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THE RELATIONSHIPS BETWEEN LANGUAGE USE AND THE BIG FIVE PERSONALITY FACTORS. Jodi Abshere, Wendy Barker, and Mary Dzindolet. Cameron University, Department of Psychology, 2800 Gore Blvd., Lawton, OK 73505.

Pennebaker found that the words individuals use when expressing emotion are related to personality. The purpose of this study was to examine the relationships among language use during task performance and personality. Twenty-six students completed the NEO PI-R Big Five personality inventory and performed two tasks. Correlational analyses found relationships between linguistic style and personality. For example, the higher one scored on the Neuroticism scale, the more often the person spoke in the past tense, $r(24)=.53, p<.05$, and the less often they spoke in the future tense, $r(24)=-.42, p<.05$. Extraversion, Agreeableness, and Conscientiousness scores correlated negatively with the use of past tense, $r(24)=-.64, p<.05$; $r(24)=-.45, p<.05$; $r(24)=-.64, p<.05$. Implications for future research are discussed.

CHARACTERIZATIONS OF RESERVOIR FOOD WEBS ALONG A LATERAL AND LONGITUDINAL GRADIENT (LAKE TEXOMA OK-TX). Tim Birdsong¹ and Rich Zamor². ¹Department of Biological Sciences, Southeastern Oklahoma State University, Durant, OK 74701; ²Department of Zoology, University of Oklahoma, 730 Van Vleet Oval Rm. 314, Norman, OK 73019

Because reservoirs are a prominent feature of the landscape and often of great regional economic importance, it is important for aquatic ecologists to understand how they function. Our specific objectives were (1) identify the food webs and (2) determine if food webs varied along longitudinal gradients in Lake Texoma, Oklahoma. Because environmental gradients have been identified both longitudinally and laterally in Lake Texoma, we examined fish communities and fish stomach contents along these zones. The stomach content of each fish was observed and food webs were drawn for near-shore and offshore areas of each of three longitudinal zones. Our analyses indicated distinct food webs present among the three zones with varying levels of connectivity in each. The greatest level of connectivity was in a transitional, near-shore habitat. This zone had a higher species diversity and greater abundance of omnivorous fishes. The wide-ranging diet of omnivorous fishes likely accounts for the high connectivity. The riverine sample included mainly detritivores while the lacustrine zone contained a higher relative abundance of piscivores. Our results suggest multiple food webs are present across the longitudinal gradient of Lake Texoma. Further research into food web structure in reservoir systems is needed to increase our understanding and improve our ability to make decisions involving the management of these valuable fisheries.

VACCINE-INDUCED SARCOMAS IN NORTHEAST OKLAHOMA FELINES AND VACCINATION PRACTICES USED BY VETERINARIANS Kris Bramlett. Department of Biology, Oral Roberts University, Tulsa, Oklahoma 76171

Risk of feline vaccine-induced sarcomas (VIS) has become prominent in veterinary medicine. A survey was developed to determine the significance of VIS in Northeast Oklahoma

andwhether vaccination protocols of local veterinarians showed an appropriate concern of the risk. Three risk factors for VIS were considered: 1) location at which veterinarians administer vaccines; 2) use of adjuvants, a common addition to vaccines, which have the potential of causing precancerous changes in surrounding cells; and 3) frequency with which veterinarians vaccinate felines, as a less frequent vaccination schedule decreases the risk of a VIS. A vaccination protocol developed in 1998 by the American Association of Feline Practitioners (AAFP) and the Vaccine-Associated Feline Sarcoma Task Force recommends specific sites for the three core vaccines (rabies, FELV, and FVRCP). Following this protocol permits amputation (if necessary) and facilitates identification of the causative vaccine. In the past three years, 33 suspected VIS were observed in the 77,515 cats vaccinated at 47 practices surveyed. This frequency (4.26/10,000) was significantly larger than the frequencies cited in earlier studies, e.g., 1/10,000, 1/5,000, 0.63/10,000. My survey requested veterinarians to estimate the number of suspected VIS observed in the past three years which may have caused an artificial inflation of results. However, the vaccination protocol could be improved, as only 54.7% of the felines received the three core vaccinations in the AAFP recommended locations, only 10.6% of the veterinarians used only adjuvant-free vaccines; and 87.3% of the felines were vaccinated for each of the three core vaccines on a yearly basis.

DETERMINGING LYCOPENE CONTENT IN MINIMALLY PROCESSED WATERMELON. B. A. Ceriotti¹, Stan Rice¹, J. K. Collins¹, and P. Perkins-Veazie².

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Red-fleshed watermelons are a rich source of the antioxidant lycopene. Diets rich in this carotenoid are implicated in reduced risk for cardiovascular disease and some cancers. It is not known if cutting or processing watermelon will reduce lycopene content. This study was conducted to determine if watermelon lycopene degraded after cutting and storage. Twenty watermelons each of a seeded and seedless cultivar were cut into 5 cm cubes and placed in unvented or vented polystyrene containers and held at 2°C for 3 or 7 days. Carbon dioxide and oxygen environments in boxes were monitored using a gas chromatograph to determine if the fruit became anaerobic. Lycopene content was determined by extracting watermelon tissue with a 2:1:1 ratio of a hexane, acetone, and ethanol mixture and absorbance of the hexane layer measured at 501 nm using a spectrophotometer. Lycopene content declined slightly after 7 days of storage with both cultivars and box treatments. Carbon dioxide levels increased while oxygen levels decreased in unvented boxes but did not reach anaerobic levels. An increase in carbon dioxide levels did not result in increased losses of lycopene.

TREEFALL LIGHT GAPS: PERCENT AREA AND AVERAGE SIZE IN A COSTA RICAN CLOUD FOREST. Brad Christoffersen. Southern Nazarene University, Bethany, OK 73008.

Treefall light gaps are the basis for the forest mosaic model of the tropical forest and play important roles in maintaining species diversity and contributing stages in the life cycle of many trees. This study was conducted in the QERC Tropical Montane Rain Forest of Costa Rica. The percent gap area of this oak/bamboo association was calculated using a canopy densitometer, clinometer, and line-point transect sampling. Six transects, 600-m long with an average of 100 data points, were analyzed. The average percent tree-fall-gap area of the forest was 5.1% with values ranging from 2.6% to 10.4%. Average transectal gap length, an indicator of average gap size, was 4.61 m, with values ranging from 1.69 m to 8.25 m. Significant differences among both sets of means were found. The Student-Newman-Keuls (SNK) test detected Zone C2 and C4 means having a significant difference in the case of gap length, but failed to detect significant differences among any pairs in the case of total percent

gap area. Because gaps are affected by so many conditions, they can serve as ecological indicators for climate and atmospheric change over long periods of time, as well as account for many differences in forests.

SPATIAL VARIABILITY AND RELATIONSHIPS AMONG SELECTED SOIL AND FORAGE TRAITS IN A WINTER WHEAT PASTURE. J. A. Gressett¹, C. T. MacKown², B. K. Northup², R. Slagell-Gossen¹. ¹Redlands Community College, El Reno, OK, 73036; ²USDA-ARS Grazinglands Research Lab, El Reno, OK, 73036.

Millions of stocker calves in the southern Great Plains are grazed each year on winter wheat (*Triticum aestivum* L.) pastures. During the first 3 weeks of grazing wheat, stockers often gain little or no weight even though the quality of forage is considered excellent. Because forage factors may affect stocker adaptation to wheat, spatial distributions of forage and soil traits in a 2-ha wheat pasture were measured to determine if soil traits could be used to predict forage availability and N composition. Samples were collected in a modified grid pattern with most samples spaced 5-m apart in eight rows spaced 15-m apart. Biomass ranged from 71 to 3980 kg/ha (mean = 1790 kg/ha, RSD = 35%) and had uniform protein level of 261 g/kg (RSD = 4%), but nitrate-N levels varied from 522 to 8420 mg/kg (mean = 4860 mg/kg, RSD = 31%). Nitrate-N levels exceeding 3.0 g/kg are potentially toxic to unadapted calves. Plant traits were unrelated to available soil N, which ranged from 16 to 249 kg/ha (mean = 72 kg/ha, RSD = 57%). Biomass was unrelated to soil pH (4.4 - 7.1), Mehlich III extractable P (22 to 135 mg/kg), and KCl extractable Al (1 to 32 mg/kg) in the top 10 cm of soil. Interpolated maps depicting distribution of traits across the wheat pasture demonstrate local scale variability and poor replication among map patterns. For pastures exhibiting forage with high nitrate, producers should evaluate variability in forage availability to insure stocking rates do not lead to excessive grazing and consumption of potentially high nitrate wheat stems.

ANALYSIS OF PHOTON DISTRIBUTION IN LIGHT GAPS OF A TROPICAL RAINFOREST. M. A. Hall. Department of Biology, Southern Nazarene University, Bethany, OK 73008.

Forest canopies do not uniformly filter light. The architecture of canopy trees and the geometry of canopy openings play vital roles in determining the spatial distribution of diffuse and direct radiation that reaches the forest floor. Because light plays a major environmental role, the spatial patterns of light availability will influence many variables. Knowledge of this distribution will contribute to the understanding of the rainforest ecology as a whole. From May 31, 2001 to June 20, 2001, data were collected, as part of a preliminary study, in hopes of finding a way to mathematically represent the distribution of light found in "gaps" created by canopy openings. The intensity of diffuse radiation was measured as a function of angle and distance from some central location. In addition, readings were taken from three different strata in the forest (canopy, understory and floor). Preliminary intensity distribution functions will be presented. With these results, we hope to build a model of the radiation flux received by the forest through light gaps. The study was conducted at the Quetzal Education and Research Center, San Gerardo de Dota, Costa Rica.

A COMPARISON OF SUBURBAN BIRD POPULATIONS OF TALLINN, ESTONIA AND TULSA, OKLAHOMA. Stephen Herr. Engineering/Physics Department, Oral Roberts University, Tulsa, OK 76171.

Republics of the Former Soviet Union suffered countless episodes of unbridled pollution. To investigate the effects of environmental damage, annual bird census were taken for five years in Tallinn, Estonia, and for comparison in Tulsa, Oklahoma. The two areas have similar population density, residential development, annual rainfall, and relief. Approximately equal numbers of species were observed in both areas; however, abundance of individuals was higher in Estonia. Finches and other small songbirds were especially abundant. Relative abundance ratings were formulated based on the daily likelihood of observing a species. In Tallinn, the highest ratings were recorded for the chaffinch, great tit, white wagtail, fieldfare, black bird, and hooded crow, as well as house and tree sparrows. In Tulsa, the most abundant species were the mocking bird, house finch, American robin, cardinal, blue jay, European starling, Canadian goose, and also the house and tree sparrows. The most obvious reason for higher abundance in Estonia is the greater forest cover and presence of wetland conditions. Also, a reverence for nature has encouraged better management of environments throughout cities and suburban areas with very little pesticide or fertilizer use. Not surprisingly, habitat preservation is the strongest factor in establishing strong wildlife viability.

TRILINABLE POLYGONS IN THE EUCLIDEAN PLANE. Michael Scott McClendon and Charles L. Cooper. Department of Mathematics, University of Central Oklahoma, Edmond, OK 73034.

An *m-trilivable point* is defined as a point in the interior of an *n*-gon *P* such that there exist three points x_1, x_2 and x_3 on *P* such that $d(x, x_1) = d(x, x_2) = d(x, x_3) = m$. In this paper we will describe various properties of *m*-trilivable points. Furthermore, we will describe necessary and sufficient conditions under which polygons contain *m*-trilivable points.

EISENHOWER PHYSICS TEACHERS' WORKSHOP: DEMONSTRATIONS AND LAB EXERCISES. Jerry D. McCoy and Saibal Mitra. Physics Department, University of Tulsa, 600 S. College Ave., Tulsa, OK 74104.

Ask most high school physics teachers how often they do classroom demonstrations and lab exercises and their answer will probably be, "NOT ENOUGH!!!" Yet most know how important good demos and exercises are to getting their point across and capturing their students' interest. They also know that building up an adequate arsenal of demos, exercises and the required equipment can take years, even if their primary training and teaching specialty is physics. With the help of an Eisenhower federal grant, we have been working to improve this situation for Oklahoma high school physics teachers. For the last three summers, we have presented a two-week workshop for instructors in their first years of teaching physics. The purpose of the workshop has been to help participants learn to create their own demos and lab exercises using readily available or easily obtainable equipment. Following the workshop, we have included the participants in a resource network of physics teachers. This talk will describe our efforts and the progress we have achieved.

A SURVEY OF THE MACRO-FUNGI OF PONTOTOC RIDGE NATURE PRESERVE. David L. Miller and Clark L. Ovrebo. Department of Biology, University of Central Oklahoma, Edmond, OK, 73034.

Pontotoc Ridge Nature Preserve is a 3000+ acre parcel of land in southern Pontotoc County, Oklahoma. Owned by the Nature Conservancy, it boasts cross-timbers forests, bottomland

hardwood forests and tall grass prairie. Clark Ovrebo has been collecting macro fungi there since 1996; David Miller initiated an intensive collecting program beginning in the fall of 2000. Transects were set up in two different forest sites: an upland forest site and a bottomland hardwood site. This study has two goals: to catalog the macro fungi of the preserve and to compare the fungal diversities of the two sites. Thus far, we have found that the upland forest has produced more fungi in terms of numbers of taxa and numbers of collections. The bottomland forest, although presumably moister, sustained extensive damage in the winter ice storms of 2000. As a result, it has been unsuitable for sampling. The gilled fungi and boletes of the Agaricales (Basidiomycotina) are the focus of this project. Some prominent taxa collected include: Family Amanitaceae: several species of *Amanita*; Boletaceae: *Gyroporus castaneus*, *Gyroporus purpurinus*, *Gyrodon (Boletinellus) meruloides*, *Boletus fraternus*, *Strobilomyces floccopus*, *S. dryophila*, *S. confusus*; Cortinariaceae: several species of *Inocybe*; Lepiotaceae: *Lepiota cristata*, *Lepiota rubrotincta*, *Leucocoprinus caepaestipes*, *Macrolepiota procera*, Russulaceae: *Lactarius piperatus*, *Lactarius volemus*, several species of *Russula*; Strophariaceae: *Hypholoma fasciculare*, *Pholiota albocrenulata*; Tricholomataceae: *Laccaria laccata* var. *palidifolia*, *Clitocybe gibba*, several species of *Gymnopus (Collybia)*, *Xerula radicata* var. *radicata*.

GENERATING NESTED DELETIONS IN GENOMIC CLONES HOUSED IN pJCPAC-MAM2. Kyle J. Moore and Jonathon S. Coren Ph.D. Department of Biology, Southwestern Oklahoma State University, 100 Campus Drive, Weatherford, OK, 73096.

The Human Genome Project relied extensively on the bacterial artificial chromosome (BAC) and the P1 artificial chromosome systems (PAC) to sequence the genome. The annotated genome sequence suggests there are 35,000 to 40,000 genes. Genomic DNA cloned into the improved PAC system (pJCPAC-MAM2) that we created grows in both bacterial and mammalian cells. This allows investigators to find genes based on their function. This PAC system can also be used in conjunction with retrotransposon vectors to determine gene boundaries by making nested deletions in individual library members. To investigate this latter role we constructed new retrotransposon vectors that contained different versions of a mutant *loxP* site and introduced them into two library members constructed in pJCPAC-MAM2. Deletions were generated and confirmed by FIGE gel electrophoresis. Therefore, one should be able to use this technology *in vivo* in mammalian tissue culture.

ANALYSIS OF THE JUNCTION BETWEEN THE UNIQUE LONG AND UNIQUE SHORT REGIONS OF THE BABOON CYTOMEGALOVIRUS GENOME. Susan R. Neubauer, Tami G. Ross and Earl L. Blewett. Oklahoma State University Center for Health Sciences, Tulsa, OK 74107.

We have recently cloned and sequenced the repetitive DNA region and adjacent genes at the UL/US junction in the BaCMV OCOM4-37 genome. When this region is compared with the homologous areas of the genomes of HCMV strains AD169, Towne and Toledo, several observations can be made. First, the BaCMV and the HCMV genomes are strongly conserved and the genes in BaCMV share co-linearity with HCMV. Second, the US region of BaCMV is inverted with respect to the prototype orientation of HCMV strain AD169. Third, the repetitive and inverted DNA region at the UL/US junction is much smaller in BaCMV than in HCMV. Finally, BaCMV retains gene homologs to the UL genes found in HCMV strain Toledo but not found in HCMV strain AD169.

MUSHROOMS OF LAWN AND GARDEN IN OKLAHOMA. Clark L. Ovrebo. Department of Biology, University of Central Oklahoma, Edmond, OK 73034.

During periods of wet weather, mushrooms and other fleshy fungi appear frequently in urban areas on lawns, gardens and compost piles. Most belong to the Basidiomycota and include the gilled fungi, boletes, stinkhorns, and puffballs. While some are edible, some are poisonous. Perhaps the most common of the lawn fungi is the poisonous *Chlorophyllum molybdites*. It occurs throughout the summer and early fall and is recognized by the large basidiomes, scaly pileus, and green lamellae and spores. Another common, large fungus occurring later in the summer is *Amanita thiersii*. Other lawn mushrooms found during the summer and fall include *Coprinus comatus*, *Marasmius oreades*, *Leucoagaricus naucinus*, *Agaricus campestris*, *Melanoleuca alboflavida*, *Conocybe lactea*, and *Coprinus plicatilis*. *Leucocoprinus breviramus* and *L. luteus* fruit on compost but the latter also occurs on lawns. Fruiting from buried wood is *Coprinus variegatus*; *Pluteus petasatus* occurs on wood chips. Ectotroph fungi like the genus *Russula* may occur if ectotroph trees are present. Although pines are not native to central Oklahoma, *Suillus brevipes* is commonly seen fruiting beneath them in the early winter. The stinkhorns *Phallus impudicus*, *P. ravenellii*, *P. rubicundus* and *Lysurus periphragmoides* occur on lawns or soil. Various puffballs are seen on lawns including the large *Calvatia cyathiformis*. Surprisingly, the spring mushroom, *Morchella esculenta*, can be found in yards especially under eastern red cedar.

POTASSIUM FIELD APPLICATION TO ENHANCE LYCOPENE CONTENT IN WATERMELON. K. Perez¹, S. Rice¹, P. Perkins-Veazie², W. Roberts³. ¹ Department of Biology, Southeastern Oklahoma State University, Durant, OK 74701; ²USDA-ARS, South Central Agricultural Research Laboratory, Lane, OK 74555; ³Department of Horticulture, Oklahoma State University, Wes Watkins Agricultural Research and Extension Center, Lane, OK 74555.

Watermelon contains potassium and is an excellent source of lycopene. Potassium helps lower blood pressure and improves circulation in the human body, and lycopene is an antioxidant that appears to reduce the incidence of some cancers. This experiment was done to determine if field applications of potassium fertilizer would enhance the potassium and lycopene content of watermelon. Potassium soil levels were adjusted with potassium chloride to achieve 0.5, 1 (recommended rate), 2, and 3 times recommended rates for watermelon production. Petiole levels of potassium were monitored through vine growth, and 40 melons per treatment were sampled. Rind thickness increased with increasing soil potassium. Watermelon flesh texture was highest at the recommended rate (1X) of potassium. Lycopene increased slightly with increased potassium application. These results indicate that altering potassium fertility in the field affected watermelon quality.

HIGH THROUGHPUT SEQUENCING OF THE BABOON CYTOMEGALOVIRUS GENOME. Tami G. Ross, Susan R. Neubauer, Earl L. Blewett. Department of Biochemistry and Microbiology, College of Osteopathic Medicine, OSU Center for Health Sciences, Tulsa, OK 74107.

Baboon cytomegalovirus (BaCMV) is a beta-herpesvirus closely resembling human cytomegalovirus (HCMV). Our laboratory is using BaCMV and baboons as models for CMV disease in humans. The genomic DNA sequence of the prototype BaCMV strain, OCOM4-37, will be useful information for our studies. We have cloned >95% of the BaCMV genome in plasmids or bacterial artificial chromosomes (BACs). We are sequencing each clone by DNA shearing/shotgun cloning or by introducing primer binding sequences by

transposon-mediated mutagenesis (NEB). The constructs are being sequenced at the OSU CORE Facility (Stillwater, OK) and in collaboration with the Human Genome Project Advanced Center for Genome Technology laboratory at the University of Oklahoma (Norman, OK). We have sequenced 120,000 base pairs of the approximately 200,000 base pair genome and this draft sequence is available in GenBank (Accession # AC090446).

POPULATION DYNAMICS OF *ECHINACEA PALLIDA* AT THE TALL GRASS PRAIRIE, OKLAHOMA. Adam K. Ryburn¹, Mark E. Payton², and Michael W. Palmer¹. ¹Department of Botany, ²Department of Statistics, Oklahoma State University, Stillwater, OK 74078.

Echinacea pallida, the pale purple coneflower, is a perennial herb native to the Great Plains. Although its relatives in the genus have been studied extensively because of the putative medicinal properties of some species and rarity of others, little is known about its biology. In a study of the population dynamics of the species, data were collected over a 4-year period from a site at the Tall Grass Prairie Preserve in northern Oklahoma. An exploratory investigation using logistic regression was conducted to explain causes of survivorship and recruitment within the population; 3528 individual plants were included in the analyses. Individuals were classified as "reproductive" (producing heads) and "vegetative" (basal rosettes only). Measured variables used in the analyses included sum of leaf lengths, maximum leaf lengths, number of leaves, and the squared values of these variables, which allowed for nonlinearity. Results of analyses confirm patterns in the data set. Recruitment from "vegetative" in one year to "reproductive" the following year was best explained by maximum leaf lengths, maximum leaf lengths squared, and number of leaves. Changes in state from "reproductive" to "vegetative" the following year were best explained by maximum leaf lengths and max leaf lengths squared. Survivorship of "vegetative" plants was best explained by number of leaves. None of the measured variables was able to explain significantly the survivorship among the "reproductive" plants.

ADAPTIVE RESISTANCE TO ANTHRAX LETHAL TOXIN. Isabelle I Salles, Amy Tucker and Jimmy D Ballard. University of Oklahoma, Department of Botany-Microbiology, 770 Van Vleet Oval, Norman, OK 73019.

Bacillus anthracis lethal toxin (LeTx), composed of protective antigen (PA) and lethal factor (LF), is selectively cytotoxic to mouse macrophages. LF is known to cleave the N-terminal domain of mitogen-activated protein kinase kinases (MAPKKs). This cleavage affects the activation of their target substrates; however, perturbation of MAPK signaling has not been directly linked to cytotoxicity of the toxin. Here we provide evidence that normally sensitive cells can develop an adaptive resistance to LeTx. Pretreatment of RAW264.7 macrophages with subcytotoxic doses of LeTx protect these cells against higher doses of the toxin. We showed that the adaptive resistance requires a functional toxin, MAPKK cleavage, and did not prevent subsequent toxin entry. The resistance was directly correlated with a different phosphorylation profile of ERK in pretreated versus nonpretreated cells. The latter presented a sustained level of ERK phosphorylation during an exposure to high doses of the toxin whereas pretreated cells displayed a remarkable decrease in the level of phosphorylated ERK. This differential response may be mediated by RAF1, an upstream activator of MAPKKs as an increase of this protein was observed in pretreated cells.

FIRST RECORD OF *LEPTODONTOMYS* (RODENTIA: EOMYIDAE) IN THE LATE MIOCENE (CLARENDONIAN) OF THE SOUTHERN GREAT PLAINS. Kent S. Smith^{1,2} and John J. Makipour¹. ¹Department of Zoology, University of Oklahoma and ² Sam Noble Oklahoma Museum of Natural History, Norman, OK 73019.

The first occurrence of *Leptodontomys* (Rodentia: Eomyidae) in the Clarendonian land mammal age of the southern Great Plains is reported herein. *Leptodontomys* sp. is represented by a single left m2 from the Whisenhunt Quarry, Beaver County, Oklahoma. The specimen was recovered from about 500 kg of rock matrix that was processed using a double-box system of screenwashing boxes. Except for the eomyid, this sample of rock matrix produced insectivore (Soricidae and Talpidae) and rodent (Castoridae, Cricetidae, and Zapodidae) taxa similar to those previously reported from this locality.

AN ENVIRONMENTALLY FRIENDLY EXTRACTION PROCEDURE FOR CAROTENOIDS. S. Stubenz¹, S. Rice¹, J. K. Collins², P. Perkins-Veazie², and W. Fish². ¹Southeastern Oklahoma State University, Durant, OK 74701-0609; ²USDA, ARS, South Central Agricultural Research Laboratory, Lane, OK 74555.

The autumn olive (*Eleagnus angustifolia*) is a wild plant whose small red berries are a rich source of lycopene, an antioxidant carotenoid. The lycopene in autumn olive is tightly bound in cell wall material and is difficult to extract using normal hydrocarbon solvent methods. Autumn olives also contain sizable amounts of waxes and lipids that must first be saponified; otherwise, these can be dissolved into the extraction solvent and cause analysis interferences. In addition, the solvents normally used in lycopene extraction are extremely flammable and hazardous, and waste disposal is expensive. In previous laboratory experiments, researchers found that lycopene could be easily extracted from watermelon and tomatoes using nonhazardous detergents. It was not known if autumn olives could be successfully extracted using the detergent methods. In this study six cultivars of autumn olives were extracted with a patent-pending detergent solvent method. Samples had been previously extracted using normal organic solvent methods. Extraction of carotenoids from autumn olive was successful using the detergent system; maceration of tissue and filtering were the critical steps in extraction. These results offer new promise for extracting lycopene from plant material with waxes and heavy cell wall material.

MAKING EVOLUTIONARY THEORY EXCITING AND RELEVANT: AN INTER-DISCIPLINARY APPROACH USED WITH HIGH SCHOOL STUDENTS. Erik Terdal, Mike Wilds and Kathi McDowell. Northeastern State University, 3100 E. New Orleans, Broken Arrow, OK 74014.

In our "Wildlife Forensics" Summer Academy (sponsored by a Summer Academy grant from the Oklahoma State Regents for Higher Education) we combined wildlife biology, criminal justice and genetics in an exciting scenario designed to teach evolutionary theory. The two-week program revolved around the investigation of the alleged killing of an endangered species, the gray wolf. The students investigated a mock crime scene and prepared the case for trial under the federal endangered species act. The defense argument was that the slain animal was a dog or a dog-wolf hybrid, not a pure wolf. This conflict could only be resolved by using theory about the speciation process. Students learned three ways to distinguish dogs and wolves: DNA, behavior, and skull morphology. This paper focuses on forensic craniometry. Students measured six real skulls from each species; the skulls were chosen to illustrate the natural variability within and between the species.

Students analyzed the data statistically and graphed the results for use in a moot trial. As expert witnesses for prosecution or defense, they used their data to explain to the "jury" (their parents) the speciation process. We believe this approach made evolutionary theory much more appealing to the students than would have a focus solely on speciation mechanisms.

EFFECTS OF METAL CONTAMINATION OF THE ENERGETICS OF THE RED-EARED SLIDER TURTLE (*TRACHEMYS SCRIPTA*) AND THEIR IMPLICATIONS FOR THE SPECIES AS A BIOMONITOR. Lee Anne Tome-Moeller and Joseph R. Bidwell. Department of Zoology, Oklahoma State University, Stillwater, OK 74078.

Red-eared slider turtle (*Trachemys scripta*) eggs were incubated in metal (lead, zinc, and cadmium) contaminated substrate or exposed to metals via direct application of metal solutions to the eggshells. Total and bioavailable metal content of substrates were determined as was metal content of eggshells, turtle shells, and turtle tissue minus the shell upon hatching. Metabolic rates of embryos in eggs were measured weekly. *T. scripta* eggs accumulated zinc from incubation substrates and from exposure to metal solutions. Zinc uptake was dose-dependent and differential among tissues depending on exposure route. No differences in mass specific metabolic rates of embryos were observed. Results indicate that *T. scripta* eggs may be good biomonitors of metal contamination in terrestrial substrates.