

# Transactions of the Kansas Academy of Science

## Contents of Volume 98 (1995)

### Numbers 1-2

#### SYMPOSIUM ON CATALYSIS IN THE CLASSROOM

- Catalysis in Bioinorganic Chemistry, p. 2-16. Daryle H. Busch. See [Abstract](#)
- Catalysis in Drug Design and Medicinal Chemistry, p. 17-23. William C. Groutas, Radhika Venkataraman and Rongze Kuang. See [Abstract](#)
- Building Heterogeneous Catalysts an Atom at a Time, p. 24-33. Kenneth J. Klabunde, Yong-Xi Li and Abbas Khaleel. See [Abstract](#)
- Catalysis in the Classroom: Materials for the Presentation of Ideas and Results from Bio-organic Chemistry, p. 34-43. Richard L. Schowen. See [Abstract](#)

#### TECHNICAL PAPERS

- The Cabeza de Vaca Basin Subspecies of the Lizard *Sceloporus undulatus*, p. 44-60. Hobart M. Smith, David Chiszar, Julio A. Lemos-Espinal and Edwin L. Bell. See [Abstract](#)
- Local Distribution of Prairie Voles (*Microtus ochrogaster*) on Konza Prairie: Effect of Topographic Position, p. 61-67. Schelle Hand Bixler and Donald W. Kaufman. See [Abstract](#)
- Range Extension of Southwestern Cupgrass (*Eriochloa acuminata*) into Kansas, p. 68-71. F.E. Northam and P.W. Stahlman. See [Abstract](#)
- Dielectric Continuum Assumption Applied to Binary Solvents Containing Acetonitrile with an Aromatic Cosolvent, p. 72-79. Orland W. Kolling. See [Abstract](#)

#### Short Note

- New County Records for Two Reptiles in Kansas, p. 80-81. Eugene A. Young and Max C. Thompson.

### Numbers 3-4

- Distribution of the Alligator Snapping Turtle (*Macrolemys temminckii*) in Kansas, p. 83-91. Paul A. Shipman, David R. Edds and Lenn E. Shipman. See [Abstract](#)

- Notes on the Hyporheic Rotifera of the Ninnescah River, Kansas, USA, p. 92-101. Paul N. Turner, Christopher Newport University and Donald A. Distler. See [Abstract](#)
- Biological Condition of an Agricultural Soil Six Years After Conservation Reserve, p. 102-112. Michael G. Noll, Curtis J. Sorenson and Charles W. Rice. See [Abstract](#)
- A Note on Dipolarity-Polarizability Effects for Aromatic Solvents, p. 113-117. Orland W. Kolling. See [Abstract](#)
- Spiders of the Kansas Ecological Reserves, p. 118-129. Hank Guarisco. See [Abstract](#)
- Organic Petrography of the Nodaway Coal (Upper Pennsylvanian) in Eastern Kansas, p. 130-143. Wolfgang Scherer and Daniel F. Merriam. See [Abstract](#)
- Plasma Parameter Optimization Using a Neural Network, p. 144-148. R. Jones. See [Abstract](#)
- Search for Gold and Other Heavy Elements in the Ultraviolet Spectra of A-Type Stars, p. 149-155. K.I. McDavitt, J.W. Manweiler and J.P. Davidson. See [Abstract](#)
- Decline in the Diversity of Bivalvia, Ninnescah River, Kansas, p. 156-159. Donald A. Distler and Daniel E. Bleam. See [Abstract](#)

### Short Notes

- An Archaeological Record of the Plains Pocket Gopher (*Geomys bursarius*) in Southwestern Missouri. Larry N. Brown.
- Geologic Mapping on Digital Orthophoto Quadrangle (DOQ) Images in Kansas. Daniel F. Merriam and Thomas D. Mettelle.

### Abstracts

- **Catalysis in Bioinorganic Chemistry.** Daryle H. Busch, Chemistry Department, University of Kansas, Lawrence, Kansas 66045.

Metallic elements, whose chemistries have been viewed traditionally as inorganic, play central roles in catalysis by metallo-enzymes and in energy transduction in vivo. Zinc ion is among the most abundant occurring in enzymes, especially in those promoting substitution reactions, and its role is illustrated with the example of carboxypeptidase A and its biomimics. Oxidation reduction chemistry is controlled in many organisms by heme proteins in which iron is the key element. Cytochromes P450 are discussed to illustrate the roles of the heme proteins. Essential elements of coordination

chemistry, and of iron and heme protein chemistry are presented to provide a basis for understanding.

- **Catalysis in Drug Design and Medicinal Chemistry.** William C. Groutas, Radhika Venkataraman and Rongze Kuang, Department of Chemistry, Wichita State University, Wichita, Kansas 67260.

The intimate relationship between rational drug design and mechanistic enzymology is illustrated using a range of examples taken from the current literature.

- **Building Heterogeneous Catalysts an Atom at a Time.** Kenneth J. Klabunde, Yong-Xi Li and Abbas Khaleel, Department of Chemistry, Kansas State University, Manhattan, Kansas 66506.

Nanometer-size metal particles attached to catalyst supports make up the most important class of industrial catalysts, and are vital to our fuel, textile, chemical, and environmental protection industries. How these interesting materials are produced and learning how they work is a fascinating topic, and is well-suited for classroom instruction. One approach is to prepare the nanometer particles by adding one atom at a time at low temperatures, using metal vaporization techniques. These and other recent experiments have shed light on detailed functions of the particles. Especially by studying bi-metallic systems, electronic and ensemble (geometric) effects have been clarified. In addition, strong-support-metal-interactions (SMSI) may be explained by geometric "decoration" effects. Thus, morphology is extremely important. Recent experiments on platinum-tin particles will be briefly reviewed. Studies in this area are leading the way in the new field of nanotechnology.

- **Catalysis in the Classroom: Materials for the Presentation of Ideas and Results from Bio-organic Chemistry.** Richard L. Schowen, Departments of Chemistry, Biochemistry, and Pharmaceutical Chemistry, University of Kansas, Lawrence, Kansas 66045-0046.

Recent developments in organic chemistry and biochemistry are shown as examples with which the classroom teacher can illustrate the main principle of catalysis, that catalysts stabilize transition states. Included are host-guest chemistry and molecular recognition leading to self-replication; biomimetic chemistry leading to artificial enzymes; abzymes or catalytic antibodies; agents that lead to the self-destruction of DNA; and ribozymes, or catalytic ribonucleic acids.

- **The Cabeza de Vaca Basin Subspecies of the Lizard *Sceloporus undulatus*.** Hobart M. Smith, Department of EPO Biology, University of Colorado, Boulder, Colorado, 80309-0334. David Chiszar, Department of Psychology, University of Colorado Boulder, Colorado 80309-0345. Julio A. Lemos-Espinal, Laboratorio de Conservacion, CyMA, UICSE Escuela Nacional de Estudios Profesionales Iztacala, UNAM, Apartado Postal 314, Tlalnepantla, Estado de Mexico, Mexico. Edwin L. Bell, Department of Biology, Albright College, Reading, Pennsylvania, 19612-5234.

The population of *Sceloporus undulatus* occupying the vast sand dune area of part of the ancient Cabeza de Vaca Basin of north-central Chihuahua, Mexico, belongs to the terrestrial *consobrinus* exerge, and is distinguished readily from its geographically closest described relative, *S. u. consobrinus*, by its late-developing, discrete semeions, not black-bordered, in males; the usual absence of scattered, black pigmentation ventrally in both sexes; usually a brightly striped dorsal pattern; much reduced or no paravertebral dark spots, usually replaced by a line; a marked seasonal variation in intensity of dorsal pigmentation in both sexes; dorsals usually (88%) 35-39; gular semeions usually (79%) separated medially. It is named *S. u. speari* in honor of Norman E. Spear, Distinguished Professor of Psychology at the State University of New York at Binghamton.

- **Local Distribution of Prairie Voles (*Microtus ochrogaster*) on Konza Prairie: Effect of Topographic Position.** Schelle Hand Bixler and Donald W. Kaufman, Division of Biology, Kansas State University Manhattan, Kansas 66506-4901.

Prairie voles (*Microtus ochrogaster*) were studied in ungrazed tallgrass prairie on the Konza Prairie Research Natural Area near Manhattan, Kansas in 1984-1987. Prairie voles on our topographically diverse site demonstrated a nonrandom association with topography as upland prairie was preferred over lowland and slope prairie. Preference for upland was highly consistent among male and female residents and nonresidents, however, absolute strengths of the preference for upland did differ among years and among sex-residency classes. For example, female residents were associated more strongly with upland prairie than were male residents, whereas male residents were more likely to be captured in lowland prairie than were female residents. Patterns of use of the three topographic positions also were more variable between years and between males and females for nonresidents than residents. The latter difference was consistent with nonresidents, in part, being dispersing voles that were moving through less than optimal habitat in their search for permanent home sites..

- **Range Extension of Southwestern Cupgrass (*Eriochloa acuminata*) into Kansas.** F.E. Northam and P.W. Stahlman, Kansas State University, Agricultural Research Center-Hays 1232 240th Avenue, Hays, Kansas 67601.

Specimens of southwestern cupgrass (*Eriochloa acuminata* (C. Presl) Kunth var. *acuminata*) were collected in Ellis County, Kansas, in 1992 and 1993. Hundreds of plants were observed growing in cultivated and disturbed sites covering at least 20 acres of floodplain soils on the Kansas State University Agricultural Research Center-Hays. Occurrence of this species on land associated with agricultural production suggests that initial introduction probably resulted from human transport of agricultural products. The adaptability of southwestern cupgrass to disturbed environments, plus reports of its weediness in other states, indicate that the species has potential as a pest in Kansas.

- **Dielectric Continuum Assumption Applied to Binary Solvents Containing Acetonitrile with an Aromatic Cosolvent.** Orland W. Kolling, Natural Science Division, Southwestern College Winfield, Kansas 67156.

Cosolvent systems containing the polar acetonitrile (AN) paired with a nonpolar or slightly polar aromatic component represent an adjustable but relatively broad interval for bulk dielectric constant (2 to 36 at 25°C). Trends in the Kirkwood, Block-Walker, Onsager, Brady-Carr, and Marcus continuum functions for solvent mixtures were examined for the specific case of acetonitrile:toluene and these were compared to results for the isodielectric pair, ethyl-benzene:toluene. The influence assigned to polarizability by the aromatic species is significant and was quantified for twelve monosubstituted and disubstituted benzenes in binary mixtures having acetonitrile as the cosolvent in common.

- **Distribution of the Alligator Snapping Turtle (*Macrolemys temminckii*) in Kansas.**

Paul A. Shipman<sup>1</sup>, David R. Edds and Lenn E. Shipman, Division of Biological Sciences, Box 4050, Emporia State University Emporia, Kansas 66801

<sup>1</sup>Present Address: Department of Zoology, Oklahoma State University Stillwater, Oklahoma 74078

During the spring and summer of 1991 we investigated the distribution of the alligator snapping turtle (*Macrolemys temminckii*) in Kansas by surveying 12 historical sites and 72 other possible sites of occurrence in southeastern Kansas

rivers and streams. Although we captured 1002 turtles of eight different species, no alligator snapping turtles were noted by us. However, a single adult female alligator snapping turtle was collected by anglers in May 1991. Documented records and reports of the alligator snapping turtle in Kansas are compiled and natural history information pertaining to this species in Kansas is reviewed.

- **Notes on the Hyporheic Rotifera of the Ninnescah River, Kansas, USA.**

Paul N. Turner, Department of Biology, Chemistry and Environmental Science  
Christopher Newport University, Newport News, Virginia 23606-2998

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

Rotifers present in North American lotic interstitial habitats, rarely have been documented in the literature. This type of habitat in the Ninnescah River was examined for rotifers in June, July, September, and November 1993 and January 1994. A 9-cm deep core was taken from the submerged bed of the river and immediately divided into three equal 3 cm subsamples. The resultant aliquots were examined and all rotifers were identified and enumerated. Twenty-four species, comprising 10 genera, were identified. Many rotifers of the Order Bdelloidea were unidentifiable, but three of these were distinguishable to the genera *Dissotrocha* and *Rotaria* and one to a probable new variant of *Dissotrocha aculeata*. The species occurring in greatest numbers were *Encentrum velox*, *Lecane luna*, *L. papuana*, *L. inermis*, and *Lepadella patella*, respectively.

- **Biological Condition of an Agricultural Soil Six Years After Conservation Reserve.**

Michael G. Noll and Curtis J. Sorenson, Geography Department, University of  
Kansas Lawrence, Kansas 66045

Charles W. Rice, Department of Agronomy, Kansas State University  
Manhattan, Kansas 66506

Microbial properties of Kenoma silt loam soil in Coffey County, Kansas, were investigated for a native tallgrass prairie, a field currently under cultivation, and a previously cultivated field that was reseeded to native grasses in 1986 as part of the Conservation Reserve Program (CRP). Soil samples were taken from the surface 10 cm and analyzed for soil respiration, microbial biomass carbon (C)

and nitrogen (N), N availability, and dehydrogenase activity. In comparison to soils in native prairie, measures of microbial quality in soils under cultivation decreased as follows: microbial biomass C and N by 67%, nitrogen availability by 37%, dehydrogenase activity by 68%, and respiratory rate by 69%. When CRP land was compared with soils in cultivation, no significant differences could be detected in terms of microbial biomass N, N availability, and dehydrogenase activity. The CRP land showed lower values of microbial biomass C, but a significantly higher respiratory rate. These results led to three important conclusions: First, the results strongly confirm that cultivation has a profound impact on native prairie soils. Second, the levels of soil microbial quality parameters in the reseeded prairie were not similar to those in the native prairie after a period of 6 years. Third, a higher respiratory rate in the reseeded prairie indicates a response of the soil microbial community to the reestablishment of permanent prairie vegetation. The latter point also was supported by a greater proportion of active pools of C and N in the reseeded prairie.

- **A Note on Dipolarity-Polarizability Effects for Aromatic Solvents.**

Orland W. Kolling, Natural Science Division, Southwestern College Winfield, Kansas 67156

For aromatic polar and apolar solvents, the solvent dipolarities ( $P_i^*$ ) from linear solvation free energy relationships (LSFE) can be correlated to their respective molecular dipole moments. The added secondary polarizability effects observed for these solvents usually have been rationalized in terms of the Onsager function in index of refraction. However, the interpretation of such secondary effects can be clarified by using a semiquantitative molecular orbital treatment of molecular polarizability-hyperpolarizabilities for the simple alkylbenzenes and halobenzenes.

- **Spiders of the Kansas Ecological Reserves.**

Hank Guarisco, Kansas Biological Survey, 2041 Constant Ave., Lawrence, Kansas 66047-2906

Henry S. Fitch, Fitch Natural History Reservation, 2060 E. 1600 Rd., Lawrence, Kansas 66044

A current checklist of the spiders of the Kansas Ecological Reserves of the University of Kansas is presented. It includes 249 species, which is

approximately half of the known spider fauna of the state. Recent taxonomic changes and synonymies are provided.

- **Organic Petrography of the Nodaway Coal (Upper Pennsylvanian) in Eastern Kansas.**

Wolfgang Scherer and Daniel F. Merriam, Intevep, SA, P.O. Box 76343, Caracas, Venezuela and Kansas Geological Survey, University of Kansas, Lawrence, Kansas 66047

The Nodaway coal, a thin but regionally persistent coal bed of Late Pennsylvanian age, was studied to determine the lateral variability of the organic facies, diagenesis of coal composition, and effect of hydrothermal and groundwater flushing on certain metallic ions. Representative samples were taken along the outcrop belt and analyzed by organic petrography and geochemical methods. The Nodaway is a vitrinite-dominated trimacerite, highly volatile, subbituminous (based on vitrinite reflectance) coal that has a fairly uniform petrographic composition along outcrop except across the Bourbon Arch and in the northern part of the Cherokee Basin where it changes laterally into a carbonaceous shale of silt. All coal samples show a statistically significant background in concentrations of Zn and Pb and local anomalies of about two orders of magnitude occur in two localities in southeastern Kansas.

- **Plasma Parameter Optimization Using a Neural Network.**

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

An artificial neural network program has been employed to model the performance of a plasma confinement device. Plasma density, temperature, and confinement are predicted as functions of the control parameters: magnetic field strength, neutral gas pressure, and input electrical power.

- **Search for Gold and Other Heavy Elements in the Ultraviolet Spectra of A-Type Stars.**

K.I. McDavitt, J.W. Manweiler and J.P. Davidson, Department of Physics and Astronomy, University of Kansas, Lawrence, Kansas 66045

Using a DEC-VAX program Viris, a KU-developed interactive computer program, several chemically peculiar (CP) stars have been searched for the presence of gold in the spectral images of the International Ultraviolet Explorer

(IUE). The presence of Au was observed in several sets of images from the short wavelength primary (SWP) camera aboard the IUE satellite. A strong Au II line was noted at 1800.58 Å in Cnc (HD 78 316) in order 77 of SWP images 1352, 3086 and 3960; Lup (HD 141 556) in order 77 of SWP images 4688 and 4689; and CrB (HD 143 807) in order 77 of SWP image 1334.

- **Decline in the Diversity of Bivalvia, Ninnescah River, Kansas.**

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

At least 22 species of bivalve mollusks historically have occurred in the Ninnescah River Basin. Fifteen native unionacean species are extirpated and six exist in low numbers. The exotic species, *Corbicula fluminea*, is the most abundant and widespread bivalve in the system. Slow climatic changes from cool-moist to warm-dry following the last glacial period and rapid changes in stream regimen initiated by EuroAmerican settlement of the region in the 1880's are proposed as factors in this decline.