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Abstracts

- **Physical Sciences Programs at Baccalaureate-Degree-Granting, Independent Colleges and Universities in the Midwest: A Profile and Some Implications.**

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In order to establish a "profile" of physical sciences programs at small (enrollment < 3500), independent (private or nonpublic), baccalaureate-degree-granting (undergraduate) institutions in six Midwestern states, a questionnaire was sent to heads of the physical sciences (inclusive of programs in chemistry,

earth science/geology, physics and "other") at 65 colleges and universities. The questionnaire solicited information concerning the reporting institution, degree-granting majors' programs, numbers of faculty in the specific physical sciences disciplines, and annual numbers of degrees conferred in the various discipline programs. Based on the 26 usable responses, all but one institution grant a chemistry baccalaureate degree, 50 percent grant a degree in physics, and fewer than 12 percent offer one or more other degrees in a physical sciences discipline or discipline combination. The mean number of full-time-equivalent (fte) chemistry faculty is 2.5; the physics fte faculty is 1.5. (Median faculty numbers were lower for all disciplines.) Any other physical sciences discipline had a mean fte faculty less than one. The annual mean number of graduates per program was > 1.0 for chemistry (2.4), physics (2.1), and natural science (1.0) for institutions possessing the degree program. Implications of findings from the respondents relative to physical sciences program "vitality" are discussed, particularly issues of contributions of these institutions to the physical sciences workforce, apparent heavy faculty workloads and potential faculty isolation from colleagues.

- **The Significance of Residency and Body Size on the Aggression and Dominance of the Crayfish *Orconectes nais*.**

Hala U. Gali-Muhtasib, Department of Biology, American University of Beirut, Beirut, Lebanon.

Christopher C. Smith, Division of Biology, Kansas State University, Manhattan, Kansas 66506.

The aggressive behavior of *Orconectes nais* was examined in the laboratory with the aim of determining the influence of size and residence (familiarity with surroundings) on the outcome of individual encounters. After maintaining the crayfish in isolation for 24 hrs., residents won 80% of the encounters with intruders of the same size and 93.5% of the encounters with intruders of smaller size. Thus, residency was important in encounters where the intruder was equal or smaller in size. Crayfish size outweighed residency when the intruder was larger in size. The type of behavioral contact was different in the various size groups. When size differences were large, threat and avoidance were the common behaviors established upon contact. However, physical contact was more evident among individuals with smaller size differences. In similar sized individuals, physical contact usually led to fighting. The significances of the size-related dominance to natural populations is discussed.

- **Fish Communities in the Little Arkansas River Basin, Kansas 1884-1996.**

A.J. Strong, S. A. Wilkinson, and M. J. Lydy, Department of Biological Sciences, Wichita State University, Wichita, Kansas 67260-0026.

Information on fish populations in the Little Arkansas River Basin (LARB) was gathered from observations dating as far back as 1884, and from a comprehensive collection made in 1996. The results of the current project indicate there have been fluctuations in the fish community composition during the last 100 years, as highlighted by two species that have not been identified in the LARB in the last 25 years. Both *Notropis topeka* and *Moxostoma macrolepidotum* were collected from Sand Creek in Harvey County in 1884 and were not collected again in the basin after that date. *Notropis topeka* now is categorized as SINC (species in need of conservation) species in Kansas. This report represents a thorough account of fishes presently in the basin and provides an extensive baseline to be used for comparisons in the future.

- **Paleomagnetism of Pre-Illinoian Till Near Kansas City, Kansas.**

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Four till exposures in the Kansas City area were sampled and analyzed for remanent magnetism. These analyses indicate that unoxidized and unleached till has normal polarity. The primary carrier of remanent magnetism is magnetite. Normal polarity probably is recorded by detrital remanent magnetism (DRM) or post-depositional remanent magnetism (pDRM). Some of the oxidized and leached samples show evidence of alteration of the magnetite and the presence of mineral phases such as hematite, goethite, and maghemite. Normal polarity of till in the Kansas City area suggests that till was deposited within the last 780,000 years. Because glacial sediments are older than terrace deposits along the Kansas River containing the Lava Creek B ash (dated at 620,000 years old), glacial deposits probably are between 780,000 and 620,000 years old. Glacial sediments in the Kansas City area are time equivalent to the Independence Formation described in northeastern Kansas.

- **The Winged Mapleleaf, *Quadrula fragosa* (Conrad 1835) in Kansas.**

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Charles H. Cope, Kansas Department of Wildlife and Parks, Region 4 Office, 6232 E. 29 North, Wichita, Kansas 67220.

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Donald A. Distler, Department of Biological Sciences, Wichita State University, Wichita, Kansas 67260-0026.

Prior to 1925 only a few reports of *Quadrula fragosa* existed for streams in Kansas. Because of the absence of available specimens necessary to corroborate these accounts, the validity of these reports was brought into question, and the presence of this species in Kansas was discounted by some authorities in the state. An examination of shell material collected by Charles H. Cope in 1982 from the Neosho and Verdigris Rivers in Kansas confirms the historical presence of this species from both rivers.

- **Prescribed Burning Effects on Total Nonstructural Carbohydrates of Roughleaf Dogwood.**

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Walter H. Fick, Department of Agronomy, Kansas State University, Manhattan, Kansas 66506.

Roughleaf dogwood (*Cornus drummondii* Meyer) is a major invading shrub of the bluestem prairie. Production and availability of desirable forage species may decrease as the cover of this shrub increases. The objectives of this study were to relate total nonstructural carbohydrates (TNC) in roots to phenological growth stage and evaluate effects of late-spring (? May 1) prescribed burning on TNC concentrations. Roots samples were collected at 2-week intervals from burned and unburned experimental plots at two locations during the 1983 and 1984 growing seasons. The low point in the TNC cycle occurred at the full-leaf stage of development, followed by increasing concentrations between the full-leaf and full-bloom stages. A second period of increasing root TNC levels occurred during seed development. Maximum TNC levels in roughleaf dogwood occurred 1 to 2 months before the average freeze date, then declined in the late season after seed maturation. Root TNC concentrations of burned plants in both years were reduced on several sampling dates compared with those of unburned plants. The low point in TNC concentration was delayed 30 to 60 days for plants on the burned sites. Reduced root TNC levels were evident in 1984 when plants in plots burned only in 1983 were compared with those in unburned plots. Burning for 2 consecutive years reduced TNC levels of roughleaf dogwood more than burning for 1 year, delaying the low point until July. Root TNC levels had recovered completely when plants entered dormancy in the fall. Effects of late-spring burning on TNC levels may be useful for developing systems of integrated (burning + herbicide) brush management.

- **The Origin of the Negative Resistance found in Langmuir Probe Characteristics.**

R. Jones, Physics, Emporia State University, Emporia, Kansas 66801.

One or more regions of negative resistance are occasionally seen in Langmuir probe characteristics. We have identified several different causes for such perturbed probe traces.

- **Rephotographing Alexander Gardner's 1867 *Across the Continent on the Union Pacific Railway, Eastern Division*.**

John Charlton, Kansas Geological Survey, University of Kansas, Lawrence, Kansas 66047-3726.

The photographic series made by Alexander Gardner in Kansas between mid September and late October 1867 is the earliest and most diverse systematic photo-documentation of the American West. The Kansas series, originally titled *Across the Continent on the Union Pacific Railway, Eastern Division*, is an early part of a later series titled *Across the Continent on the Kansas Pacific Railroad*. The entire series systematically photo-documented the surveyed railroad line which began at the Mississippi River in St. Louis and ended at the Pacific Ocean near San Francisco, California. The Kansas series, consisting of several hundred views between Kansas City and Fort Wallace, in Western Kansas, documented the initial impact of the new railroad settlements on the native prairies. This was particularly true along the Smoky Hill river route where construction was in progress as shown in Gardner's pictures. This series makes an especially valuable source for a rephotographic series to detail visually the transformation of the Kansas landscape by the early European settlements along the railroad. The picture samples presented here along the Smoky Hill route were made using traditional rephotographic techniques of repeating the original views from as close as possible to Gardner's original vantage point, at the same day of the year, and at the same time of day. This offers both old and new views with the same lighting and environmental conditions to compare and contrast the subjects 130 years apart. The documentation of the present survey also will make rephotographic surveys of the series possible in the future.

- **Wheat Emergence and Yield as Related to Cultivar and Seed Treatment.**

William F. Heer, Department of Agronomy, Kansas State University, South Central Kansas, Experiment Field, 10620 S. Dean Rd. Hutchinson, KS 67501.

Fungicide seed treatments may be recommended for protecting winter wheat (*Triticum aestivum* L.) seedlings from seedborne pathogens. However, effects

of these seed treatments on stand establishment (emergence) and grain yield under field conditions are not clear. A 3-year field study was conducted to determine the effects of various fungicide seed treatments on emergence and grain yield of several commercial winter wheat cultivars in the south-central Great Plains. The research was conducted at Hutchinson and Caldwell, Kansas. Treatments consisted of six cultivars (main plot) and six seed fungicide treatments (subplot). The split-plot analysis of variance revealed no interaction between seed treatment and cultivar. A nonsignificant trend toward reduced emergence of seedlings from treated seed was evident across all cultivars. This trend, however, had non consistent effect of grain yield at either location. In areas of limited postemergence disease pressure, plants in plots where the seed is treated may compensate for reductions in stand (reduced emergence), such that grain yields will be similar to those from untreated seed. Thus, seed treatments should be considered when seed/soilborne pathogens are suspected or seed with poor or low germination or a reduced seeding rate is used.

- **Solvent Reaction Field Effects Upon the Trans/Gauche Conformational Equilibrium of 1,2-Dichloroethane in Aprotic Media.**

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The trans/gauche ratio for 1,2-dichloroethane was determined at 298°K from the respective infrared absorptions of the two conformations using FTIR techniques. From measurements in twelve aprotic solvents, it was determined that the ratio decreases as the solvent polarity increases in aprotic dipolar media. This solvent-dependent trend was analyzed in terms of the conformational free energy shift (ΔG°_c) arising from the coupling of dipolarity and polarizability factors within the reaction field. Of the several reaction field models examined, the McRae function proved to be superior in correlating the ΔG°_c data with solvent dielectric constant (E) and index of refraction (n) parameters.

- **Results from 30 Years of Kansas April Rural Mail Carrier Surveys.**

Roger D. Applegate¹ and Christopher K. Williams²

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April Rural Mail Carrier Survey (RMCS) trends for ring-necked pheasant (*Phasianus colchicus*), northern bobwhite (*Colinus virginianus*), cottontails (*Sylvilagus* spp.) And black-tailed jackrabbit (*Lepus californicus*) are similar (1963-97), and exhibit declines in the early 1970's followed by a leveling off. All species experienced all-time highs in the 1960's and 1983. Peaks for jackrabbits occurred in 1989 and 1992, and cottontails in 1991.

- **The Sharon Springs Roundup and Prairie Rattlesnake Demography.**

Henry S. Fitch, Division of Biological Sciences, University of Kansas, Lawrence, KS 66045.

In the present century rattlesnake roundups have become popular in various parts of the United States as a form of recreation and as a means of generating income for the sponsoring agencies. Various species of rattlesnakes including *Crotalus atrox*, *C. adamanteus*, *C. horridus*, and *C. viridis* are hunted. The only Kansas roundup was initiated in 1992 in the town of Sharon Springs and *C. viridis* is the species hunted. Attributes of the Kansas prairie rattlesnake as a game animal are its fertility (mean litter 10.7) and early maturity (third year). About 80% of females produce young each year, unlike more northern populations of the species that reproduce biennially or triennially. In the Kansas prairie, rattlesnakes natural attrition amounts to from one-fourth to one-third annually. Relatively few of the snakes survive for as long as ten years. In order to assure maintenance of a supply of snakes sufficient to provide the recreation and income expected from the roundup, conservation measures must be adopted. Size limits and bag limits should be enforced. About one-fourth of the snakes captured are gravid females, and these should be released unharmed to ensure a continuing supply.

- **Comparison of Waterfowl and Shorebird Use of a Man-made Wetland, Lake, and Pond.**

William Langley, Chris Frey, and Mike Taylor, Butler County Community College, El Dorado, Kansas 67042.

This study determined the extent to which waterfowl and shorebirds used a man-made wetlands compared with a lake and a pond in the area. During the 1997 spring migration, 26 surveys were conducted. A total of 14,057 waterfowl and 3,172 shorebirds were observed. During the early spring, the waterfowl

used the lake most, but during late spring, the wetlands were used most by surface-feeding waterfowl. Nearly all the shorebirds were observed at the wetlands. Of the 25 species of shorebirds observed, 24 species were seen at the wetlands, and 11 of these were recorded for the first time in Butler County. The man-made wetlands attracted waterfowl and shorebirds beyond what existing water habitats did in the area.

- **Weed Management in Planting of Tree and Shrub Seedlings with Sulfometuron Methyl (Oust).**

Wayne A. Geyer and Charles E. Long, Kansas State University, Manhattan, KS 66506, USA.

Sulfometuron methyl (Oust) at two rates was evaluated for use as a weed control agent with 26 broadleaf and coniferous species. Herbicidal application over newly planted seedlings is desirable to reduce weed control costs. Both rates (0.14 and 0.28 kg ai/ha) provided excellent control of broadleaf and grass weeds. Nearly all tree and shrub species exhibited some leaf damage; however, limited tolerance to the lower rate was exhibited by 18 species. Lower rates are suggested for both good weed control and injury tolerance, especially with band application and interrow cultivation.

- **Characterization of Antibodies Produced to Recombinant Polyomavirus Structural Proteins.**

Stefanie G. Thompson, Wendy M. Reeves, Ke An, and Richard A. Consigli, Section of Virology and Oncology, Division of Biology, Kansas State University, Manhattan, KS 66506.

Four polyomavirus antisera were examined and characterized. These antisera included a prokaryotic expressed recombinant VP1 antiserum, a baculovirus expressed recombinant VP1/2 antiserum, and for comparison, a virion polyclonal antiserum. The respective antisera were characterized for their ability to inhibit hemagglutination, to neutralize virus infection, and to detect polyomavirus proteins by immunofluorescence and Western blot assays. This research indicates that prokaryotic and eukaryotic expressed sources of the same antigenic proteins influence the properties of the antibodies produced.

- **Expert System Control of Plasma Experiments.**

R. Jones, Physics, Emporia State University, Emporia, KS 66801.

An expert system designed to assist in the operation of plasma physics experiments is described.