

1993

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PROGRAM

Arkansas Academy of Science

Seventy-Seventh Annual Meeting

2-3 April, 1993

Henderson State University at Arkadelphia

Friday, April 2, 1993

Registration	Garrison Activity Center 1st floor lobby
Executive Committee	Dawson Room, 2nd floor West
First Business Meeting	Auditorium, 1st floor West
Exhibits-Refreshments	Hallway, 2nd floor South

Paper Sessions

Biomedical	Cabe Room, 2nd floor South
Vertebrate Zoology	Ross Room, 2nd floor West
Botany	Wilson Room, 2nd floor South
Organic Chemistry and Biochemistry	Room D209, 2nd floor West
Physics, Math, Geology,	Galloway Room, 2nd floor South
Engineering	
Banquet	Banquet Hall, 2nd floor South
Speaker: Mr. Richard Hoover Title: "The Unseen World"	Auditorium, 1st floor West

Saturday, April 3, 1993

Registration	Garrison Activity Center 1st floor lobby
Exhibits-Refreshments	Hallway, 2nd floor South
Second Business Meeting	Auditorium, 1st floor West
Science Education Committee Meeting	Jones Room, 1st floor Center

Paper Sessions

Inorganic-Physical Chemistry	Room D209, 2nd floor West
Physics, Engineering	Galloway Room, 2nd floor South
Aquatic and Environmental Biology	Wilson Room, 2nd floor South
Vertebrate Zoology	Ross Room, 2nd floor West
Invertebrate Zoology	Ross Room, 2nd floor West
Microbiology and Molecular Biology	Cabe Room, 2nd floor South
Science Education	Room D209, 2nd floor West
Friday D202, Saturday L217	

SECTION PROGRAMS

*Undergrad

**Grad Students

Friday, April 2, 1993

BIOMEDICAL

Chair: Clifton Orr, University of Arkansas at Pine Bluff

*Sensitization of Human Multiple Transitional Cell Carcinoma Cells to Cisplatin by Anguidine. Sedrick C. Rice, Angela W. Davis, Mattie M. Glover and Clifton Orr, Department of Biology, University of Arkansas in Pine Bluff, AR.

*Sensitization of Human Multiple Transitional Cell Carcinoma Cells to Platinum Anticancer Drugs by Anguidine. Miriam M. Glass, Jacqueline A. Potter, Sedrick C. Rice, Mattie M. Glover and Clifton Orr, Department of Biology, University of Arkansas at Pine Bluff, AR.

*Differentiation of Dimethyl Sulfoxide (DMSO) Treated Cells into Granulocytic Cells as Detected by Immunophenotyping and Flow Cytometry. Angela W. Davis and E. Timm, Jr., Department of Biology, University of Arkansas at Pine Bluff, AR and Roswell Park Cancer Institute, Buffalo, NY.

*Effects of Ephedrine Isomers and Their Oxazolidines on Locomotor Activity in Rats. Lance M. Williams, Lawrence D. Fitz and Richard B. Walker, Chemistry Department, University of Arkansas at Pine Bluff, AR.

*Long-Term Follow-Up of Atrial and Ventricular Electrograms and Their Correlation with Chronic Capture Thresholds. Jeffrey B. Marott, J. E. Val-Mejias, (Bruce Haggard). Hendrix College, Conway, AR and Wichita Institute for Clinical Research, Inc., Wichita, KS.

Potential Impacts of the Use of Female Condoms on the incidence of HIV Infections in U.S. R. R. Gorforth and S. A. Goforth, Computer Systems Engineering, University of Arkansas at Fayetteville and Holt-Krock Clinic, Fort Smith, AR.

VERTEBRATE ZOOLOGY

Chair: J. D. Wilhide, Arkansas State University

Distribution of the Paleback Darter, *Etheostoma pallidorsum*, an Ouachita Mountain endemic. Mitzi G. Pardew, Betty G. Cochran and William R. Posey II, U.S. Forest Service, Ouachita National Forest, Mt. Ida and Glenwood, AR, Henderson State University, Arkadelphia, AR.

New Distributional Records for Arkansas Sturgeons. Thomas M. Buchanan, Henry W. Robison and Ken Shirley, Department of Biology, Westark Community College, Fort Smith, AR, Department of Biological Sciences, Southern Arkansas University, Magnolia, AR and Arkansas Game and Fish Commission, Little Rock, AR.

Changes in the Arkansas Fish Fauna From 1988 to 1993. Henry W. Robison, and Thomas M. Buchanan, Southern Arkansas University, Magnolia, AR, Westark Community College, Fort Smith, AR.

Distribution of the Mole Salamander, *Ambystoma talpoideum* (Urodela: Ambystomatidae), in Arkansas with Notes on Paedomorphic Populations. Stanley E. Trauth, Betty G. Cochran, David A. Saugey, Williams R. Posey and Wesley A. Stone, Department of Biological Sciences, Arkansas State University, State University, AR, U.S. Forest Service, Caddo Ranger District, Glenwood, AR, and U.S. Forest Service, Ouachita National Forest, Jessieville, AR.

Histology of the Caudal Hedonic Glands in the Dark-Sided Salamander, *Eurycea longicauda melanopleura* (Urodela: Plethodontidae).

Stanley E. Trauth, Richard D. Smith and Abby Cheng, Department of Biological Sciences, Arkansas State University, State University, AR.

Break

Enlarged Posterior Maxillary Teeth in the Scarlet Snake, *Cemophora coccinea* (Serpentes: Colubridae), Using Scanning Electron Microscopy. Stanley E. Trauth, Department of Biological Sciences, Arkansas State University, State University, AR.

Extralimital Hummingbirds in Arkansas: An Update, Discussion of Key Traits and the Conservation of Individual Birds. William H. Baltoszeg, E. Perk Floyd, Max D. Parker, Thomas L. Foti and William M. Shepherd, Department of Biology, University of Arkansas at Little Rock, AR, Arkansas Audubon Society, Malvern, AR, Arkansas Natural Heritage Commission, Little Rock, AR.

Unhatched Eggs in Nests of Red-Cockaded Woodpeckers. Joseph C. Neal, Warren G. Montague, Claudia F. Bailey and Douglas A. James, Poteau Ranger District, Waldron, AR, and Department of Biological Sciences, University of Arkansas, Fayetteville, AR.

Arkansas Range Extensions of the Eastern Small-Footed Bat (*Myotis leibii*) and Northern Long-Eared Bat (*Myotis septentrionalis*) and Additional County Records for the Hoary Bat (*Lasiurus cinereus*), Silver-Haired Bat (*Lasionycteris noctivagans*), Southeastern Bat (*Myotis austroriparius*) and Rafinesque's Big-Eared Bat (*Plecotus rafinesquii*). David A. Saugey, Daniel R. England, Laura R. Chandler, V. Rick McDaniel, Marsha C. Rowe and Betty G. Cochran, U.S. Forest Service, Ouachita National Forest, Jessieville, AR, Department of biology, Southern Arkansas University, Magnolia, AR, Department of Biology, University of Arkansas at Little Rock, AR, Department of Biology, Arkansas State University, State University, AR, Stamps High School, Stamps, AR, and U.S. Forest Service, Ouachita National Forest, Glenwood, AR.

BOTANY

Chair: James Rasmussen, Southern Arkansas University

Costs and Benefits of Endophyte in Tall Fescue, E.L. Piper and C.P. West, Departments of Animal Science and Agronomy, University of Arkansas, Fayetteville, AR.

Influence of Genotype and Culture Medium on Callus Induction from Tall Fescue Leaves. M.E. McConnel, C.P. West and E.L. Piper, Department of Agronomy and Animal Science, University of Arkansas, Fayetteville, AR.

Effects of Fescue Alkaloids on In Vitro Prolactin Release. T.M. Danard, E.L. Piper, A.S. Moubarak and D.H. Hays, Dept. of Animal Science, University of Arkansas, Fayetteville, AR.

Effects of Selected Allelochemicals on Isolated Mitochondria and Chloroplasts. James A. Rasmussen, Frank A. Einhellig and Angela M. Hejl, Department of Biological Sciences, Southern Arkansas University, Magnolia, AR, Graduate Studies and Research, Southwest Missouri State University, Springfield, MO, and Department of Biology, University of South Dakota, Vermillion, SD.

Effect of Light, Nitrogen, and Water Management on Rice (*Oryza sativa*) Tolerance to Fenoxaprop. Roy J. Smith, Jr., Aurora M. Baltazar and Paolo Nastasi, U.S. Dept. Agr., Agr. Res. Serv. and Univ. of Arkansas, Stuttgart, AR.

**Examination of Resistance of Apple Genotypes to Apple Bitter Rot. Yan Shi, Curt Rom and J.C. Correll, Dept. of Hort. and Forestry, and Plant Pathology, Univ. of Arkansas, Fayetteville, AR.

Break

*Stress Induced Protein Changes in Tall Fescue. Robbin L. G. Long, Lance T. Adams, Jerry D. Corley, Alvan A. Karlin, B.L. Parsons, M.G. Kleve and Kurt J. Henle, Department of Biology, University of Arkansas at Little Rock, Department of Medicine and Physiology/Biophysics, University of Arkansas for Medical Sciences and VA Medical Center, Little Rock, AR.

*A Vegetation and Floristic Study on DeGray Lake. Piers Majestyk and Stephanie Modisett, Department of Biology, Henderson State University, Arkadelphia, AR.

Additional Occurrences of the Bog Clubmosses in Southern Arkansas. James R. Bray and Daniel L. Marsh, Department of Biology, Henderson State University, Arkadelphia, AR.

Occurrence of Hybrid Honey Locust (*Gleditsia X texana* Sarg.) in Southwest Arkansas. Brian A. Smith and Daniel L. Marsh, Henderson State University, Department of Biology, Arkadelphia, AR.

Botanical Inventory of a Cypress-Tupelo Swamp. Veryl V. Board, Charlotte Allen and Andrea Reeves, Natural Sciences and Mathematics Division, Arkansas College, Batesville, AR.

Leaf and Fruit Variation in the Maple-Leaved Oak, *Quercus shumardii* Buckl. var. *acerifolia* Palmer (Fagaceae). George P. Johnson, Biological Sciences, Arkansas Tech University, Russellville, AR.

George Engelmann's Plant Explorations in Arkansas Territory, 1835. Harriet H. Jansma, Communications Director, Office of University Relations, University of Arkansas, Fayetteville, AR.

BIOCHEMISTRY AND ORGANIC CHEMISTRY

Chair: John Hardee, Henderson State University

*Calcium Uptake and Binding by the Basal Plasma Membrane of the Human Placental Syncytiotrophoblast. Carl Smith, Sid Kammath and Neena Haider, Washington University School of Medicine, Dept. of Pediatrics, St. Louis, MO.

*Preparation of $C_{64}H_{54}F_{24}P_4Ru_2S$. Mandy Prosser, Edmond Wilson and Bill Durham, Department of Chemistry, Harding University, Searcy, AR and Department of Chemistry and Biochemistry, University of Arkansas, Fayetteville, AR.

*Isolation and Purification of Glutathione Reductase. David C. Limburg and Marsha McNutt, Harding, University, Searcy, AR.

*Oxidation-Bromination of Tetrahydrothiophene. Edward Boone and David Cole, Department of Chemistry, Harding University, Searcy, AR.

The Use of Sodium Percarbonate in the Oxidative Cleavage of alpha-Diketones. Teresa T. Evans and Dominic T. C. Yang, Department of Chemistry, University of Arkansas at Little Rock, AR.

Break

Determination of Hammett Pyridine 3-Aza and 4-Aza Replacement Constants by 1H NMR Studies of Amide Systems. Frank L. Setliff, Nikhil G. Soman and Alan D. Toland, Department of Chemistry, University of Arkansas at Little Rock, AR.

**X-Ray Structure Determination of Oxazolidines Derived from

Ephedrine. Lawrence D. Fitz, Ram Kashyap, Lance M. Williams, Lakasa C. Wyatt and Richard B. Walker, Chemistry Department, University of Arkansas at Pine Bluff, AR.

*Effects of Aromatic Ring Substituents on the Rates of Hydrolysis of Oxazolidines Derived from Ephedrine Isomers and Aromatic Aldehydes. Lakasa C. Wyatt, Lance M. Williams, Lawrence D. Fitz and Richard B. Walker, Chemistry Department, University of Arkansas at Pine Bluff, AR.

A Study of the Reaction Using General-Acid Catalysts in the Reduction of Substituted Benzoquinones by N-Methyl Acridan. Hollie C. Walton and Gaston Griggs, Department of Chemistry, John Brown University, Siloam Springs, AR.

Small Basic Proteins of *Crotalus horridus horridus*; Variation of Compositions and Structure in Groups and Individuals. Michael L. Merchant and Collis R. Geren, University of Arkansas, Department of Chemistry and Biochemistry, Fayetteville, AR.

PHYSICS, MATH, GEOLOGY, ENGINEERING

Chair: Jules Mollere, Henderson State University

HIV infection and the Intravenous Drug Abuser Community: Analysis and Predictions. Jun Yuan, Daniel Berleant and R. Ron Gorforth, Dept. of Computer Systems Engineering, University of Arkansas, Fayetteville, AR.

Note** User-Interface Coding for the Cern/Geant Nuclear Physics Program. David L. Roetzel and W. J. Braithwaite, Physics and E&I, University of Arkansas at Little Rock, AR.

**Time Projection Chamber's Efficiency, Obtained Using Cern's Geant Code. Charles M. Byrd, Christine A. Byrd and W. J. Braithwaite, Physics/E&I, UALR, Little Rock, AR.

*Monte Carlo Detector Modeling and Display, Using the Cern Library. Christine A. Byrd, Charles M. Byrd and W. J. Braithwaite, Physics/E&I, University of Arkansas at Little Rock, AR.

Break

**Vertebrate Remains from Red River, Southwest Arkansas. Terry A. Sanders, Southern Arkansas University, School of Education, Magnolia, AR.

Sinkhole Excavations in Peccary Cave, Newton County, Arkansas. Leo Carson Davis and Kenneth M. Ball, Department of Physical Sciences, Southern Arkansas University, Magnolia, AR and El Dorado High School, El Dorado, AR.

INORGANIC AND PHYSICAL CHEMISTRY

Chair: James Graham, Henderson State University

A Reevaluation of Distortional Isomerism in $[LWOCi_2]PF_6$. Patrick J. Desrochers and John H. Enemark, Department of Chemistry, University of Central Arkansas, Conway, AR and Department of Chemistry, University of Arizona, Tucson, AZ.

*Gas Phase Reactions of Au^+ with Ethane, Propane and n-Butane. E. E. Ward, W. S. Taylor, L. M. Babcock and T. L. McNeal, Department of Chemistry, University of Central Arkansas, Conway, AR and Department of Chemistry, University of Georgia, Athens, GA.

Reduced Species in Rainfall. David M. Chittenden, Department of Chemistry and Biochemistry, Arkansas State University, State University, AR.

The S-H Stretching Frequencies in Ruthenium Mercaptan Complexes and the Crystal and Molecular Structures of $[\text{CpRu}(\text{PPh}_3)_2(\text{s-C}_4\text{H}_9\text{SH})]\text{BF}_4\text{CH}_2\text{Cl}_2$ and $[\text{CpRu}(\text{PPh}_3)_2(\text{i-C}_4\text{H}_9\text{SH})]\text{BF}_4\text{CH}_2\text{Cl}_2$. Haengsoon Park, David Minich, M. Draganjac, Joey W. Crump, A. W. Cordes and Elizabeth M. Holt, Department of Chemistry and Biochemistry, Arkansas State University, State University, AR, Department of Chemistry and Biochemistry, University of Arkansas, Fayetteville, AR, and Department of Chemistry, Oklahoma State University, Stillwater, OK.

PHYSICS AND ENGINEERING

Chair: L. Carson Davis, Southern Arkansas University

Summary of K- & L-Shell Ionization by Carbon Ions. Rahul Mehta, Department of Physics, University of Central Arkansas, Conway, AR.

Measurement of NP-Elastic Analyzing Power and Spin Transfer. Heather L. Woolverton, University of Central Arkansas, Department of Physics, Conway, AR.

The Current Effect on the Electron Driven Shock Waves. Mostafa Hemmati, Arkansas Tech University, Physics Department, Russellville, AR.

Pressure Balance at Magnetopause Crossings. Dean Hirschi, University of Central Arkansas, Department of Physics, Conway, AR.

**Superconducting Interconnects for Multichip Modules. R. G. Florence, S. S. Ang and W. D. Brown, Department of Electrical Engineering, University of Arkansas, Fayetteville, AR.

Break

**Sputter Deposition and Thallination of TI-Ba-Ca-Cu-O Superconducting Thin Films. T. H. Dhayagude, S. S. Ang and W. D. Brown, Department of Electrical Engineering, University of Arkansas, Fayetteville, AR.

**Semi-Insulating Polysilicon Hetero- and Isotype Junctions on Silicon. R. M. Ranade, S. S. Ang and W. D. Brown, Department of Electrical Engineering, University of Arkansas, Fayetteville, AR.

*Electrodeposition of Mixed II-III₂-VI₄ Semiconductor Phases as Potential Thin Film Solar Cell Materials. Robert D. Engelken, Chris Poole, Larry Yu and Gerard Williams, Department of Engineering, Arkansas State University, State University, AR.

*Investigation of Quasi-Nernstian Behavior of Open-Circuit Potentials with Compound Semiconductors Under the NASA Jove Program. Robert D. Engelken, Gerard Williams, Larry Yu and Chris Poole, Department of Engineering, State University, AR.

AQUATIC AND ENVIRONMENTAL BIOLOGY

Chair: Billy Teague, Cooperative Extension Service

Distribution and Population Structure of Freshwater Mussels (Unionidae) in Lake Chicot, Arkansas. John L. Harris, Pete Rust, Steven W. Chordas III and George L. Harp, Department of Biological Sciences, Arkansas State University, State University, AR.

**The Ichthyofauna of the Village Creek System. Anthony L. Holt and George L. Harp, Department of Biological Sciences, Arkansas State University, State University, AR.

Culvert Modification to Provide Passage for Orangebelly Darters, *Etheostoma radiosum*. Richard W. Standage, Herbert L. Mansbridge and Karen M. Hartman, USDA, Forest Service, Ouachita National Forest, Hot Springs, AR and USDA, Forest Service, Ouachita National Forest,

Fourche Ranger District, Danville, AR.

**The Fishes of Bayou Meto and Wattensaw Bayou, Two Lowland Streams in Central Arkansas. Walter Dean Heckathorn, Arkansas Fish and Wildlife Cooperative Unit, University of Arkansas, Fayetteville, AR.

Effects of Urban, Nonpoint Source, Stormwater, Runoff on Water Quality, Woodruff Creek, Sherwood, (Pulaski County) Arkansas. Chris A. King, Department of Geology, University of Arkansas, Fayetteville, AR.

Break

Nitrates in Arkansas' Private Rural Water Supplies: Water Sampling and Site Evaluation. Billy Teague, Phil Tacker and Stanley Chapman, University of Arkansas Cooperative Extension Service, Little Rock, AR.

*A Three Year Study of a Cypress-Tupelo Swamp. Veryl V. Board, Charlotte Allen and Andrea Reeves, Natural Sciences and Mathematics Division, Arkansas College, Batesville, AR.

Environmental Analysis of the Coddoo River and Its Tributaries: Comparison of Water Quality During 1992 with 1974-75. Kelly L. House, J. D. Bragg, Clark Kuyper, T. Kent Thomas and Renn Tumblison, Garland County Community College, Hot Springs, AR, Henderson State University and Ouachita Baptist University, Arkadelphia, AR.

**Some Effects of Sewage Effluent on an Ozark Stream. Linda E. Moss and George L. Harp, Department of Biological Sciences, Arkansas State University, State University, AR.

Bacteriological and Chemical Quality of Fresh Shrimp Available in Arkansas. Darlene Gentles and J. D. Bragg, Garland County Community College, Hot Springs, AR and Henderson State University, Arkadelphia, AR.

Development of a Low-Level Radioactive Waste Disposal Facility. Greta J. Dicus, Radiation Control and Emergency Management, Arkansas Department of Health, Little Rock, AR.

Ultraviolet Spectra of Acetic Acid, Glycine, and Glyphosate. Rosa McConnell, J. Scott McConnell and Lloyd Hossner, University of Arkansas at Monticello, AR, Southeast Research and Extension Center, Monticello, AR and Texas A&M University, College Station, TX.

VERTEBRATE ZOOLOGY

Chair: Julia Reid Bollinger, Arkansas State University

*Ichthyofauna of a Cypress Tupelo Swamp. Veryl V. Board, Charlotte Allen and Andrea Reeves, Natural Sciences and Mathematics Division, Arkansas College, Batesville, AR.

*Preliminary Home Ranges of an Island Population of Nine-Banded Armadillos (*Dasypus novemcinctus*). Karen E. Caster, Paul T. Caster and Gary A. Heidt, Department of Biology, University of Arkansas at Little Rock, AR.

*The Effects of Ethanol on Choriovitelline Membrane Vasculature in Chick Embryos. Kay L. Kinneman and Bruce Mendelson, (J. Keith Sutton), Department of Biology, Hendrix College, Conway, AR and Department of Anatomy, University of Arkansas for Medical Sciences, Little Rock, AR.

*Analysis of Convergence in the Structure of Dorsal Guard Hairs of Ecologically Similar Species of Mammals. Connie Baber and Renn Tumblison, Department of Biology, Henderson State University, Arkadelphia, AR.

Analysis of Morphometric Variation in Geographically Isolated Versus Continuous Populations of *Plecotus townsendii*. Renn Tumblison and Verlan McCool, Department of Biology, Henderson State University, Arkadelphia, AR.

**Home Range of the Southern Flying Squirrel (*Glaucomys volans*) in West-Central Arkansas. Karen D. Stone, Gary A. Heidt and Paul T. Caster, Dept. of Biology, Memphis State University, TN and Department of Biology University of Arkansas at Little Rock, AR.

Mate Choice in Golden Hamster, *Mesocricetus auratus*. Sara M. Hardin, Laura Musolf and Joseph Lombardi, Department of Biology, Hendrix College, Conway, AR.

INVERTEBRATE ZOOLOGY

Chair: Julia Reid Bollinger, Arkansas State University

A Checklist of Phosphorescent Spiders in Arkansas. Peggy Rae Dorris and Robin Owens, Biology Department, Henderson State University, Arkadelphia, AR.

Chironomidae of the St. Francis Sunken Lands in Northeast Arkansas. Betty G. Cochran, Edmond J. Bacon and George L. Harp, U.S. Forest Service, Glenwood, AR, Department of Natural Sciences, University of Arkansas at Monticello, AR and Department of Biological Sciences, Arkansas State University, State University, AR.

*Body Size, Male Aggression, and Male Mating Success in the Cottonwood Borer (*Plectrodera scalator*, Coleoptera: Cerambycidae). Stacie Adams, Steven K. Goldsmith, Zoe Stewart and Angela Trimble, (Keith Sutton), Department of Biology, Hendrix College, Conway, AR and Department of Biology, University of Tulsa, Tulsa, OK.

*Identification of Benthic Invertebrates and Zooplankton From Stomachs of the Ouachita Madtom (*Noturus lachneri*) in the Saline River Drainage, Arkansas. Carolyn N. Lewis, H. Denise Beck, Charlie J. Gagen and Richard W. Standage, Department of Biological Sciences, Arkansas Tech University, Russellville, AR and U.S.D.A. Forest Service, Ouachita National Forest, Hot Springs, AR.

MICROBIOLOGY AND MOLECULAR BIOLOGY

Chair: Ann T. Bragg, Garland County Community College

T Helper Cell Type 1 Activity is Required for Protection Against Chlamydial Genital Disease. J. U. Igietseme, D. M. Magee, T. J. Kincy, D. M. Williams and R. G. Rank, Department of Microbiology and Immunology, University of Arkansas for Medical Sciences, Little Rock, AR and University of Texas Health Sciences Center, San Antonio, TX.

Characterization and Mapping of Simian Varicella Virus Transcripts. Nanette J. Gusick, Wayne L. Gray, Thomas M. Fletcher and Carla Y. Pumphrey, Department of Microbiology and Immunology, University of Arkansas for Medical Sciences, Little Rock, AR.

Mapping, Sequencing, and Transcriptional Analysis of the Simian Varicella Virus Glycoprotein II Gene. Carla Y. Pumphrey and Wayne L. Gray, Department of Microbiology and Immunology, University of Arkansas for Medical Sciences, Little Rock, AR.

A Tomato Fruit Glycine-Rich Protein May be a RNA-Binding Protein. Barbara L. Parsons, Maurice G. Kleve and Autar K. Mattoo, Biology Department, University of Arkansas at Little Rock, AR and U.S.D.A., Agricultural Research Service, Plant Molecular Biology Laboratory, Beltsville Agricultural Research Center-West, Beltsville, MD.

The Role of Ions and Ion Modulators on the Invasion of HELA Cells by *Salmonella typhimurium*, *Shigella flexneri*, and *Listeria monocytogenes*. David Niesel, M. Rachel McDowell and Gaston Griggs, University of

Texas Medical Branch, Galveston, TX and John Brown University, Siloam Springs, AR.

Break

*The Preparation of Dual Function Plasmid Vectors for Simultaneous Reporter Gene Screening and Antibiotic Resistance Selection in Plant Transformation. Martha A. Hubbard, Barbara L. Parsons and Maurice G. Kleve, Department of Biology, University of Arkansas at Little Rock, AR.

*Cloning of cDNA for Mouse Lung Glutathion S-Transferase GST 5.7. Michael A. Eckles, Piotr Zimniak, (Mark Sutherland), Hendrix College, Conway, AR and University of Arkansas for Medical Sciences, Little Rock, AR.

**Canela is the Alternate Host of a Heteroecious, Macrocytic Rust of Horned Rush. D. A. Sadler, R. D. Cartwright and G. E. Templeton, Department of Plant Pathology, University of Arkansas, Fayetteville, AR.

*DNA from the Radiation Resistant Organism *Micrococcus radiodurans* Confers Radiation Resistance to *E. coli*. Robert Cowherd, James W. Hardin and Thomas J. Lynch, Department of Biology, University of Arkansas at Little Rock, AR and Department of Medicine and Biochemistry-Molecular Biology, University of Arkansas for Medical Sciences, Little Rock, AR.

The Prevalence of *Borrelia burgdorferi*, the Lyme Disease Spirochete, in Ticks and Rodents in Northeast Arkansas. Kim K. Simpson and Lawrence W. Hinck, Department of Biological Sciences, Arkansas State University, State University, AR.

SCIENCE EDUCATION

Chair: Jane Dunn, Henderson State University

Chemistry In Context: Applying Chemistry to Society. Conrad Stanitski, Chemistry Department, University of Central Arkansas, Conway, AR.

Use of a Commercial Interface in the Advanced Chemistry Laboratory. Williams S. Taylor and Paul Krause, Department of Chemistry, University of Central Arkansas, Conway, AR.

Native Plants and Undergraduate Research. William H. Baltosser and Kelly D. Hitt, Department of Biology, University of Arkansas in Little Rock, AR.

Critical Thinking with Botany: Use of Keys, Wagner Trees, and GPDM as Teaching Exemplars. James H. Peck, Department of Biology, University of Arkansas at Little Rock, AR.