Poster and Exhibit Abstracts

(In alphabetical order by author)

Nazar A. Al-Ibraheemi; Plant and Environmental Sciences, New Mexico State University

Adaptable Cover Crops for the Southwest Cropping Systems

Cover crops can be included in cropping systems to increase soil organic matter, conserve soil moisture, improve soil fertility; and control weeds, diseases and pests. However, choosing appropriate cover crops can be challenging in arid and semi-arid regions. A study was conducted to evaluate adaptability of selected summer cover crops including legumes and cereal grasses in a field that had previously been in chile production for several years. This field had documented incidences of many soil borne pathogens and weeds. The objective of this study was to evaluate the performance of several species of cover crops that will help reduce disease and weed pressures and provide the vital biomass needed for soil quality improvement. Agronomic characteristics, moisture utilization, soil temperature, and soil physico-chemical properties were measured. Preliminary results show that sorghum sudan and lablab mixture, sole sorghum sudan, and pearl millet yielded high biomass of 47, 43, and 25 Mg ha-1respectively, and showed high ability to suppress weeds. Among legume cover crops, sesbania, had the highest biomass (30 Mg ha-1) and the least amount of weeds (0.37 Mg ha-1). Other tested cover crops which included cowpea, lablab, hairy vetch, and buckwheat produced low amount of biomass; showed poor weed suppression; and were susceptible to soil-borne diseases in the field used for this study.

Faisal Alturkistany; Molecular Biology, New Mexico State University

Developing FRET partners for fluorescence lifetime measurements in cytometry

Förster Resonance Energy Transfer (FRET) is a common fluorescence-based detection method, and can be used for studying intracellular signaling events and protein function. For example, protein-protein interactions can be measured with FRET as well as protein movement within a cell. In our laboratory, we have been developing new analytical methods to track protein location within cells at a high throughput. Our focus is to develop a way in which the fluorescence lifetime can be measured with a flow cytometer. FRET is an ideal technique for this research because it not only can reveal protein movement but also exposes fluorescence lifetime changes of the fluorescent species involved in the FRET process. Therefore in this contribution, we describe the development of a new FRET assay using green fluorescent protein (GFP) and a novel fluorescent compound (2-hydrazinylpyridine (HPY)) synthesized at the Department of Chemistry and Biochemistry. HPY dye can bind to molecular activators, one of which is estrogen. Thus our experimental design is to express GFP with estrogen receptor and then introduce the HPY fluorophore to the cell environment to observe movement within the cell and possible interaction and FRET with GFP. Our results include cytometry data and fluorescence microscopy images to prove transfection of the GFP and estrogen receptor into mammalian cells and the presence of HPY. The end goal will be the establishment of a new time-resolved cytometry assay to be used for high-throughput diagnostics.

Rebecca Britt Armenta; Plant and Environmental Sciences, New Mexico State University

Understanding the nature and sources of dust storms in the Four Corners Region during the period 2000-2012 by using surface based observations and satellite data

Dust storms affect climate, weather, environmental and health. It is important to understand the main causes and sources of windblown dust impacting the Four Corners Region due to the adverse impacts on human health. Dust particles may be transported hundreds of kilometers from their source and may undergo chemical changes due to mixing in clouds and polluted airmasses, and changes in particle size. Satellite data is used in this study to determine dust source behavior such as their movement over time and seasonal cycle. The analysis involves a combination of image processing and computer modeling during the period from 2000 to 2012 to help give us develop a conceptual model that will lead to more reliable dust storm predictions and warning advisories.

Ma. Gina M. Babb, Christopher Pierce, & Ian Ray; Plant and Environmental Sciences, New Mexico State University

Marker-Assisted Selection (MAS) to Improve Alfalfa (Medicago sativa L.) Drought Tolerance

DNA-MAS was employed in alfalfa to determine if marker alleles that previously influenced shoot and root biomass productivity in an experimental research population could be used to improve productivity of three elite cultivars (Malone, Melton and Multileaf) in water-limited (WL) environments. A base population (C0) possessing the above marker alleles in a 50% Malone genetic background was initially developed. Ten Cycle1 populations designated as HS1+, HS1-, HS3+, HS3-, LS2+, LS2-, HR2+, HR2-, LR2+, and LR2- were then developed by imposing selection for C0 plants that possessed (+), or did not possess (-), specific combinations of DNA marker alleles associated with high shoot (HS), low shoot (LS), high root (HR), and low root (LR) biomass. The HS1+, HS3+, LS2+, LR2+, HR2+ and C0 populations were then crossed to the three cultivars to develop 18 MAS cultivar hybrids. Thirty-two populations described above were evaluated for shoot biomass production under WL field conditions during 2011 and 2012. Six forage harvests were conducted in each of the two years. Yield results showed that significant differences (P¡0.0001) existed among the populations across two years. HS3+ exerted a significant marker effect with a 23% increase in forage yield over HS3-. HR2+ significantly increased yield by 20% over HR2-. HS1+ increased yield by 18% over HS1- . LR2+ and LS2+ decreased forage yield by 15% and 3%, with respect to LR2- and LS2-. Among the MAS-Melton hybrids, MeltonHS3+, MeltonHS1+, MeltonHR2+, and MeltonC0 outperformed MeltonLS2+ and MeltonLR2+. However, Melton yielded better than the MAS-Melton hybrids. Among the MAS-Malone hybrids, MaloneHS3+ and MaloneLS2+ out-yielded MaloneLR2+, MaloneHR2+, MaloneHS1+ and MaloneC0. MaloneHS3+ demonstrated a non-significant 6% yield advantage over Malone. All MAS-Multileaf hybrids significantly outperformed the Multileaf cultivar and MultileafC0. We conclude that MAS was effective in improving the forage productivity of some alfalfa cultivars in drought-prone environments.

Suman Bagga, Jose Luis Ortega, Wathsala Rajapakse, & Champa Sengupta-Gopalan; Plant and Environmental Sciences, New Mexico State University

Development of Glyphosate Resistant Chile by Expressing a Mutated Chile EPSPS Gene

Glyphosate (N-(phosphonomethyl)glycine) is a non-selective broad-spectrum, post emergent herbicide that inhibits 5-enolpyruvyl-shikimate-3-phosphate synthase (EPSPS), an essential enzyme in the aromatic amino acid biosynthetic pathway of plants and microorganisms. Glyphosate is a widely used herbicide due to its efficacy, spectrum of weed control and desirable toxicological and environmental properties. However, as it inhibits EPSPS in all plants, it cannot be used over the top of crop plants to control weeds in the agricultural fields. While several other crops have been genetically modified to develop glyphosate resistance by introducing bacterial genes encoding for glyphosate resistant EPSPS, our study focuses on developing glyphosate resistant chile using a cisgenic approach. Towards this goal we have developed an efficient regeneration and transformation system for chile. We have isolated a chile gene for EPSPS and have introduced a mutation in the gene, which would allow for the synthesis of the EPSPS protein with enzymatic activity but will not bind glyphosate. We have tested the functionality of the mutated gene by agroinfiltration followed by western blot analysis and glyphosate assay. Using the stable transformation protocol that we have developed, the chile EPSPS gene construct with the mutation has been introduced into chile plants. The putative transformants obtained have been confirmed for the insertion of the mutated gene by PCR. The transformants will be tested for glyphosate resistance.

Kaisa Baker, Brittany Martinez, & Jennifer Stokes; Special Education and Communication Disorders, New Mexico State University

Using Social Media as a Recruiting Tool for Research Participants

Two methods of recruiting research participants via Facebook were investigated including direct friend referral and indirect open wall-post referral. Results will present participation and referral rates. Discussion will include issues pertaining to ethics, confidentiality and efficacy.

Brian L. Barrick; Plant and Environmental Sciences, New Mexico State University

Salt Responses of Four Cotton Genotypes Grown in Two Soils

Significant research has been devoted to cotton salinity tolerance screening, but there is an abridgement of research evaluating cotton salinity-plant-soil relations in salinity screening. Furthermore, the literature base concerning the efficacy of any singular phenotypic salinity-tolerance screening method; as the individual methods are irrespective of the varying physiological mechanisms and responses at different plant life stages, is limited. Accordingly, this necessitates a better understanding to bridge the gap between in vivo experimentation to existing agronomic practices. This study evaluated the effects in salt tolerance due to genotype, salt treatment, soil, and interaction from genotype by salt treatment, genotype by soil, and genotype by salt treatment by soil in three seedling growth stages based on four selected advanced back cross inbred lines (BIL) derived from a cross between Upland and Pima and two soil types. Plant height, biomass, nutrients and other physiological traits will be determined.

Deepak Basyal; Mathematics, New Mexico State University

A Historical Look at the Hundred Fowls Problem

A cock is worth five coins; a hen, three coins; and three chicks, one coin. With 100 coins we buy 100 of them. How many cocks, hens, and chicks are there? –Zhang Qiujian, c. 5th century. This is one version of the so-called Hundred Fowls Problem. It can be translated algebraically into two linear Diophantine equations in three unknowns (a group of indeterminate equations, i.e. there are more unknown quantities than there are equations): $a + b + c = 100$; $5a + 3b + \frac{1}{3}c = 100$; where a, b, and c are the numbers of cocks, hens, and chicks, respectively. Here, only positive integer solutions are acceptable. But how does one solve 2 equations in 3 unknowns? And how was the problem solved before algebra? The problem has gained attention through its appearance world-wide and because numerous well-regarded mathematicians have worked on it, e.g. Alcuin of York (c. 740- 804), Mahavira from India (9th century), Bhaskara II from India (1114-1185), Fibonacci (c.1170- c.1250), Al-Kashi from Persia (c.1380-1429), and Leonard Euler, Swiss (1707-1783). In this poster, different versions of the problem are shown, together with some solution methods. I have used Google Books to locate my primary original sources, and my focus is on the problems occurrence in American text and recreational mathematics books from the 17th to the 20th century.

Teresa Bringas & Gracie Pargas; Special Education and Communication Disorders, New Mexico State University

The Junta Model: Training Vocational Spanish-language in Monolingual/ Bilingual Graduate Students

Bilingual practitioners are in great demand, especially those who are Spanish-speaking. This poster presents the development and application of Junta, a hybrid model for developing basic and advanced vocational Spanish in a diverse group of monolingual and bilingual graduate students at New Mexico State University. In order to effectively communicate with people from diverse Spanish-speaking backgrounds, our NMSU graduate program requires two semesters of a weekly meeting, called Junta, for the development vocational Spanish-language skills. Junta also creates opportunities to learn the elements of working with an interpreter and that of being an interpreter if they are bilingual. Students develop case role-playing scenarios that they will then perform as cultural events as if in the real setting. The main focus is on oral language with complementary activities involving both reading and writing. Large group, partner, and individual activities are utilized. Each student is encouraged to provide topics for discussion and contribute to the development of the meeting plan. Students also help co-facilitate the Junta by planning language learning activities, locating community resources, and organizing ways to teach and stimulate in-class application of new clinical skills in Spanish. Topics covered each semester may include, for example: legal rights and parent information, ethnographic interviewing, assessment principles, treatment methods, and traits of differences versus disorders. Bilingual or not, participating students are expected to provide input on topics, develop useful professional tools and references, practice and apply knowledge from related coursework and clinical experience, demonstrate respect and interest during listening and/or oral participation, and reflect on and practice skills in need of development in Spanish. Community outreach and events are incorporated for real life use of the Junta skills. Pre- and posttest measures and interviews are administered bilingually, also giving the students an opportunity to reflect on their growth.

Randa G. Burks-Keeley; Special Education, New Mexico State University

Student Perceptions of Co-teaching Models

This presentation will provide the audience with student perceptions regarding the effectiveness of the five co-teaching models in the inclusion classroom. This study determined the preferences of students regarding the five models and the perceived effectiveness of each model using descriptive statistics and survey rubrics. Currently, there is no research determining which of the five co-teaching models has more impact on student outcomes or is more highly preferred by students or teachers (Murawski & Swanson, 2001; Weiss, 2004). This research adds to this literature by determining which model is most effective and/or preferred by students.

Randa G. Burks-Keeley; Special Education, New Mexico State University

Kinesthetic Literacy Intervention- Literacy Through Movement

Content presented includes quantitative and qualitative results from a year-long literacy intervention study in which kinesthetic movement was applied to inclusive classroom literacy instruction. Results measure student performance and improved perceptions of literacy among third grade students from low socioeconomic and culturally and linguistically diverse backgrounds in Southern New Mexico. LTM instruction is a delivery service focused on the retention of students through the integration of kinesthetic movements into literacy instruction in an inclusive classroom, which is theorized to improve literacy comprehension and student attitudes. LTM is an instructional approach that can transition from elementary to secondary; improving literacy performance and retention at all levels.

Malynda Chizek; Astronomy, New Mexico State University

GCM Investigation of Martian Methane Observations

Recent observations have indicated spatially and temporally variable abundances of methane (or another gas in the same spectral range) in the Martian atmosphere (1, 2, 3, 4, 5, 6), although the validity of these reports is debated (7) and the inferred methane lifetimes (<1 year) are much shorter than expected (600 years; 1, 8). These observations cover several methane bands over several years, and suggest different source locations and production rates, as well as different seasonal peaks in abundance. GCMs have been used to interpret the martian methane observations of 4 (8, 9), but there are no published GCM analyses of the observations of 2, 3, 5, 6. We use the NASA Ames GCM version 1.7.3 (10) to analyze the suggested sources required for each of these observations in order to search for characteristics in common for all of the martian methane observations, and to attempt to rectify the differences. In addition, we will present the abundances expected to be measured at Gale Crater for each of these observations. Krasnopolsky, Icarus (2004) Formisano et al., Science (2004) Geminale et al., P&SS (2008) Mumma et al., Science (2009) Fonti & Marzo, A&A (2010) Geminale et al., P&SS (2011) Zahnle et al., Icarus (2011) Lefevre & Forget, Nature (2009) Mischna et al., P&SS (2011) Kahre et al., JGR (2006)

Sengdhuan Defibaugh-Chavez & Swati Somuri; Public Health Sciences, New Mexico State University

Do Religious Commitment and Behavioral Motivational Tendencies Mediate Differences in Risk Behavior Engagement among Different Racial/Ethnic Groups?

Racial/ethnic background, religious commitment and motivational tendencies have demonstrated a relationship to risk behavior engagement in past research. This study examines whether religious commitment and motivational tendencies mediate the relationship between racial/ethnic background and risk behaviors (e.g., alcohol/substance use, risky sexual behavior, unsafe driving). Methods. Participants included 1848 undergraduate students (66% women). Fifty percent of the sample was white, 29% Hispanic, 11% Black, 3% Asian/PI, 2.1% American Indian, and 4.6% Other. Students completed an online survey that included measures of substance use (alcohol, marijuana), number of sexual partners, perceived stress, physical activity, and unsafe driving. It also included the Carver & White (1994) BIS/BAS Survey, the Religious Commitment Inventory-10 (Worthington et al, 2003), and basic demographic questions. Results. This study found that race/ethnicity, religious commitment and motivational tendencies were related to engagement in risk behaviors (p-values ¡ .01). Specifically, religious commitment was negatively related to alcohol use, number of sexual partners, smoking, and marijuana use (r between -.145 and -.297) and positively related to perceived stress (r = .113). Regarding motivational tendencies, Punishment Sensitivity was negatively

related to physical activity and number of sexual partners (r = -.16 and -.12, respectively) and positively related to perceived stress (r = .27). Drive and Sensation Seeking were positively related to alcohol use, physical activity, unsafe driving, and marijuana use (r between .11 and .22). Multivariate analyses revealed racial/ethnic differences across all risk behaviors examined. MANCOVA analyses suggest that neither religious commitment nor motivational tendencies mediate racial/ethnic differences in risk behaviors.

Hannah E. Drumm, Immo A. Hansen, & David P. Price; Molecular Biology, New Mexico State University

Gene Expression in the Diuretic Organ of the Yellow Fever Mosquito

Maintenance of osmotic balance and excretion of waste products is extremely important in any organism; loss of these abilities is de-habilitating if not fatal. For this reason, it is difficult to say osmotic regulation in fresh water mosquitoes is more important than in other organisms. However, due to the life history of mosquitoes the diuretic system is presented with challenges above and beyond those most organisms encounter. During larval and pupal life stages mosquitoes are aquatic organisms, becoming terrestrial organisms following emergence as adults. The challenge is shifted within minutes from surviving in an aquatic environment, pumping out large volumes of excess water and retaining solutes; to surviving a terrestrial environment where dehydration is a real danger. After completing sexual development the females take a blood meal in order to produce eggs, presenting an entirely new challenge. During blood meal they take up their own body weight or more of a nearly isotonic solution. Uptake of this large of a volume severely limits their mobility; the mosquito must rid itself of this excess fluid rapidly, as she is easy prey while encumbered. We performed an analysis of all genes being expressed within the main organ diuretic organ of the Yellow Fever Mosquito (Aedes aegypti), the Malpighian tubules. We compared gene transcript abundance in 4th instar larva and adult females, 3 days post-emersion. We were able to identify several genes with altered expression level between the two groups, and identified new transporter genes which may play an important role in diuresis.

Andrea Einck; Anthropology, New Mexico State University

Petrographic Analysis of Historic Brownwares at a 19th Century Military Fort: Results and Implications

In this poster, I will analyze the historic Brownware ceramics collected from Fort Selden, New Mexico (1865-1891), using petrographic analysis to determine the ceramics specific temper types and possible source area(s). The analysis will provide further information on local pottery production-distribution networks and allow for comparison with northern New Mexican and Texan/Mexican historic Brownware manufacture methods. My project provides additional information about the effects and influence of the American military on the Southwestern frontier. My results reveal new dimensions of ethnic and social interactions between the mestizo Hispanic community and Fort Seldens military inhabitants.

Diane Feuillet; Astronomy, New Mexico State University

Optical High Resolution Spectra of APOGEE Stars

The Apache Point Observatory Galactic Evolution Experiment (APOGEE) is an SDSS-III survey that is obtaining high resolution near-IR (H band) spectra of 100,000 Milky Way stars in an effort to chemically trace formation and evolution of Galactic stellar populations. Optical echelle spectra of a small subset of survey targets have been obtained with the ARC 3.5m telescope for the purpose of 1) helping to understand and calibrate the abundance analysis of the APOGEE IR spectra, and 2) measuring abundances of elements that do not have spectral features in the APOGEE wavelength region, which will ideally include neutron capture elements. We present our current sample of 130 (out of a projected 500) stars, which is drawn from the brightest APOGEE targets and covers a range of stellar parameters (temperature, metallicity, and surface gravity), and compare some optically derived quantities with those from the APOGEE abundance pipeline.

Cathaleen Marie Ford; Government, New Mexico State University

Women's Influence on the Arab Spring: Prospects for the Future

The Arab Spring spread rapidly across the Middle East and North Africa (MENA) after a Tunisian man burned himself alive in protest of an oppressive government. Now, nearly two years later, we are left with many questions

about what will happen next for the people in the region. Women for example, were significantly influential in the uprisings yet continue to be discriminated against considerably. Research on this topic has brought to light two possible prospects for the future of womens rights in the MENA. One possible outcome is a movement toward gender equality for women, where the events of the Arab Spring represent a successful transition to a new social order that recognizes women as equal, productive members of society. Alternatively, some see the future regressing back to the same issues and obstacles women were subjected to before the rebellions. This research will explore the immense role women played as the events unfolded during the Arab Spring, and what the implications are for the future. Specifically, this research consists of a comparative study of two countries in North Africa-Egypt and Morocco-to answer three questions: How were feminist activists involved? What achievements were made towards womens rights? And finally, what does the future hold for women in the MENA? Feminist theory will be utilized to examine the two countries and to provide answers to the three research questions. This study will shed light on why womens activism was so important, yet the Arab Spring seems to have them left behind.

Andrea Christina Gallegos; Physics, New Mexico State University

Lg Attenuation in the Central and Eastern United States Revealed by the EarthScope Transportable Array

Data from EarthScope's Transportable Array Network (TA) were used to generate a new and more comprehensive attenuation map of the regional Lg phase for the central and eastern United States (CEUS). The two-station method, which eliminates source effects, was used to measure interstation Q. Regional Lg phases generated by 39 events recorded from 2010 to 2012 resulted in 76,937 interstation Q measurements. Preliminary results show northeast trending high Q regions (low attenuation) through the majority of the CEUS. Regions of low Q (high attenuation) were seen along the Minnesota-Wisconsin border, the Mississippi embayment, and along the Oklahoma-Texas border. These results are the first step in creating a more detailed model of crustal attenuation in the CEUS. This model can improve ground motion predictions of future large earthquakes for more accurate hazard assessment and improve overall understanding of the structure and assemblage of the CEUS.

Andrea Gallegos & Nishath Rajiv Ranasinghe; Physics, New Mexico State University

Lg Geometrical Spreading

Lg amplitude data from the International Seismological Centre (ISC) Catalog were used to invert for the geometric spreading, attenuation factor, station gain, and source gain of Iberia, Kazakhstan, the Western U.S., and globally. We attribute the higher than spherical spreading as due to temporal spreading. Temporal spreading occurs because the Lg waveform spreads in its temporal length with distance so there is a corresponding decay in amplitude. This adds approximately 0.5 to the geometric spreading coefficient. The Q values found are higher than the predicted values from previous studies because more of the amplitude decay is explained by geometric and temporal spreading of the waves.The Lg spreading varies geographically, cannot be assumed a priori, and it is an important factor in Lg decay.

Daniel Gambacorta; Psychology, New Mexico State University

Strategic deference: Dominant competitors inhibit creative display

Dominance is a form of status derived from the ability to control resources via threat of physical force. We proposed that one way that humans defer to more dominant individuals is by inhibiting creative displays in competitive mating contexts. This deference functions to prevent physical harm being brought on by the more dominant individual. Forty-nine male participants were led to believe that they were competing with another male for the chance to go on a lunch date with an attractive female. Participants were shown a shirtless picture of their competitor. The picture depicted either a dominant (strong) male or a subordinate (scrawny) male. Videotapes of participants being interviewed by the female with the male competitor watching were then rated on several dimensions by a team of coders. Results revealed that participants competing against a dominant male produced fewer and lower quality creative displays than participants competing against a subordinatemale.

Kyle Garrison; Fish, Wildlife, and Conservation Ecology, New Mexico State University

*Influence of livestock grazing on forage biomass, activity budgets and foraging efficiency of desert bighorn sheep (*Ovis canadensis mexicana*) in southern New Mexico*

The desert bighorn sheep (*Ovis canadensis mexicana*) is an iconic species treasured for both aesthetics and sport. Prior to European settlement, desert bighorn numbered in the thousands in New Mexico. By 1980, however, overhunting, disease, and habitat degradation by livestock reduced desert bighorn to just 69 wild animals. In the following thirty years, desert bighorn populations have recovered to an approximate 750 animals state-wide. Though trends are promising, desert bighorn recovery remains an ongoing challenge. One profound land use which can impact bighorn populations is cattle grazing. By altering the habitat and foraging behavior of desert bighorn, cattle grazing may influence bighorn population growth. Thus, we have begun research investigating the impacts cattle grazing on desert bighorn sheep in New Mexico. We hypothesize that cattle grazing on desert bighorn habitat reduces the quantity and quality of forage for desert bighorn, thus reducing foraging efficiency. To test this hypothesis we are quantifying forage resources and behavior of desert bighorn in grazed and ungrazed ranges. Specifically, we are measuring the composition and biomass of key forage species at different spatial scales by sampling transects across each habitat and at observed bighorn foraging stations. We are also collecting observational data on desert bighorn activity budgets and foraging bouts to quantify foraging efficiency. Observational data will include time spent feeding, number of steps taken, and time spent in non-feeding activities. We predict that the ungrazed habitat will have higher edible forage biomass, allowing desert bighorn to forage more efficiently than in the grazed habitat.

Sean Gaynor; Geological Sciences, New Mexico State University

The Burro Mountain plutonic complex: Evaluating Emplacement Mechanisms of a 1.4 Ga A-Type Granitoid Pluton in southwest New Mexico

The Burro Mountains expose ∼1.4 Ga granitoids that cut Paleoproterozoic rocks of the Mazatzal province, as part of the vast ∼1.4 Ga granite/rhyolite province spanning Laurentia. Mapping of the pluton has revealed significant compositional and textural variations, ranging from a coarse-grained, biotite-hornblende granodiorite to fine-grained muscovite leucogranite. The color index of the pluton decreases southward, paralleling trends of decreasing grain size, xenolith abundance, and megacrystic feldspars. Mapping has revealed gradational and sharp contacts between compositional phases of the pluton. Based on these textural and mineralogical differences, intrusive units related to ∼1.4 Ga magmatism in the Burros have been redefined as four units: the Jack Creek Granodiorite, Burro Mountain Granite, Langford Mountains Granite and Separ Granite. The Jack Creek Granodiorite, combining previous mapping of the Jack Creek Granite and the granodiorite unit, is a coarse-grained, megacrystic granodiorite. It is the only unit with deformation, ranging from mild foliation to mylonitic grain reduction and migmatite production. What was formerly mapped as the Burro Mountain Granite is now broken down into three units. The Burro Mountain Granite is defined as moderate-grained biotite granite. The Langford Mountains Granite and the Separ Granite are luecogranites separated by textural differences. Division into these units is confirmed through major element geochemistry, specifically the addition of the Langford Mountains Granite and the Separ Granite, as the two units plot in a unique region. The Jack Creek Granodiorite spans a broad geochemical range, matching other large-scale granodiorite such as the Half Dome Granodiorite of the Tuolumne Intrusive Suite.

Matthew J. Gould; Biology, New Mexico State University

*Estimating American black bear (*Ursus americanus*) abundance and density in New Mexico using noninvasive genetic analysis.*

One of the main challenges for wildlife management agencies is to set harvest levels that ensure for the long-term persistence of populations. Due to financial and logistical constraints, management agencies often lack relevant estimates of vital rates for all populations or subpopulations for which they must set harvest quotas or must extrapolate vital rates and population parameters estimated from research studies to populations and areas outside the study area. Currently, estimates of black bear abundance and density are lacking in New Mexico. In a collaborative effort between New Mexico State University, the New Mexico Cooperative Fish and Wildlife Research Unit, and the New Mexico Department of Game and Fish, we will estimate the abundance and density of black bears within 5 of the new 13 bear management zones in New Mexico. We will use non-invasive hair traps and bear rubs along with genetic samples collected from management, research, and hunter-harvested bears in mark-recapture models to estimate the

abundance and density of black bears in the Sacramento and Sangre de Cristo Mountains of New Mexico. Hair samples will be collected over the course of three summers. Genetic samples will be analyzed at the termination of each field season. Population estimates will be provided to the New Mexico Department of Game and Fish, and will aid them in setting harvest limits for black bears in the Sacramento and Sangre de Cristo Mountain black bear management zones. This is the first non-invasive black bear DNA project conducted in the state of New Mexico.

Melissa J. Guynn & Adam G. Underwood; Psychology, New Mexico State University

Partial-Match Cues with High-Overlap Improved Prospective Memory during Implied Unexpected Context

Prospective memory (PM) is memory dedicated to fulfilling an intention at a future point of time. Research indicates that expectations of the possible future context in which the PM cue may occur affects performance. Specifically, PM is improved when the cue occurs within the context it was expected to occur and is hindered when it does not (Cook, Marsh, & Hicks, 2005). The current study examined whether the degree of overlap partial-match cues have with PM cues could differentially affect PM during an unexpected future context; and moreover, to identify the cognitive processes mediating any improvement. To achieve this, expectation of context was implied during intention formation. Results indicated semantic (high-overlap) partial-match cues, but not perceptual (low-overlap) partial-match cues, improved PM. Furthermore, semantic partial-match cues resulted in adjustment of attentional allocation policies and more instances of spontaneous retrieval. The study suggests that PM can be improved during an unexpected context.

Michael Hayden; Astronomy, New Mexico State University

Milky Way Abundance Gradients from SDSS-III/APOGEE

We present initial abundance gradients in the Milky Way as determined from high-resolution (R ¿ 20,000) spectra of red giant stars. Our observations were taken with the SDSS-III APO Galactic Evolution Experiment (APOGEE) and have a S/N of at least 100. APOGEE is able to sample a large range of Galactocentric radii (Rgc) including the bulge and inner disk regions of the galaxy by working in the near-IR. From a sample of nearly 30,000 stars taken during the first year of APOGEE operation, we estimate distances using spectroscopically-derived surface gravities combined with extinction estimates from near- and mid-IR photometry. This sample includes stars with $0 <$ Rgc $<$ 20 kpc, and is constrained to a range of heights about the plane, Z, from 0 to 2 kpc. We determine radial abundance gradients for sub-samples that include different heights about the plane and different [α/Fe] ratios. We find that the radial abundance gradient is steeper in the plane than above it for stars with near-solar [α/Fe], and mostly flat for stars with higher [α/Fe] at all Z.

David Hernandez-Quezada; Biology, New Mexico State University

Microbial biodiversity transmitted within seeds of the plant genus Leucaena (Fabaceae).

Bacterial endophytes are defined as microbes that live inside of plant tissues without causing disease. Recent discoveries suggest that the diversity of endophytes is greater than previously thought and numerous endophytes have been discovered that are beneficial to plants, promoting growth, deterring herbivores, fixing nutrients, and preventing infection from other microorganisms. These microbes may be acquired trough different mechanisms, with some being vertically transmitted through the seed of the host plant. We are investigating vertically transmitted endophytes recovered from genomic DNA extractions from seeds of the genus Leucaena. Through this study we hope to characterize vertically transmitted bacterial communities. Employing bacterial specific 16S primers and a phylogenetic approach that includes samples of all major lineages of Eubacteria, we have recovered DNA sequences from lineages related to Herbaspirillum and Stenotrophomonas, which includes lineages of potential nitrogen fixing and iron reducing bacteria not previously known from legume tissues. Relative to the use of NCBI Blast searches, our phylogenetic approach has been useful for eliminating chloroplast and mitochondrial contaminant sequences. We are also attempting to use a novel DNA extraction kit, to enrich for bacterial DNA, in association with a second generation sequencing approach to sequence all potential endophyte DNA without potential problems from PCR bias.

Terri Horn; Sociology, New Mexico State University

Evaluating the Impact of Implementing a Milling Station in Rural Tanzania

NMSU researchers are working with Womens Global Connection (WGC), a non-profit organization in San Antonio, TX., to assess the social, economic, and cultural impact of the implementation of a milling station on rural farmers in Bukoba, Tanzania. Focus groups and interviews were conducted with program participants in July 2012.

Jessica Jackson; Counseling and Educational Psychology, New Mexico State University

The Relationship Between Racial Microaggressions and Ethnic Identity in Black Young Adults

This research study focuses on the impact that racial microaggressions has on ethnic identity. Racial microaggressions are subtle forms of racism that are expressed as microassaults, microinvalidations and microinsults (Sue, Capodilupo & Holder, 2008; Torres, Driscoll & Burrow, 2010). The current research has shown that racial microaggressions have a negative impact on adults (Smith, Allen & Danley, 2007; Sue, Capodilupo & Holder, 2008). Studies (McMahon & Watts, 2002; Wong, Eccles & Sameroff, 2003) have also found that identification with ones ethnic group can sometimes serve as a protective factor against the negative effects of racial microaggressions. The current study intends to apply the current literature of microaggression to adolescence in which youth encounter the major task of forming their identities (Blash & Unger, 1995). It has also been reported that Black youth become much more aware of and are more likely to perceive social messages about inferiority and stigmatization (Lee et al., 2011). Due to this heightened sensitivity, the experience of racial microaggressions may have a greater impact on adolescents during this time. This study aims to better understand the relationship between racial microaggressions and ethnic identity among African American youth. The data will be collected from a Historically Black College or University in the southeastern region of the United States. Participants will complete a self-report survey of their past behavior and ethnic identification during their high school years. Supported by NIH grant R25GM061222

Jinjin Jiang; Biology, New Mexico State University

The use of Paraquat in study of stress defense capacity in mosquitoes

Anautogenous female mosquitoes take blood meal for egg production. Blood (hemoglobin) digestion results in heme associated oxidative stress, which is detrimental to various life traits, such as fecundity and longevity. As an adaptation, mosquitoes have evolved certain antioxidant mechanisms to cope with this oxidative stress. Besides, mosquito midgut harbors a microbial community. Upon blood meal, enteric bacteria become dominant in the midgut. The antioxidant capacity of these bacteria may contribute to the redox homeostasis in the blood-fed gut. The herbicide Paraquat is a known oxidative stress inducer. In this study we used Paraquat feeding to determined mosquito antioxidant capacity and its significance to fecundity. The feeding on 1 and 2 mM Paraquat diet caused a low level of mortality. Interestingly, the Paraquat induced mortality was increased after blood feeding, suggesting that blood meal increase the oxidative stress to a level that exceeds the protective capacity of mosquitoes. Moreover, 1mM and 2mM paraquat diet reduced fecundity, less number of eggs were produced compared to the mosquitoes on normal sugar diet. Meanwhile, Paraquat feeding changed the gut bacterial composition. Enterobacter sp. and Rahnella sp. were increased. To further explore the role of Enterbacter sp. in the gut we generated a mutant Enterobacter, the O-antigen ligase gene of which was disrupted by a Tn5-Kan-2 transposon. The mutant was sensitive to Paraquat in culture. The newly emerged mosquitoes were fed on the sugar meal containing mutant or wild-type Enterobacter to reconstruct gut bacterial community. The mosquitoes were examined on egg production. The mosquitoes with mutant reconstruction showed higher egg retention rate, i.e. more mosquitoes had retained eggs in the ovaries, compared to the mosquitoes with normal gut flora on regular sugar. In summary, mosquito defense against oxidative stress is critical for egg production, and gut bacteriaplay a significant role in protection against the stress.

Leila Karimi; Chemical Engineering, New Mexico State University

Selectivity Studies in the Desalination Process Using Electrodialysis

Desalination as an artificial process by which saline water is converted to fresh water is considered as a solution to global drinking water crisis. Electrodialysis (ED) is a membrane based separation process in which the partial separation of the components of an electrolyte solution occurs due to the applied electrical voltage. Although Electrodialysis Reversal (EDR) technology has been commercially used since the early 1960s, the fundamental understanding of this

technology is not fully developed. Groundwater resources, which are very important sources of drinking water in many parts of the world as well as southwest region of the United States, have various water chemistries. Therefore, ions with higher levels should selectively be removed, since most of the other ions exist within acceptable range based on drinking water standards. Although ion exchange membranes have been studied considerably, the lack of comprehensive research for ion selectivity in ED/EDR, especially in pilot scale cannot be neglected. In order to achieve this point of science it is needed to be known that which parameters affect removing monovalent or multivalent ions in the targeted separation processes. Consequently, the effect of different parameters in removal of target ions should be determined and explained that can be helpful in finding the optimized operating conditions in order to reducing costs for electrodialysis processes. Finally, the research approach develops as follows: 1. Pilot-scale experiments which are performed on a full pilot-scale electrodialyzer in Brackish Groundwater National Desalination Research Facility (BGNDRF) in Alamogordo. 2. Lab- scale experiments in which different ion exchange membranes are characterized regarding their selectivity toward the various ions. Additionally, the effective parameters in selective removal of ions are determined for presenting an empirical model. 3. Advanced lab-scale experiments by which the hypotheses for ion selectivity in EDR processes is clearly demonstrated, and the final version of model for preferential removal of ions in EDR processes is verified.

James Kilcrease; Plant and Environmental Sciences, New Mexico State University

Chile Carotenoids: The Link Between Color, Inheritance and Sub-Cellular Morphology

Chile peppers (Capsicum annuum) are a very valuable and highly sought after crop, especially here in New Mexico with an annual production of approximately 70,000 tons (NMDA 2011). This keystone crop of New Mexico is utilized in many different fashions including but not limited to fresh consumption, dried powders, medicinal products, decoration, and natural pigmented coloring agents. Chile pepper fruit accumulate very high concentrations and complex mixtures of pigmented structures called carotenoids. This accumulation in pericarp tissue results in pepper fruit colors such as red, yellow, orange, brown, and even purple. In the fruits and flowers, these carotenoids accumulate to even higher levels within sub-cellular structures called chromoplasts. Carotenoids are antioxidants, and specific carotenoids such as β-carotene and β-cryptoxanthin function as essential dietary components by having vitamin A precursor activity. We hypothesize that chromoplast architecture may influence carotenoid packaging and content. Therefore the objective of this research is to investigate chromoplast shapes, intra-organellar architecture, and inheritance patterns for fruit that mature to different terminal colors with distinct carotenoid abundance profiles.

Cindy Kratzke & Candyce Luna; Public Health Sciences, New Mexico State University

Breast Cancer Prevention for Hispanic and Non-Hispanic Women: Mobile Messages and Implications For Quality Improvement with Clinical Office Collaboration

While growing literature supports increased Internet use for seeking breast cancer prevention information, little is known about the use of mobile breast cancer Hispanic women are more likely to be diagnosed at later stages for breast cancer and have lower screening mammography rates. Purpose: We examined knowledge of breast cancer risk factors, breast cancer prevention information channels, prevention mobile message preferences, and mobile message appointment reminder preferences among women in southern New Mexico. The study was guided using a conceptual framework with McGuires Input-Output Persuasion Model. Methods: Women ages 40 and older at an imaging center completed a survey assessing their information channels, breast cancer knowledge, mobile message preferences and demographics. Results: Of the 157 participants ages 40 to 91 (mean = 61, SD = 12.07), the most common channels reported were television (58%), magazines (46%), brochures (23%), and Web sites (23%).Using bivariate analysis, non-Hispanic women (53%) compared to Hispanic women (33%) were more likely to have higher knowledge of breast cancer risk factors (p = .035). Non-Hispanic women were more likely to use cell phones (p=.013). Of the 136 cell phone users, Hispanic women were more likely to prefer receiving breast cancer prevention text messages and cell messages (p ¡ .05 for both). Hispanic (50%) and non-Hispanic women (32%) preferred to receive a text appointment reminder. Conclusions: Traditional and mobile messages are necessary for non- Hispanic women and Hispanic women who may be early adopters of technology. Health promotion specialists may collaborate with clinical offices to develop assessments of patient mobile message preferences for improving mammography adherence, patient education, and best practices in managing screening appointments.

Neeshia Macanowicz; Fish, Wildlife, and Conservation Ecology, New Mexico State University

Unique desert sinkholes in Roswell, NM and the benthic macroinvertebrate communities

Benthic fauna are a central component in food webs and used for water quality assessment because of their diversity and response to environmental variables. New Mexico comprises of less than two percent aquatic ecosystems. Near Roswell, NM the Bitter Lake National Wildlife Refuge (BLNWR) harbors a unique complex of 40+ sinkholes. The sinkholes are heterogeneous in abiotic and biotic attributes. For example, depth ranges from 0.2-14.5 m, salinity from 3.85 122 ppt and fish abundance from 0 40 m-3. The purpose of this research was to identify benthic macroinvertebrate communities in forty sinkholes and relate species abundance and diversity to environmental factors. We sampled the benthic community with light traps, Hester-Dendy samplers and ponar grab. Canonical Correspondence and Multiple Regression Analyses were used to relate benthic communities to environmental drivers. Results revealed fish and salinity as primary drivers of benthic communities. Sinkholes with fish or high salinities as well as shallow, turbid and warmer sinkholes had lower benthic diversity. Comprehensive data of benthic macroinvertebrates at BLNWR will protect the rare desert wetland habitat and endangered species through support of future management.

Dennis C. McCarville; Civil Engineering, New Mexico State University

*Using Remote Sensing to Map Saltcedar (*Tamarix spp.*) in the Bosque del Apache National Wildlife Refuge*

Saltcedar has replaced native vegetation in the Bosque del Apache NWR resulting in loss of habitat for native species and reduced water availability for surrounding native vegetation. To manage saltcedar stands, accurate maps are needed. This study investigated the use of Landsat-5 Thematic Mapper satellite imagery for classifying the Bosque del Apache riparian area into areas with saltcedar and areas without saltcedar. The advantage of using Landsat-5 TM imagery is that it is available from the U.S. Geological Survey for free, historical changes in saltcedar extent can be re-constructed, and remote areas can be mapped without disturbing endangered wildlife. Four trial periods (1996, 2001, 2005, and 2008) using spring, summer, fall, and winter images were used with various combinations of: 1) products derived from the imagery and 2) radiometric correction methods - to classify the riparian area and produce saltcedar maps. Radiometric correction was used to remove the distorting effects that the atmosphere has on the Landsat satellite images. Classification methods included: Maximum Likelihood, Support Vector Machine, and Neural Networks. Maps with 85% (or better) overall accuracy were produced for all four trial periods. The surprise result was that image combinations classified without radiometric correction produced maps with equal or better accuracy than maps produced using images that were radiometrically corrected prior to classification. This means less expensive methods can be used to map saltcedar in the Bosque del Apache NWR. Future work will combine evapotranspiration estimates with mapping results to calculate the amount of water consumed by the saltcedar.

Jean McKeever; Astronomy, New Mexico State University

Variable Red Supergiants: Solar-like Oscillations at Ultra-low Frequencies?

We study two Kepler data sets of stars along the red giant branch (RGB), one of which shows standard solar-like oscillations in their frequency power spectrum and are well within the limits of the classical RGB. For these stars we present global oscillation parameters and compare to other similar data sets. The second set from our Kepler GO program, is composed of red supergiants that are bright (on average $\sim$1000 solar luminosities) and cool ($\sim$3000-3500 K) stars. Initial analysis of one year of Kepler lightcurves for these stars has revealed low-frequency oscillations of large amplitude, possibly of solar-like origin. We attempt to ascertain global parameters for these stars and compare them with known scaling relations to see if the valid ranges of these relations can be extended down to such low frequencies.

Anita L. Mihecoby; , New Mexico State University

Indigenous Ways of Knowing Group Counseling

The need for alternatives to the current models of counseling psychology practice for the purpose of addressing the needs of diverse populations is well established (Gone, 2009, Duran & Duran, 1995). Indigenous Ways of Knowing (IWOK) as a viable paradigm from which to do counseling and therapy has just begun to emerge in the literature (Grayshield & Mihecoby, 2010). It is imperative that a greater understanding, acceptance, and legitimacy in

mental health care research, policy and practices from indigenous perspectives be included into the literature (Duran & Duran, 1995). Native American post-colonial psychology recommended that interventions among indigenous communities focus on cultural revitalization and increased awareness regarding the association of colonization and the current status of marginalized communities realities (Duran & Duran, 1995). A community intervention based on Native American medicine wheel teachings and recommendations for treating the soul wound among indigenous populations will be implemented to explore appropriate measures that may support the efficacy of an indigenous model. Pre- and post- data will be collected this spring to explore changes in participants self-awareness, ethnic identity, perceived stress, health behaviors and cultural knowledge. This research is supported by NIH RISE grant R25GM061222.

Sayed Gebrill Mohmed, Jose Ortega, Champa Sengupta-Gopalan, & Jules Tabilona; Plant and Environmental Sciences, New Mexico State University

The role of sucrose phosphate synthase in the seeds and nodules of pea (Pisum sativum)

Garden pea (Pisum sativum), is a leguminous plant that is capable of forming a symbiotic relationship with a N2-fixing soil bacteria (Rhizobia) resulting in the formation of an organ called the root nodule. While the rhizobia in the nodules convert atmospheric N2 into NH3, the photosynthetic tissues provides the nodules with sucrose, both for the purpose of energy source and in the conversion of ammonia into amino acids. Besides the nodules, the developing seeds in pea also depend on the leaves for sucrose. The key enzyme in sucrose synthesis is sucrose phosphate synthase (SPS). We have identified two classes of SPS genes in pea as seen in other legumes. Our objective is to determine if the gene members exhibit differential expression pattern between the photosynthetic tissues (source) and the heterotrophic organs like the nodule and the seeds (sink). Comparison of the regulatory sequences of the two classes of genes in pea and other legumes using bioinformatics tools, may indicate the type of signals that regulate the two gene classes. While the role of SPS in leaves is self explanatory, its role in heterotrophic tissues is not as clear. Since sucrose is the precursor to many of the different metabolites and storage oligosaccharides in the heterotrophic tissues and also a signaling molecule, we propose that SPS plays a role in fine-tuning the levels of sucrose in these tissues. To test our proposal, we are monitoring the expression pattern of genes involved in the metabolism of sucrose and the synthesis of the different oligosaccharides. Understanding the role of SPS in the seeds and nodules of pea is crucial in our approach using genetic engineering tools to increase seed yield in this important legume.

Mohsen Mohseni Moghadam; Plant and Environmental Sciences, New Mexico State University

Growth and Competitive Ability of Glyphosate-Resistant Palmer amaranth (Amaranthus palmeri) Populations from New Mexico as Compared to Susceptible Populations

Gene amplification confers glyphosate resistance in two populations of Amaranthus palmeri from New Mexico. However, the relative growth and development of these populations, compared with the susceptible populations, are unknown. Greenhouse experiments were conducted to compare the growth, relative competiveness and seed production of two glyphosate resistant (R) and susceptible (S) populations. Under non-competitive conditions the S populations had greater leaf area, height and biomass compared with the R populations. Further studies with one of the S populations under two different alternating temperature regiments indicated that in both conditions S population produced more biomass compared with R populations. Replacement series with three ratios of R:S (16:0, 8:8 and 0:16), under different alternating temperature regiments, indicated superior competitiveness of S population. Fertilization experiments revealed that the S population produced more seeds compared with the R populations. The seed production from crosses and reciprocal crosses was lower than the S population, but higher than the R populations. The data suggests that in the absence of herbicide selection, the R populations from New Mexico would be dominated by the S populations.

Salvador Dennito Munoz; Chemistry, New Mexico State University

Reactivity Explorations of New Iron Tris(carbene)borate Complexes

Iron(II) complexes supported by new strongly donating scorpionate ligands have been prepared. These N-heterocyclic carbene ligands incorporate a broad range of donor strengths and steric profiles allowing for the impact of these parameters on subsequent metal-based chemistry to be compared. Reaction of these tris(carbene)borate ligands with

FeCl2 results in the formation of four-coordinate pseudo tetrahedral iron chloride derivatives, which have been characterized by standard methods. Further reactivity exploration of these new iron based complexes including aziridination of organic substrates is being sought as in analogous scorpionates. Aziridines have proven to be challenging synthetic targets for chemists and developing new methodology for their preparation will aid in exploring the pharmacological activity of this functional group.

Tapaswy Muppaneni; Chemical Engineering, New Mexico State University

Transesterification of Camelina, Palm and Waste Cooking Oils Using Supercritical Ethanol with Hexane as a Cosolvent: A Comparative Study

In this comparative study, camelina sativa oil, palm oil and waste cooking oil were transesterified under supercritical ethanol conditions to produce high yields of fatty acid ethyl esters (FAEE). Hexane was used as a co-solvent, which helped to increase the mutual solubility of alcohol and vegetable oil and thus increased the yield of the ethyl esters. This catalyst free process enables the transesterification of the oils to ethyl esters in short reaction times followed by simple separation and purification steps.As a result the viscosity and the volatilization temperature of the oils were reduced.Different process parameters like alcohol to oil molar ratio, reaction temperature, reaction time and the co-solvent ratio were optimized.The FAEE samples were analyzed using GC-MS and thermogravimetric analysis (TGA.The fuel properties of ethyl esters produced were compared with ASTM standards for biodiesel.

Tapaswy Muppaneni, Sundaravadivelnathan Ponnusamy, & Harvind K. Reddy; Chemical Engineering, New Mexico State University

Adsorption equilibrium and kinetics for arsenic removal using aluminum based adsorbents

Sol-gel derived activated alumina, supercritical carbon dioxide dried sol-gel derived activated alumina, and iron-aluminium hydrous oxides were synthesized to study the adsorption equilibrium and kinetics of arsenic removal. The main application of this study is to remove arsenic at very low concentrations from drinking water. The adsorbents were characterized using scanning electron microscope (SEM) and nitrogen adsorption for their surface and pore texture properties. The iron-aluminium hydrous oxide adsorbent was independent of the initial pH of the solution for arsenic removal. Adsorption isotherm of arsenic onto sol-gel derived activated alumina is explained by the Freundlich adsorption model and the Langmuir adsorption model best explains the adsorption isotherm of arsenic onto supercritical CO2 dried sol-gel derived activated alumina and iron-aluminium hydrous oxides. Supercritical CO2 dried sol-gel derived activated alumina showed the highest adsorption capacity of 8.99 mg/g. A pseudo-second order model was used to explain adsorption reaction kinetics of arsenic onto the adsorbents and the pseudo-second order model fits the experimental data very well with a R2 value greater than 0.99.

Rakesh Nath; Astronomy, New Mexico State University

Hα Observation at the UND Observatory

The UND Observatory aims to image the full disk sun to detect features in the Hα.Full disk imaging in the Hα will reveal full disk features such as the chromospheric network, plages, prominences and laments. The aim of the thesis is to quantify what kind of features are visible in full disk im- ages of the sun taken from the UND observatory with the changing seeing conditions and speci cally suggest probable feature

Brenda C. Nieto; Biology, New Mexico State University

Fine Root Production and Belowground Soil Processes Across a Dryland Ecotone

Drylands cover 30% of Earths terrestrial land area and due to its size changes to dryland soil carbon pools, including shifts in vegetation from grasslands to shrublands (shrub encroachment), has the potential to impact the global carbon cycle. Shrub encroachment may be linked to rising atmospheric carbon dioxide (CO_2) levels that can alter plant carbon allocation from aboveground to belowground sources and change the distribution of roots and nutrients caused by the change in plant functional group. Research suggests root derived C from root decomposition and exudation is an important component of the soil carbon pool and may play a larger role in nutrient cycling than previously thought. Soil respiration is one of the largest fluxes in the global carbon cycle and can be root or microbial respiration, but the relative contribution of each to total soil respiration remains unclear. The study investigates

correlations between fine root (< 2 mm diameter) production and soil respiration to determine the role of root derived C in drylands where belowground biomass can exceed aboveground biomass due to high root shoot ratios. We measured CO_2-efflux under shrub canopy/ within grass and interspaces microsites at grassland to shrubland ecotone. We hypothesize that root production will be positively correlated to CO_2 flux and higher respiration rates will be located at under canopy and within patch microsites because of higher concentration of roots. Preliminary soil respiration results show a significant difference between soil respiration at under canopy and within patch microsites indicating root derived respiration.

Mohammed F. Nasir Omer; Plant and Environmental Sciences, New Mexico State University

Preliminary Study of Green Manure Legumes Suitable for the Southwest

Using legumes as green manures can significantly improve soil fertility and provide much needed biomass for soil health improvement of many farmlands in the desert southwest of the United States. However, adaptable legumes that are drought tolerant and can produce sufficient quantities of biomass need to be selected for this region. A study was conducted to screen and evaluate the performance of selected green manure candidates that can potentially benefit the farming systems in this region. Specific objective of the current study was to evaluate the growth pattern, biomass production and soil quality impacts of several green manure crops. A total of 15 legume species were evaluated including adzuki bean, sesbania, tapery bean, pigeon pea, fava bean, green bean, lima bean, lablab, yellow sweet clover, hairy vetch, bush bean, mung bean, guar, moth bean and cowpea. Agronomic characteristics of the species were measured during the growing season that lasted from July to November and the legume biomass was measured before the seeding stage. Soil chemical and physical analyses were performed on samples taken before and after the growing season. Preliminary results indicate that sesbania and lablab produced the highest biomass of 29 Mg ha-1 and 10 Mg ha-1 respectively and these legumes also provided good ground covers capable of suppressing weeds. Although hairy vetch did not perform very well in terms of biomass production during the summer/early fall, the biomass increased rapidly in the late fall/early winter season. The final biomass of the hairy vetch was 24 Mg ha-1 , indicating its preference for cooler temperatures. Further studies are needed to develop agronomic management of the selected promising candidates and their integration into the local cropping systems.

Yahia Othman & Rolston St. Hilaire; Plant and Environmental Sciences, New Mexico State University

Remotely-Sensed Reflectance Data Reveal Moisture Status of Southern New Mexico Pecan Orchards

For large fields, satellite data make it possible to detect moisture status of plants early and thereby improve drought detection and monitoring. We screened plant physiological changes that occur during the irrigation of pecan orchards to determine if we could link moisture status of plants with changes in remotely-sensed satellite data gathered from the Landsat Thematic Mapper and the Landsat Enhanced Thematic Mapper. We conducted the study simultaneously on two southern New Mexico mature pecan orchards. Plant physiological responses and remotely sensed surface reflectance data were collected from trees that were either well irrigated or in water deficit. The Band 5 to Band 7 ratio, which is a ratio of satellite spectral bands within the shortwave infrared spectral region, positively and significantly correlated with midday stem water potential in five of six irrigation events. Multiple linear regression of remotely sensed variables revealed a significantly relationship with midday stem water potential in all events. Midday stem water potential is plant water stress indicator. Because changes in Band 5 to Band 7 ratio and multiple regression of spectral variables correlate with the moisture status of pecan orchards, we conclude that remotely sensed data holds promise for detecting the moisture status of pecan orchards.

Sri Harsh Pakala & Dr. Paul Furth; Electrical & Computer Engineering, New Mexico State University

A 22dB PSRR Enhancement in a Two-Stage CMOS Opamp Using Tail Compensation

A new compensation technique known as tail compensation is applied to a two-stage CMOS operational amplifier. The compensation is established by a capacitor connected be- tween the output node and the source node of the differential amplifier. For the selected opamp topology, tail compensation allows better performance in terms of bandwidth and power supply rejection ratio (PSRR) when compared to Miller and cascode compensation. Operational amplifiers using Miller, cascode and tail compensation were fabricated in a 0.5-μm 2P3M CMOS process. The circuits operate

at a total quiescent current of 90 μA with 1.5V power supplies. Experimental results show that tail compensation increases the unity-gain frequency by 60% and 25% and improves PSRR from the positive rail by 22 dB and 26 dB over a frequency range from 23 kHz to 3.0 MHz compared to Miller and cascode compensation, respectively.

Anna Paradox; AEEC, New Mexico State University

Straw into Gold: A Look at the Economics of Straw Mini-Bale Insulation

Before 1977, manufactured homes had no requirement for insulation. As a result, these homes have high heating costs, and many are still in use. One possible solution is encasing the manufactured homes in insulating walls of straw mini-bales. This research examines the savings such walls could provide in heating costs and compares it to the cost of building the walls.

Javier Perez-Ramirez; Electrical & Computer Engineering, New Mexico State University

Optimized Laser Beam Parameters for Communications in Space Environments in the Presence of Pointing Errors

We investigate the behavior of spatially partially coherent beams (PCBs) in the presence of pointing errors in the space communication environment. Closed form expressions for the optimal coherence length for minimizing outage probability and maximizing average signal-to-noise ratio (SNR) are derived. In the case of outage probability, we observe that the optimal coherence parameter does not depend on the pointing error statistics. For average SNR results, PCBs can improve performance when large fixed beam offsets are present. We also provide BER performance analysis results for a convolutionally coded system and demonstrate significant performance improvement using PCBs with optimized parameters.

James Weston Pitman; Fish, Wildlife, and Conservation Ecology, New Mexico State University

Microhabitat selection and mortality site characteristics of elk calves in the Blue Range Wolf Recovery Area

Elk *(Cervus canadensis* in New Mexico have been free from wolf predation since the extirpation of the Mexican gray wolf *(Canis lupus baileyi)* by the mid to late 1900s. The Mexican Wolf Recovery Plan was initiated in the late 1970s with the goal of creating a captive breeding program and reestablishing wolf populations in the wild. The initial recovery area, the Blue Range Wolf Recovery Area (BRWRA), was designated in west-central New Mexico and east-central Arizona, with reintroductions beginning in 1998. All confirmed wolf kills within the first seven months of release were of adult elk and calves, and subsequent studies have found this to be the main component of Mexican gray wolf diets. However, the impacts of wolf reintroduction, along with existing predator impacts, on neonatal survival and recruitment have not been assessed. The main purposes of this study are to characterize microhabitats selected for calf bedding sites and at cause specific mortality sites, and determine if these characteristics are related to survival. Results to be obtained include assessing the importance of topographic and vegetation structure characteristics in site selection, determining the influences guiding this selection, and determining the relative success of these selections in promoting calf survival. By determining microhabitat differences between surviving and non-surviving calves, optimal habitat characteristics and locations can be determined. Knowledge of these relationships may allow the development of management plans that maintain optimal calf rearing habitat, reduce depredation impacts, and support sustainable populations of both elk and the Mexican gray wolf.

Kelsey Quinn; Animal and Range Science, New Mexico State University

Alterations in CXCR4 and CXCL12 in ovine placental tissues during early pregnancy: natural breeding and assisted reproductive technologies (ART)

Implantation and placentation is a complex process, involving various signaling molecules. Chemokine receptor 4 (CXCR4) is up regulated in endometrium during implantation and has only one recognized ligand, CXCL12. In human trophoblast cells, CXCL12/CXCR4 signaling suppresses apoptosis, and stimulates proliferation and invasion. We have recently shown increased CXCL12/CXCR4 mRNA in ovine conceptuses on days 17-30, with complementary elevated CXCR4 mRNA and protein in the endometrium on day 35. This prompted investigation of CXCL12/CXCR4 signaling during earlier days of gestation. Further, because placental defects appear the first weeks of gestation with ART, we examined CXCL12/CXCR4 expression in sheep undergoing ART. We hypothesized that during early pregnancy CXCL12/CXCR4 increases to assist in placentation and that ART compromises the CXCL12/CXCR4 system.

To test this hypothesis, caruncle (CAR) and fetal membrane (FM) tissues were collected on days 0 (non-pregnant), 18, 22, 26 and 30 of pregnancy. For ewes exposed to ART, samples were collected on day 22 of pregnancy after embryo transfer (ET), in-vitro fertilization (IVF) or in-vitro activation (IVA) and compared to control pregnancies resulting from natural breeding (NAT). Real time PCR was used to assess mRNA levels, and Western blot analysis was conducted for protein expression. In FM, CXCR4 mRNA increased as gestation advanced with the greatest levels on day 26. In sheep subjected to ART, CXCL12 protein was elevated with every type of ART compared to NAT. The increase of CXCR4 in FM during early pregnancy suggests this signaling system plays a role in further promoting implantation and placentation. Because CXCL12 was greater in FM from ART pregnancies, it may function in immune cell migration, which may be compromised during ART. We interpret this data to mean the CXCL12/CXCR4 signaling system must be properly regulated during early pregnancy and dysregulation in this system may compromise pregnancy, possibly leading to embryonic mortality.

Meredith Rawls; Astronomy, New Mexico State University

Red Giants in Eclipsing Binaries: First Look at Kepler *Light Curves*

We present a catalog and initial analysis of eclipsing binaries in the *Kepler* field that contain at least one red giant star to test theories of stellar evolution. We estimate stellar parameters using two independent techniques: asteroseismology and light curve transit modeling. Our sample is derived from overlaps in the *Kepler* red giant and eclipsing binary catalogs, and yields 53 candidate red giants in eclipsing binaries, of which 33 clearly show the global oscillation modes expected in red giant stars. We carefully consider whether the oscillating red giants belong to the eclipsing binaries they are associated with, infer red giant masses and radii from global oscillation modes, and present orbital parameters derived from light curve modeling for a subsample of stars. This work is supported by NSF grant AST-0849986 and LANL IGPP grant 10-054.

Jessica Richardson; Psychology, New Mexico State University

The Role of Affect and Cognition in Judgments about the Need for Mental Health Treatment and Willingness to Help

Mental illness has become a major public health concern. However, it is rarely studied from the point of view of the public. The current research used surveys to investigate public perceptions of the need for mental health treatment in a target individual. It also examined the publics willingness to help the target. Furthermore, we investigated the mediating role of affect and cognition in these evaluative processes. In four experiments, we found that affect mediated the relationship between mental illness and evaluations of the need for treatment. However, it was cognition that mediated the relationship between mental illness and peoples willingness to provide help. We concluded that negative affective responses elicited by the presence of mental illness resulted in increased perceptions of the need for treatment. When personal responsibility for helping was requested, people relied on cognitive processes likely associated with their own ability, knowledge, and willingness to help.

Robert Sabie; Geography, New Mexico State University

Participatory mapping and environmental justice within the Navajo Nation

Environmental justice (EJ) is a broadening field within the realm of environmental advocacy. One the many foci of EJ advocacy groups is generating equitable representation during the environmental impact assessment process. This project was an applied geography exercise in community-based mapping that provided technical assistance to the Navajo grassroots organization The Forgotten People. The Forgotten People is a non-profit organization dedicated to improving the well-being of the people who live within the Navajo Nation in Arizona. Developments in Geographic Information Systems (GIS) and the gathering of spatial data have increased the ability to recognize and quantify environmental injustices. Although GIS is widely used by environmental professionals, GIS technical expertise is not always available to grassroots organizations. Thus, the spatial aspect of environmental injustice is absent from the conversation. Many Navajo families live near the Peabody Western Coal Companys Kayenta and Black Mesa mining operation. The community needed cartographic assistance in creating a map that illustrated the proximity of cultural features to the mining operation. Spatial data on home locations, sacred sites, mining sites and water resources were aggregated by community members over the past decade using handheld Global Positioning Systems (GPS) and cameras that were capable of geo-tagging photos. I imported the data into ArcGIS 10.0 and

applied appropriate symbology. The data were then imported into ESRI Arc Flex Viewer and published online. A participatory approach empowers the community to be involved in decision making and become agents of their own development."

Karla Salazar; Biology, New Mexico State University

Serine Proteases Analysis in the Immunity of the Symbiotic Hawaiian Bobtail Squid Euprymna Scolopes

Serine proteases (SPs) are a group of enzymes with proteolytic activity. It has been reported that SPs have pivotal functions in vertebrates such as digestion, degradative processes, blood clotting, and complement system activation. These last two functions are involved in the innate immune response usually triggered by injury or pathogen invasion. To investigate if the Hawaiian bobtail squid, *Euprymna scolopes*, uses SPs as part of its immune response and if these enzymes play a role in the colonization and maintenance of symbiosis with the bacteria *Vibrio fischeri* it is first necessary to identify the SPs present in the host. Initial analysis of the E. scolopes light organ expressed sequence tag library revealed 84 potential EST sequences with homology to the SP group. BLAST analysis suggested these potential SPs fall into 3 main categories which are fibrinolytic, digestive or transmembrane enzymes. A more detailed analysis of these sequences is underway to elucidate if the identified squid EST sequences are truly SPs and if they have a role in the immune response of *E. scolopes* and therefore in the squid-vibrio symbiosis.

Jesus Salvador Sambrano, Jr.; Chemical Engineering, New Mexico State University

Developing a high-sensitivity time-resolved flow cytometer

Biomedical analysis and in-vitro assays are becoming more demanding on modern biomedical instruments compared to those that existed in previous decades. Flow cytometers are one example a biomedical instrument that is heavily exploited by the clinical diagnostic and research community. Flow cytometry permits rapid counting and sorting of a variety of mammalian cells, single-celled organisms, or microspheres, by taking flowing samples and focusing them hydrodynamically through the path of a tightly focused laser beam. Upon passage through the excitation beam, fluorescence or light scatter occur, which are indirect quantitative measurements of molecular phenomena occurring within a cell. Moreover, cytometry systems continue to expand in complexity and size. Our laboratory continues to optimize the ability to measure the fluorescence lifetime with flow cytometry. The time-resolved techniques are not commercially available and optimized yet growing in popularity because of the functionality it brings to cytometrists. One dominant problem that is faced with time-resolved systems is the inability to detect enough photons for the lifetime measurement. We are focusing on ways on how we can optimize the number of photons collected through a new design and development of a high sensitivity time-resolved cytometer (HSTC). The objective is to create a HSTC to acquire dim fluorescence that comes from irregular or minute intracellular events (i.e. signal transduction). We hope to obtain time-dependent quantitative data from smaller, finer molecules compared to traditional flow cytometers. Our design considers use of avalanche photodiodes (APD) as opposed to the standard photomultiplier tubes (PMTs) because they are compact yet powerful. We are evaluating wider bandwidth PMTs and multiple laser units to assist in increasing sensitivity we seek while minimizing the size of the cytometry system in general. Future work will involve studying a variety of cell-based or single molecule applications where the fluorescence lifetime can be exploited.

Joshua Sandry; Psychology, New Mexico State University

Superior visual search accuracy after exposure to natural relative to urban environments.

Recent studies have demonstrated a performance benefit when interacting in natural compared to urban environments. Presently, we are interested in testing whether visual search performance would differ depending on environmental exposure. We exposed participants to images of either natural scenes or urban scenes and asked them to complete a visual conjunction search (identifying the letter O embedded in an array of Qs). Consistent with existing literature, findings revealed that participants were more accurate at identifying targets when they were exposed to images of nature relative to participants exposed to images of urban environments.

Nicholas Santantonio; Plant and Environmental Sciences, New Mexico State University

Genetic Mapping of Carbon Isotope Discrimination in Drought-stressed Alfalfa (Medicago sativa L.)

The need to develop drought resistant crops with higher water-use efficiency is evident in the arid Southwest where water availability is limited. Alfalfa, New Mexicos highest cash value crop, is no exception. High water-use efficiency (WUE) is defined by a crops ability to assimilate more carbon, as CO_2, per unit of water transpired. A surrogate measurement of WUE involves the assessment of a plants ability to discriminate between different carbon isotopes of CO_2. To genetically dissect the carbon isotope discrimination (CID) trait in alfalfa, 96 families representing an alfalfa linkage mapping population were evaluated in a replicated field experiment for forage yield under drought stress for two harvests in 2005, 2006 and 2007. Shoot tissues from a subset of 31 families were also sampled for CID analysis in one harvest in 2006 and 2007. Additionally, crown/root biomass in the top 25cm of soil was measured in 2007. The linkage mapping population was genotyped with 334 DNA markers to construct linkage maps for the 8 alfalfa chromosomes. Analysis of the DNA marker and field data was conducted using interval mapping to identify regions of the alfalfa genome (referred to as QTL) that influenced forage yield, crown/ root biomass and CID. QTL were assigned to regions of the genome that exceeded the 2.8 genome wide LOD threshold as determined by multiple regression of the phenotypic data on the marker data with 1,000 permutations. A total of 11 CID QTL were detected. Three of the CID QTL co-localized with forage biomass QTL and one CID QTL co-localized with a crown/root biomass QTL. In each of these four cases, the direction of the CID effect was positively correlated with forage or crown/root biomass. This evidence suggests that in many cases CID and forage or crown/root biomass production may be influenced by the same locus.

John William Schutte; Chemical Engineering, New Mexico State University

Chemical Recycling of Plastic Solid Waste for the Production of Transportation Fuels

Since the first industrial scale production of synthetic polymers (plastics) took place in the 1940s, the production, consumption and waste generation rate of plastic solid waste (PSW) has increased considerably. Plastics are used in our daily lives in a number of applications, from greenhouses, mulches, coating and wiring, building materials to packaging, films, covers, bags and containers. It is only reasonable to find a considerable amount of PSW in the final stream of municipal solid waste (MSW). In the U.S., PSW found in MSW has increased to a total of 31 Million Tons in 2010. Thermoplastics make up roughly 80% most of which is packaging (Dewil et al., 2006). Worldwide packaging accounts for over 35% of plastic consumption (Clark and Hardy, 2004). Chemical recycling has a potential for both economic and environmental production of transportation fuels. To date only studies limited in scope have been performed on the production of transportation fuels from PSW. Studies on catalytic production of transportation fuels from PSW have been limited due to the fact that at the time of these studies fuel prices made research un-economically justifiable. Research performed on the optimization of production conditions and into improved catalysts or cheaper catalysts could prove highly beneficial to furthering chemical recycling of PSW. Representative plastic wastes from MSW will be pyrolized under varying process conditions, and the resulting gaseous, liquid, oil, wax, and char products will be collected and characterized. These products will be studied to understand their ability to substitute for commercially available fuels.

Jeremy Schwark; Psychology, New Mexico State University

Hitting a Miss: Limitations of Signal Detection Theory

Recent visual search studies show that an observers perception of the task can affect their performance on the task. This raises the important question of whether signal detection theory (SDT) can properly account for this observer behavior. The current study found that in some conditions, participants reach a quitting threshold and report the presence of a target they did not detect. A SDT analysis on these hits reveals patterns of sensitivity change not typically found in the literature. The authors suggest that reaction times may be used to assess the accuracy of conclusions drawn from SDT.

Joshua Sherman; Plant and Environmental Sciences, New Mexico State University

Relationship of manganese nutrition to photosynthesis in pecan.

Pecans in New Mexico became the number one cash crop in New Mexico in 2010. The essential trace element manganese (Mn) performs a critical physiological role in plants. Mn nutrition in pecan and its relationship to photosynthesis parameters in the field has never been researched. The objective of this study is to evaluate the relationship of foliar applied Mn to photosynthesis, leaf nutrient content, and chlorophyll content of two cultivars

in a bearing orchard for experiment one and one cultivar in a non-bearing orchard in experiment two. In 2011 two treatments were established for experiment one in the bearing orchard of Western and Wichita cultivars consisting of a control (0%) and a high application rate of 3% Mn. Four treatments were established in experiment two of the non-bearing Pawnee cultivar, each with a specific Mn rate: Control (0%), Low (.75%), Medium (1.5%), and High (3.0%). Photosynthetic rates, chlorophyll content, and leaf nutrient analyses were collected at regular intervals throughout the study to detect any differences among or between treatments. A significant increase in photosynthesis was only detected in the medium rate treatment, suggesting a more defined application rate and leaf nutrient level target of 150 parts per million Mn in pecan growing in the Mesilla Valley.

Narinder Singh & Christopher S. Cramer; Plant and Environmental Sciences, New Mexico State University

Progress for reduced Iris Yellow Spot disease symptom expression in onions

Thrips and Iris yellow spot virus (IYSV) are two major pests of onion, worldwide. No onion cultivar has been reported to show any resistance to these pathogens. In the summer of 2009, plants with fewer Iris yellow spot (IYS) disease symptoms were selected and the resulting progeny were evaluated in the summer of 2012. These selected lines were compared with their respective original population to see if any progress for reduced IYS symptom expression had been made. Data on the number of thrips per plant (adults plus juveniles) and IYS disease severity symptoms were collected from 10 plants per plant. For IYS severity ratings, a scale of 0 to 4 was used, where 0 indicated no symptoms and 4 represented more than 50% of leaf tissue was necrotic. Data recording for thrips count started on 9th week for 3 dates on 3 weeks interval and ratings for severity started on 12th week for four dates with 2 weeks interval. NMSU 10-577-1 and NMSU 10-582-1 exhibited less severe IYS disease symptoms when compared to their original populations, PI 172702 and PI 172703 on 4th and 3rd rating, respectively. NMSU 10-575-1 also showed an improvement in 18th week. NMSU 10-575-1 exhibited fewer thrips per plant at 15th week when compared to its original population, PI 172702, even though reduced thrips number per plant was not selected for originally. These breeding lines selected by NMSU onion breeding program selected for their tolerance to IYS disease suggesting that the progress towards this virus tolerance can be made.

Sukhbir Singh, K. Grover, S.B. Begna and S.V. Angadi; Plant and Environmental Sciences, New Mexico State University

Response of Spring Safflower Genotypes to water Stress in semi-arid New Mexico

Water stress is the most important environmental stress limiting crop yield and quality in the arid and semi-arid regions of New Mexico. In this region, rainfall is low and unpredictable and irrigation resources are declining due to over exploitation of the aquifer. Identifying crops that can grow well with limited water will help sustaining agriculture in the region. Safflower is a deep rooted, stress tolerant crop that originated in desert environment and could be well adapted to the semi-arid irrigated agriculture of New Mexico. The objective of the project was to assess drought physiology and yield formation of two diverse spring safflower genotypes with or without water extraction from deep root system. Half of experimental blocks were pre-irrigated with 6.5 inches of water to fill the empty profile from previous crop of corn, while other half remained empty. The results of physiological parameters such as water potential, photosynthetic activity and relativewater content will be discussed. The results of agronomic observations such as plant height, number of pods per plant, number of seeds per pod, seed weight and seed yield will also be presented.

Elizabeth Arleen Smith; Plant and Environmental Sciences, New Mexico State University

Climatic Controls on a Municipal Dust Control

The City of Las Cruces, New Mexico, is working on a stricter dust control ordinance than that currently in place that targets new and existing construction sites. Disturbed soil at construction sites are frequently the cause of enhanced wind erosion containing blowing sand as well as finer particles in the size range of PM10 that have the potential to trigger asthma attacks in some individuals. These soil particles have also shown to carry fungi and bacteria that also potentially contribute to adverse respiratory health effects. This project enhances our knowledge of dust control in an arid environment and provides options for economical dust control solutions for the City and developers. Three plot sites have been established in the Las Cruces area where each plot consists of a six 30 meters

x 15 meter test sections. Using available dust suppressant and management products on the market, the intention is to find the suppressant effectiveness and cost effectiveness of each treatment. The treatments being tested are two organics (pecan mulch and glycerin from a biofuel processing plant), wind barrier fence, chemical suppressants (Top Seal and Dirt Glue^{TM}). Sand movement is monitored with Big Spring Number Eight sand traps within each test section. We also monitor precipitation, winds, temperature and humidity at each plot to assess wind erosion responses to environmental conditions throughout the study. This poster provides preliminary results of this study over the course of three seasons.

Nilusha Maduwanthi Sudasinghe; Chemistry and Biochemisty, New Mexico State University

Compositional Description of Nannochloropsis salina Hydrothermal Liquefaction Products and Water Soluble Compounds by Direct Infusion FT-ICR Mass Spectrometry

We report a detailed compositional characterization of four hydrothermal liquefaction (HTL) products of Nannochloropsis salina by ultra-high resolution Fourier-Transform Ion Cyclotron Resonance mass spectrometry (FT-ICR MS). The liquefaction products separate into bio-crude oil, water-soluble fraction, solid residue, and gaseous fraction. Here, we provide a compositional comparison for organic compounds observed in HTL bio-crude and aqueous fraction. We also compare HTL products for N. salina harvested in the early growth phase and that harvested in the early stationary phase. Ultra high mass resolving power of FT-ICR-MS enables observation of several thousand peaks in each mass spectrum and sub-part-per-million mass accuracy combined with Kendrick mass sorting facilitates the assignment of unique elemental compositions to each peak in the spectrum. Compounds are grouped by heteroatom class, type (number of rings plus double bonds to carbon) and carbon number. Among the ∼100 unique heteroatom classes detected in the HTL products, the predominant classes are O2, O4, N1, N1O1, N1O3, N2, N2O1, N2O2, N3 and N3O1. Compounds identified in the bio-crude oil and aqueous fraction on the negative ion mode contain high amount of free fatty acids. The aqueous fraction contains high relative abundances of highly-oxygenated compounds, especially O5-O9 compounds. Carbon number distributions and three-dimensional mass spectral images show that bio-crude oil contains higher aromaticity, higher carbon number compounds compared to the aqueous fraction. Although there is a ∼7% difference in total FAME content between the high and low lipid HTL oils, the observed composition of the two products is quite similar.

Veena Unnithan; Biology, New Mexico State University

Recovery and persistence of MS2 virus spiked to Nannochloropsis salina grown in wastewater

Nannochloropsis salina is a species of marine algae with relatively high lipid content that is considered for biofuel production. Wastewater may be a good source of nutrients for biofuel algae; however they can have complex microbial consortia including enteric viruses that may pose human health risks. Standard risk protocols assess virus viability by host specific plaque assays that assume viral particles to be uniformly distributed in the sample. Complex charged and hydrophobic loci on algal cells may affect this assumption. We verified the likelihood for algal cells to modify the partitioning of viruses between planktonic and attached compartments and the role of algal cells on virus persistence employing MS2 bacteriophages as surrogate for enteric viruses. Instantaneous MS2 partitioning tests were done for aged algae of variable physiological states, grown either in algal growth medium or wastewater. Co-incubation tests were carried out to estimate viral viability during algal growth. For both tests viable or total MS2 were estimated by standard double agar layer assay or quantitative PCR (qRT PCR). Little instantaneous partitioning occurred, with most of MS2 remaining in the planktonic compartment. During co-incubation, viability of MS2 was drastically reduced within 8 hours although Real- Time PCR indicated presence of MS2 RNA up to 312 hours of incubation. Partitioning of viral particles between planktonic phase and retention on algae varied with the age of the algal culture. Presence of algae, as well as presence of wastewater organic compounds, enhanced recoverability of viable or total MS2. This proposed method will help understand the role of the presence of the algal cells on the recovery of spiked MS2 virus in a system.

Laura Valentino, Beth Renick, Janine Weitzell, & Cindy Kratzke; Public Health Sciences, New Mexico State University

Caregivers and Stress: Evaluation of Caregiver Stress Websites and Implications for Usability

Approximately 29% of U.S. adults provide informal care for a loved one who is ill, disabled, or elderly. Many family caregivers are also elderly and may be in poor to fair health themselves according to the Administration on Aging. Caregivers are likely to seek online caregiving tips on stress in order to find information in a timely manner. They are likely to seek help to alleviate their own stress related to caregiving responsibilities. The National Institute on Aging (NIA) and the National Library of Medicine (NLM) created an evaluation tool which health professionals can use to determine the appropriateness of websites for older adults. Objective: The purpose of this study is to evaluate websites designed for caregiving and stress that target caregivers. Methods: Ten websites were selected using Google as a search engine. The search words used were caregiving and stress. Research suggests most people start with a search engine to find online information. The ten websites were evaluated using the 25-item NIA/NLM evaluation tool. Each website was scored for specific items in the areas of readability, presentation, incorporation of other media, and navigation categories. Results: Usability scores ranged from 16 to 23 with a mean score of 19.7 (SD=2.11). While there is no optimal score that is agreed upon by experts, previous research has shown that to be considered older adult-friendly at least 70% of guidelines must be met. Only 3 out of the 10 websites were deemed to fit those guidelines. Conclusions: Within the sampled websites used in this study, there are a wide range of NIA/NLM evaluation scores indicating that some caregiver support websites may not be adequately meeting the needs of caregivers. Further research may provide information to develop strategies to improve website usability for caregivers.

Ben Wright, Ferdinando Fioretto, Gholamali Rhanavard, Ping Hou, Khoi Nguyen, Reza Tourani, & Tiep Le; Computer Science, New Mexico State University

Cross-Research Collaboration towards Machine Learning

Started from a desire to bridge a gap between research groups in the Computer Science Department, we began an investigation into the research topic of Machine Learning (ML). As such an area bridges research interests of many participants, yet no classes have a focus in it, we began a joint Literature Survey group to begin learning through a quick overview of ML. By splitting up the work and presenting our findings to the group we quickly moved onto various applications of ML that were of interest to individuals in the group. Overall, the group was quite active and enjoyed the weekly presentations. Towards the end of the literature survey, a number of members expressed a desire to move towards more project-based, or application specific, research. This was reinforced by the fact that ML is a very wide and diverse area of research. As such, this spring will see members work towards specific projects dealing with ML closer to their own fields of research, such as data mining, natural language processing, or software monitoring.

Cat Wu; Astronomy, New Mexico State University

The Mystery of Spiral Galaxies: Ionized Gas Velocities from Multi-Slit Spectroscopy for Nearby, Edge-on Galaxies

Spiral galaxies are known for their spiral arms filled with stars. But these galaxies also have a fainter component made of gas and dust that creates a huge sphere around the spiral arms. It's called a 'halo,' and no one knows where all the material comes from – Supernovae? Other galaxies? Outer space? Studying how fast halo material orbits within a galaxy and comparing it to how fast stars in the spiral arms orbit around the galaxy's center can shed light on where the halo comes from and has implications for how galaxies evolve.