historical fire sites in the piñon-juniper woodlands on Rowe Mesa, NM. Using random, strategic sampling (selecting areas that had fire evidence) we sampled 25 trees at each of the three sites. For each tree, we measured height, DBH, location, aspect, and physical site characteristics. We cored each tree using a SUUTO® increment borer to determine age and detect fire scars. At each site we took a tree "cookie" (cross-section) from an obviously fire scarred tree as well. Our objectives for this project were to 1) determine forest age structure for each species; 2) estimate the fire frequency; and 3) quantify the fire regime (frequency, severity, and seasonality). Our results provide an estimated age and stand structure for each site. The oldest juniper we measured was approximately 203 years, our oldest piñon was ~290 years, and the oldest ponderosa pine was approximately 134 years. Only a total of 5-8 trees showed evidence of fire scarring. We were not able to determine an accurate fire frequency for this system from this data. This project demonstrates that estimating age and fire frequency is very challenging in this woodland system because of false and missing rings. However, the data collected from this study provides a baseline historic reference condition for piñon-juniper woodlands on Rowe Mesa.

Characterization of Copper Resistance in Bacterial Isolates from the Pit Lake of Nacimiento Copper Mine in Cuba, New Mexico

Toni Marie Noble and Richard Plunkett

*Undergraduate Student, Biology

The Pit Lake of the Nacimiento Copper Mine, located near Cuba, New Mexico, has been plagued with copper contamination at a toxic level of 6.3 parts per million (ppm). Copper is considered to be toxic if it is above 1.3 ppm (Pizzaro *et al.*, 2001). The purpose of this research is to aid in future studies of bioremediation of the pit lake by identifying copper resistance in 12 bacterial isolates found within the pit. Minimum inhibitory concentrations (MIC) of CuSO_4 were determined for bacteria grown in a defined medium (basal salts medium); these were compared to previously determined MIC of CuSO_4 for bacteria grown in a complex medium (tryptic soy medium). MICs were determined by inoculating serial dilutions of CuSO_4 in basal salts medium with bacterial isolates. Growth was determined by measuring optical density of cultures at 600 nm after incubation at 25 °C for 72 hours. The MIC of CuSO_4 was higher for all bacterial isolates grown in basal salts medium when compared with the tryptic soy broth cultures. This indicates that these bacterial isolates are more resistant to CuSO_4 in a low nutrient defined medium when compared to a high nutrient undefined medium.

Antimicrobial Resistance Levels in *Escherichia coli* Isolated from Northern New Mexico Wild Elk, Domestic Cattle, and Humans

Robert Ortega*, Ben Nelson and Richard Plunkett

*Undergraduate Student, Biology

Interpretation of changes in bacterial antimicrobial resistance requires baseline values in bacteria with minimal exposure to commercially produced antibiotics. In this study, *Escherichia coli* isolated from three different groups (human, cattle and elk) were tested for resistance to seven antibiotics, with elk having no artificial exposure. Fecal samples were collected from comingled herds of elk and cattle in Las Tusas in San Miguel county and Las Aguitas in Mora county. The human samples were collected from the Las Vegas city water treatment plant. The *E. coli* isolates were tested for antimicrobial resistance against seven commonly used antibiotics in accordance to the National Committee for Clinical and Laboratory Standards for the Kirby-Bauer technique. Results indicated low resistance and no significant difference in resistance ($p < 0.05$) in all three groups for six antibiotics (gentamycin, tetracycline, ampicillin, kanamycin, amikacin, ciprofloxacin). The seventh antibiotic (amoxicillin/clavulanic acid) had low resistance in isolates from cattle and elk but relatively high resistance in the human isolates (72%) and significantly greater difference to the cattle and elk isolates ($p < 0.05$). Multi drug resistance was exhibited in five human, three cattle, and one elk isolate. No isolates exhibited resistance to more than two antibiotics. This limited data suggest that antibiotic use of these seven antibiotics has not effected antibiotic resistance of *E. coli* isolated from elk and cattle but may be effecting resistance of isolates from humans.

Eruption Characteristics Of The Cienega Cinder Cone, Cerros Del Rio Volcanic Field, New Mexico

Marine Foucher, Andrew Romero* and Jennifer Lindline

*Undergraduate Student, Geology

Common models of cinder cone construction envision a single pipe-like conduit transporting magma from a deep reservoir to the eruptive vent. We posit that cinder cone plumbing systems involve numerous feeder geometries. To test our hypothesis, we studied the Cienega Cinder Cone, one of several volcanoes of the Cerros del Rio volcanic field (CdR). The CdR is the largest ($>700 \text{ km}^2$) middle Pliocene to Pleistocene basaltic volcanic field of the Rio Grande Rift. CdR eruptive centers are typically low-relief central vent volcanoes. We employed field, structural, and granulometric analysis to map the volcanic facies, document magma flow directions, and record effusion clast sizes. The Cienega Cinder Cone is actually a volcanic complex consisting of several vents, multiple intrusions, numerous lava flows, and voluminous tephra deposits. Vent facies include vesiculated fragments, oxidized cinders, and spatter agglutinate. Proximal wall facies are very well sorted with major coarse lapilli and bombs while the distal wall facies are moderately sorted with major fine-very fine lapilli. Macrostructures on feeder intrusions consistently show magma moving towards vent sites. Samples throughout the complex contain modal olivine, pyroxene, and plagioclase phenocrysts in an aphanitic matrix. Our observations show that the Cienega Cinder Cone is a monogenetic volcanic system that developed by endogenic and exogenic dome growth with short eruptive events derived from a rapidly evolving reservoir-conduit network. Our work suggests that the simple exteriors of some cinder cones hide a complex history, which would change the appreciation of the related volcanic hazards in active cinder cone systems.

Arsenic Accumulation in Aquatic Vegetation from Streams Influenced by Hydrothermal Springs in the Jemez Mountains

Saul Ruiz¹, Lorraine Garcia², Daryl Williams² and Edward A. Martinez²

*Undergraduate Student, Biology

¹New Mexico Highlands University Department of Biology and Chemistry Las Vegas New Mexico, 87701

²New Mexico Highlands University Department of Natural Resource Management Las Vegas New Mexico, 87701

In recent years global climate change has had a major impact on snow pack and water runoff, which for decades have been feeding many different rivers within the Jemez Mountains in northern New Mexico. This change in runoff may negatively impact aquatic ecosystems in this region. One concern is the contribution of heavy metals from hydrothermal springs into the Jemez Mountain streams. The purpose of this study is to use aquatic plants to determine how metal distribution and potential ecosystem impact. To complete this task aquatic vegetation

was collected from 11 sites exposed to heavy metal contributions by hydrothermal springs. Heavy metal analysis for arsenic was completed and preliminary results indicate that arsenic bioaccumulated within plant tissue at higher concentrations than the surrounding water. These findings show that arsenic contamination is occurring; however ecosystem impact has not yet been determined. Future work will provide more information on the possible impacts of the aquatic ecosystems in the Jemez Mountain streams.

X-Ray Structural Study of Halide and Acyl-Derivatives of (Di) Carbonyl-Bridged Tricyclic Acceptors

Bhupinder Sandhu¹, Marina S. Fonari^{1,2}, Tatiana V. Timofeeva¹, Yulia A. Getmanenko³, Seth R. Marder³

*Undergraduate Student, Chemistry

¹*Department of Biology and Chemistry, New Mexico Highlands University, Las Vegas, NM 87701, USA*

²*Institute of Applied Physics ASM, Chisinau, Moldova*

³*Department of Chemistry and Biochemistry, Georgia Institute of Technology, Atlanta, GA 30332, USA*

X-ray structure investigations of halides and acyl benzoyl derivatives, with dithiophene (dithiazole) core as the potential materials for the development of n-channel organic field-effect transistors (OFET) or photonic applications are presented. The comparative analysis of intermediates and final products of dihalides and bis-acyl derivatives of [2,1-*b*:3,4-*b'*]dithiophene (dithiazole) reveal dramatic effect of the nature of the substituents in the acyl groups on molecular packing. The intermediates with diketone protected bridge are characterized by distortion from planarity which prevents the stacking interactions, whereas the crystal packing of targeted planar di-carbonyl molecules is governed by short intermolecular contacts and $\pi\cdots\pi$ interactions resulting in stacking motifs favorable for charge transport.

How do Metal Ions Affect Deposits formed in Alzheimer's Disease?

S. Smith*

*Undergraduate Student

Alzheimer's disease is one that affects millions of people worldwide. The aggregation of amyloid β -peptide in the brain is one of many characteristics of the neurodegenerative disease. In this study, we investigated the effects of calcium and magnesium on these buildups in the brain by thioflavin T assay using ovalbumin as imitation A β peptides. Both calcium and magnesium should will promotion of aggregation with the aggregates formed in the ovalbumin by the dye. We observed upon using calcium chloride that calcium ions were capable of promoting aggregation of amyloid peptides. With increasing concentrations of calcium chloride, aggregation promotion increased as well. Magnesium chloride did not promote aggregation as well as calcium chloride did. The fluorescent activity of magnesium ions proved to be dramatically less than that shown by calcium ions. Calcium showed a significant increase in fluorescence over magnesium, thus suggesting that calcium better promotes aggregation with amyloid β -peptides (A β) than does magnesium. The basic cause of Alzheimer's disease is the accumulation of amyloid β -peptide deposits in the brain. Previous studies as well as my own have shown that calcium very well promotes the aggregation of these peptides, indicating a link with the onset and progression of the disease. Magnesium didn't show a good aggregate promotion property, suggesting that it may not play a key role in the formation of aggregates as calcium does.

Identifying proteins important for spermatogenesis using *Golga3*^{repro27} mice

Adrian Vigil^{1*}, Rahul Sigdel¹, Charlotte Mobarak², and Carol Linder¹

*Undergraduate Student, Biology

¹*Department of Biology and Chemistry New Mexico Highlands University*

²*Dept of Chemistry and Chemical Biology, University of New Mexico*

Male infertility is responsible for up to half of all cases of infertility and affects one in 20 men in the general population. In this study we are interested in the role of the *GOLGA3* gene in spermatogenesis. *Golga3*^{repro27} is a chemically-induced point mutation in the golgin subfamily A member 3 gene which disrupts spermatogenesis during meiosis and leads to complete male infertility. The purpose of this study was to determine why the *Golga3*^{repro27} mutation causes a more severe phenotype on the C57BL/6J (B6) inbred strain compared to the C3HeB/FeJ (C3Fe) strain. We are using a proteomics approach to determine the role of genetic background in controlling spermatogenesis. Global differences in protein expression from the two strains are being examined

using 2-D gel electrophoresis. Testes were isolated from 14 day old B6-*Golga3^{repro27}* and C3Fe-*Golga3^{repro27}* mice and pooled into two biological protein samples (n=4/sample) from each strain. Proteins were isolated using the Bio-Rad sequential extraction kit, quantified using the BCA protein assay, lyophilized, and the protein quality checked by SDS-PAGE in preparation for 2-D gel analysis carried out in collaboration with the proteomics lab at the University of New Mexico. Sixteen protein spots were identified as differentially expressed in *Golga3^{repro27}* mutant mice compared between the two strains from the 2-D gels. The spots were excised in duplicate, subjected to trypsin digestion, and analyzed by MALDI mass spectrometry including peptide mass fingerprinting and MS/MS analysis. After MALDI mass spectrometry analysis, 45 proteins were identified corresponding to the sixteen protein spots digested in trypsin. From the 45 proteins identified from MALDI mass spectroscopy only 24 of the proteins (transferrin, enolase and alpha-fetoprotein) had a protein confidence interval (C.I.) from peptide mass fingerprinting and total ion confidence interval score from MS/MS of higher than 95% ($p < 0.05$).

Bullfrog Impacts on Aquatic Invertebrates in Mora River on Wind River Ranch

Clint West*, Edward Martinez, and Jesús Rivas

*Undergraduate Student, Natural Resource Management

The bullfrog, *Rana catesbeiana*, is an invasive species that have been present in the Mora River, northeastern New Mexico for several decades. The purpose of this study is to determine the impact bullfrogs have on macroinvertebrate abundance and diversity in the Mora River within Wind River Ranch. Macroinvertebrates were collected from pools and riffles pre and post removal of bullfrogs. Macroinvertebrates were identified and enumerated to calculate various metrics to determine diversity, abundance, richness and water quality using macroinvertebrates as indicators. To date, pre bullfrog removal sampling has occurred and samples from two sites have been processed. Preliminary data (two sites) indicate that the water quality of the Mora River is "Fair" and abundance and diversity is high. Future work will determine water quality and biodiversity of macroinvertebrates within the entire five-mile stretch of the Mora River pre and post bullfrog removal.

Bio-assessment of the Santa Fe River between McClure and Armijo Park

Clint West*, Jerry Jacobi, and Edward Martinez

*Undergraduate Student, Natural Resource Management

Noticeable impacts from anthropogenic activities on the Santa Fe River between McClure and Armijo Park have invoked concerns of watershed health. These concerns have led to a bio-assessment study and temperature analysis of the Santa Fe River. Macro invertebrates and temperature data were collected for two years from four sites. Temperature readings were recorded every half hour using data loggers. Invertebrates and physiochemical parameters were gathered once annually. Invertebrates were identified to family and various metrics were used to determine the water quality of the Santa Fe River. Metrics were compared to a range of values indicating excellent, good, fair, and poor water quality. The results conclude that water quality decreased from the headwaters to the downstream sites and between the two years. If this trend continues the Santa Fe River between McClure and Armijo Park could experience decreased water quality. The temperature data expressed trends in seasonal changes and also exceeded 20 degree Celsius for several consecutive weeks; which is the stress temperature for trout. Increased water supply along with vegetation management in this reach could greatly improve water quality.

NOTES:

Index of Names

- A.W. Subudhi, 21
 Adam Brister, 13
 Adele Ludi, 23
 Adrian C. Carter, 20, 21
 Adrian Vigil, 25
 Ana Caudillo, 21
 Andrew Romero, 24
 Angel De Nieves Arellano, 5, 9
 Angelina Boampong, 19
 Arcadius Krivoshein, 5, 6, 12
 B. O'Driscoll, 11
 B. van Wyk de Vries, 14
 Ben Gonzales, 21, 22
 Ben Nelson, 24
 Benjamin Villarreal, 5, 8
 Bhupinder Sandhu, 25
 Brian Kuntz, 22
 C. Siddoway, 20
 C.T. Harper, 21
 Carlos Ordóñez, 13
 Carol C. Linder, 17, 25
 Cathryn Brooks-Williams, 11
 Cesar Alvizo, 15
 Charlotte Mobarak, 17, 25
 Clint West, 21, 22, 26
 Craig Conley, 15, 22
 Crystal Montoya, 15
 D. Freedman, 20
 Daniel Gutierrez, 21
 Daryl Williams, 16, 19, 21, 24
 Donna Woodford-Gormley, 5, 8
 Draguta Sergiu, 16
 E.M. Wasson, 21
 E.R. Green, 21
 Eddie Tafoya, 5, 7
 Edward Martinez, 16, 19, 21, 22, 24, 26
 Elizabeth C. Long, 9
 G. Ludvigson, 12
 Germaine Alarcon, 4
 Gilbert Rivera, 4
 J. Doveton, 12
 J. Smith, 12
 Jason Martinez, 19
 Jennie Guilez, 21
 Jennifer L. Bochenek, 9
 Jennifer Lindline, 11, 14, 18, 24
 Jennifer Runnels, 16
 Jerry Jacobi, 26
 Jesús Rivas, 5, 7, 16, 21, 26
 Jim Fries, 1, 4
 Jody Rosenblatt, 19
 Joel Zazueta, 16
 Jose I. Griego, 9
 Jose N. Maestas, 21
 José Ramón Lopez, 5, 10
 Joseph A. Aragon, 19
 Juan Guaba, 21
 Kate E. Zeigler, 12
 Linda LaGrange, 4
 Lorraine Garcia, 16, 21, 24
 Marina S. Fonari, 16, 25
 Marine Foucher, 14, 24
 Maura Pilotti, 9
 Michael Petronis, 11, 12, 13, 14, 18, 20
 Octavio Ayala, 15
 Peter Linder, 5, 6
 R.C. Roach, 21
 Rachael Lucero, 23
 Rachelle Bonnet, 5, 9
 Rahul Sigdel, 17, 25
 Rene Ebule, 13
 Rene Juarez, 22
 Reyna Montaña, 15
 Rhonda Trujillo, 14, 18
 Richard Plunkett, 4, 5, 6, 15, 20, 23, 24
 Robert Ortega, 24
 Robert Vazquez, 18
 Rodolfo Martinez, 13
 S. Smith, 25
 S.M. Schneider, 21
 Samuel Bentum, 12
 Sara Brown, 21, 23
 Saul Ruiz, 24
 Sebastian Medina, 16
 Seth R. Marder, 25
 Steven L. Garcia, 20
 Tatiana V. Timofeeva, 16, 25
 Tiffany Abeyta, 9
 Timothy Sanchez, 16, 21
 Toni Marie Noble, 23
 Tyler Broderick, 5, 9
 Verónica Saunero-Ward, 5, 7
 William Jaremko-Wright, 5, 10
 Yapeng Gu, 19
 Yulia A. Getmanenko, 25