

1972

56th Annual Meeting, 1972. Program

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PROGRAM

Arkansas Academy of Science

Fifty-Sixth Annual Meeting
UNIVERSITY OF ARKANSAS
Fayetteville, Arkansas

Meeting concurrently with sessions of the:

Arkansas Science Teachers Association

Arkansas Council of Teachers of Mathematics

Society of Physics Students of the American Institute of Physics

American Chemical Society, Arkansas Sections

Arkansas Science and Technology Council

Friday, 7 April

Saturday, 8 April

SENIOR AND COLLEGIATE ACADEMIES -- Registration
SENIOR ACADEMY -- Executive Committee
COLLEGIATE ACADEMY -- Executive Committee
SENIOR ACADEMY -- Business Meeting
COLLEGIATE ACADEMY -- Business Meeting

JUNIOR ACADEMY -- Registration
JUNIOR ACADEMY -- Business Meeting
SENIOR ACADEMY -- Symposium: Interaction of Science,
Industry, and Government
JUNIOR ACADEMY -- Science Talent Search
JUNIOR ACADEMY -- Papers
COLLEGIATE ACADEMY -- Symposium: Natural History of
the Buffalo River
JUNIOR ACADEMY -- Banquet and Awards Presentation
SENIOR ACADEMY -- Roundtable Discussion: Technology
Transfer in Arkansas
JUNIOR ACADEMY -- Astronomy Demonstration

ALL ACADEMIES AND PUBLIC - Moon Rock Display
NASA Space Mobile
Demonstration
Space Shuttle Program
Lecture: The Power Crisis
Is Fission the Answer?

SENIOR ACADEMY -- Papers
COLLEGIATE ACADEMY -- Papers
SENIOR ACADEMY -- Business Meeting
SENIOR ACADEMY -- Papers

Symposium: INTERACTION OF SCIENCE, INDUSTRY, AND GOVERNMENT

**Presiding: John L. Imhoff, Head, Industrial Engineering Department,
University of Arkansas, Fayetteville, Arkansas 72701**

DEVELOPMENT OF CENTERS FOR REGIONAL PROGRESS

Karsten Vieg, Manager, Regional Resource Center,
Midwest Research Institute, Kansas City, Kansas

SCIENCE AND CORPORATE PROFITS (LOSSES)

Barry Bebb, Director, Advanced Technology Laboratory,
Texas Instruments Company, Dallas, Texas

MISSISSIPPI TEST FACILITY - INTERGOVERNMENTAL APPROACH TO ENVIRONMENTAL RESEARCH PROGRAMS

Gary North, Chief, EROS Program, United States
Department of Interior, Bay St. Louis, Mississippi

THE STATE DEPARTMENT OF POLLUTION CONTROL AND ECOLOGY

Neil Woomer, Arkansas Department of Pollution Control
and Ecology, Little Rock, Arkansas

DISCUSSION

Program

Collegiate Academy of Science Symposium: NATURAL HISTORY OF THE BUFFALO RIVER

**Presiding: Joe F. Nix, Department of Chemistry,
Ouachita Baptist University, Arkadelphia, Arkansas 71923**

**AN INTRODUCTION TO THE BUFFALO RIVER
COUNTRY**

Dr. Neil Compton, President, Ozark Society

THE PREHISTORY

Hester Davis, Arkansas Archeological Survey, University
of Arkansas

THE GEOLOGY

Joe M. Clark, Geologist, Arkansas Western Gas Company
(retired)

THE VEGETATION

Edward E. Dale, Jr., Department of Botany and
Bacteriology, University of Arkansas

SUMMATION AND DISCUSSION

Joe F. Nix, Department of Chemistry, Ouachita Baptist
University

ARKANSAS SCIENCE AND TECHNOLOGY COUNCIL

Roundtable Discussion: TECHNOLOGY TRANSFER IN ARKANSAS

**Chairman: Robbin C. Anderson, Dean, Arts and Sciences College,
University of Arkansas, Fayetteville, Arkansas 72701**

JAMES O. WEAR

Central Instruments Program
Veterans Administration Hospital
Little Rock, Arkansas

WILLIAM SOHL

Research Associate
Graduate School
University of Arkansas

ROGER CHAMBERLAIN

Plant Manager
Dow Chemical Company
Magnolia, Arkansas

WILLIAM SHEPHERD

Vice President, Retired
Arkansas Power and Light Company
Little Rock, Arkansas

JOHN REID

Vice President for Research
Baldwin Electronic Company
Little Rock, Arkansas

GLEN ACHORN

Chief, Biological Laboratory
Pine Bluff Arsenal
Pine Bluff, Arkansas

M. L. LAWSON

Chairman, Science Department
Harding College
Searcy, Arkansas

ROBERT KIRKWOOD

Professor of Biology
State College of Arkansas
Conway, Arkansas

JOHN OSOINACH

Department of Sociology
Arkansas State University
Jonesboro, Arkansas

HAROLD R. MUENZMAIER

General Manager, Reinforced Plastics Department
A. D. Smith Company
Little Rock, Arkansas

ARMAND DE LAURELL

Acting Director, Arkansas Department of Planning
Capitol Building
Little Rock, Arkansas

SECTION PROGRAMS

ANTHROPOLOGY SECTION

Chairman: Robert G. Chenhall

HENRY M. MILLER: A Floral Reconstruction of Early
Historic Northwest Arkansas

SHELLY DAVIS: A Reconsideration of British Maglemose
Technology - A Test of the function of "Harpoons"

ROBERT T. TAYLOR: Sayers - A Previously Undefined
Caddoan Phase

DAVID J. WOLF: A Functional Analysis of the Artifact

Assemblages from Three Union County, Illinois, Prehistoric
Sites

MARY JO GRINSTEAD and SANDRA C. SCHOLTZ: Pop-
ulation Profiles via Factor Analysis - Study of a Rural Arkansas
Community

ROBERT G. CHENHALL: Computerized Data Banks for
Multi-Site Research

BIOLOGICAL SCIENCES SECTION I

Chairman: Richard L. Meyer

RENIE R. MALLORY: The Effects of Ammonium-Nitrogen, Nitrate-Nitrogen, and Ortho-Phosphate on Natural Algal Populations under Controlled Conditions

MARVIN W. HALDOR and JOHN K. BEADLES: A Study of Some Physico-Chemical Parameters and Phytoplankton Standing Crop in Four Northeast Arkansas Commercial Fish Ponds

STANLEY A. WOLFRAM: Algal Population Studies via Substrate Pioneering

TOM N. PALKO: Zooplankton Population Variations in Lake Dardanelle and Several of its Tributaries as Affected by Introductions of Poultry Effluents - Preliminary Report

JERRY L. MCGARY and GEORGE L. HARP: Distribution of Benthic Macroinvertebrate Fauna of a Cold Tailwater - Little Red River, Arkansas

TOM N. PALKO: Problems Encountered in Assessing Water Quality by Automated Methods

J. H. WHEELER and R. L. MEYER: The Applicability of Biochrome Analysis Technique to the Identification of Phytoplankton Populations

GEORGE L. HARP and RONALD HUBBARD: The Limnology of Bauxite Open Pits

PEGGY R. DORRIS: A Checklist of Spiders Collected in Mississippi Compared with a Preliminary Study of Arkansas Spiders

E. PHIL ROUSE and L. N. MEDVEDEV: Common Chrysomelidae in Arkansas

CHARLES LINCOLN, JACOB R. PHILLIPS, W. P. BOYER, and FLOYD D. MINER: Insect Pest Management for Cotton and Soybeans

T. R. C. ROKEBY, G. S. NELSON, and G. C. HARRIS, JR.: JR.: Bioclimatic Chambers for Research with Poultry

Theory of Locomotion

JUDITH D. CUNDALL: A Comparison of Plasma Protein Patterns of Four Species of Watersnakes (Genus *Natrix*)

EUGENE B. WITTLAKE: A Taxonomic Note on the Fossil *Glyptostrobus* Occuring in Northeastern Arkansas

FRANK H. TAINTER: Aquatic Fungi in the Classroom

HUGH A. JOHNSON: The Occurrence of Camelia Petal Blight in Southern Arkansas

DOUGLAS JAMES: Failure to Establish Feral *Coturnix* Quail Populations in Arkansas in the Late 1950's

GARY A. HEIDT: Anatomical and Behavioral Aspects of Killing and Feeding by the Least Weasel, *Mustela nivalis* L.

CHEMISTRY SECTION I

Chairman: T. D. Roberts

JERRY F. CASTEEL and EDWARD S. AMIS: Specific Conductance of Highly Concentrated Magnesium Salts in Mixed Solvents

SISTER MARY CARL MALMSTRON and A. W. CORDES: Crystal and Molecular Structure of Two Phenothiazines

KAY FAIR and A. W. CORDES: Crystal and Molecular Structure of Tetra-Substituted Tungsten (VI) Chlorides

KARAN PASHMAN and D. A. JOHNSON: Photochemical Linkage Isomerization

N. CHAN and D. A. JOHNSON: Crystal and Molecular Structure of Platinum (II) Imidazole Complexes

L. B. HANDY and C. C. HENDERSON: Reactions of Tungsten (VI) Chloromethoxides with Strong Bases

N. R. OSTLUND: A New Approach to Frequency-Dependent Perturbation Theory

JAMES O. WEAR: Silver in Dog Spinal Fluid by Activation Analysis

BIOLOGICAL SCIENCES SECTION II

Chairman: P. M. Johnston

DOUGLAS W. CURRAN: Survival of Placental Implants in Non-Pregnant Animals

LELAND F. MORGANS: Histological Study of the Liver of the Channel Catfish *Ictalurus punctatus*

DALE V. FERGUSON: Molecular Specificity Associated with Alleviation of Actinomycin D Inhibition of Protein Synthesis

TERRY W. SCHULTZ: Functional Morphology of the Oral Appendages and Foregut of *Lirceus garmani* (Crustacea: Isopoda)

CHRISTINA W. CHAN and DAVID A. BECKER: *Trypanosoma lewisi* Kent (Protozoa: Mastigophora) Ultrastructure and

CHEMISTRY SECTION II

Chairman: W. L. Cairns

SAM MERSHON and J. A. THOMA: Computer Modeling of Enzymes

J. A. THOMA, G. V. K. RAO, J. ALLEN, A. JENNINGS, A. BOWANKO, and C. J. CROOK: Formation of Stable Cellodextrin-Lipoenzyme Complexes

W. L. MEYER and R. B. LEWIS: Amino Acid Sequence of Tentoxin

MITSUO OKA and ARTHUR FRY: The Acid-Catalyzed Rearrangement of 2,4-Dimethyl-3-Pentanone-3-¹⁴C

M. FOREMAN and S. SIEGEL: The Reduction of Dienes by Diimide; Structure and Reactivity

R.E. LEA and R.P. QUIRK: Sodium Borohydride Reduction of 5-Hexenylmercuric Bromide

RALPH HOWARD: A Simple and Inexpensive Technique for Producing High Quality Line Drawings of Conformationally Complex Molecules

GEOLOGY SECTION

Chairman: Ronald H. Konig

BRADFORD HANSON: Fracture Patterns of Northwest Arkansas as Determined from Small Scale Aerial Photography

REINHARD FROLICH: Geoelectrical Possibilities of Detecting Stream Channels in Carbonate Rock

CHARLES STONE and BOYD HALEY: Late Paleozoic Stratigraphy in the Ouachita Mountains of Arkansas

RICHARD L. WILSON: Palynology of the Wills Point Formation of Southern Arkansas

JOHN GLENN: Stratigraphy and Sedimentary Structures of a Middle Bloyd Fluvial Sandstone

DOY L. ZACHRY: Morphology and Sedimentary Structures of an Early Pennsylvanian Beach Sandstone

E. CHARLOTTE GLENN: Conodont Biostratigraphy of Early Pennsylvanian Rocks of Northwest Arkansas

CHARLES STONE and BOYD HALEY: Windows and Klippen in the Core Area of the Ouachita Mountains of Arkansas

ALVIN A. CHINN and RONALD H. KONIG: Dynamic Interpretation of Calcite Twin Lamellae in Limestone of Northwest Arkansas

MATHEMATICS SECTION

Chairman: William Orton

CARL C. STEYER: Sunspot Analysis and Prediction

ROBERT P. SMITH: Hypotheses Testing for Continuous Time Parameter Gaussian Processes

ROY J. FULLER: Non-Abelian Gaussian Sums

R. B. HORA: Translations of a Semigroup Which is the Disjoint Union of Commutative Semigroups

W. FELDMAN: Order and Convergence Spaces

J. PORTER: The Krein-Milman Theorem in Convergence Spaces

WILLIAM D. HAMMERS: A Look at the Reisz-Markov Theorem

W. H. SUMMERS: The Weighted Approximation Problem

PHYSICS SECTION I

Chairman: Steve M. Day

W. F. WEI: Magnetoresistance in Single Crystal Cadmium Selenide

ROCKY WRIGHT and MIKE CHENG: Some Dielectric Measurements in Aluminum Potassium Alum

DAN SHELOR: An Experimental Apparatus for the Study of the Scott Effect

JOHN C. VLACHOYANNIS: A Helium Cooled Radio Frequency Pre-Amplifier for Use in Super-Conducting Accelerometer

S. J. MORRIS: A Foreigner Investigates

CHARLES POSEY: An Electrostatic Motor Designed to Run from the Earth Electric Field

PHYSICS SECTION II

Chairman: Paul Sherrah

RANDY SULLIVAN: Astronomy at Southeastern State College

HERBERT C. SCHADE: Construction of a Low Cost Planetarium

LARRY HUGGINS: Construction and Operation of a Radio Telescope

DAVID WOLFE: Computerized Map of the Radio Sky at 220 MHZ

Arkansas Collegiate Academy of Science

Neal Sumerlin
President

Ramona Rice
Secretary

Brian Smith
Treasurer

Ronnie Sexton
President-elect

MINUTES

The April 8 meeting of the Collegiate Academy of Science, Neal Sumerlin presiding, was called to order. Minutes of the last meeting were read by the secretary and a motion was made and passed to accept the minutes as read.

A new constitution for the Collegiate Academy was presented for discussion and possible adoption. The motion was made and passed to change the constitution to read that the representatives from each school should be elected by that school rather than appointed by the president of the Collegiate Academy.

A discussion of the relevancy of the office of President-Elect ended in the motion that the status of the President-Elect remain as stated in the proposed constitution. The motion passed.

A motion was made to adopt the new constitution as amended in the business meeting. The motion passed.

New officers elected are:

Eddie Reed, President-Elect, Philander Smith College; Kathy King, Secretary, College of the Ozarks; and John Gillean, Treasurer, Hendrix College.

Mrs. Johnson of Philander Smith College was elected to a two-year term as sponsor. Dr. Noel Robotham will be serving his second year as sponsor of the Collegiate Academy in 1972-73.

After the introduction of the new president, Mr. Ronnie Sexton, College of the Ozarks, the meeting was adjourned.

Respectfully submitted,
Ramona Rice, Secretary

FINANCIAL REPORT

Previous balance	\$87.89
Credits	\$16.00
Expenditures	
Annual Meeting	\$76.14
Treasury expenses	3.81
Total Expenditures	79.95
Balance 1 June 1972	\$23.94

ABSTRACTS OF PAPERS

HERMAN WENZLER (University of Arkansas, Fayetteville, Arkansas): Determination of Gibberellins in Plant Materials

Several bioassays have been used for determining gibberellins in plant materials. One of the most common is the barley endosperm bioassay based on sugar production. Reducing sugars are measured by use of neocuproine as the color reagent and glycine as the copper chelating agent. In other bioassays the ability of gibberellin (GA_1) to overcome dwarfness in some plants has been exploited.

Three bioassays were compared to determine which was the most sensitive to low concentrations of GA_1 . The relative ease and length of time required for each test were evaluated also. The barley endosperm bioassay was the most sensitive for GA_1 . Dwarf corn and rice bioassays, though less sensitive, were useful because asepsis was not required.

(Research supported by NFS Undergraduate Research Participation Program grant no. GY-8918.)

ROBERT TAYLOR AND DAVID MAGOUYRK (Arkansas College, Batesville, Arkansas): Auxospore Production by *Melosira varians*

Melosira varians, a fresh-water colonial centric diatom, was found to be the dominant plant form growing on a concrete dam of a natural spring near Batesville, Arkansas. Auxospores were observed in the natural condition during the month of January. It was found that the rate of auxospore production could be increased significantly by raising the sodium chloride content of the water in which the diatom was incubated. *Melosira varians* was gradually replaced as the dominant flora of the dam with the advent of warmer weather, and auxospore production ceased under natural conditions. At present it appears that auxospore production can be induced in the laboratory by incubating the diatom near 4C with proper sodium chloride concentration.

LYNN REYNOLDS (College of the Ozarks, Clarksville, Arkansas): Wild Flowers of Lost Valley

A photographic documentation of the flora of Lost Valley has been made. Such documentation is necessary because many of the wild flowers of the area are being destroyed by the increasing number of visitors to this state park.

ROBERT B. WHITE (Hendrix College, Conway, Arkansas): Purification and Study of the Alkaline Phosphatase of *E. coli*

The alkaline phosphatase of *Escherichia coli* is a non-specific phosphomonoesterase which possesses phosphotransferase activity. It is a stable zinc metalloprotein (MW = 86,000) consisting of two identical subunits. The enzyme is of interest as a model for other phosphatases of wide occurrence which are studied clinically in relation to several diseases, including some cancers.

Escherichia coli cells were grown in a phosphate-deficient medium, harvested by centrifugation, then disrupted by sonication. The soluble enzyme was purified by double-pass, ion-exchange chromatography on DEAE-cellulose. These methods resulted in a 900-fold increase in specific activity from that of the original culture and a 17-fold increase from that of the crude extract, although total yield (13.5%) was low. Attempts to crystallize the enzyme have been unsuccessful.

KURT DOEGE (University of Arkansas, Fayetteville, Arkansas): Some Investigations on the Effects of Red Light on the Nucleic Acid Concentrations of Etiolated Corn Seedling Mesocotyls

This research had two objectives: first, to develop satisfactory procedures for extraction and assay of RNA and DNA from corn mesocotyl tissues; and second, to apply these techniques in investigation of nucleic acid levels in red-light-inhibited corn seedlings and in dark-grown seedlings, both DNA and RNA contents of the red-light-treated seedlings were lower, although DNA levels in the red-light-treated seedlings may have undergone a transient increase. Attempts were made to correlate these differences in nucleic acid levels with the observed red light inhibition of the mesocotyl growth.

(Research supported by NSF Undergraduate Research Participation Program grant no. GY-8918.)

MARILYN MARTIN (Hendrix College, Conway, Arkansas): On the Induced Function Theorem

The following theorem by A.R. Bednarek and A.D. Wallace is proved. Induced Function Theorem: Let X and Y be sets. Let R be a relation from X into Y , let E and F be equivalences on X and Y respectively, and let ψ and ϕ denote the respective natural maps. If $X=RY$ and if $R^{-1} \circ E \circ R$ RCF, then there exists a unique function $h: X/E \rightarrow Y/F$ such that $h\psi p = \phi q$ where p and q are the projections of R to X and Y respectively. Moreover, in addition to the foregoing hypotheses if $Y=XR$ and $R \circ F \circ R^{-1}$ CE, then h is an isomorphism.

Sierpinski's Lemma: Let X , Y and Z be sets. Let $F: X \rightarrow Y$ and $g: X \rightarrow Z$ be functions with f onto, and let $f(x) = f(x')$ imply $g(x) = g(x')$ for all $x, x' \in X$. Then there is a unique function $h: Y \rightarrow Z$ satisfying $g = hf$. This lemma and the Induced Function Theorem are shown to be equivalent and the first isomorphism theorem, second isomorphism theorem, and third isomorphism theorem for groups are shown to be corollaries to the Induced Function Theorem.

DAVID GOGGANS (Hendrix College, Conway, Arkansas): Properties of the Ring of Continuous Functions on the Unit Interval

Let I be the unit interval and R be the ring of continuous functions on I . It is shown that R has proper zero division and contains subrings that are not ideals and ideals that are not maximal. It is proved that R is neither Artinian nor Noetherian. For any C in I , define $M_C = \{f \in R: f(c) = 0\}$. It is proved for any maximal ideal M , there exists a c in I such that $M = M_C$.

KEITH WAYLAND (Harding College, Searcy, Arkansas): Another Look at the Countability of the Rationals

Let N denote the set of positive integers and X denote the set $\{u10^{an} + v10^n \mid u, v, n \in N, (u,v) = 1, 10^{n-1} \leq v < 10^n\}$, where (u,v) is the g.c.d. of u and v . Theorem 1: Each element of X has a unique representation in terms of u , v , and n . Theorem 2: There exists an onto mapping from X to the set of positive rational numbers. The countability of the rationals follows immediately from these two theorems.