

ABSTRACTS

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Agriculture Section

Aide, M., Barton, S., Southeast Missouri State University. NUTRIENT UPTAKE IN SOYBEANS AMENDED WITH GYPSUM AND LIME. Gypsum and lime treated were soil applied to a Wilbur soil (Coarse-silty, mixed, superactive, mesic Fluvaquentic Eutrudepts) in a randomized block design with four replications. Gypsum and lime treatments did not significantly influence the soybean yield (50.5 bu/acre) or nutrient uptake of N, P, K, Mg, Ca, S, Fe, Mn, B, Cu or Zn. Nitrogen, P, K, S, Cu and Zn was largely partitioned to the seed. Magnesium, Fe, Mn, B were largely equally partitioned between seed and the other plant organs. Calcium was largely partitioned into the leaf component.

Allen, A., Dudenhoeffer, G., Zang, Y., Omara-Alwala, T., Lincoln University. FEEDING TECHNIQUES FOR NORTHERN JUVENILE BLUEGILL (*LEPOMIS MACROCHIRUS*). The objective of this experiment was to determine the optimal feeding technique for juvenile bluegill with initial weights of about 1.4g ($p < 0.05$). Twenty-eight 151L experimental tanks in an indoor system were stocked with 50 bluegills and acclimated for two weeks prior to an eight week feeding trial using a commercial feed. Each tank was randomly assigned one of the following treatments: hand fed to apparent satiation one (HF1), two (HF2), three (HF3) or four (HF4) times daily within an eight hour period; hand fed four times within an extended twelve hour period (HF4E); or fed with 12(BF12) or 24(BF24) hour belt feeders. Feed amounts for belt-fed fish started at 2% of their body weight with feed adjusted based upon feeding activity. Final weight, weight gain, and specific growth rate in HF4 and HF4E were best amongst the treatments ($p > 0.05$). Percent weight gain ranged from 415

to 868% with HF4E significantly greater than the other treatments. Fish in HF1, showed the lowest growth performance. Final mean weights ranged from 7.4 to 13.7g. Feed conversion ratios were below one for all treatments. Results indicated that optimum growth occurred in juvenile bluegill fed four times daily.

Shipp, M., Hoilett, N., Musunuru, N., Northwest Missouri State University. IMPACT OF BIOCHAR ON SOIL MICROBIAL DIVERSITY. Greenhouse gases such as carbon dioxide, methane, and nitrous oxides are of major concern because of their potential impact on atmospheric temperatures. Soil microorganisms are important regulators and consumers of atmospheric greenhouse gases and consequently aerobic soils can act as either a source or sink for these gases. Biochar is showing promise to enhance C stabilization in soils. However, the role of biochar and the interacting effect of tillage on soil microbial community and their function have received limited attention and studies have had mixed results. Our premise is that biochar technology needs to be investigated relative to its influence on soil microbial communities. We hypothesize that treatment of soils with biochar will cause a shift in soil microbial communities in soils. Our objective is to determine the effect of biochar types on soil microbial communities. The soil microbial community will be profiled using PLFA analysis at each soil sampling date. The expected outcomes of the total project are to develop the ecological mechanisms that use biochar management to enhance agricultural production and reduce greenhouse gas emissions from soils.

Fisher, B., Eaton, T., Eivazi, F., Lincoln University in Missouri. A REVIEW ON RASPBERRY PRODUCTION. Economically, raspberry production count for about 18 million

dollars a year in the United States. They are high in nutrients, including elgiac acid, a cancer defeating compound. A site selection and preparation is necessary for raspberries production. Raspberries should be planted in open sites exposed to full sun for a minimum of six hours a day. Raspberry plants should be planted 300 to 500 m away from wild berry plantings, and should not be planted following crops of strawberries, potatoes, tomatoes or eggplants. Raspberries will grow and produce on many different types of soil but will be most productive on sandy loam soils well supplied with organic matter (3 to 5% organic matter) and plant nutrients. A soil test is recommended to assess the nutrient content and pH of the soil. Fertilization and pH adjustment should be done according to the recommendations of the soil testing laboratory. Raspberries are self-fruitful, so only one cultivar is needed for pollination and fruit production. Raspberry roots are long and need deep top soil to grow well and produce. Raspberry canes may be long and need trellising for support. If properly planted, raspberry planting may live and produce for 15 to 20 years in average, if well cared for with fertilization, irrigation and weeding.

Atmospheric Sciences

Rabinowitz, J., Lupo, A., Sadler, J., University of Missouri-Columbia. A COMPARISON OF IDF PRECIPITATION CURVES TO PERIODIC ANOMALIES IN THE CENTRAL MISSOURI RIVER VALLEY. Over the last few decades, atmospheric research has worked on assimilating regional rainfall statistics to improve the monitoring of precipitation and the understanding of climatic variability. The goal of this work is to bridge rainfall gauge position to the prediction of regional precipitation and crop forecasting issues. Among the nine rain gauges currently positioned throughout Goodwater Creek (a 72.5 sq. kilometer basin to the northeast of Columbia, Missouri); four gauges have been active from 1976 to the present; two of which have been active since 1969. The primary statistical analysis will examine return periods for heavy rainfall across the central Missouri River Valley basin over the last 45 years and evaluating the inter-annual variability of precipitation. This will be complemented by the analysis of intensity-duration-frequency (IDF) curves. One concern is whether the analog data between 1969 and 1997 are sufficiently reliable. This will be addressed by comparing synoptic flow regimes using North American Regional Reanalysis archives. The second aspect involves assessing possible relationships between climatic trends and higher atmospheric water vapor content.

Biological Sciences

Willand, J., Baer, S., Gibson, D., Missouri Southern State University, Southern Illinois University Carbondale. THE INFLUENCE OF POPULATION SOURCE AND SPECIES POOLS ON PROPAGULE SUPPLY IN AN EXPERIMENTAL PRAIRIE RESTORATION. A common first step to restoring plant communities is the introduction of seeds by restoration practitioners. However, plant propagules are subject to environmental filters that constrain their germination, establishment, and survival. Abundance and richness of ramets, emerged seedlings, seed rain and the soil seed bank were measured in a restoration experiment consisting of a split-plot design with population source of dominant grasses (cultivar vs local ecotype) as the whole-plot factor and sown subordinate species (three unique pools of non-dominant species) as the subplot factor, respectively. Abundance of emerged ramets was similar between communities sown with cultivar and local ecotypes of the dominant grasses, but differed among sown species pools in prairie restored with cultivars but not with local ecotypes. Number of emerged seedlings also differed among species pools, but only in communities sown with local ecotypes of the dominant grasses. Richness of the seed rain was influenced by an interaction between dominant grass population source and sown species pool. We found no consistent negative effect of dominant grass cultivars on propagule supply.

Gearin, C., Luscier, J., Truman State University. SHORT-TERM RESPONSES OF FALL MIGRATORY BIRD COMMUNITIES TO SUBURBAN RIPARIAN MANAGEMENT IN NORTHEASTERN MISSOURI. Riparian zones, the vegetation belts adjacent to streams and rivers, are important corridors for birds travelling through landscapes fragmented by human development. While previous studies of riparian management have focused on the Southwest and Great Plains, the effects of riparian restoration on birds in mesic Midwestern environments have been little studied. The structural diversity of riparian vegetation through fragmented landscapes may affect the diversity of birds that use such corridors. We hypothesized that increasing the height of non-woody vegetation near the stream bank would lead to bird communities with more high-wetland-affinity species. We surveyed three riparian sites in Adair County: one with mowed vegetation (Truman State U., TSU), one with a no-mow zone (Rotary Park, ROPA), and one in a restored oak-savannah habitat (Big Creek Conservation Area, BCCA). Due to the small scale of the restoration project, we were not able to replicate the treatment condition. Species richness estimates (\pm SE) ranged from 10.6 \pm 3.18 for TSU, 12.2 \pm 2.76 for ROPA, and 18.2 \pm 3.06 for

BCCA. While species richness was similar among sites, species composition was not. Wetland species composition ($\pm 95\%$ C.I.) ranged from $24.68\% \pm 8.64\%$ for TSU, $8.33\% \pm 2.75\%$ for ROPA, and $24.01\% \pm 6.90\%$ for BCCA. With 95% confidence, TSU had at least 7.24% higher wetland species composition than ROPA. Changes in vegetative structure had significant impacts on community composition in the short term. Long-term monitoring of small-scale restoration could help elucidate the impacts of riparian management on birds in suburban landscapes.

Conservation

Messick, J., Missouri Southern State University. OLD DATA, NEW METHODS: ANALYZING LOCATIONS AND MOVEMENTS OF THE NORTH AMERICAN BADGER USING GEOGRAPHIC INFORMATION SYSTEMS (GIS). Radio tracking and capture locations were collected as part of ecologic studies of the North American badger (*Taxidea taxus*) and plague (*Yersinia pestis*) in southwestern Idaho, 1975-1977. In this project I compare the original analysis of locations and movements with methods utilizing GIS that were not available during the initial field work. Locations manually plotted on maps were converted to the Universal Transverse Mercator (UTM) coordinate system and analyzed using GIS. GIS standard distance and other quantitative measures of locations usually agreed with the original determinations of home range and movement with the exception of the linear movements of dispersing young. The original research emphasized temporal changes and differences among badger age groups in antibodies to plague. In the current project I use grouping analysis and related GIS pattern analysis tools to evaluate the spatial distribution of antibodies to plague. No clearly defined spatial pattern to plague antibodies in badgers was evident, perhaps because of badger movements between sample collection, and, as suggested in the original research, plague may have been present over the entire study area.

Parker, P., Asigau, S., Jaramillo, M., University of Missouri St. Louis. UNDERSTANDING DISEASES IN GALAPAGOS BIRDS: CAN THEY BE CONTROLLED?. In collaboration with the Saint Louis Zoo, the Galapagos National Park, and the Charles Darwin Foundation, our research group at UMSL has undertaken an extensive screen of pathogens in Galapagos birds. One of our recent findings was a Plasmodium species that causes avian malaria. We have described four distinct lineages of avian Plasmodium on the islands, but only one lineage (Lineage A) appears to be well established and regularly transmitted on the archipelago. We focus on trying

to understand the transmission dynamics of Plasmodium Lineage A to assess the opportunity for control or elimination of the parasite. Our overarching goal is to prevent the highly endemicized avifauna from following the fate of similarly endemicized Hawaiian avifauna, where dozens of species went extinct following the arrival of Plasmodium. To date there have been no extinctions of endemic bird species in Galapagos. We have screened more than 5000 individual birds on 14 major islands and identified apparent hotspots of infection of Lineage A, using microscopy, PCR and DNA sequencing for identification. Endemic birds do not show gametocytes (the last intraerythrocytic stage of the parasite's life cycle) on thin blood smears, suggesting they are not competent hosts for the parasite. We therefore focus on the two introduced bird species breeding extensively on the archipelago, smooth-billed anis and cattle egrets as potential reservoirs. A parallel effort aims to identify which of the 3 mosquito species present is the vector. The potential arrival of multiple lineages through migratory bobolinks does not include Lineage A. The possibility that Lineage A arrived(s) through the substantial number of migratory shorebirds passing through Galapagos remains unexplored.

Serious, M., Toone, K., Patel, F., Heth, R., Missouri Southern State University. EFFECT OF ZINC AND COPPER ON THE GROWTH OF COMMON DUCKWEED, LEMNA MINOR.. Lemna minor is a common macrophyte in backwaters of southwestern Missouri streams, many of which have poorly developed macrophyte assemblages. We tested the effects of ambient water⁴ from a mining influenced stream and artificially elevated concentrations of zinc and copper on growth rates of duckweed, L. minor. Our study consisted of five treatments of five replicates apiece. Treatments consisted of 1) a control (10 Lemna fronds in 400 ml stream water from Jones Creek, a non-mining influenced stream) , and similar treatments but with metal solutions added, 2) ambient Turkey Creek water (TCamb) 3) 10microM zinc (HZn), 4) low (1 microM) copper sulfate (LCu), and 5) high 20microM copper (HCu). Treatments were run for 26 days when replicates were examined for the number of new Lemna fronds. Analysis of variance of the five treatments ($P = 0.000035$) followed by Tukey pairwise comparisons showed no significant effects of ambient Turkey Creek water or Zn concentration (mean TCamb 27.6, HZn 30.2, control 25.8). Both Cu concentrations, however, were significantly lower from all non-Cu treatments (mean = 6.4 LCu and 3.6 HCu). Zinc, unlike Cu, does not apparently affect growth rates of Lemna, and perhaps by extension, macrophytes in these systems.

Hackney, K., Serious, M., Heth, R., Missouri Southern State University. EFFECT OF ZINC AND COPPER ON LEAF DECOMPOSITION RATE AND AMPHIPOD MORTALITY. Southwestern Missouri watersheds within the lead-zinc mining belt are often contaminated with metals derived from past mining activities which in other watershed have affected leaf decomposition and survival and growth of sensitive stream invertebrates. We investigated the effect of zinc and copper on both the amphipod *Hyaella azteca* mortality and decomposition rates of red elm leaves. Our study consisted of six treatments with 5 replicates apiece. Treatments included 400 ml of filtered stream water and dried red elm leaves from a presumably uncontaminated watershed as well as 1) a leaf decomposition control (LC) with no amphipods, 2) amphipod mortality control (MC) with 10 amphipods, 3) ambient water from a metal contaminated stream and amphipods (TCamb), 4) low 5 microM Zn (LZn), 5) high 10 microM Zn (HZn) and 6) low 1microM Cu (LCu). Mortality rates after 26 days (ANOVA $P = 0.0015$) ranged from 0.3(TCambient) to 0.90(HZn). All Tukey pair-wise comparisons were significantly different except LC-TCamb, LZn-LCu, and HZn-LCu. Leaf decomposition (ANOVA $P=0.0029$) was significantly reduced by TCamb and the three metal treatments when amphipods were present, but metals did not significantly reduce presumed microbial decomposition when amphipods were absent. Elevated Zn and Cu both affect amphipod mortality and subsequent leaf decomposition.

Geology & Geosciences

Schmidt, D., Stupiansky, J., Steffen, B., Westminster College, University of North Alabama, South Louisiana Community College. DEPOSITIONAL INTERPRETATION OF A FOSSIL-BEARING STRATUM USING INTEGRATED SEDIMENTOLOGICAL AND PALEONTOLOGICAL DATA. Sediments of a fossil-bearing stratum within the Blackwater Draw Formation are exposed in Plainview, Texas. These sediments are associated with Pleistocene fluvial deposition, and exhibit lateral changes in texture. As texture changes laterally, so does fossil mollusc diversity. Thus, sediments from three locations (PS-1, 2, and 3) were sampled horizontally for grain size analyses and fossil mollusc abundances. PS-1 and 2 show variable grain size distributions, coarse-grained crossbeds, and a diverse mollusc fauna. PS-3 A and B represent changes in vertical texture. Grains associated with PS-3A contain carbonate-coated quartz grains, low biodiversity, but high abundances of *Gyraulus parvus* and *Sphaerium transversum*. *G. parvus* and *S. transversum* are tolerant of stressed water conditions. The presence of these taxa and carbonate-

coated grains suggest deposition from isolated bodies of concentrated water. PS-3B possesses finer grain sizes and no fossil content. These depositional characteristics of the fossil-bearing stratum were compared to a modern stream channel in west Texas. Similar depositional characteristics are preserved in microenvironments of the modern stream.

Hagni, R., Hagni, A., Missouri University of Science and Technology, Ann Hagni Consulting, LLC. ASPECTS OF GENESIS OF JAMAICA BAUXITE ORES. The bauxite deposits of Jamaica formerly were the world's largest producers. They occur within karst sink structures and on karst surfaces of Tertiary limestones. Earlier hypotheses on the origin of the bauxite involved leaching of aluminum from: 1) clays in the host limestones, 2) older uplifted volcanic rocks, 3) younger volcanic rocks postulated to have occurred above the host limestones. Most recently, noting highly altered bentonitic Miocene tuffs on the nearby ocean floor, it has been speculated that air-fall tuffs may form the protore. Because the bauxite ores contain up to 14% P₂O₅, CL microscopy was used to examine the character of the phosphorus-bearing grains. Apatite and collophane commonly exhibit CL elsewhere, but were not found in the Jamaican bauxite. The CL study revealed zircon and SEM-EDS indicated 1.9% ZrO₂ in the bauxite. Heavy, non-magnetic concentrates show highly zoned zircon with a bimodal size distribution. Reflected light and SEM-EDS study of opaque grains in concentrate identified titaniferous magnetite, titaniferous hematite with exsolution ilmenite, and ilmenite. These results suggest that volcanic tuffs could well have provided the bauxite protore.

Physics & Engineering

Zhang, Y., Shaw, J., Monismith, D., Chakraborty, H., Northwest Missouri State University. COMPUTATIONAL SIMULATIONS OF ELECTRONIC MOTIONS AND EXCITATIONS IN NANOSTRUCTURED SURFACES BY ION-SURFACE CHARGE-TRANSFER INTERACTIONS. Nanostructured surfaces can be broadly defined as substrates in which the typical features have dimensions in the range of one to several nanometers. The recent surge of interest in these systems originates from the remarkable quantum effects that may arrive from critical size reduction. We studied the electron dynamics in mono-crystalline metal surfaces with stepped vicinal surfaces. The unoccupied bands of the surface are resonantly excited via the charge transfer interaction of the surface with a moving hydrogen ion. The interaction dynamics are simulated via a quantum mechanical wavepacket propagation approach which can enable detailed, microscopic visual-

izations of the electronic motion on and below the surface, as well as the excitation and decay of surface-localized states induced from nanometric quantization and sustained by the surface band gap. The survival probability of the interacting ionic species was calculated. Initial results clearly show resonant states in the ion survivability. The program needs to be run for a number of different metals and different surface structure parameters to determine the underlying dynamics of these resonances.

Engeman, T., Rockhurst University. **CARDIOVASCULAR RESPONSE TO REDUCED PRESSURES.** The purpose of this Physics of Medicine project was to design and build an arterial and venous system model to investigate the physics principles that underlie the functioning of the human cardiovascular system in both standard and reduced atmospheric pressure. Research was conducted on the biological and physical perspectives of reduced atmospheric pressure on the body and incorporated into the physical model design. Through trial and error, a cardiovascular (CVS) model was developed from a complex tubing system. To investigate the effect of reduced pressure acting on the cardiovascular system, an experiment was conducted on the CVS model. The model's responses to reduced atmospheric pressure were observed by placing the system in a glass bell chamber and reducing the atmospheric pressure to 2.5psi. Data was collected and analyzed using PASCO software and pressure sensors. Results from design and initial testing indicate that placement of check valves is critical to allow for enough positive and negative pressure to be produced enabling the circulation of fluid throughout the system. The CVS model will be used in the Physics of Medicine Program at Rockhurst University to study pressure differences that cause fluid flow in the cardiovascular system. Future experimentation plans include an integration of physics principles as they relate to the physiological responses on the human body when exposed to reduced atmospheric pressure.

Science Education

Haskins, M., Rockhurst University. **USING ELECTRONIC DEVICES TO DEVELOP GEOSPATIAL AND ANALYTICAL SKILLS.** Smartphones, iPads, and tablets provide a unique and easy method to collect data for geospatial analysis. Through free public accounts with companies e.g., Esri and ArcGIS, instructors can create data collection pages accessible on a variety of electronic devices. Students collect the data and then seamlessly move the data onto maps for geospatial analysis. Applying this technology to Citizen Science projects

allows students to “see” their data while making meaningful contributions to “real” and ongoing studies. Collectively these authentic experiences help develop skills needed in STEM fields, expose students to a wide variety of STEM careers, and highlight the value of interdisciplinary projects. Participants in this session will use their own electronic devices and/or work with others to collect geospatial data for analysis and leave equipped to implement this process in their own classroom. A brief discussion will also explore the possibility of “mining” public data for geospatial analysis in the event electronic devices are not available for student use. Because instructors can adjust both the complexity and method of data collection projects can be geared to any age.

Social & Behavioral Sciences

Griffith, R., Johnson, A. Park University. **USING IMAGERY TO ESTIMATE SIZES OF US STATES: MORE IS NOT BETTER.** We will report on a study of mental imagery involving fifth graders. More specifically, the students were given a test booklet of 44 US states and asked to identify the name of the state and select which of the four size variations of the state would appropriately fit into a reference outline map of the continental United States. We will present the identification and size estimation results across gender and that accuracy is a function of the number of sides visible on the outline map. Fewer cues yielded higher accuracy suggesting that visual cues may interfere with mental imagery judgments.

Smith, P., Independent Scholar. **EXISTENTIAL ANTHROPOLOGY AND THE ARCHITECTURE OF APPROACH AND ASCENSION.** The focus of this presentation will be the subject of architecture. Not its physical properties or dimensional characteristics, but how it results from human psychology in reaction to the existential situation and the social purposes to which it is used. Some basic principals of Existential Anthropology will be used to examine the architectural characteristics of approach and ascension beginning with the condition of physical vulnerability of Homo-vulneare, which leads to interdependence and social cohesion which necessitates a hierarchical structure and social stratification which is reinforced with the architecture of selective approach. This is especially demonstrated with some Mississippian temple mounds and is carried on into our modern forms of government and commercial architectural designs. The architecture of ascension, which we see in Neolithic and primary structures, extends from the like-equals-like rational association, which stems directly from the existential condition

and the elements of vulnerability, reason, remembrance, the need to know and what is not known.

Taeckens, A., Gosselink, C., Missouri State University. **HAPPINESS, PERSONALITY, AND ACTIVITY IN OLDER ADULTS.** Previous researchers have assessed concepts such as happiness, activity levels, and personality traits among various age groups (Eakman et al., 2010; Gosling et al., 2003; Lyubomirsky, n.d.). But never before have these three factors been assessed in adults age >65. The Subjective Happiness Scale (SHS, Lyubomirsky, n.d.), Ten-Item Personality Inventory (TIPI, a condensed measure of The Big Five Inventory [BFI], Gosling et al., 2003), and Meaningful Activity Participation Assessment (MAPA, Eakman et al., 2010) were administered to consenting older adults residing in The Gardens Independent Living (GIL) facility in Springfield, MO. Of the 88 GIL residents, 22 completed the surveys (research is ongoing). Three hypotheses were tested: H1 Respondents who score high in extraversion and openness will be more active than those who score low on these traits; H2 Respondents' perception of their current activity level (sedentary to very active) is a stronger predictor of happiness than self-reported number of completed activities within one week; H3 Respondents whose SHS score categorizes them as unhappy will report lower activity levels than those with high SHS scores. The quantitative data were entered into PSPP. Preliminary analyses supported H1 and H3. However, H2 was disproven. Further research needs to replicate this study in other older adult housing models (e.g. assisted living, nursing homes) to determine whether these trends hold for elders who require more care. Implications for real-world applications of these findings will be discussed, inasmuch as improving older adults' wellbeing and quality of life are the ultimate objectives of gerontological research.

Semler, B., Lincoln University. **REDUCING FEAR OF PUBLIC SPEAKING: FIRST GENERATION LOW SES HISTORICALLY BLACK COLLEGE STUDENTS.** Public Speaking in many colleges is required and plays a major role in the successful career of a student both in and after college. Teaching Public Speaking at a Historically Black College represents challenges for new instructors. Many students are first generation college students that come from low socially economic status backgrounds. Through preliminary qualitative research and current research a new speech teacher can reduce speech anxiety and reduce recidivism in the course. The findings of the preliminary research suggest the important role creating a welcoming and supportive environment has on the outcomes of student success. The research lists several suggestions a new teacher can use in the instruction of a

Public Speaking course to increase successful outcomes and reduce recidivism for first generation low (SES) college students.

Abstracts: Posters

Agriculture

Aide, M., Beighley, D., Dunn, D., Southeast Missouri State University, University Missouri Fisher Delta Research Center. **FURROW AND DELAYED FLOOD IRRIGATED RICE: THE ALLEVIATION OF ARSENIC UPTAKE.** A two-year study was conducted comparing furrow and delayed-flood irrigation across two soil textures on the uptake of arsenic in rice. Two soil types employed were the (i) the Crowley silt loam (Fine, smectitic, thermic Typic Albaqualfs) and (ii) the Sharkey clay (Very-fine, smectitic, thermic Chromic Epiaquerts). In both years, the arsenic uptake in paddy rice, brown rice and polished rice grown under delayed flood irrigation ranged from 0.2 to 0.26 mg As / kg; however, arsenic concentrations in these same rice classed when grown with furrow irrigation were less than the detection limit (0.1 mg As / kg). The arsenic concentrations in rice were not significantly influenced by soil type. Conversion to furrow irrigated (row) rice may appreciably limit arsenic uptake.

DeVore, E., Haskins, M., Wills, C., Rockhurst University. **NESTING BEHAVIOR OF NATIVE MASON BEES.** Historically solitary mason bees have deposited their eggs in tunnels created by beetle larvae in trees and wooden posts. In recent years bee enthusiasts have increasingly embraced the rearing of native bees which has resulted in companies developing a variety of commercial nesting tubes and boxes. Although there are many suggestions about the placement of nesting boxes all sources indicate exposure to sun, protection from rain, and close proximity to both pollen and water are key variables in nesting success. While the pollen serves as a source of food, the bees require easy access to moist soil so they can build mud walls between each linearly-deposited egg and for the protective mud cap built to seal the tube. It is commonly believed that bees select nesting boxes closest to water/mud resources thus enabling them to reduce foraging time. The goal of our research was to examine the nesting behaviors of native mason bees in artificial boxes filled with commercial nesting tubes. In June 2014 four bee boxes were placed along a fence row bordering a grassy pasture while the other two were placed closer to a house. Five of the six nesting boxes were rarely shaded, while the sixth box was completely shaded at all times. In October the nesting boxes were transported to the lab and

inspected. The number of used and unused tubes in each nesting box was recorded, as well as number of bee larvae/pupa/adults. The nesting box located the farthest from a permanent source of moist and exposed soil (a pond bank) and the nesting box in full shade contained significantly more bees than did other nesting boxes. Surprisingly the majority of adult bees were found in the nesting box that likely had the lowest environmental temperature, i.e., the fully shaded nesting box.

Biological Sciences

Barta, C., Pitcher, S., Bartlett, J., Scott, E., Drake, D., Missouri Western State University. OAK MARCESCENCE IN MISSOURI: AN ECOPHYSIOLOGY STUDY. Most leaves abscise from deciduous trees in autumn. A zone of distinct cells with weakened cell walls, called abscission layer forms near the base of the leaf's petiole, which breaks during abscission. Abscission is controlled by the concerted interaction of plant hormones. However, in some deciduous species, like oaks the abscission layer does not form until spring, referred to as marcescence. Though the retained leaves may deter grazing herbivores and protect nascent buds in the spring, delayed leaf shedding negatively impacts litter formation and nutrient cycling. Despite its ecological relevance, the eco-physiology and environmental drivers of marcescence are not yet understood. The current study investigates the molecular ecophysiology of marcescence in oak species in Missouri. Preliminary results indicate a delay in the onset of senescence (aging) in trees marcescent during the winter, associated with a depletion of leaf abscisic acid (ABA) contents in the early autumn. Additionally, we found an inverse relationship between leaf ABA – a non-volatile isoprenoid phytohormone - pools and the emission of isoprene, a volatile hydrocarbon emitted throughout the summer in the studied species. Isoprene emission is strongly affected by the environment and can be altered by exposure to environmental stress. We hypothesize, that transient increases in isoprene synthesis and emission, triggered by micro environmental divers, may deplete ABA pools available to coordinate hormonal changes necessary for the formation of the abscission layer in the fall in marcescent trees.

Callahan, S., Hatfield, S., Mizera, N., Campbell, J., Campbell, A., Northwest Missouri State University. DEVELOPMENT OF SELECTIVE MEDIUM FOR ISOLATING PROTEOBACTERIA FROM THE ORAL CAVITY OF HEALTHY HUMAN SUBJECTS. Bacterial assemblages in the human oral cavity are diverse and are responsible for maintaining oral health and onset of oral diseases, such as caries, periodontitis and malodor. Next-generation sequencing techniques have better defined taxonomic groups associated with health and disease,

but most oral microbes have not been cultivated in a laboratory setting. We designed media containing defined, sole carbon sources and a range of pH to enrich bacteria from the saliva of a healthy, human volunteer. The media were selective for a defined group of Proteobacteria and included isolates similar to clinically relevant microbes. Testing of additional volunteers is underway to determine if this medium is universally selective for Proteobacteria.

Gamba, D., Michalski, D., Scuderi, M., Fejer, E., Hartmann, N., Li, J., Logsdon, J., Rois, L. Arant, E., Hughes, M., University of Missouri - St. Louis. RNA-SEQ TRANSCRIPTOME PROFILE REVEALS GENES REGULATED BY THE CIRCADIAN CANDIDATE CG17386 IN DROSOPHILA MELANOGASTER. Several physiological and behavioral processes are controlled by a specialized biological clock synchronized with the 24 h cycle. Although the core molecular components of these circadian rhythms have been identified, the exact genetic mechanism by which the clock regulates biological processes is not fully understood. Based on the interest on studying gene expression changes underlying circadian neuronal activity, the aim of this study was to quantify differential expression of genes controlled by a circadian candidate CG17386 in *Drosophila melanogaster*. CG17386 is a gene which displays a cyclical expression, but with unknown function prior to this study. We performed high throughput sequencing (RNA-Seq) to construct transcriptional profiles from two *Drosophila* genotypes (GFP control and CG17386 experimental) of males and females. In the experimental samples the expression of CG17386 had been RNAi-depleted. We mapped the obtained reads to the *Drosophila* genome and transcriptome implementing RUM (RNA-Seq Unified Mapper). RUM also quantified expression levels of mapped transcripts by calculating RPKMs (reads per kilobase per million reads). Statistically significant differential expression was assessed with a two-way ANOVA. Our analyses on the mapped transcriptomes revealed 134 differentially expressed genes ($p < 0.001$) regulated by CG17386. Two clusters of genes are differentially expressed in CG17386 compared to GFP, and these are different between males and females. The family of immune-induced molecules (IM1, IM2, IM3 and IM23) is an interesting example of transcripts whose expression was highly affected by CG17386. All were up-regulated upon CG17386 knockdown expression, suggesting that CG17386 contributes to the regulation of the immune molecular network.

Goodroad, S., Nunez Torres, A., McFarlin, S., Daggett, M., Missouri Western State University. MONITORING THE EFFECT OF DIET ON LIPID ACCUMULATION IN

DROSOPHILA MELANOGASTER LARVAE. *Drosophila* is an emerging model organism in which to study the effects of diet on the regulation of metabolism and physiological function. In order to analyze the effect different diets and food additives have on the accumulation of lipids in *Drosophila* larvae, we have established a control diet and optimized an established method to monitor the accumulation of lipids in third instar *Drosophila* larvae known as the floating larvae assay. We report on the simplicity and utility of using the floating larvae assay to access changes in lipid accumulation in flies raised on different diets.

Guo, M., Westminster College. **ISOLATION OF MYXOBACTERIA FROM SOIL AND PURIFICATION OF POTENTIAL ANTIBIOTIC SUBSTANCES.** *Guo, M., M. Amspoker, Department of Biology and Environmental Science of Westminster College. **ISOLATION OF MYXOBACTERIA FROM SOIL AND PURIFICATION OF POTENTIAL ANTIBIOTIC SUBSTANCES.** This study was conducted to isolate myxobacteria from soil and detect the production of antibiotic substances. Myxobacteria are a group of Gram negative bacteria famous for their unique life cycle and social behavior. They produce a number of useful secondary metabolites, including antibiotics. Even though myxobacteria are widely distributed in natural ecosystems, such as soil, their isolation has long been a hard and tedious process. The slow growth rate and special growth patterns make them easily overgrown by other bacteria and thus often overlooked by researchers. Thus, the first part of this study is to compare different isolation methods that have been published. So far, four isolation methods (Singh's Plates, Soil baiting, filter paper plate and CY-C10 agar) have been conducted and two strains of *Myxococcus* have been successfully isolated. Based on the morphology, they possibly belong to *M. xanthus* and *M. fulvus*. Filter paper plate and Singh's Plates turned out to be the most efficient, and fruiting bodies can be observed within two weeks under 32 °C. No fruiting formations were observed on geese dung plate. CY-C10 agar was found to be more efficient used as enrichment culture than isolation culture. The second and also on-going part of this study is to isolate and purify antibiotics from the isolated strains. The bacteria were inoculated with 1 liter of CT broth, and then incubated with vigorous gyratory shaking. The antibiotics are expected to be detected and purified after three day's incubation with chloroform extraction, silicic acid chromatography and silica TLC plate.

Lee, S., Spears, K., Johnson, A., Campbell, A., Campbell, J., Northwest Missouri State University. **CULTIVATION OF BACTERIAL COMMUNITIES FROM SEDIMENTS OF SMALLIN CIVIL WAR CAVE IN SOUTHWESTERN**

MISSOURI. Isolated, subterranean ecosystems (e.g. caves) often create "biological islands," where organisms take different evolutionary paths from those outside. Few of the microbes living in such environments have been grown or studied in laboratories. In order to isolate and explore the microbes from the Smallin Cave, located in southwestern Missouri, plates of varying pH and nutrient sources, including DNA, were used. We then extracted and sequenced the DNA from isolates to identify and study the organisms. Most were identified as members of the genera *Pseudomonas*, *Aeromonas* and *Massilia*. Ultimately, we hope to further characterize these isolates and combine the results with the existing data on endangered cave fish and the biogeochemical components, providing a more comprehensive understanding of the biological community of the caves.

Moore, L., Ott, M., Adwell, N., Stojadinov, J., Creamer, B., Missouri Southern State University. **CLONING AND SEQUENCING OF GLYCERALDEHYDE-3-PHOSPHATE DEHYDROGENASE GENOMIC SEQUENCES IN BRASSICA OLERACEA AND CORIANDRUM SATIVUM.** Glyceraldehyde-3-phosphate dehydrogenase (GAPDH) is an essential enzyme in the glycolytic pathway, and therefore is highly conserved in its genomic sequence across species. In this experiment, we determined partial genomic sequences of the cytoplasmic GAPC isozyme of GAPDH in *Coriandrum sativum* (Cilantro), *Brassica oleracea* var. *acephala* and var. *capitata* (Kale and Cabbage). Genomic DNA was isolated from the plants using column purification, and initial and nested PCR for GAPC was performed using degenerate primer pairs based on the GAPC sequence in *Arabidopsis thaliana*. Final PCR products were then cloned into the pJET cloning vector and propagated through transformation. Plasmids were isolated and restriction digestion was used to verify the presence of the GAPC PCR fragment. Verified plasmids were then sequenced and GAPC nucleotide sequences were aligned and assembled and verified using nucleotide BLAST. While we found there to be high conservation between our data and published GAPC sequences, we did discover variations within our chosen species. These sequences were then uploaded to the NCBI database for use in future evolutionary and functional studies of the GAPDH gene.

Ruggiero, M., Willever, K., Hamilton-Brehm, S., Moser, D., Campbell, J., Northwest Missouri State University, Desert Research Institute. **ISOLATION AND CHARACTERIZATION OF POTENTIALLY NOVEL BACTERIA FROM A TERMINAL, ALKALINE LAKE (WALKER LAKE) IN NEVADA.** Walker Lake, located near Las Vegas, Nevada, has been found to be an interesting source of uncultivated

bacteria when analyzed with next-generation sequencing techniques. As this lake dries and becomes more saline, the bacterial community has become more halophilic and alkaliphilic. We designed minimal media containing single carbon sources, inorganic salts, trace metals and vitamins to closely mimic the composition of the water from the Walker Lake sample. This allowed for the isolation and identification of potentially new species of the genus *Roseinatronobacter* and *Aquiflexum*. Ongoing physiological and biochemical characterization will allow comparison of these isolates to named species.

Saxena, S., Nims, J., Murphy, M., Janowiak, D., Saint Louis University. THE CONTRIBUTION OF GLUTATHIONE TO THE VIRULENCE OF STREPTOCOCCI IN MOUSE MODELS OF INVASIVE DISEASE. *Streptococcus agalactiae*, or Group B *Streptococcus* (GBS), infects populations with a compromised or under-developed immune system. Neonates are especially susceptible GBS-induced meningitis and sepsis. While penicillin has been used in the past to rid the body of infection and prevent transmission from GBS-colonized mothers to their infants during childbirth, GBS is capable of acquiring tolerance against the drug. Additionally, some patients are allergic to penicillin, and many strains of GBS are resistant to other common antibiotics. Therefore, new, more specific drug targets must be developed to prevent and combat GBS infection. GBS produces a variety of antioxidants that prevent the host's immune system from effectively clearing the bacteria. One such antioxidant is glutathione, a small thiol compound synthesized by the bifunctional enzyme gamma-glutamylcysteine synthetase-glutathione synthetase. The overall objective of this study is to determine the contribution of glutathione synthesis to the virulence of GBS in a mouse model of sepsis. Our central hypothesis is that GBS maintains high levels of glutathione in order to survive intracellularly. We have previously knocked out the gene responsible for glutathione synthesis in GBS (*gshAB*) and have shown the resulting glutathione-deficient strain of GBS to be more sensitive to immunologically-relevant oxidative stresses. Therefore, to test our hypothesis that glutathione synthesis plays an important role in defending GBS against the host innate immune response, we will compare the survivability and health of mice infected with wild type or glutathione-deficient GBS.

Thomas, C., Hamilton-Brehm, S., Willever, K., Moser, D., Campbell, J., Northwest Missouri State University, Desert Research Institute. PROKARYOTIC DIVERSITY OF AN AQUIFER IN THE MOJAVE DESERT. Studies of microbes in deep, subsurface water remain rare due to difficulty in

sample collection and lack of culturability of most bacteria and archaea. Water samples taken from an aquifer in the Mojave Desert displayed an immense diversity of bacterial species when analyzed with next-generation sequencing techniques. We designed minimal growth media to simulate environmental conditions of the aquifer and isolated a potentially novel strain of *Bacillus*. The isolate has shown a 98% similarity to the 16S RNA sequence of *Bacillus subterraneus*, isolated from an aquifer in Australia. Because 16S rRNA genes do not adequately distinguish strains of *Bacillus*, biochemical testing is ongoing to compare our isolate to the type strain of this species.

Biomedicine & Biotechnology

Steinmetz, M., Missouri State University. CHARACTERIZATION OF THE SIRT2 & SIRT3 HOMOLOGS THD13, 15, & 16 IN TETRAHYMENA THERMOPHILA. Histone deacetylases (HDACs) are proteins that remove acetyl groups from histone tails causing the development of the tightly compacted heterochromatin. In recent times a type of NAD⁺-dependent deacetylases known as sirtuins have been found to be associated with an extensive number of roles within the cell. In humans there are seven known sirtuins (SIRT1-7). Specifically, Sirt2 localizes to the nucleus and cytoplasm and is involved in several functions including cell-cycle control. In addition, it has been elucidated that Sirt3 localizes in the mitochondria and plays a role in the regulation of mitochondrial proteins and reactive oxygen species (ROS). Both of these sirtuins have been linked to aging and cancer. In *Tetrahymena thermophila* several homologs of the SIRT2 and SIRT3 genes exist including THD13, THD15, and THD16 as noted through bioinformatics. The aim of this project is to further elucidate the contribution of these histone deacetylases in repair mechanisms, particularly their involvement in the onset of cancer and age related disease. Expression of the THD13 gene displayed a significant change succeeding exposure to MMS and fluorescent imaging confirmed mitochondrial localization. In addition, bioinformatics and literature review further established the extensive roles of Sirt2 and Sirt3 in repair, genome stability, and disease.

Computer Science & Mathematics

Le, T., Seiffert, J., Truman State University. A NEW REINFORCEMENT LEARNING ALGORITHM FOR A GAME-PLAYING AGENT. Reinforcement learning is one of

the best approaches to machine learning that resembles human experience and which also enables adaptation in unknown contexts very well. Within the general family of reinforcement learning algorithms, there are powerful tools to help computers understand and learn completely unfamiliar environments, but many of the algorithms in common use have weaknesses. One key weakness is the inability to learn when the number of states used to represent the environment is large. Our research addresses this weakness by combining a reinforcement learning approach called Q-learning with another type of machine learning algorithm called Adaptive Resonance Theory (ART), a neural network algorithm in unsupervised learning, to comprehend more about artificial intelligences and to create an agent that can handle the weaknesses we have using traditional method and can learn and adapt to different environments. ART clusters the states into groups which represent similar states, so it helps Q-learning resolve the state-space dimension difficulty, and it also helps the reinforcement agent learn quicker by recognizing the similar states. By creating a new algorithm fusing Q-learning and ART we are able to demonstrate a more intelligent agent than the traditional methods allow. Our results are illustrated using the games Pac-Man and Bomber-man where we show our algorithm results in a higher rate of success than does the standard approach.

Conservation

Coomes, J., McGhee, J., Northwest Missouri State University. THE EFFECT OF ANNUAL POND SIZE VARIATION ON COMMON SNAPPING TURTLE CAPTURE RATES. The Common Snapping Turtle (*Chelydra serpentina*) plays an important role in aquatic ecosystems in northwest Missouri. Little information exists, however, on the habitat use of this species in this region. We began a mark-recapture study on the common snapping turtle to assess its use of three ponds near Mozingo Lake, Nodaway County, Missouri. We hypothesized that the likelihood of capture for common snapping turtles would increase in ponds with less variation in area over a ten year period, and more variation in emergent vegetation over the study period. Although we found no significant relationship between these parameters and capture rates, the study's small sample size precludes a significant result.

Rois, L., Merz, B., Parker, P., University of Missouri St. Louis, Saint Louis Zoo. CONSERVATION GENETICS OF THE AMERICAN BURYING BEETLE (*Nicrophorus americanus*). After disappearing from over ninety percent of its historical range by the 1980's, conservation of the American Burying Beetle (*Nicrophorus americanus*) became top priority

for the species, spurring a variety of studies investigating behavior, natural history, and genetics. Only a few natural populations remain in six states: South Dakota, Nebraska, Kansas, Oklahoma, Arkansas, and Rhode Island. In addition, two captive populations supplement three experimental (reintroduced) populations located in Massachusetts, Ohio, and Missouri. The rapidly advancing techniques in genetics allow for finer detailed understanding of population dynamics to guide management of captive and wild populations. Using a population genetics framework and microsatellite markers we addressed two main questions, asking: (1) whether three of the remaining natural populations are genetically distinct from each other; and (2) whether the Saint Louis Zoo captive breeding population successfully maintains the genetic diversity of the wild population from which its founders came. Dried specimens were collected from three locations; the Saint Louis Zoo, which was established from Fort Chaffee, AR beetles, the Roger Williams Park Zoo, established from Block Island, RI beetles, and the Nebraska wild population. Minimally invasive DNA extraction from unpreserved specimens was developed. Preliminary results from fragment analysis suggest that there are two genetically structured populations of *N. americanus* supported by the geographic isolation of the remaining natural populations and may suggest an extinct genetic signature.

Physics & Engineering

Shi, K., Anstine, D., Magrakvelidze, M., Chakraborty, H., Northwest Missouri State University. STUDY OF GIANT ENHANCEMENT AND ATTOSECOND DELAY IN PHOTOIONIZATION OF ATOMS CONFINED IN C240. We investigate the effects of confinement and electron correlation on the photoemissions of noble gas atoms sequestered endohedrally in C240. The time-dependent local density approximation (TDLDA) method [1] with Leeuwen and Baerends (LB94) exchange-correlation functional is employed. We study the moduli and phases of the photoionization dipole matrix elements involving atomic-type as well as atom-fullerene hybrid-type levels of the molecules and extract associated cross sections and angle-integrated Wigner-Smith time-delays [2]. We examine the size effects of the molecular cage on the plasmonically enhanced strength of the atomic ionization [3]. Furthermore, the behavior of emission time delays in attoseconds, induced by this enhancement as well as by the confinement-modified atomic Cooper minima, as a function of fullerene size is scrutinized in detailed. [1] Madjet et al., PRA 81, 013202 (2010); [2] Dixit et al., PRL 111, 203003 (2013); [3] Madjet et al., PRL 99, 243003 (2007). This work was supported by the U.S. National Science Foundation.

Science Education

Heyen, A., Hicks, F., Lincoln University, Rush University. INTEGRATION OF SIMULATION INTO AN AAS NURSING PROGRAM. A quality simulation program may enhance learning and improve student success. The purpose of the project was to develop a quality, sustainable simulation program by firmly integrating simulation into the curriculum. The objectives of the project were to: address barriers to full utilization of the simulation lab; incorporate simulation across the AAS and RN-BSN curricula; evaluate simulation as a teaching-learning strategy in nursing education at Lincoln University. The barriers to faculty utilization of the simulation lab were resolved and no new concerns identified. Integration of simulation into the curriculum progressed. Simulation was an effective learning strategy for the students. Simulation as a teaching strategy was also effective. Faculty should continue to incorporate and expand simulation into the AAS program, the BSN program and expand into the RN-BSN curricula. For simulation to continue to be successful, the University will need to invest monetary and human resources in the nursing program.

Social & Behavioral Sciences

Hearst, D., Koenig, E., Stockwell, M., Prabhu, P., Bruce, E., Moore, T., Truman State University. RACIAL DIFFERENCES IN INITIAL CONTACT MESSAGES IN ONLINE DATING. This research examines the effect of differences in race of the responder to an online personal ad in predicting the content of initial contact messages. Initial contact messages from 209 male personals were coded for race and whether specific reference was made to information in the target profile. 103 responded to a target profile that was of a “white” female, and 106 responded to the target profile of a “black” female. Results indicated that white men were significantly more likely to comment about information in the target ad. Chi square analysis showed that while men were significantly more likely to date within their race ($p < .001$), white men were significantly ($p < .001$) more likely to make reference to specific content in their initial contact with the target ad. Further, the “white” target ad was significantly more likely to receive an initial contact that made reference to specific content in the ad ($p < .025$). Why are white men more likely to try to win a woman’s attention with a comment or question specifically about her ad? Perhaps white men feel a need to “stand out” from the crowd of other males trying to attract a partner online through more “personalized” contact.

Hearst, D., Koenig, E., Prabhu, P., Stockwell, M., Moore, T., Bruce, E., Truman State University. YOU AT 21: A COURSE IN THE QUANTIFIED SELF. When people think of the Quantified Self movement, they often think in terms of wearable technology – smartwatches, chest straps, and other appliances designed to monitor health and biometric data. However, psychological science has long had a place at the forefront of individual differences research and the ability to truly quantify the self. You at 21 is a class designed for students to better know themselves and others through reminiscence, psychological and genetic testing, interviews, journaling, and life-logging. Seventeen students have now participated in two sections of the You at 21 course. Reminiscence is recorded every week, both to a specific prompt and to a meaningful picture from the student’s life. Psychological testing is done through the use of the self and observer measures of the Big 5, in addition to type testing with the Riso-Hudson Enneagram Type Indicator and the Color Code. Student evaluations of the class have been universally positive. The Quantified Self movement has beneficial applications in the lives of undergraduate psychology students, who can use the tools of psychological science to better understand themselves and their place in the world.

Jaehn, A., Park University. STRESS IN COLLEGE FRESHMEN: A COMPARISON OF DOMESTIC VS. INTERNATIONAL STUDENTS. The transfer from high school to college can be a stressful time for most students because of the number of transitions and adjustments people need to make. Individuals not only have to become familiar with a new environment, new expectations and rules, but also to adjust to a new daily routine. In addition, to these new things, many freshmen have to learn how to live together with one or more strangers in the smallest spaces; the residential (dorm) rooms. It is certain that the freshman year of college can be perceived as exciting and adventurous. However, it is worthwhile to take a look at students’ experienced stress and how it impacts one’s well-being. This examination would not be complete without comparing different types of freshmen. The emphasis lies on the comparison of native (domestic) versus non-native (international, study abroad) college freshmen and what they experience as they react to their first months in college. The literature review will discuss possible contributors to stress (i.e., adjustment process, homesickness, and the culture shock) and identify variables (i.e., maladaptive behaviors and weight gain) that may serve as indicators for perceived stress.

Santiago, C., Park University. SEX AND AGE DIFFERENCES IN OBJECT-LOCATION MEMORY. Are women more advanced than men at object-location tasks? Many researchers

have asked this question in the previous decades yielding interesting and varying results. Men are reported to perform higher on mental rotation tasks and navigation while women are better at recall and recognition. If there are gender differences in mental rotation activities, a form of spatial ability, do these relate to how men and women might perform on spatial tasks within realistic or applied settings? Given the importance of object-location memory, researchers have wondered whether factors (non-manipulated independent variables) other than sex influence people's recognition and location recall of stimuli. The current research study examined sex and age differences in object-location memory performance among 378 college students. There was partial support for the hypothesis that women are better than men at locating objects. However, the hypothesis that younger people are better than older people at locating objects was not supported. Implications for public policy are discussed.

Stockwell, M., Prabhu, P., Hearst, D., Koenig, E., Bruce, E., Moore, T., Truman State University. SHARK TANK: THE IMPACT OF GENDER, RACE, AGE, AND ATTRACTIVENESS. This study examined ninety-four contestants on the first two years of the ABC television show Shark Tank in terms of how characteristics such as gender, race, age, and perceived attractiveness impacted whether their business received funding and how much money their business was offered. Factors such as gender, race, and age are "protected" classes in terms of US Federal anti-discrimination law, and so bias in terms of these factors is important. Logistic regression analysis showed that although female contestants were perceived as more attractive than men ($p < .001$) and younger people were perceived as more attractive than older people ($p < .001$), there

were no significant differences in whether a business was funded or how much funding it received due to the factors of gender, race, age, or attractiveness. Contestants on Shark Tank were diverse in their gender, race, age, and attractiveness, but none of these factors were predictive of funding. Perhaps investors like Damon John, Robert Herjavec, Kevin O'Leary, Lori Greiner and Mark Cuban are successful precisely because they are able to tune out systematic biases and judge contestants purely on the merits of their business ideas.

Stockwell, M., Moore, T., Bruce, E., Koenig, E., Prabhu, P., Hearst, D., Truman State University. BUILDING THE QUINTESSENTIAL COMEDIAN: A DEMOGRAPHIC ANALYSIS. Demographic information of Comedy Central's top 100 stand up comedians was analyzed to find the characteristics that define the quintessential comedian, a comedian who has all of the major demographic characteristics. Previous research (Hatala & Horton, 2013) had shown an effect from birth order. Only children are significantly overrepresented in the rankings and ranked higher overall than first-born, middle-born, and last-born children. This study examined gender, socioeconomic status, religious heritage, and educational attainment. Compared to the general population, chi-square analysis found that comedians from this selection were found to be significantly overrepresented ($p < .005$) by men (93% of ranked comedians vs. 50% of the population), high school dropouts (60% vs. 11%), individuals born into a low socioeconomic status (90% vs. 25%), and individuals born into Jewish families (33% vs. 2%). These characteristics define the quintessential comedian. One comedian from this selection, Lenny Bruce, was found to have all of these characteristics, and was ranked third on Comedy Central's top 100 list.