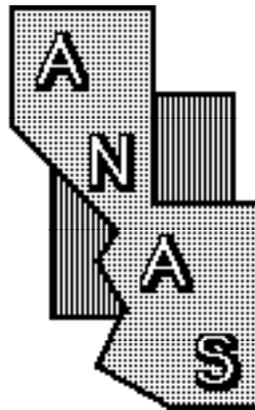


2008

Volume 43

**PROCEEDINGS
ARIZONA-NEVADA
ACADEMY OF SCIENCE**



FIFTY SECOND ANNUAL MEETING

March 29, 2008

**Southwestern University
Phoenix, Arizona
2007-2008 Annual Reports**

**March 29, 2008
Southwestern University
Phoenix, Arizona**

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ABBREVIATED SCHEDULE AND ACTIVITY LOCATIONS

Friday, March 28

The Board of Governors will meet Friday, March 28, from 6:30 - 8:30 PM
Mountain Vista Club of Vistancia Village, 29701 N. Sunrise Point, Peoria, AZ

Saturday, March 29

All section meetings on Saturday will take place on the campus of Southwestern University, 2625 E. Cactus Road, Phoenix, AZ

7:00-8:30 am	Registration: Student Activity Center lobby
8:00 - 10:00	Paper Sessions: Student Activity Center Classrooms A101, A210, A211, A212, A213, A220 and A221.
10:00 - 10:30	Coffee Break and Poster Session: Student Activity Center Gym
10:30 - 11:30	Paper Sessions: Student Activity Center Classrooms A101, A210, A211, A212, A213, A220 and A221 .
11:30 - 1:40	Annual ANAS Awards Luncheon and Annual Business Meeting: Cafeteria
1:00 - 3:00	Paper Sessions: Student Activity Center Classrooms A101, A210, A211, A212, A213, A220 and A221.
3:00 - 3:30	Coffee Break: Student Activity Center lobby
3:30 - 5:30	Paper Sessions: Student Activity Center Classrooms A101, A210, A211, A212, A213, A220 and A221 .

SUMMARY OF SECTION MEETINGS

Section	Session	Time	Room
Biology/Geology / Psychology	I	8:35	A210
Chemistry	I	9:15	A211
Geography	I	8:00	A212
	II	1:45	
Hydrology	I	8:00	A213
Poster Session		10:00	

All rooms are in the Student Activity Center.

LUNCHEON SPEAKER

LISA SHENDER, DVM

Wildlife Disease Specialist, Arizona State Game And Fish

"CHRONIC WASTING DISEASE – FATAL PRION DISEASE"

Lisa Shender obtained her Doctor of Veterinary Medicine from the University of California, Davis. Prior to that, she received a Masters degree in Wildlife Sciences from Humboldt State University in Northern California. She has worked for the Research Branch of the Arizona Game and Fish Department since August 2004, where she runs the wildlife health program.

Her primary duties include the chronic wasting disease and avian influenza surveillance programs, providing assistance in game animal translocations, performing necropsies, and a variety of other related responsibilities.

BIOLOGY/ GEOLOGY/ PSYCHOLOGY/ SESSION

SESSION I 8:35

ROOM: A210

Chairpersons: Robert Bowker, Robert McCord, Mende Davis

8:35-8:55

THE IMPACT OF PINYON MORTALITY ON GROUND-DWELLING ARTHROPODS

Robert Delph, Neil Cobb (Northern Arizona University, Flagstaff, AZ), Paulette Ford (University of New Mexico, Albuquerque, NM)

Drought has severe negative affects on plants and their associated arthropod communities. Aerial surveys and ground studies have shown regional death of pinyons, thus demonstrating landscape-scale changes in canopy volume and understory vegetation. In this study we documented the impacts of drought-induced mortality of pinyon pine (*Pinus edulis*) on ground-dwelling arthropod dynamics of the Middle Rio Grande Basin, New Mexico. Our major objectives were to determine if there were differences in species composition, richness and abundance of ground dwelling-arthropods associated with environments experiencing high or low pinyon mortality. Pitfall traps were used to quantify ground-dwelling arthropod dynamics in response to pinyon die-off. We predicted significant impacts on arthropod community dynamics due to the increased complexity of micro-habitats from both standing and fallen trees. Analysis of arthropod community composition between high and low pinyon mortality environments showed significant differences, including 25% of the individual taxa being indicators of high or low pinyon mortality. Experimental plots with and without woody debris quantified the effect of fallen woody debris on ground-dwelling arthropod dynamics. Thus both observational and experimental plots showed that arthropods can be highly responsive to disturbance events that lead to even moderate changes in the environment.

8:55-9:25

EXOPALEONTOLOGY: EXPLORING FOR A FOSSIL RECORD ON OTHER PLANETS IN OUR SOLAR SYSTEM

Jack Farmer (School of Earth & Space Exploration, Arizona State University, Tempe, AZ)

In exploring for a record of ancient biospheres on other planets, understanding of the factors that control microbial fossilization is crucial. We especially need to understand how preservation varies between different groups of microorganisms, over extremes of the physical and biological environment and how diagenetic (post-depositional) changes affect the long-term retention of microbial biosignatures in ancient sedimentary deposits, including cryopreservation in ices. Such “taphonomic” studies enable us to define rules of preservation that can be used to optimize our exploration strategies (missions and

instruments) to search for biosignatures of life preserved in the ancient sedimentary deposits of other planets. In this talk I will review taphonomic modes of some common chemical sedimentary environments on Earth (hydrothermal, evaporative lake, mineralizing soils and periglacial systems) and discuss implications for planning future missions to Mars and outer Solar System icy moons.

9:25-9:45

NEW DISCOVERIES FROM THE ?CENOMANIAN TURNEY RANCH FORMATION, SOUTHEASTERN ARIZONA

Robert D. McCord (Arizona Museum of Natural History, Mesa, AZ)

The Turney Ranch Formation consists of sandstones and mudstones deposited in a coastal alluvial plain of the Bisbee Basin of likely Cenomanian Age. Previous vertebrate fossils are limited to fragmentary remains and the ?Brachiosaur *Sonorasaurus*. Recent discoveries in the formation revealed a heretofore unsuspected wealth of vertebrate fossil remains at multiple stratigraphic intervals and in differing lithologies. Dinosaurs represent several taxa and sizes with some associated material. A turtle pleural fragment possesses a faint and well-worn sculpture reminiscent of a pleurosternid or perhaps a trionychid. These discoveries suggest that the Turney Ranch Formation may be the most productive terrestrial fossil fauna in Arizona and among the most productive Cenomanian faunas in North America.

10:00 – 10:30 COFFEE BREAK/POSTER SESSION: GYM

10:30-10:50

RADON DANGERS, DETECTION AND MITIGATION IN PALEONTOLOGY LAB SITUATIONS

Gavin McCullough (Arizona Museum of Natural History, Mesa, AZ)

Radon is a colorless, odorless radioactive gas that occurs as a product of radium or uranium decay. In recent years, radon has been identified as a serious health hazard in residential and industrial environments. The EPA estimates that about 20,000 lung cancer deaths are radon-related. Radon poses a risk of lung cancer to non-smokers, and a far greater risk of lung cancer to smokers. Paleontologists working in areas bearing radioactive fossils, such as the Morrison Formation of the western interior, have been aware of radon issues for some time, and have dealt with it accordingly. Recently the AZNMH tested its paleontology laboratory and storage vaults for radon, and discovered that Pliocene fossils collected from southeastern Arizona are sources of elevated radon levels (above 4 pCi/L, the EPA “action level”), prompting us to take immediate action. We employed simple dust control measures, 24-hour active ventilation, and increased passive ventilation during work hours. Our radon levels have steadily dropped at a rate of 0.10 pCi/L per week since taking these steps. In addition, we are scheduled to receive an industrial-grade ventilation system as part of a safety upgrade allowance. Radon detection is inexpensive and mitigation is not complicated, but health effects due to radon exposure can be severe. We recommend radon testing for laboratory and industrial situations that work with fossils, rocks, or create mineral dust as part of their work.

10:50-11:05

CHARACTERISTICS OF OSTEOPATHIC TREATMENT FOR CHILDREN WITH CEREBRAL PALSY

Diane Clawson, Melinda F. Davis, Katherine A. Worden, and the CAM Cerebral Palsy Study group (University of Arizona, Tucson, AZ)

Clinical trials in osteopathic medicine rarely collect empirical data about osteopathic techniques and treatment regions. We report on detailed treatment data that were collected as part of a pilot study of osteopathic medicine for children with spastic cerebral palsy. Treatment data were available for 24 children, who received up to 10 sessions during a six month period. The children ranged in age from 2 to 12, with a wide range of functioning (average Gross Motor Function Measure = .45; SD =.35). This presentation will focus on similarities and differences in osteopathic techniques and treated regions. The results from these descriptive analyses demonstrate the utility of empirical measures in osteopathy, and also identify areas for further development.

11:05-11:20

ATTENTION DEFICIT DISORDER: METHODS AND MEASURES

Cameron Davis (University of Arizona, Tucson, AZ)

This presentation will examine the characteristics of common measures that are used to diagnose Attention Deficit Disorder (ADD). Tests and rating scales used to assess ADD were identified in a literature review and categorized by type of method. Most of the measures were self-report or other-report, and were oral or written. The results of this study may suggest other approaches that can be used to identify ADD.

11:20-11:35

PREDICTING SUCCESS IN GRADUATE SCHOOL

Melinda F. Davis (University of Arizona, Tucson, AZ)

Who succeeds in graduate school? Who succeeds after graduation? How do we measure “success”? Grades and standardized test scores such as the GRE predict *some* of student success in graduate school. However, minimum admission standards limit differences at enrollment, and the majority of variance in student success is unexplained. The evaluation of the NSF-funded VIGRE program in the Departments of Mathematics and Applied Mathematics at the University of Arizona provides an opportunity to examine these questions using archival data. This presentation demonstrates the use of Rasch modeling procedures to construct a measure of academic and professional success in mathematics, and illustrates its use in an outcome evaluation. The methods used in this evaluation can be easily adapted by other institutions to guide admissions decisions.

11:35 – 1:40 LUNCHEON: CAFETERIA

CHEMISTRY SESSION

SESSION I 9:15

ROOM: A211

Chairperson: Timothy Vail

9:15 – 9:30

***POSSIBLE ENVIRONMENTAL EXPOSURES OF URANIUM FROM SHEEP**

Lydia A. Edgewater and Jani. C. Ingram, (Northern Arizona University, Flagstaff, AZ)

During the 1940 – 1970's, uranium mining took place on the Navajo Reservation, resulting in hundreds of abandoned mines and areas of mine waste. The issue with past mine activities continues to be a problem for the people who live near the abandoned mines on the Navajo Reservation. A suspected pathway of uranium exposure to the Navajo is through their food supply, specifically from mutton, a traditional food eaten by the Navajo people. In the Summer of 2006, we worked with a Navajo family who provided our research group with aged sheep which had grazed on the abandoned mines near Cameron, AZ for most of its life. We are working with this family to analyze the organs and tissues of the sheep to determine if uranium accumulation is present. A focus of the recent work on this project has been to develop extraction procedures for uranium analysis. These extracts are then analyzed for elemental uranium using inductively coupled plasma mass spectrometry. The information learned from these studies will be reported back to the affected Chapters. Finally, we recently have been in contact with a family living in the Cameron Chapter who are raising sheep that graze on and around the uranium mines.

9:30 – 9:45

***CONCENTRATIONS OF PAH and PM 2.5 IN WOOD SMOKE FROM PRESCRIBED BURNINGS**

Lillian Portz and Marin Robinson (Northern Arizona University, Flagstaff, AZ)

PAHs (polyaromatic hydrocarbons), are known carcinogens and fine particulate (PM 2.5 – particulate matter measuring 2.5 microns or less in diameter) are both associated with serious health effects. Repeated exposure to these components of wood smoke can lead to health problems and early mortality. Firefighters are at high risk due to overexposure from work conditions. Wood smokes from prescribed fires on the Arizona Apache Indian Reservation were collected on both ignition and smoldering fires during the 2006/2007 burn periods on Teflon and quartz filters through a MetOne E-BAM monitor. Samples were analyzed for PAH and PM 2.5 levels to better understand if a correlation between high concentrations and firefighter respiratory health existed. Examination of original field data showed overall low concentration levels of PAHs and PM 2.5. It was

concluded that due to atmospheric dilution and proximity, firefighters are not at high risks from inhalation.

9:45 – 10:00

***TEACHING GENERAL CHEMISTRY USING FIELD-BASED LEARNING**

Beatriz I. Estrada and Jani C. Ingram (Northern Arizona University, Flagstaff, AZ)

This project should encourage students to investigate environmental chemistry issues of importance to their communities. A change in curriculum was piloted in a 2nd semester general chemistry class during the fall 2007 semester. The goal of the project was to collect baseline water chemistry information of these waters to utilize if and when the Snow Bowl begins using reclaim water to make snow for the ski resort. These results will be useful to the environmental impact evaluation. The students were surveyed before and after the course. Additionally, the final exam scores for pilot course were compared to the final exam scores for students taking the traditional 2nd semester lab course. The reported data show a clear relationship of how a relevant, research-like laboratory experience for young students taking freshmen chemistry has an impact on their outlook on chemistry and/or scientific career paths.

10:00 – 10:30

COFFEE BREAK/POSTER SESSION: GYM

11:30 – 1:40

LUNCHEON: CAFETERIA

GEOGRAPHY SESSION

SESSION I 8:00

ROOM: A212

Co-Chairpersons: Dr. Soe Myint, Dr. Elizabeth Wentz and Dr. Steve Yool

8:00-8:15

APPLICABILITY OF SPECTRORADIOMETRIC DATA IN DISCERNING VEGETATION WITHIN AN URBAN ENVIRONMENT

Elizabeth A. Ridder (Arizona State University, Tempe, AZ)

Spectral signatures were collected from the foliage of sixteen species of plants in December 2007 using a portable spectroradiometer that collects spectral signatures over the range of 220 to 1050 nanometers. The purpose of these measurements was to determine if enough variation exists in these spectral signatures to differentiate between various plant species within an urban environment. The reflectance data were plotted and predictive discriminant function analysis (PDA) was utilized to classify the vegetation based on their spectral responses. Examination of the plotted reflectance data revealed that interspecies variation did not always exceed intraspecies variation, indicating these data are not sufficiently distinctive for species classification. PDA was effective, however, at distinguishing between species when all species were evaluated together, with an accuracy of 75% and a Kappa coefficient of 0.73.

8:30-8:45

PREDICTING AIR TEMPERATURE THROUGH REMOTELY SENSED DATA

Donna A. Hartz (Arizona State University, Tempe, AZ)

Phoenix, Arizona, a city that has experienced explosive growth during the past 50 years, also has a significant urban heat island (UHI) which is warmer air temperatures measured in the city as compared to the surrounding rural area. The UHI which can be upwards of 10°F a few hours after sunset is created by the heat retention of the city's complex, heterogeneous urban fabric. Additionally, metropolitan Phoenix has considerable air temperature variability at a neighborhood scale, where temperatures can vary upwards of 8°F in short distances. Air temperature measurement is reliant upon widely spaced weather stations which do not adequately register this neighborhood variability. Measuring or estimating air temperatures throughout this complex urban environment at the neighborhood scale is difficult at best. Using satellite remotely sensed images this study, undertaken in 2006, presents measured neighborhood characteristics (landcover, vegetation and surface temperature) and compares them to air temperatures from 10 widely dispersed weather stations in metropolitan Phoenix, Arizona as a first step towards creating a model which can better estimate air temperatures at a neighborhood scale.

8:45-9:00

**GEOSPATIAL MODELING OF SUBTLE LAND COVER CHANGES:
OVERVIEW AND OUTLOOK**

Michaela Buenemann (University of Arizona, Tucson, AZ)

Subtle land cover changes such as desertification or woody plant encroachment pose significant challenges to natural resource management. Despite their likely value in helping devise smart management strategies, however, the capabilities of geospatial approaches have only been partially explored. This paper provides a brief overview of published work to substantiate this claim. The paper then outlines an integrative GIS, remote sensing, and spatial modeling approach for quantifying the spatio-temporal dynamics of woody plant encroachment in a semiarid watershed. It also presents results from this approach, including multi-temporal maps of woody plant abundances, woody plant encroachment vulnerability maps, and an illustrated summary of factors influencing the process. The paper concludes by discussing some of the requirements for more realistic, comprehensive, dynamic, nonlinear, and hierarchical spatio-temporal models of subtle land cover changes, including the following: more research on human and natural drivers, controls and hurdles of land cover change; consideration of various spatial and temporal scales; improvement of existing models and development of new ones; agreement regarding data and techniques standards; and increased multi-disciplinary collaboration.

9:00-9:15

**GEOVISUALIZING INTERANNUAL VARIATION OF LIVE FUEL MOISTURES
IN SOUTHERN ARIZONA**

Stephen R. Yool (University of Arizona, Tucson, AZ)

Wildfire activity grew suddenly in the mid-1980s. Large-wildfire frequencies have increased, fires burn longer, and wildfire seasons last longer. Largest increases in fire activity occurred in mid-elevation, Northern Rockies forests, where land-use histories have little effect on fire risks and are associated with the earlier arrival of warm temperatures associated spring snowmelt and fuel curing. Such changes control the annual cycle of live fuel moistures. Live fuel moistures for the 18 years for each of three 'sky island' sites in southern Arizona were plotted against climate variables, enabling visualization of spatiotemporal patterns of fire season fuel moisture stress/curing from 1989 to 2006 within and across these regions. Fire seasons began earlier and lasted longer at lower elevations. Fire seasons began later and were shorter at higher elevations. Fire seasons in anthropocentric landscapes were found to be highly variable. Characterized fire seasons linked to climate variables in FMS/climate grids for the three Southern Arizona sites show strong relationships to current year climate conditions, but also a clear link to the past. Viewed together, the fire season summaries for these three sites provide a powerful visual representation of fire season fuel moisture stress over the last two decades. Such maps could enable spatially explicit investigation of interactions by fuel type between climate change, earlier curing, and effects of interannual time lags on fuel moisture status.

9:15-9:30

A LOW COST IMAGING SYSTEM FOR AUTONOMOUS DATA COLLECTION

Grant Fraley and Christopher Lippitt (San Diego State University, San Diego, CA)

High spatial resolution remote sensing data provide detailed information on landscape conditions and support tasks ranging from map updating to disaster management. However, costs associated with the tasked collection of high spatial resolution remote sensing data limit its accessibility. These costs are of particular concern for public mapping agencies and emergency services. A micro unmanned aerial vehicle called the low cost unmanned imaging system (LOUIS) was developed to improve access to current and high spatial resolution aerial imagery. The LOUIS system is based on hobbyist remote control airplane technology and fits within a guitar sized portable case. An onboard flight computer that incorporates both a global positioning system and inertial measurement unit provides automated flight and camera triggering capabilities to the system. A Bayer array true color sensor collects 1-5 cm spatial resolution frames. This manuscript outlines the operational flight and imaging characteristics of the LOUIS platform and demonstrates two autonomous data collection scenarios: (1) map updating and (2) post disaster damage assessment.

9:30-9:45

HEALTH AND WATER AFFECTS IN A NATIVE COMMUNITY

Tommy Rock and Dr. Jani Ingram (Northern Arizona University, Flagstaff, AZ)

The purpose of this study is to find out how the Navajo communities surrounding the abandoned uranium mines are impacted. A pathway of exposure from these abandoned uranium mines includes their water resources, which they depend on for consumption, livestock, and irrigation. In many areas the residents have no running water and must haul water from unregulated wells. Our research team has collected water samples from nine water sources in various places in the region. One well has been found to have uranium concentrations approximately four times the E.P.A drinking water standard. Another is almost two times the drinking standard and a third is at the standard. The other wells are below the standard. We are surveying the communities to determine where they get their water, how they use it, and the frequency that they haul. Before asking any survey questions, we ask for the community members consent to participate in our study. If they agree to participate, we not only administer the survey, but we also collect G.P.S data to determine the location of their house with respect to the wells. The purpose of collecting location information is so we can plot the area from high impact to the least impact. We are using Garmin Legend Cx G.P.S to get their coordinates when we get consent from the household. Once we get the coordinates, we plot them on the map using ArcGIS 9.2. The results will be shared with Navajo Nation.

9:45-10:00

A PRELIMINARY ASSESSMENT OF REMOTELY SENSED VEGETATION PHENOLOGY FOR DETECTING SEMIARID SPATIO-TEMPORAL LANDSCAPE CHANGE PATTERNS

Jahan Kariyeva and Willem J.D. van Leeuwen (University of Arizona, Tucson, AZ)

Landscapes of arid and semiarid ecosystems are exposed to extreme and complex climatic variations, which results in distinctive vegetation and land cover change patterns.

The study of vegetation phenology is important for understanding and predicting ecosystem's response and vulnerability to disturbances caused by changing climate conditions. The goal of the study is to develop a methodology to analyze and quantify dynamics in phenological characteristics for such semiarid landscapes as Wupatki National Park areas and areas adjacent to the park. It is hypothesized that phenological dynamics of changing and disturbed landscapes will differ from landscapes that remain relatively unchanged under similar drought conditions, i.e. earlier start and later end of growing season. Vegetation phenology can be detected by means of remotely sensed data by exploiting the spectral characteristics of canopy density and plant structure. Because each vegetation type follows unique but fairly predictable phenological patterns that are associated with specific land cover types, sensor based data is capable of measuring landscape-scale vegetation dynamics that are descriptive of ecosystem conditions.

Remotely sensed time-series vegetation greenness data such as Normalized Difference Vegetation Index (NDVI) are used to characterize spatio-temporal patterns in vegetation phenology. To analyze spatial patterns of landscape we propose to examine such landscape metrics as spatial extent, composition, and fragmentation of vegetation cover. Satellite based phenological metrics such as vegetation greenness onset, senescence, magnitude, and timing of growing seasons are proposed to quantify temporal patterns and will be related to precipitation and vegetation classification data to explore the causes and extent of the phenological changes. The phenological characterization of semiarid landscapes will be critical for understanding vegetation response to droughts.

10:00-10:30 COFFEE BREAK/POSTER SESSION: GYM

10:30-10:45

A CENTURY OF SPATIOTEMPORAL DYNAMICS OF PINYON-JUNIPER WOODLANDS: INVASION, DROUGHT, AND DIE-OFF

Michael J. Clifford and Neil S. Cobb (Merriam-Powell Center for Environmental Research and Northern Arizona University, Flagstaff, AZ), Paulette L. Ford (University of New Mexico, USDA Forest Service Rocky Mountain Research Station, Albuquerque, NM)

Pinyon-juniper woodlands have expanded throughout the American Southwest since EuroAmerican settlement. This expansion has been documented in both, extent of

woodlands and stand densification. In the mid-1990s a decade-long drought began in the Southwest. In 2002, this severe drought caused a bark beetle outbreak, killing between 20-90% of pinyons throughout the region. To document spatiotemporal dynamics of woodlands we used remotely sensed data, obtaining maps and high resolution aerial photos from 1883, 1936, and 2004. The 2004 image was multispectral; therefore we were able to determine pre-drought and post-drought stand conditions. We also used field data to validate remotely sensed data and document mortality in Arizona and New Mexico. Pinyon mortality averaged 48% and 62% for Arizona and New Mexico, respectively, but several gradients of mortality were observed. Remote sensing data indicate a similar pattern of mortality with canopy cover. Our results show canopy cover increased 2-fold from the 1880s until the drought of 2002. From 1936 to 2002, woodland expansion occurred drastically in areas with lower canopy (<10%) cover, but areas of high cover (>20%) remained relatively stable during this period. During the recent drought, tree die-off reduced canopy cover to pre-EuroAmerican levels, indicating these climate change type droughts have the ability to quickly alter woodland structure.

10:45-11:00

THE INFLUENCE OF TOPOGRAPHY ON HABITAT AREA ESTIMATES

Duane Jay Haselfeld (Psomas, Costa Mesa, CA)

Estimates of habitat area have wide application in ecology and natural resources management. Area is a common normalization variable used in estimates of biological productivity, ecological carrying capacity, and carbon budgets. Area is also the legal unit of measurement used to quantify the amount of protected or critical habitat present for the purpose of permitting, impact analysis, and mitigation. In practice, habitat area is generally measured as a planimetric area taken from an established base map. In reality, the planimetric area is a non-linear approximation of the actual surface area occupied by a given habitat, since the planimetric area represents a projection of the actual surface topography onto a plane surface (i.e., the map sheet). The purpose of this paper is to quantify the magnitude of error that can arise from using the traditional planimetric method of habitat area estimation. A simple equation is derived that illustrates the relationship between planimetric areas and true “topographic” areas as function of surface slope. We then review a comparative analysis of habitat area estimates and slope from a forest in southern California. Results indicate that habitat area estimates based on planimetric areas consistently underestimate true habitat areas by 5-65%.

11:00-11:15

MULTI-HAZARDS DEMONSTRATION PROJECT (MHDP): MAPPING VEGETATION TYPE CONVERSION IN SOUTHERN CALIFORNIA

Cynthia S.A. Wallace (Southwest Geographic Science Team, USGS, Tucson AZ)

Jon Keeley (Western Ecological Research Center, USGS, Three Rivers CA)

The USGS Multi-Hazards Demonstration Project (MHDP) brings together multiple disciplines and partners to help communities in southern California reduce potential

severe impacts from natural hazards. The goal of the USGS activities is to provide an understanding of the relationships between human actions and environmental vulnerabilities to aid in making informed decisions about possible risk-reduction activities. As a part of the wildfire and debris flow hazards assessment for the southern California MHDP, this research characterizes the impact of past management activities on loss of native plant communities and replacement by functionally different non-native plant assemblages. We use satellite data to regionally map occurrences of alien-invasive grasses and forbs in the chaparral communities of Southern California. MODIS satellite data coupled with field observations are used to extract and compare the phenological signatures of landscapes dominated by alien-invasive grasses and forbs to landscapes dominated by native chaparral vegetation. Based on the distinctive phenologies of the two vegetation types, we select an optimal suite of Landsat images with finer spatial resolution to discriminate between the types and model their current regional distribution. Using historical Landsat data, we plan to extrapolate these results both temporally and spatially to compile a record of vegetation-conversion change across the southern California region back to the 1970's.

11:15-11:30: MEET THE AUTHORS—A discussion of morning papers

11:30-1:40 LUNCHEON: CAFETERIA

SESSION II

1:45-2:00

IDENTIFYING TORNADO DAMAGED AREAS USING AN OBJECT-ORIENTED APPROACH AND CHANGE DETECTION TECHNIQUES

Soe Myint (Arizona State University, Tempe, AZ)

Remote sensing techniques have been shown effective for large-scale damage surveys after a hazardous event in both near real-time or post-event analyses. The paper aims to compare accuracy of common imaging processing techniques to detect tornado damage tracks from Landsat TM data. We employed the direct change detection approach using two sets of images acquired before and after the tornado event to produce a principal component composite images and a set of image difference bands. Techniques in the comparison include supervised classification, unsupervised classification, and object-oriented classification approach with a nearest neighbor classifier. Accuracy assessment is based on Kappa coefficient calculated from error matrices which cross tabulate correctly identified cells on the TM image and commission and omission errors in the result. Overall, the Object-oriented Approach exhibits the highest degree of accuracy in tornado damage detection. PCA and Image Differencing methods show comparable outcomes. While selected PCs can improve detection accuracy 5 to 10%, the Object-

oriented Approach performs significantly better with 15-20% higher accuracy than the other two techniques.

2:00-2:15

SOIL SALINITY DETECTION USING REMOTELY SENSED IMAGERY: A CASE STUDY OF LAND DEGRADATION IN THE MEXICALI VALLEY MEXICO

Gabriel L Judkins (Arizona State University, Tempe, AZ)

The degradation of irrigated lands through the process of soil salinization, or the buildup of salts in the soil, has hampered recent increases in agricultural productivity and threatens the sustainability of large-scale cultivation in critical agricultural regions of the world. Rapid detection of soil salinity on a regional basis has been identified as key for effective mitigation of such land degradation, and various remote sensing techniques have been attempted over the last twenty years to accurately detect and map soil salinity on a regional basis. However, the results have been mixed as difficulties in detecting salinity has led to the development of complex and expensive remote sensing techniques with varying levels of accuracy. A case study of soil salinization affecting agricultural lands in the Mexicali Valley of Baja California, Mexico was selected due to the region's agricultural significance for export fresh winter produce. Soil salinity is mapped using field data collected concurrently with Landsat Thematic Mapper 5 imagery and regression analysis to produce a model of salinity with a high degree of sensitivity to minor variations. Low levels of salinity were detected throughout the study area with several clusters of elevated salinity also mapped. While soil salinity was generally low, the potential for agricultural impacts remains of concern due to the sensitivity of crops cultivated in this region. This research demonstrates the ability to accurately detect soil salinity on a regional basis when field data collection techniques are employed in conjunction with remotely sensed imagery.

2:15-2:30

URBAN RESIDENTIAL MOSAIC: RACIAL RESIDENTIAL AND SOCIO-ECONOMIC PATTERNS IN PHOENIX METROPOLITAN AREA

Min Jo Kang and Won Kyung Kim (Arizona State University, Tempe, AZ)

Residential segregation describes the distribution of different groups across units within large area, and it is a persistent feature of urban life. The purpose of this research is to analyze the spatial patterns of residential segregation in Phoenix metropolitan area and to examine the relationship between residential segregation and income level. This paper presents a GIS-based approach to measuring residential segregation by scale such as census tract and census block. Significant clustering of residential segregation was discernible from mapping the racial and ethnic variables. The spatial patterns of residential segregation would vary depending on household's income level. The use of local spatial statistics is essential for identifying and evaluating the spatial clustering of residential segregation.

2:30-2:45

AIR PHOTO INTERPRETATION AND INFORMATION TECHNOLOGY FOR INDIAN SETTLEMENT RESEARCH

Noel Ring (Private Consultant, Retired Geographer), Ken Goss (Former General Manager, (AeroGraphics Corporation) and Elaina Hyde. (Astronomer, University of Amsterdam)

Land development often threatens in both rural and urban America to destroy remaining traces of Indian settlement features ranging from roadways and canals in the Southwest to stone star maps and observatories in the Northeast. Usually best discerned on historic aerial mapping photography, detection of relict patterns requires careful attention to basic API techniques, ground truth surveys, comparative land use analyses, and historical research. Internet access to USGS EROS Data Center imagery, high resolution commercial satellite data, pattern analysis software, and GIS systems now allow rapid high tech applications. Among problems impeding progress on finding and analyzing prehistoric Indian landscapes are geographic constraints of remote locations in the Southwest, e.g. Pueblo Bonita and Mesa Verde, reforestation in the Northeast, and both geologic and climate conditions everywhere. Additionally, API courses have virtually vanished from the American college curriculum. Politics and old paradigms inhibit scientific research when when state archaeologists claim that all stone structures in New England are of colonial origin or Indians are reluctant to discuss the character of sacred sites. While well-funded research on Meso and South American science and engineering continues, e.g. Olmec, Mayan, Nazca and Incan achievements, North American Indian cultures merit equal attention before theirs are obliterated. "Back to basics" API and new IT can help.

2:45-3:00

EARLY DETECTION OF SINKHOLES USING INSAR

Jagadeesh Chirumamilla and Chris Lukinbeal (Arizona State University, Tempe, AZ), Brian R. Sovik, GISP (AMEC, Tempe, AZ) and Bibhuti Panda (AMEC, Tempe, AZ)

Through the application of InSAR (Interferometric Synthetic Aperture Radar), images were processed for predicting sinkholes. Research on the named sinkhole, "Winksink #2" located near the cities of Kermit and Wink, Texas are the focus of this study. Winksink #2 was formed in June 2002 and Winksink #1 was formed in March 1992. Formation of these two sinkholes took place during a short time span. Through InSAR data, the changes in surface elevation at Winksink #2 was reviewed and analyzed prior to its collapse at the surface. The technology for the study used Interferometric images (Interferograms) generated using radar images obtained from the satellites of European Space Agency (ESA) and European Remote Sensing Satellites (ERS 1 and ERS 2) over a period of nine calendar years starting from 1992 through 2000.

3:00-3:30 MEET THE AUTHORS—Afternoon Papers Discussion

COFFEE BREAK AND ADJOURNMENT: LOBBY

HYDROLOGY SESSION

SESSION I 8:00

ROOM: A213

Chairperson: Boris Poff

8:00-8:15

LONG-TERM CHANGES IN MAGNITUDES AND TIMING OF PEAK SNOWPACK ACCUMULATIONS ON ARIZONA WATERSHEDS: A PRELIMINARY ASSESSMENT

Peter F. Ffolliott (University of Arizona, Tucson, AZ)

Field observations and predictions obtained from computer simulators indicate that the magnitudes and timing of peak snowpack accumulations in the western states are changing, with the magnitudes (snowpack water equivalents) less and timing earlier in the snowmelt-runoff season. These changes have often been attributed to changes in global climate. Because snowmelt-runoff is a major source of streamflows from Arizona watersheds, a study of the long-term magnitudes and timing of peak snowpack accumulations has been initiated. Data sets representing measurements from the network of snow courses maintain by the Natural Resources Conservation Service (formerly the Soil Conservation Service) and their cooperators provide the analytical basis for this study. These data sets represent almost 70 years of snowpack measurements and, therefore, are the longest continuous record of snowpack conditions on Arizona's watersheds. A preliminary assessment confirms the findings of some of the earlier investigations of long-term snowpack changes, that is, the magnitudes of peak snowpack accumulation are declining and the peaks are occurring earlier.

8:15-8:30

CLIMATE CHANGE IMPACTS ON MUNICIPAL AND AGRICULTURAL WATER SUPPLY IN CHILE

Daniel G. Neary (USDA Forest Service, Flagstaff, AZ), Pablo Garcia- Chevesich (Santo Tomas University, Santiago, Chile)

Agricultural and municipal water supply interests in Chile rely heavily on streams which flow from the Andes Mountains. The highly productive Copiapo agricultural region, on the southern edge of the Atacama Desert, is a major supplier of fruit and other crops for the Northern American market during winter. This region relies entirely on snow and ice-melt streams to provide irrigation water. Santiago, the Chilean capitol, is the country's major metropolitan area with a population of 5.5 million. Rainfall that averages 420 mm/year is twice that of Phoenix. However, Santiago is very similar to Phoenix in that it has a rapidly expanding population and it relies on water supplies derived from

surrounding or more distant mountain ranges. Recent changes in the climate in South America are resulting in decreased snowpacks and glacier volumes in the Andes Mountains. This paper discusses the current water supply situation in Chile in light of its growing demand for water and declines in supply due to climate change.

8:30-8:45

CHARACTERISTICS AND BEHAVIOR OF A COOL-SEASON PRESCRIBED FIRE IN THE OAK SAVANNAS OF THE SOUTHWESTERN BORDERLANDS

Karen A. Koestner (USDA Forest Service, Flagstaff, AZ), Daniel G. Neary (USDA Forest Service, Flagstaff, AZ), Gerald J. Gottfried, (USDA Forest Service, Phoenix, AZ), Ruben A. Morales (USDA Forest Service, Douglas, AZ)

Oak-savannas comprise over 80,000 km² in the mountains and high valleys of the southwestern United States and northern Mexico. However, there is relatively little scientific data to aid in the management of this broad ecotype. Fire, which was once the most important natural disturbance in this system, has been excluded due to over-grazing and fire suppression practices. This has resulted in ecosystem changes and fuel accumulations. Prescribed fire is one management technique to restore natural processes within southwestern oak-savannas by reducing woody species density, increasing herbaceous plant production, and creating vegetative mosaics on the landscape. However, questions concerning the seasonality of burn treatments and the overall effects of these treatments on physical and ecological processes need to be addressed prior to broad management application. The Cascabel Watershed Study is a collaborative interdisciplinary study to determine the effects of cool-season and warm-season prescribed burning on a southwestern oak-savanna ecosystem. Twelve small watersheds in the Peloncillo Mountains of southwestern New Mexico have been monitored for seven years to provide adequate hydrologic calibration data prior to seasonal prescribed burning treatment application. These watersheds are grouped in four replicated blocks, each consisting of a cool-season treatment, a warm-season treatment and a control watershed. This paper will discuss the characteristics and behavior of the cool-season burn treatment, summarizing burn intensity and severity estimates.

8:45-9:00

HOW USEFUL IS LIDAR IN ESTABLISHING A STREAM GAUGING NETWORK IN A TROPICAL EXPERIMENTAL FOREST

Boris Poff (Rocky Mountain Research Station, Flagstaff, AZ), Daniel G. Neary (USDA Forest Service, Flagstaff, AZ), and Gregory P. Asner (Carnegie Institution, Stanford, CA)

The Hawaii Experimental Tropical Forest- Laupahoehoe Unit (HETF) on the Isle of Hawaii was formally established on state land on March 23, 2007. Research in the HETF will focus on tropical forestry, hydrology, conservation biology, invasive species control, native forest restoration and ecology, and sustainable commercial timber practices, along with education, training, outreach and preservation of cultural values. In the summer of

2007 the Carnegie Airborne Observatory (CAO) was used to provide LiDAR data for the HETF. While the data will be used for a great variety of purposes, this presentation focuses on the data's usefulness to establish a stream gauging network. The Southwest Watershed Science team of the US Forest Service's Rocky Mountain Research Station, in collaboration with the Institute for Pacific Island Forestry, of the Pacific Southwestern Research Station, conducted stream field work in the HETF to collect baseline data for future research. While the LiDAR data were useful in identifying major geomorphic features, such as waterfalls and side channels, ground and GPS work was still deemed essential in the collection of baseline watershed data.

9:00-9:15

SOUTH-TO-NORTH WATER DIVERSION PROJECT IN CHINA

Hui Chen and Peter F. Ffolliott (University of Arizona, Tucson, AZ)

The South-to-North Water Diversion Project is the largest water project in the world. It was initially proposed in 1952 and the main construction was started in 2002, after 50 years of study and inventory. It is expected that the project will be completed in 2050 with an approximate investment of 486 billion yuans (7 yuans = \$US1 dollar). The South-to-North Water Diversion Project will not only relieve severe water shortages in northern China, but, importantly, it will control water resources by establishing a strategic water distribution and security network of the Yangtze River, Huaihe River, Yellow River, and Haihe River. The project consists of three routes - Western Route, Middle Route, and Eastern Route - diverting water from upstream, middle-stream and downstream of Yangtze River. Total water transfer is expected to be approximately 44.8 billion m³ per year by 2050, with 17.0 billion m³, 13.0 billion m³ and 14.8 billion m³ in Western Route, Middle Route and Eastern Route, respectively.

9:15-9:30

MODIS VEGETATION METRICS AS INDICATORS OF HYDROLOGICAL RESPONSE IN WATERSHEDS OF CALIFORNIA MEDITERRANEAN-TYPE CLIMATE ZONES

Dillon T. Fitch, Douglas Stow, Allen Hope (San Diego State University, San Diego, CA)

Vegetation characteristics of a watershed are important in determining hydrological response. Quantifying the relationship between vegetation and hydrological response has the potential to aid in the prediction of runoff. The utility of Moderate Resolution Imaging Spectroradiometer (MODIS) satellite data to estimate hydrological response variables at the watershed scale is tested in this study. Using statistical regression models an exploratory analysis was conducted to quantify the relationship between MODIS spectral vegetation indices and hydrological response variables. Both ordinary least squares and spatial varying parameter models were used. Results show that moderate linear relationships exist between many vegetation metrics and evapotranspiration. Through the spatial expansion method, results indicate that the inclusion of spatial-varying parameters strengthens the relationship between spectral vegetation indices and

hydrological response variables. Results also indicate a weakening of this vegetative-hydrological response relationship as a consequence of increasing aridity of the environment (i.e., water limitation). This suggests that the control on the evaporation process in this study area by soil moisture is greater than by vegetation.

9:30-9:45

WATERSHED MANAGEMENT PROGRAMS ON NATIONAL FORESTS IN 2008 COMPARED TO 1978

Robert E. LeFevre (USDA Forest Service, Tucson, AZ)

10:00-10:30 COFFEE BREAK/POSTER SESSION: GYM

10:30:10:50

HYDROLOGY AND EROSION IMPACTS OF MINING DERIVED COASTAL SAND DUNES, CHANARAL BAY, CHILE

Daniel G. Neary (USDA Forest Service, Flagstaff, AZ), Pablo Garcia- Chevesich (Santo Tomas University, Santiago, Chile)

Nearly 12 km² of contaminated sand dunes, located in the Bay of Chañaral, Chile, are the result of about 15 years of mining operations that released contaminated sediments to the bay. Even though the sediment release no longer occurs, the coastal winds transport the heavy metals attached to the sand grains over the town of Chañaral. This area is arid desert, with no more than 10 mm/year of precipitation. Between 1938 and 1990, more than 300 million Mg of highly contaminated residual sediments were deposited in the Pacific Ocean. The chemical analyses of the sediments have shown high contents of copper, iron, arsenic, zinc, cyanide, lead, aluminum, mercury, molybdenum, and other heavy metals. These toxic metals inside the sediments have avoided the establishment of almost any leaving been. As a consequence of the exposure to the toxic dust produced by the coastal winds, there has been a high incidence of skin, lung, and eye problems, as well as a high incidence of cancer tumors among Chañaral's population. Even though there have been some attempts at stabilizing the contaminated sand dunes, none have succeeded. The most practical solution appears to be stabilize of the sand dunes with multiple row tree shelterbelts next to the town of Chañaral. This paper examines the hydrologic processes which formed the sand deposits and the potential remediation program.

10:50-11:10

TRANSPIRATION OF EMORY OAK TREES IN THE SAVANNAS OF THE SOUTHWESTERN BORDERLANDS REGION

Peter F. Ffolliott, Cody L. Stropki, and Aaron T. Kauffman (University of Arizona, Tucson, AZ)

Transpiration of Emory oak trees on the Cascabel watersheds in the savannas on the eastern slope of the Peloncillo Mountains in southwestern New Mexico has been estimated by the sap-flow method. Parenthetically, Emory oak is considered to be a

“proxy” for the other oak species on the watersheds, namely Arizona white and Toumey oak. Knowledge of transpiration is important to developing a more complete water budget for this ecosystem. While the transpiration rates of individual trees are similar, initial results indicate that there are significant differences in the transpiration of oak trees in the savannas and more dense woodlands of the region. Transpiration in the oak savannas approaches one-half of that in the oak woodlands with the difference attributed to the respective differences in tree densities.

11:10-11:30

INTERNATIONAL CO-OPERATIVE PROGRAM ON ASSESSMENT AND MONITORING OF AIR POLLUTION EFFECTS ON FORESTS – SIERRA ANCHA EXPERIMENTAL FOREST, ARIZONA

Boris Poff (Rocky Mountain Research Station, Flagstaff, AZ) and Daniel G. Neary (USDA Forest Service, Flagstaff, AZ)

The International Co-operative Program on Assessment and Monitoring of Air Pollution Effects on Forests (ICP) was launched in 1985 under the Convention on Long-range Transboundary Air Pollution of the United Nations Economic Commission for Europe (UNECE) due to the growing public awareness of possible adverse effects of air pollution on forests. ICP Forests monitors the forest condition in Europe, in cooperation with the European Union using two different monitoring intensity levels. The first grid (called Level I) is based on around 6000 observation plots on a systematic transnational grid of 16 x 16 km throughout Europe. The intensive monitoring level comprises around 800 Level II plots in selected forest ecosystems in Europe. Currently 41 countries participate in the ICP Forests. In 2007 the US Forest Service has chosen to set up a synthesis network of 18 sites throughout the US with an ICP Level II platform at each site. Each site will include a NADP weather station, UV Radiation Monitors and Ozone Sensors. The Sierra Ancha EF was chosen to be part of this network, because it is the most southern EF in the contiguous US and because it is downwind from one of the nation’s largest metropolitan areas – Phoenix, Arizona.

11:30-1:40

LUNCHEON: CAFETERIA

POSTER SESSION

SESSION 10:00 – 10:30

ROOM: GYM

Chairperson: Erik Gergus

ROLE OF NON-NEURONAL NICOTINIC RECEPTORS IN ANGIOGENESIS

David Ng, Vanique Le and Hugo R. Arias (Midwestern University, Glendale, AZ), Sarah S. Mousa (Princeton University, Princeton, NJ) and Shaker A. Mousa (Albany College of Pharmacy, Albany, NY)

Nicotine is known as the addictive component in cigarette smoking. New evidence indicates that nicotine also has pro-angiogenic activity. This research is focused on the role of non-neuronal nicotinic receptors (AChRs) on angiogenesis in human umbilical vein endothelial cells (HUVECs) and in the chick chorioallantoic membrane (CAM) model. The results indicate that nicotine increased: (1) both vascularization and endothelial cell tube formation in a concentration-dependent manner similar to that for the fibroblast growth factor (FGF-2). Several specific cholinergic agonists (i.e., epibatidine, cytisine, and benzyldene-anabaseine analogs) also induced vascularization in the CAM model; and (2) breast, colon, and lung cancer growth rate. The results also indicate that the nicotine pro-angiogenic effect was inhibited by FGF-2 and $\alpha_v\beta_3$ integrin antibodies, the MAP kinase (ERK 1/2) inhibitor PD98059, cholinergic noncompetitive antagonists such as mecamylamine and ibogaine, and several $\alpha 7$ AChR agonists, suggesting the mediation of the FGF-2 receptor, $\alpha_v\beta_3$ integrin, and $\alpha 7$ AChRs in this process. This demonstrates the potential risk of nicotine exposure for cancer development.

***CHARACTERIZATION OF ANTIDEPRESSANT BINDING SITES ON THE NICOTINIC ACETYLCHOLINE RECEPTOR**

Carl J. Sullivan, Matt Crundsen, and Hugo R. Arias (Midwestern University, Glendale, AZ)

This work is an attempt to identify antidepressant (AD) binding sites on the *Torpedo* nicotinic acetylcholine receptor (AChR). We used [³H]doxepin Scatchard-plots, [³H]TCP competition binding and Schild-type analysis, AD-induced [³H]cytisine binding modulation, and molecular modeling. Our results indicate that the AChR has one [³H]doxepin binding site and that AD affinity for the [³H]TCP site in the desensitized

state follows the sequence: imipramine = amitriptyline > milnacipran > doxepin > fluoxetine > bupropion > reboxetine > paroxetine > nefazodone > hyperforin. AD binding trends differ in the resting state. Schild-analysis suggests that ADs interact sterically with the TCP site. [³H]Cytisine binding was enhanced by ADs when the AChR is in the resting but activatable state; and imipramine interacts with a domain formed between the valine and serine rings from the ion channel. Binding and modeling results indicate that the AD binding site overlaps the TCP locus in the middle of the desensitized AChR ion channel, and that ADs may inhibit AChR function due to an increase in receptor desensitization.

INTERACTION OF NOVEL IBOGAINE ANALOGS WITH THE HUMAN $\alpha 3\beta 4$ NICOTINIC RECEPTOR

B. Coleman, S. Sarrami, and H.R. Arias (Midwestern University, Glendale, AZ), D. Feuerbach (Novartis Institutes for BioMedical Research, Switzerland), and H-J. Borschberg (Swiss Federal Institute of Technology, Switzerland)

This work is an attempt to characterize the binding site and the inhibitory activity of ibogaine analogs on the human $\alpha 3\beta 4$ nicotinic acetylcholine receptor ($\alpha 3\beta 4$). In this regard, we used [³H]ibogaine equilibrium binding and Scatchard-plots, [³H]ibogaine and [³H]epibatidine competition binding, and ibogaine-induced inhibition of Ca²⁺ influx approaches. The results indicate that: (1) there is one high-affinity binding site for [³H]ibogaine, (2) ibogaine inhibits the $\alpha 3\beta 4$ with higher potency than that for the $\alpha 1\beta 2\gamma\delta$ AChR, (3) ibogaine interacts with different conformations of the $\alpha 3\beta 4$ with the indicated affinity (or potency) sequence: Desensitized > Resting > Open, (4) [³H]ibogaine competition experiments indicate that ibogaine and 18-MAC, among ibogaine analogs, and imipramine and dextromethorphan, among other known noncompetitive antagonists, have the highest affinities for the $\alpha 3\beta 4$ ion channel, and (5) [³H]epibatidine competition experiments indicate that ibogaine analogs interact with the agonist sites with very low affinities. Interaction of 18-MAC with the $\alpha 3\beta 4$ ion channel could be important for its anti-addictive property.

THE TAHITIAN BUTTERFLYFISH: A BAY SPECIALIST AND TERRITORIAL OMNIVORE

Joshua Copus (Northern Arizona University, Flagstaff, AZ), Robert H. Reavis (Glendale Community College, Glendale, AZ), and Stephen Shuster (Northern Arizona University, Flagstaff, AZ)

Butterflyfish (Family Chaetodontidae) are easily observed and well studied members of coral-reef communities. Their behavior and ecology have been cited to support models of speciation, territoriality and mating system theory. However, most studies of butterflyfish have focused on obligate corallivores. To further test these models, we investigated the behavior and ecology of the endemic Tahitian butterflyfish, *Chaetodon trichrous*. First, we determined the distribution of this fish around Moorea Island, French Polynesia where

it was a dominant Chaetodon species in two bays of Moorea, but not seen in other habitats. The turbidity of these waters might explain the relatively drab coloration of C. trichrous. Second, we tested the hypothesis that determinations of 'territoriality' may depend on the duration of observations made on butterflyfish. We were unable to determine territoriality in our first (short) season of observations. However, territorial behavior was confirmed after additional observation. Finally, we observed that C. trichrous feeds on benthic and planktonic organisms, not coral, yet most adults were found in pairs. Our preliminary research suggests C. trichrous could also mate monogamously.

***ANTIMICROBIAL ACTIVITY OF NATURAL PLANT EXTRACTS AGAINST FIVE BACTERIAL SPECIES**

Robert W. Gamboe, Becky Ogbaudu, Rosemary Reyes, Pedro Chavez (Midwestern University, Glendale, AZ) and William P. Baker (Southwestern College, Phoenix, AZ)

In vitro antibacterial activity of herbal products commonly used by the Mexican-American community was analyzed in this study. Traditional uses for these herbal products include general tonics and over-the-counter medications used to treat specific conditions or diseases. The present study examined the antibacterial activity of 76 herbal products using the disk diffusion method as part of the process of understanding the chemistry, toxicity and efficacy of these plant products. Ethanol extracts of the herbs were examined using a standard antimicrobial disk diffusion method. Extracts were tested against both Gram positive (*Bacillus subtilis*, *Micrococcus luteus*, and *Staphylococcus aureus*) and Gram negative (*E. coli* and *Pseudomonas aeruginosa*) bacteria. Pilot study data with herbal products from Phoenix resulted in 4 plants being active against *Staphylococcus aureus* and one active against *Pseudomonas aeruginosa* out of the 38 plants tested. These results served to validate our procedures and indicate the need for the present study. Implications of these results for bioactivity and drug discovery potential of herbal products are discussed. This study serves as basis for further research on these herbs.

BAF53a PROTEIN LEVELS CONTRIBUTE TO CELL MOTILITY

C. Wills and E. Hull (Midwestern University, Glendale, AZ)

The BAF53a gene codes for an actin binding protein that has a series of diverse roles within the cell. Our focus is on BAF53a role in cell locomotion. Animals that are homozygous for an insertion mutation in the BAF53a gene are embryonic lethal. Although heterozygous animals develop into apparently healthy adults, the migration of keratocytes from these animals is dramatically different than wild-type animals. Preliminary data from our lab suggests that individual keratocytes from heterozygote animals can not extend a stable lamella which results in a dramatic reduction in cell migration. To verify that this observed phenotype is due to decreased expression levels of the BAF53a protein, we have quantitated the relative amounts of this protein in cell

lysates from wild type and heterozygote animals. This data supports the hypothesis that the observed phenotype is due, at least in part, to the decreased levels of the BAF53a protein in heterozygote animals.

GLOBAL WARMING REDUCES THE OPPORTUNITY FOR SEXUAL SELECTION AND ELIMINATES FEMALE MIMICRY IN A MARINE ISOPOD

Samantha Dorr, Carina Hall, Corinne Santella, Ryan Paulk, Joshua Copus, Kelcey Mead and Stephen Shuster (Northern Arizona University, Flagstaff, AZ)

The effects of global warming on sea surface temperature, as well as on the breeding systems of coastal marine species, are poorly-known. We show that over a 20 year period, maximum sea surface temperature in the Gulf of California has increased, and during this period, the breeding system of the marine isopod, *Paracerceis sculpta*, has changed. In *P. sculpta*, 3 genetically distinct male morphs coexist; α -males are largest and defend harems within calcareous sponges using elongated posterior appendages; β -males invade harems by mimicking female behavior and morphology; tiny γ -males invade harems by stealth; females are monomorphic. Mating system theory predicts that as average harem size (H) increases, sexual selection intensifies, and alternative mating strategies will more readily invade populations. We examined these relationships in monthly samples of isopods collected 16 years apart (1983-85 and 2000-01). In 1983-85, these predictions were met. However, by 2000-01, increasing sea temperature appears to have decreased the availability of calcareous sponges. Maximum harem sizes also decreased, and female mimics (β -males), which specialize on large harems, disappeared entirely. Our results show how environmental change can change the intensity of sexual selection and thereby change a species' mating system. As global warming continues such changes could become widespread.

DETERMINING COMPENSATORY MECHANISMS FOR LOSS OF VACUOLAR FUNCTION IN *SACCHAROMYCES CEREVISIAE*

Nick S. Netzel, Jillian L. Wisby, and Pamela A. Marshall. (Arizona State University West Campus, Glendale, AZ)

Cells must have specific ways to transport biological molecules. In humans, there are many DNA mutations that lead to malfunctions in these cellular transport processes and to disease states. We use the model organism, the yeast *Saccharomyces cerevisiae*. Yeast is easy to grow and can yield important insights into human disease for a fraction of the cost. We are studying mutations in cellular transport processes in this yeast that will advance understanding of protein transport in humans. The human lysosome and the equivalent vacuole of *S. cerevisiae* are the cellular waste deposit and recycling centers. When the human lysosome malfunctions it leads to many different diseases, including Tay Sachs disease, Krabbe disease, and cancer. A large group of mutants in *Saccharomyces cerevisiae* that have malfunctioning vacuoles has been isolated; however,

in the laboratory, these cell strains can grow very well. Our hypothesis is that changes in gene expression (mRNA and protein levels) compensate for the loss of vacuolar function in these mutants. We are using microarray technology to determine the changes in gene expression that allow mutant strains lacking vacuole function to thrive in the lab. Thus far we have analyzed *vps33* and *vps41* and find that they have several upregulated genes in common. These include YLR243w, an essential gene that has been identified as associating with actin binding proteins, four of genes involved in responses to stress, and two genes regulating mitochondrial topoisomerase. We are continuing to study the compensatory mechanisms of yeast without vacuole function and plan to next study compensation in response to a pulse of calcium, as the main site of calcium storage in yeast is the vacuole.

AUTHORITARIANISM, GENDER, AND POLITICAL ATTITUDES

Steven Funk (Northern Arizona University, Flagstaff, AZ)

I administered online surveys of right wing authoritarianism (RWA) and left wing authoritarianism (LWA) to undergraduate psychology students to determine which of many “hot button” issues were linked to political extremism. I found a number of issues that created opposing responses from each of the two political extremes. Women and men differed significantly in their attitudes in a number of key issue areas: aggressive acts and policies, perceptions of the US government and its role in world affairs, race relations, and conflict between the sexes. When data from women and men was examined separately, there were a number of issues (crime and punishment, race relations) on which RWA women’s average responses leaned in the direction of men’s attitudes, distinguishing themselves from the attitudes of other women. Conversely, on several different issues (perceptions of the US government, relations between the sexes) LWA men’s average responses tended more towards those of women than those of other men. It appeared that in both cases the political attitudes of RWA women and LWA men participants tended to be cross-gendered.

***LACK OF FOOD ALLERGY EDUCATIONAL MATERIALS CONTRIBUTES TO PARENTS’ REPORTED STRESS AND ANXIETY IN MANAGING THEIR CHILDREN’S FOOD ALLERGIES**

Maureen Keaveny and Perla A. Vargas (Arizona State University West, Phoenix, AZ), Stacie M. Jones, Lynn Christie, Debra Watkins and Suzanne Carlisle (University of Arkansas for Medical Sciences & Arkansas Children’s Hospital, Little Rock, AR), Sally Noone, Marion Groetch and Scott Sicherer (Mount Sinai School of Medicine, New York, NY)

Parents of children with food allergies face challenges in acquiring reliable, and accessible educational information on food allergy (FA) management. Focus groups were undertaken to identify educational needs of parents of children with FA. Sessions were evaluated to identify educational needs and preferences (reported elsewhere) and ongoing emotional concerns (reported here) regarding educational materials. Participants

were 36 parents (89% mothers) of children with FA recruited through the allergy clinic and/or support groups at two academic centers. Parents were managing FA for 1-19 years (median =5.25). An unsolicited concern expressed spontaneously at all 4 focus groups, and discussed as an important problem by multiple participants in each group, was that their lack of reliable information about FA seriously hindered their ability to manage food allergies, and was a major source of stress/anxiety. Parents often sought educational information from non-medical sources such as the Internet and support groups, which was also stressful both for difficult access and for uncertainty about reliability. These potentially inadequate resources were also accessed to search for ways to cope with stress. An additional reported source of stress/anxiety was the lack of educational resources for parents to use to educate other caretakers. Parents report stress and anxiety because of lack of easily accessible and reliable educational materials on FA; improving access to clear and concise educational materials would likely reduce stress/anxiety and improve parents' quality of life.

ASSAYING ANALOGUES OF BEXAROTENE TO DETERMINE MUTAGENICITY AND TOXICITY

Belinda V. Miguel, Mark E. Graeber, Jeng Eun Sarah Kwon, Erik Matro, Ivy T. Tran, Jamie N. Tedeschi, Peter Jurutka, Carl Wagner and Pamela A. Marshall. (Arizona State University West Campus, Phoenix, AZ)

Bexarotene (Targretin®) is a drug used to treat cutaneous T-cell lymphoma (CTL), as well as off label to treat other types of cancer. Bexarotene acts as a retinoid X receptor (RXR) agonist that facilitates the formation of an RXR homodimer that then binds to RXR response elements and modulates gene expression and leads to inhibition of cell proliferation. Bexarotene is an excellent remedy for CTL, but this drug also causes hypothyroidism with high frequency, presumably because it binds to RXR and RXR forms heterodimers with the thyroid hormone receptor. Thus, we are interested in synthesizing analogues of bexarotene that are specific only for the RXR homodimer. The purpose of this study was to determine the mutagenicity and toxicity of analogues of bexarotene using a *Saccharomyces cerevisiae* assay. This strain of yeast is genetically engineered to change phenotypes in response to certain mutations, in a similar manner to the bacterial Ames test. Bexarotene and eight analogues were tested individually. Four of the eight compounds evaluated were determined to be toxic but not mutagenic. Bexarotene itself and the remaining four compounds were neither toxic nor mutagenic. After testing these analogues and determining if they are toxic or mutagenic, we will next determine if these compounds bind more specifically to the RXR homodimer than bexarotene itself by employing an RXR: RXR-dependent transcription assay as well as RXR heterodimer specific assays.

INTERACTION OF IBOGAINE ANALOGS WITH THE NICOTINIC ACETYLCHOLINE RECEPTOR

Mary E. Ghafoori and Hugo R. Arias (Midwestern University, Glendale, AZ), Krzysztof Jozwiak and Irving W. Wainer (NIA-NIH, Baltimore, MD)

This work is an attempt to characterize the binding sites for ibogaine analogs on the nicotinic acetylcholine receptor (nAChR). We will use [³H]18-methoxycoronaridine ([³H]18-MC) Scatchard-plots, [³H]TCP competition binding experiments and Schild-type analysis, analog-induced binding modulation of the agonist [³H]cytisine, and molecular modeling of the AChR - 18-MC interactions. The results indicate that there is one high-affinity binding site for [³H]18-MC in the desensitized nAChR; the affinity of each 18-MC congener for the [³H]TCP locus in the desensitized state follows the sequence: 18-MC > 2-methoxyethyl-18-MC ~ 18-methylaminocoronaridine > (+)coronaridine ~ albifloranine > ibogaine, whereas, the affinity sequence in the resting state is slightly different. Schild-type analysis suggests that 18-MC interacts with the TCP site in a steric manner; [³H]cytisine binding is enhanced by the 18-MC congeners when the nAChR is in the resting but activatable state, but not in the desensitized state; and 18-MC interacts with a domain formed between the valine (position 13') and leucine (position 9') rings. Binding and modeling results indicate that the 18-MC binding site overlaps the TCP locus located in the middle of the desensitized ion channel, and that ibogaine congeners may inhibit the nAChR by inducing desensitization.

FUN1 DYE TARGETING TO THE YEAST VACUOLE IS MEDIATED BY AN UNKNOWN PROTEIN THAT TRANSITS FROM THE GOLGI TO THE PVC AND RECYCLES BACK TO THE GOLGI

B.D. Essary, M.D.Eggleston, and P.A. Marshall (Arizona State University West Campus, Phoenix, AZ)

FUN-1[2-chloro-4-(2,3-dihydro-3-methyl-(benzo-1,3-thiazol-2-yl)-methylidene)-1-phenylquinolinium iodide] is a fluorescent dye used in studies of yeast and other fungi in the research lab to monitor cell viability and in the clinical setting to assay for active fungal infection. When the plasma membrane is intact, the cells internalize the dye and it is seen as diffuse green cytosolic fluorescence. FUN-1 is transported to the vacuole in metabolically active cells and then is compacted into fluorescent red and orange cylindrical intravacuolar structures (CIVS) by an unknown transport pathway. In *Saccharomyces cerevisiae*, many single gene mutants have been identified that have phenotypes of aberrant protein sorting to the vacuole (called vacuolar protein sorting or *vps* mutants). We have been studying the formation of CIVS in *vps* mutant strains of *S. cerevisiae* to determine the mechanism of FUN-1 import into the vacuole. We find that null mutants of genes coding for proteins involved in both vesicle-mediated transport from the Golgi to the pre-vacuolar compartment (PVC) (*vps8*, *vps9*, *vps45*, *pep12*, and *vac1*) as well as in the retrograde transport from the PVC back to the Golgi (*vps5*, *vps26*, *vps35*, *vps45*, *vps51*, *vps53*, and *vps54*) all have substantially inhibited CIVS formation.

We hypothesize that there is an unknown protein or receptor required for FUN1 transport to the vacuole, which is cycling from the Golgi to the PVC and back. Thus, blocking this transport cycle, as seen in the mutants, inhibits the correct localization of the protein and hinders CIV formation.

***ELUCIDATION OF NOVEL VITAMIN D RECEPTOR INTERACTING PROTEINS: IMPLICATIONS FOR HUMAN DISEASE**

Tim A. Widener, Pamela A. Marshall and Peter W. Jurutka (Arizona State University West Campus, Phoenix, AZ)

The nuclear vitamin D receptor (VDR) mediates the actions of 1,25-dihydroxyvitamin D₃ (1,25D) to alter gene transcription in several target tissues including intestine, bone, and more recently, heart. Specific comodulator proteins can alter the rate of transcription of downstream genes in these tissues through molecular interactions with VDR, or through associated cofactors in the promoter region. Such activators or repressors can have important clinical implications if the nature of the transcriptional effect is understood. We utilized a yeast two hybrid system to identify novel proteins that interact with VDR (VIPs). A human expression library (prey) and VDR (bait) vectors were transformed into competent yeast cells. Molecular interactions between VDR and expressed human proteins enable growth of yeast cells that contain lesions in specific metabolic pathways by inducing transcription of necessary genes to synthesize histidine. A total of 45 putative VIP clones were identified, of which 18 were selected after further quantitation via a beta-galactosidase assay, eliminating potential false positives and weak interactors. These qualified yeast clones were processed to purify the prey vectors which were then cloned using bacterial transformation, furthering amplification and purification, followed by DNA sequencing. Sequences were compared with the human genome through bioinformatics tools to identify the VDR associated proteins, as well as their physiological role and their potential for dysregulation in disease. Further analysis of these proteins will be performed through human cell culture models and biochemical assays to evaluate the nature and relevance to VDR-mediated transcriptional signaling and their prospective role in human disease.

***EVALUATION OF PROLYL OLIGOPEPTIDASE ACTIVITY IN NORMAL AND MELANOMA SKIN TISSUE: DEVELOPMENT OF AN ASSAY TO ASSESS CLINICAL EFFICACY OF A NOVEL CHEMOTHERAPEUTIC**

Wasiq Zaidi, Milen V. Vitanov, Charles E. Deutch and Peter Jurutka (Arizona State University West Campus, Phoenix, AZ)

The purpose of this study was to determine the levels of prolyl oligopeptidase (POP) enzyme activity in normal and tumor human skin tissue samples. Genzyme Pharmaceuticals has developed a drug, ILX-651, which functions to inhibit tubulin interaction thereby attenuating cancer cell proliferation. ILX-651 undergoes enzymatic conversion, catalyzed by the POP enzyme, to a potent metabolite (M1) with higher

affinity for tubulin. Therefore, elevated levels of POP activity could result in more efficient conversion of ILX-651 to M1, and a predicted higher clinical efficacy of ILX-651 in certain tumors. In order to evaluate cellular POP activity, we created a reliable fluorimetric assay system using a synthetic POP substrate called Z-Gly-Pro-AMC. We tested normal skin tissue samples from 7 patients, and tumor skin tissue samples from 9 patients employing this assay. We found that the POP activity of normal human skin tissue ranged from 1.46 pmol/min/ μg to 2.48 pmol/min/ μg , while the POP activity of the skin tumors ranged from 3.86 pmol/min/ μg to 10.39 pmol/min/ μg . There was a greater variability in POP activity observed in the tumor skin tissue as compared to normal skin. Interestingly, metastasized tumors exhibited even higher POP activity than non-metastasized samples. There was also a statistically significant difference in the mean POP activity between tumor and normal skin tissue. Therefore, our results reveal that tumor tissue, especially metastasized samples, exhibit higher POP activity than normal samples. This novel observation suggests that ILX-651 may be more active in tumor versus normal tissue, and thus may serve as an effective chemotherapeutic.

***VITAMIN D AND APC MODULATE MOLECULAR CROSSTALK BETWEEN β -CATENIN/WNT SIGNALING AND THE VITAMIN D RECEPTOR IN COLON CANCER CELLS**

J. Egan, P.Thompson, E. Jacobs, M. Vitanov, M.R. Haussler, E. Gerner and P.W. Jurutka (University of Arizona, Tucson, AZ and Arizona State University, Phoenix, AZ)

Vitamin D is implicated as a protective factor in human colon carcinogenesis due to the anti-tumor activity of $1,25(\text{OH})_2\text{D}_3$, the active hormonal metabolite of vitamin D, on colonocytes. We sought to confirm that VDR associates physically with β -catenin, which regulates critical Wnt signaling events in colon tumorigenesis. We assessed the role of the intact and mutant adenomatous polyposis coli (APC) gene, commonly dysregulated in human colon cancers, as a modulator of the VDR/ β -catenin interaction. Glutathione-S-transferase (GST) pulldown assays utilizing an in-vitro transcription/translation system to produce β -catenin protein support an interaction between β -catenin and VDR that appears independent of $1,25(\text{OH})_2\text{D}_3$. Evaluation of this interaction in human cell culture using a mammalian two hybrid system in transfected HT29-APC, a cell line which allows inducible wild-type APC protein, suggests that APC positively influences the interaction between β -catenin and VDR, particularly in the presence of $1,25(\text{OH})_2\text{D}_3$. To determine the functional significance of VDR and $1,25(\text{OH})_2\text{D}_3$ on the transcriptional activity of β -catenin, a TOPflash assay was performed in HT-29 cells which revealed that β -catenin activity is significantly reduced in the presence, but not in the absence, of $1,25(\text{OH})_2\text{D}_3$. Our results support a functional VDR and β -catenin interaction that is stimulated by $1,25(\text{OH})_2\text{D}_3$ and that appears to be further enhanced in the presence of intact APC. Overall, the data suggest an APC/VDR binary or ternary complex with β -catenin resulting in a putative functional attenuation of β -catenin activity. This represents a novel crosstalk mechanism whereby $1,25(\text{OH})_2\text{D}_3$ -VDR and APC could negatively regulate Wnt signaling to restrict tumorigenesis.

***PROPHYLACTIC VITAMIN E THERAPY IN LAMBS UNDER HEAT INDUCED STRESS**

Kevin L. Bloomquist, Kim Cooper (Midwestern University, Glendale, AZ) and William P. Baker (Southwestern College, Phoenix, AZ)

White Muscle Disease (WMD) is a well recognized degenerative muscle disease found in neonatal lambs. Pathogenesis is by deficiency of selenium and/or vitamin E. Morbidity and mortality in young lambs is common in areas where selenium and/or vitamin E are deficient. Arizona is not known as a deficient area yet older lambs are diagnosed with WMD during the hot summer months. Lambs affected with WMD cannot be brought to market and are a major economic concern for Arizona producers. We propose that the extreme heat experienced in central Arizona creates an unusually high demand for vitamin E not seen elsewhere. We propose this condition be termed Heat Stress Syndrome (HSS). Little is known about the prevention of heat induced WMD or HSS. This study will review the records of a local producer to investigate the efficacy of prophylactic therapy of vitamin E in reducing HSS. Specifically, the question of whether prophylactic therapy with vitamin E reduces the incidence of HSS in older lambs will be addressed. Such therapy options would be a welcome addition to the veterinarian's therapeutic portfolio and of economic interest throughout the region.

ACADEMY BUSINESS AND ANNUAL REPORTS

OFFICERS 2007 - 2008

ELECTED

Carlton "Buck" Jones President
Elizabeth Hull Recording Secretary
Ingrid Novodvorsky Membership Secretary
Karen Conzelman Treasurer
Michael Diehl Director, Southern Arizona
Robert Reavis Director, Central Arizona
Aregai Tecele Director, Northern Arizona

APPOINTED

William Perry Baker Editor, Journal
Florence Slater Editor, Proceedings
Stephen Williams Science Olympiad/Science Bowl Liaison

SECTION CHAIRS

Robert Bowker Biology
Timothy Vail Chemistry
Steven Yool Geography
Robert McCord Geology
Boris Poff Hydrology
Erik Gergus Poster Session
Melinda Davis Psychology

COMMITTEE ROSTER

BUD ELLIS SCHOLARSHIP

Stephen M. Shuster

MEMBERSHIP

Ingrid Novodvorsky

OUTSTANDING SCIENCE TEACHER

William Perry Baker

GRANTS-IN-AID

Aregai Teclé

FELLOWS, NOMINATING

Owen Davis

BEST STUDENT PAPER

William Perry Baker

BEST STUDENT POSTER

Erik Gergus

NOMINATING

Owen Davis
William Perry Baker
Buck Jones

NECROLOGY

Ingrid Novodvorsky

PROGRAM

William Perry Baker

BUDGET

Karen Conzelman

OUTSTANDING SERVICE AWARD

Owen Davis
Stephen Williams
Karen Conzelman

PRESIDENT'S REPORT

It has been a good year for the Arizona/Nevada Academy of Science. We started with a successful 51st annual meeting at NAU and are finishing with what promises to be a successful meeting at a new venue for the Academy – Southwestern College. A heartfelt “Thank you!” to our meeting hosts, to our meeting organizer, Perry Baker, and as always to our Board of Governors for their ongoing efforts on behalf of ANAS. But most of all, “Thank you!” to you, the members who continue to create and present the science that is the purpose of this Academy.

As an organization we continue to face challenges in increasing membership and participation and it is only you, the members of ANAS, which can meet those challenges. So once again, I would like to encourage all of our members to do the following this year: submit a manuscript to the Journal, recruit a new member, educate a student, and volunteer for a post on the Board of Governors.

My sincere thanks,

Carleton ‘Buck’ Jones
President

MINUTES OF THE ANNUAL BUSINESS MEETING AND AWARDS LUNCHEON MARCH 31, 2007

Aregai Tecele, meeting organizer, introduced the guest speaker, Liz Grobsmith, Provost and Vice President for Academic Affairs of Northern Arizona University, who welcomed the membership to the campus and spoke about the university’s new science facilities and initiatives.

The business meeting was called to order at 12:30 pm by President Carleton “Buck” Jones. Board of Governors in attendance: Perry Baker, Karen Conzelman, Owen Davis, Pete Ffolliott, Buck Jones, Boris Poff, Florence Slater, and Aregai Tecele. On behalf of the Board of Governors and membership, he acknowledged Aregai Tecele, his NAU colleagues, the section chairs and sponsors for their organization of an outstanding meeting and a wonderful luncheon. He also recognized the students in attendance for their participation in the meeting.

Jones called the membership’s attention to the slate of officers nominated for 2007-2008 Board of Governors. The officers were approved by acclamation.

President Jones emphasized the following points from his President’s report:

The Academy depends on its membership. He encouraged attendees to join and recruit a new member.

There is a possibility that membership dues may need to be raised by \$5-10 in the near future to keep abreast of the increasing costs of printing the journal.

JStor database has invited ANAS to archive its back issues digitally. The Board of Governors has decided to do so with a one year lag. This time frame is hoped to increase the accessibility of JANAS' archives while retaining the revenue stream from subscriptions.

The President's report was approved as were the reports of the Permanent Secretary, Membership Secretary, Science Olympiad Liaison, and the Treasurer as published in the Proceedings.

President Jones announced the recipient of this year's Outstanding Service Award: Owen K. Davis. Dr. Davis thanked the Academy for the recognition and asked other former Presidents (W. Perry Baker, Aregai Teclé, Don Young and Pete Ffolliott) to stand and be acknowledged as well.

The recipient of this year's Outstanding Teacher Award, Johanna Strawser was announced. Recipients of Grants-in-Aid in attendance, Jolie Goldenetz and Hoang Huynh, were also recognized.

Finally, the winners of the Outstanding Student Papers and Posters were announced and presented with their \$50 prize.

Best Student Poster: Jana Lemau (ASU) - "Discovery Of Novel Vitamin D Receptor Interacting Proteins (VIPS) Involved In Apoptosis And Bone Mineral Homeostasis"

Best Student Paper (Biology, Geology, Geography, Science Education, Psychology, Mathematics): Christopher Sthultz, (NAU) - "Drought And Herbivore-Mediated Changes In Ectomycorrhizal Abundance And Community Composition On A Foundation Tree"

Best Student Paper (Hydrology): Ann Youberg, (U of A) - "Debris Flow Generation In Adjacent Unburned And Recently-Burned Areas, Coronado National Memorial, Arizona"

The Chemistry winner would be announced at the end of the afternoon session. With no further business, the meeting was adjourned at 12:50 pm.

Karen Conzelman

Substituting for Elizabeth Hull

NECROLOGY REPORT

Dr. Albert (Bud) T. Ellis, 77, passed away on October 15, 2007. An ANAS member since 1957, Bud provided many years of leadership to the Academy serving in various capacities on the Board of Governors, including President. He has been honored as a Fellow of the Academy and with its first Outstanding Service Award in 1994. The Bud Ellis Scholarship, awarded annually to an outstanding high school senior majoring in the sciences and attending a university in Arizona or Nevada, was established in recognition of his lifetime of contributions to the organization. Dr. Ellis was among those celebrated at the Founders Dinner held during the ANAS 50th Anniversary meeting in April, 2006.

Ingrid Novodvorsky
Necrology Secretary

OUTSTANDING SERVICE AWARD ANTHONY BRAZEL

After completing his studies in mathematics at Rutgers University, Anthony Brazel continued his graduate studies there, earning a master's degree in geography in 1965. He went on to complete his doctoral studies in geography at the University of Michigan, Ann Arbor in 1972. Since coming to ASU in 1974, Anthony Brazel has conducted regional and local scale research on climate and energy/water budgets in high mountains of Alaska, Colorado, and the Himalayas, in the Southwest desert and Mexico, and in the Phoenix metropolitan region. He served as Arizona's third state climatologist (governor-appointed over the span of 5 governors) from 1979-99, directing a Laboratory of Climatology and then Office of Climatology. This involved direct connections to researchers and agencies at the federal and state level (primarily National Climatic Data Center, National Weather Service, Phoenix, and the Western Regional Climate Center). He served as Chair of the Department of Geography 1991-97, as manager of the Southwest Center for Environmental Research and Policy (EPA) in 2000-2002, and is currently the Associate Director of the new School of Geographical Sciences.

In addition to his outstanding contributions to the field of climatology and public policy, Dr. Brazel has been an active ANAS member since 1975 and influential leader of the Academy. He served as the central Arizona Director from 1992-1998, ANAS President-Elect and President from 1996 to 1998, and was Geography session chair for several annual meetings. Tony became the editor of the *Journal of the Arizona-Nevada Academy of Science* in 2000 and continued to serve in that capacity until the end of 2007. In his very capable hands, *JANAS* has been able to get back into a more regular publication schedule and to elevate its stature in the academic and research communities of the Southwest.

Karen Conzelman
Owen Davis
Stephen Williams
Outstanding Service Award Committee

OUTSTANDING TEACHER AWARD

The recipient of this year's ANAS Outstanding Teacher Award is:

Shawn Lent of Western Peaks Elementary in Surprise, AZ.

Congratulations to our winner!

William Perry Baker

Outstanding Teacher Committee

BUD ELLIS SCHOLARSHIP RECIPIENTS

This year there were 28 outstanding participants from Arizona and Nevada for the Bud Ellis Scholarship of \$1000. This one-year scholarship award is made to a student with an outstanding high school academic record and who intends to enter one of the institutions of higher learning in Arizona or Nevada. As in recent years, all of the participants far exceeded the academic requirements for this award. All were exceptional students, and almost to a person, all were superlative athletes, musicians, student leaders and members of their communities.

In addition to the two co-winners, three students deserve Honorable Mention. These students include **Peter Etchevery**, of North Valley High School, Reno, NV, **Maple So** of Yuma High School, Yuma, AZ, who is Valedictorian of her class of 631 students, and **Rachel Brackett** of Kingman Academy of Learning, Kingman AZ. We are fortunate to have such energetic and talented students in our two states. .

The first co-winner of the Bud Ellis Scholarship for 2008 is **Jillian Moore** from Mountain Ridge High School in Glendale, AZ, where she is in the top 3% of in her class of 569 students and is section leader in the award winning *Pride of the West* band at Mountain Ridge High. Jillian plans to attend the University of Arizona, concentrating her studies in premedical courses in hopes of becoming a physician or physical therapist. Congratulations, **Jillian Moore!**

The second co-winner of the Bud Ellis Scholarship for 2008 is **Mary Schmidt** from North Canyon High School in Phoenix, AZ, where she is the top student in her class of 549 students and participates in club swimming and the Phoenix Children's Chorus. Mary plans to attend Arizona State University, concentrating her studies in biomedical engineering. Congratulations, **Mary Schmidt!**

Stephen Shuster

Bud Ellis Scholarship Committee

GRANTS-IN-AID RECIPIENTS

Undergraduate \$200 - Fall 2007

Nicole Luke

School of Life Sciences Arizona State University, Tempe, AZ (Sponsors: Frank Farrugia and Martin Wojciechowski)

"Floristic composition of the Park Creek Canyon"

Kevin Bloomquist

College of Health Sciences Midwestern University, Glendale, AZ (Sponsor: William Perry Baker)

"Prophylactic Vitamin E therapy in lambs under heat-induced stress"

Kevin will be presenting his work in the Poster Session of today's meeting.

Graduate - \$300 - Fall 2007

Megan Wanh

Arizona College of Osteopathic Medicine

Midwestern University, Glendale, AZ (Sponsor: William Perry Baker)

"Proposal for investigating the effectiveness of osteopathic manipulative treatment for Parkinson disease"

Aregai Tecele

Grants-in-Aid Committee

SCIENCE BOWL/SCIENCE OLYMPIAD LIAISON'S REPORT

The Arizona Science Olympiad and Arizona Regional Science Bowl held their annual tournaments at Glendale Community College (GCC) on March 1, 2008. This year marked the 20th anniversary of the Science Olympiad in Arizona. The 2008 state tournament brought together 29 teams from 23 different Arizona high schools including schools from as far away as Teec Nos Pas, Douglas and Salome as well as several from Tucson and the metro Phoenix area. All together nearly 400 high school students competed in events covering a broad spectrum of scientific disciplines, engineering, math and technology. Ribbons and medals were presented to the top seven finishers in each of the 26 different events. In addition, gift certificates, cash prizes or scholarships were awarded to top finishing teams competing in the following events: Astronomy, Boomilever, Chemistry Lab, Circuit Lab, Disease Detective, Ecology, Electric Vehicle, Fermi Questions, Health Science, Herpetology, Math Applications for Today's

Technologies, Oceanography, Physics Lab, Remote Sensing, Robot Ramble, Rocks and Minerals, Sounds of Music, WindWatts, Wright Stuff, and Write It-Do It. These awards were endowed by donations from the following sponsors: Arizona Council of Engineering and Scientific Associations, Charles Hoyt, Everett Greenli, GCC, Salt River Project, Southwest Gas, and Stan and Susan Celestian. ANAS awarded \$1000 in supply money to ten teams that competed in Experimental Design and Five Star Science as well as a total of \$100 to the top scoring schools in Ecology and Herpetology in memory of former State Director and ANAS fellow Bud Ellis. The following Academy members were among the 70+ volunteers who helped with the tournament: Robert Bowker, Pedro Chavez, Karen Conzelman, Elizabeth Cooper, Erik Gergus, Robert Reavis, Ryan Sawby, Florence Slater, James Tuohy, Steve Williams, and Don Young.

The school selected to receive the Hoyt Spirit Award was McClintock High School. Named in honor of longtime ANAS member and founder of the Arizona Science Olympiad program Charles Hoyt, this award recognizes the team that best epitomizes the spirit of the Science Olympiad. The Hoyt Spirit Award was established as an annual honor by the Arizona Science Teachers Association in 2006. Marana High School from Tucson, AZ was recognized as the top ranking new team to the state tournament with the first Rookie of the Year award, sponsored by the Employee Community Fund of Boeing Mesa.

At the conclusion of the competition, the top seven ranked teams overall were announced and presented with plaques and trophies. Catalina Foothills High School–Blue revenged their loss last year to University High School–Black by outscoring them nearly two to one. This Tucson team along with their head coach Kiki Moore, and Arizona State Director Hal Eastin will represent Arizona at the national Science Olympiad in Washington, D.C. in May. Additional information about the Science Olympiad can be found at <http://www.gc.maricopa.edu/biology/so>

On the same day, 125 students from 13 schools competed in this year's Regional Science Bowl. The "A" team from Brophy College Preparatory Academy in Phoenix won, beating Sierra Vista High School of Las Vegas in the final round, 74-54. This score spread does not really reflect the closeness of this match-up which went all the way to the 13th round of this double elimination tournament. Scholarships were awarded to the top four schools (3rd - Brophy Preparatory Academy B team, 4th - Tempe Preparatory Academy). Brophy will represent the state at the Department of Energy's National Science Bowl in Washington DC at the end of April. For more information, see <http://www.wapa.gov/dsw/scibowl/>.

Next year's tournaments are planned for Saturday, February 21, 2009 at GCC. If Academy members, their institutions or foundations are interested in getting involved in any capacity, please contact the SO/SB liaison (stephen.williams@gcmail.maricopa.edu). Volunteers and sponsorship dollars are always welcomed.

Steve Williams

Science Olympiad/Science Bowl Liaison

**TREASURER'S REPORT
2007**

Operating and Short Term Reserve Fund (Vanguard Prime Money Market Fund)

Account Value on 12/31/06	\$24,831.21
Dividend Deposits	+1,276.92
Account Value on 12/31/07	\$26,108.13

Goethe Educational Endowment Fund (Vanguard Index 500 Mutual Fund)

Account Value on 12/31/06 (181.504 shares at \$ 130.59/share)	\$23,702.61
Transferred Donations +17.063 shares	Total: 198.567 shares
Dividends +3.367 shares	Total: 201.934shares
Account Value on 12/31/07 (201.934 shares at \$135.15/share)	\$27,291.38

General Fund

December 31, 2006 Balance	\$4,089.13
Transferred to Goethe Educational Endowment Fund	- 2,325.00
Deposits	+ 11,182.00
Expenses	- 4,269.52
Transferred to ASU General Fund	- 2,000.00
December 31, 2007 Balance	\$6,676.61

ASU General Fund

December 31, 2006 Balance	\$1,109.53
Transfer from General Fund	+2,000.00
Expenses	- 1,765.52
December 31, 2006 Balance	\$1,344.01

Science Olympiad General Fund

December 31, 2006 Balance	\$34,481.54
Deposits	+28,739.00
Expenses	- 16,568.06
December 31, 2007 Balance	\$46,652.48

Science Bowl General Fund

December 31, 2006 Balance	\$2,456.48
Deposits	+6,770.65
Expenses	- 4,743.71
December 31, 2007 Balance	\$4,483.42

Market Value of Assets (as of December 31, 2007) **\$ 112,556.03**

<u>Deposits</u>	<u>General Funds Details</u>	<u>Expenses</u>
3,145.00	ANAS Membership dues	
	PayPal charges	42.08
	Journal:	
1,990.00	Subscriptions	
	Refunds	
426.00	BioOne Royalties	
76.00	Sale of Back Issues	
615.00	Reprints/Page Charges	
	Printing	957.88
	Typing	750.00
	Postage	895.96
	Hydrology Proceedings	
	Web hosting fee	166.80
	Scholarships:	
	Scholarships	0.00
	Committee Expenses/Postage	0.00
	Grants-in-Aid, High School:	
	Grants	0.00
	Printing/Postage	0.00
	Grants-in-Aid, Graduate	300.00
	Grants-in-Aid, Undergraduate	800.00
	Science Olympiad awards	1,000.00
	Annual Meeting:	
2,605.00	Registration Fees	
	PayPal Charges	58.21
	Sponsor donations	
	Proceedings, Printing	512.39
	Proceedings, Postage	0.00
	Coffee Breaks*	0.00
	Friday Reception*	0.00
	Saturday Luncheon*	0.00
	Meeting Rooms	0.00
	Awards	
	Outstanding Service	50.00
	Outstanding Teacher	50.00
	Printing/Postage	0.00
	Plaques	45.04
	Best Student Papers	200.00
	Supplies	35.60
	Governing Board Meeting luncheon	19.03
2,325.00	Goethe Endowment Fund Contributions	
	AZ Corporation Commission	10.00

	NAAS Dues	46.40
	Supplies	0.00
	Postage/Office	43.65
	Printing/Office	0.00
	Returned Check	45.00
	Bank Charges	7.00
11,182.00	SUBTOTAL	6,035.04
<u>Deposits</u>		<u>Expenses</u>
21,700.00	Science Olympiad	
6,434.00	Sponsor donations	
	Membership dues	1,440.00
	Tournament	
	Awards and Prizes	4,085.06
	Scholarships	1,250.00
	Team Travel	2,380.00
125.00	T-shirts	4,408.25
	Supplies	93.71
480.00	Lunches	629.15
	Coaches gifts	1,000.00
	Office Expenses	
	Copying and Postage	200.12
	Bank Charges	0.00
	Outreach	
	Conference registration fees	81.00
	Conference supplies	89.90
	Seed money	600.00
	Travel to Nationals (State Director)	310.87
28,739.00	SUBTOTAL	16,568.06
	Science Bowl	
4,792.00	Sponsor donations	
1960.00	School registration fees	0.00
	Scholarships	1,400.00
	Room rental fees	0.00
	Food	1666.75
	Supplies	1309.96
	Conference registration fees	331.00
18.00	Bank fees	36.00
0.65	Interest	
6770.65	SUBTOTAL	4,743.71
\$46,691.65	TOTALS	\$27,346.81

Southwestern College

