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PROGRAM

Arkansas Academy of Science

Sixty-Second Annual Meeting

UNIVERSITY OF ARKANSAS AT FAYETTEVILLE Fayetteville, Arkansas

Meeting concurrently with sessions of:

The Collegiate Academy of Science
The Junior Academy of Science

Friday, 31 March

SENIOR, COLLEGIATE, JUNIOR ACADEMIES -- Registration

SENIOR ACADEMY -- Executive Board Meeting

COLLEGIATE BUSINESS MEETING I

SENIOR ACADEMY -- First General Business Meeting

JUNIOR ACADEMY -- Westinghouse Talent Search Paper
Presentations

Lunch

SENIOR, COLLEGIATE, JUNIOR ACADEMIES -- Registration

SENIOR, COLLEGIATE ACADEMIES -- Papers [Concurrent
Sessions]:

Chemistry
Mathematics and Physics
General Physiology/Invertebrate Zoology
Environmental and Engineering Sciences I
Science Education

JUNIOR ACADEMY -- Papers [Biological and Physical Sciences,
Concurrent Sessions]

JUNIOR ACADEMY -- Executive Meeting

SENIOR, COLLEGIATE, JUNIOR ACADEMIES -- Banquet

RESERVOIR SYMPOSIUM -- Sponsored by Water Resources
Research Center, University of
Arkansas

Saturday, 1 April

SENIOR, COLLEGIATE, JUNIOR ACADEMIES -- Registration

SENIOR, COLLEGIATE ACADEMIES -- Papers [Concurrent
Sessions]:

Vertebrate Zoology
Botany
Environmental and Engineering Sciences II
Anthropology/Sociology
Geology

JUNIOR ACADEMY -- Business Meeting

JUNIOR ACADEMY -- Awards Presentation

SENIOR, COLLEGIATE ACADEMIES -- Second General Business
Meeting

SECTION PROGRAMS

[Papers marked with * are presentations by Collegiate Academy members]

CHEMISTRY SECTION

Chairman: Alex R. Nisbet

*EFFECT OF MODIFICATION OF LYSINE 88 ON CYTOCHROME C REACTIVITY.

Freda Miller, University of Arkansas at Fayetteville

DEMONSTRATIONS AND DISCUSSIONS OF USES AND EFFECTS OF CALCULATORS AND COMPUTERS IN THE TEACHING OF CHEMISTRY. Room 115 of the Chemistry Building

MATHEMATICS AND PHYSICS SECTION

*TEMPORAL PULSE CONTROL OF A MODELOCKED LASER.

James A. Berry, Mark A. Newbold and G. J. Salmo, University of Arkansas at Fayetteville

*LOIS: A LASER OPERATED ION SOURCE.

M. R. Carruth, R. H. Hughes, R. J. Anderson and L. Gray, University of Arkansas at Fayetteville

*THE DESIGN AND CONSTRUCTION OF AN INEXPENSIVE ANECHOIC CHAMBER FOR MEASUREMENT OF ACOUSTICAL RADIATION.

Charles Hughes, University of Central Arkansas

*STANDARD VUV RADIATION FROM ELECTRON IMPACT ON METALS.

Tim Heumier and R. H. Hughes, University of Arkansas at Fayetteville

*ELECTRON IMPACT EXCITATION OF TRIPLET STATES OF H₁.

R. J. Anderson and R. L. Day, University of Arkansas at Fayetteville, and F. A. Sharpton, Northwest Nazarene College

*THE PROJECTION BLINKING COMPARATOR 'PROBLICOM'.

Maurice L. Ayers, University of Central Arkansas

*THE TEMPERATURE DEPENDENCE OF THE ELASTIC MODULI OF A MACHINABLE GLASS-CERAMIC.

J. A. Brewer, S. N. Harrington and D. O. Pederson, University of Arkansas at Fayetteville

GENERAL PHYSIOLOGY/INVERTEBRATE ZOOLOGY SECTION

Chairman: Robert L. Watson

SPIDERS IN THE UNIVERSITY OF ARKANSAS ENTOMOLOGY MUSEUM.

John S. Heiss and E. Phil Rouse, University of Arkansas at Fayetteville

A PRELIMINARY REPORT OF THE NEPIDAE (HEMIPTERA) IN ARKANSAS.

George L. Harp, Arkansas State University

A CHECKLIST OF ARKANSAS ARCHTIIDAE.

Sheila M. Hoelscher and E. Phil Rouse, University of Arkansas at Fayetteville

THE BLIND BEETLE FAUNA OF ARKANSAS: COMPOSITION, DISTRIBUTION, ORIGIN. (COLEOPTERA: CARABIDAE; LEPTINIDAE; PSELAPHIDAE)

Robert T. Allen, University of Arkansas at Fayetteville

EFFECTS OF SIMULATED HIGH ALTITUDE. I. METHEMOGLOBULIN, OXYGEN-HEMOGLOBIN DISSOCIATION AND SURVIVAL.

C. P. Olander, J. L. Thomas, J. S. Sharp, and D. E. McKay, Arkansas State University and Austin College

EFFECTS OF SIMULATED HIGH ALTITUDE. II. METHEMOGLOBIN, 2,3-DIPHOSPHOGLYCERATE AND METHEMOGLOBIN REDUCTION.

W. J. Waldrip and C. P. Olander, Arkansas State University

EFFECTS OF HYPOBARIC HYPOXIA ON SOME ENZYME SYSTEMS IN THE MAMMALIAN LIVER.

D. A. Baeyens and M. J. Meier, University of Arkansas at Little Rock

A COMPARISON OF UREA TOLERANCES OF LACTATE DEHYDROGENASE FROM SIX ELASMOBRACH AND ONE MAMMALIAN SPECIES.

C. E. Parr, University of Arkansas at Fayetteville

ULTRAVIOLET LIGHT REACTIVATION OF GAMMA RAY-INDUCED LETHAL DAMAGE IN VERTEBRATE CELLS.

Stewart W. Cross and J. Gaston Griggs, John Brown University

EFFECT OF SANGUINARINE, AN EXTRACT OF *SANGUINARIA CANADENSIS*, ON FROG SKIN POTENTIAL DIFFERENCE AND SHORT CIRCUIT CURRENT.

James R. Nichols, K. D. Straub, and S. Abernathy, University of Central Arkansas, VA Hospital, Little Rock, and Duke University

THE INFLUENCE OF LEAD, AN ENVIRONMENTAL POLLUTANT, ON METAMORPHOSIS OF *RANA UTRICULARIA*.

Gloria Yeung, University of Arkansas at Fayetteville

ENVIRONMENTAL SCIENCE AND ENGINEERING SCIENCES I SECTION

Chairman: John K. Beadles

THE CONCENTRATION OF RADIONUCLIDES IN DARDELLE LAKE (ADDENDUM).

D. M. Chittenden, II and Larry McFadden, Arkansas State University

MOVEMENTS OF CHANNEL AND FLATHEAD CATFISH IN BEAVER RESERVOIR IN NORTHWEST ARKANSAS.

Thomas O. Duncan and Milton R. Myers, Jr., U.S. Fish and Wildlife Service

ADDITIONS TO THE FISH FAUNA OF PINEY CREEK, IZARD COUNTY, ARKANSAS.

William J. Mathews and Robert S. Mathews, Roanoke College and Arkansas State University

GROWTH OF CARP (*CYPRINUS CARPIO*) FROM BEAVER RESERVOIR.

Raj V. Kilambi and Walter Robinson, University of Arkansas at Fayetteville

FISHES OF THE MOUNTAIN PROVINCE SECTION OF THE OUACHITA RIVER.

John L. Harris and Neil H. Douglas, University of Tennessee at Knoxville and Northeast Louisiana University

FISHES OF THE CADDO RIVER, ARKANSAS, AFTER IMPOUNDMENT OF DE GRAY LAKE.

Michael R. Dewey and Thomas E. Moen, U. S. Fish and Wildlife Service

DISTRIBUTION AND HABITAT OF THE TAILLIGHT SHINER, *NOTROPIS MACULATUS* (HAY), IN ARKANSAS.

Henry W. Robison, Southern Arkansas University

BREEDING ASPECTS OF THE CREOLE DARTER, *ETHEOSTOMA COLLETTI*, IN THE UPPER SALINE RIVER, SALINE COUNTY, ARKANSAS.

Mike R. Galster and John D. Rickett, University of Arkansas at Little Rock

LOSS OF LARVAL FISH BY EPILIMNIAL DISCHARGE FROM DE GRAY LAKE, ARKANSAS.

Thomas E. Moen and Michael R. Dewey, U. S. Fish and Wildlife Service

THE FISHES OF MORO CREEK, A LOWER OUACHITA RIVER TRIBUTARY, IN SOUTHERN ARKANSAS.

Stephen A. Winters and Henry W. Robison, Southern Arkansas University

THE INFLUENCE OF AMMONIA ON AEROMONAD SUSCEPTIBILITY IN CHANNEL CATFISH *ICTALURUS PUNCTATUS*, RAFINESQUE.

R. M. Flagg and L. W. Hinck, Arkansas State University

LONGEVITY OF WHITE BASS IN BEAVER RESERVOIR, ARKANSAS.

T. O. Duncan and Milton R. Myers, Jr., U. S. Fish and Wildlife Service

SCIENCE EDUCATION SECTION

Chairman: Neal Buffaloe

PHYSICS AND HUMAN AFFAIRS: A RELEVANT SCIENCE COURSE FOR NON-SCIENTISTS.

Art Hobson, University of Arkansas at Fayetteville

***A SCIENCE WORKSHOP FOR HIGH SCHOOL STUDENTS.**

Gary D. Henson, University of Central Arkansas

VERTEBRATE ZOOLOGY SECTION

Chairman: John D. Rickett

THE PRESENCE OF AN UNUSUAL EOSINOPHILIC STAINING SUBSTANCE IN THE BLOOD OF SNAKES.

James J. Daley and Charles H. Calhoun, University of Arkansas for Medical Sciences and the Little Rock Zoological Gardens

SOME PHYSIOLOGICAL AND MORPHOLOGICAL ADAPTATIONS FOR UNDERWATER SURVIVAL IN *NATRIX RHOMBIFERA* AND *ELAPHE OBSOLETA*.

Chris T. McAllister, D. A. Baeyens and L. F. Morgans, University of Arkansas at Little Rock

A REQUEST FOR INFORMATION ON THE RED-COCKADED WOODPECKER (*PICOIDES BOREALIS*) IN ARKANSAS.

Fred L. Burnside, University of Arkansas at Fayetteville

SPECIES COMPOSITION AND DIVERSITY OF HAWK POPULATIONS IN NORTHEASTERN ARKANSAS.

Earl L. Hanebrink, Alan F. Posey, and Keith Sutton, Arkansas State University

PATTERNS OF AUTUMN SWARMING ACTIVITY OF EIGHT SPECIES OF BATS AT THE ENTRANCE OF AN OZARK CAVE.

David A. Saugey, Arkansas State University

DISTRIBUTION OF BATS IN THE DELTA REGION OF NORTH-EAST ARKANSAS.

James E. Gardner, Arkansas State University

AN UNUSUAL SPECIES ASSOCIATION FROM A BAT GRAVEYARD IN AN OZARK CAVE.

D. A. Saugey, R. H. Baber, and V. R. McDaniel, U. S. Forest

Service, Little Rock Museum of Science and History, and Arkansas State University

STATUS OF THE ENDANGERED WESTERN BIG-EARED BAT *PLECOTUS TOWNSENDII* (INGENS) IN ARKANSAS.

Michael J. Harvey, V. Rick McDaniel, and Michael L. Kennedy, Memphis State University and Arkansas State University

PRE- and POSTNATAL GROWTH AND DEVELOPMENT OF *MYOTIS GRICESCENS* IN NORTH-CENTRAL ARKANSAS.

D. A. Saugey, Arkansas State University

RANGES AND STATUS OF THE NUTRIA (*MYOCASTOR COYPU*) IN ARKANSAS.

Joe W. Bailey and Gary A. Heidt, University of Arkansas at Little Rock

A SUMMARY OF THE STATUS OF HARVEST MICE (*REITHRODONTOMYS*) IN ARKANSAS.

John C. Huggins and V. Rick McDaniel, Arkansas State University

INTRASPECIFIC VARIATION IN THE PRAIRIE VOLE, *MICROTUS OCHROGASTER*.

James C. Huggins and Michael L. Kennedy, Memphis State University

TASTE MASKING: A FUNCTION OF EXAGGERATED PRANDIAL DRINKING IN DESALIVATE MICE.

Richard C. Lewis, University of Arkansas at Little Rock

BOTANY SECTION

Chairman: Dale V. Ferguson

***THE INHIBITORY ACTIVITIES OF COLICINOGENIC STRAINS OF *ESCHERICHIA COLI*.**

Benny Green and Leo Paulissen, University of Arkansas at Fayetteville

***SOME ULTRASTRUCTURAL OBSERVATIONS OF THE GELATINOUS MATRIX OF THE UNICELLULAR GREEN ALGA, *HAEMATOCOCCUS*.**

Danna Rosell and Haral Burris, University of Arkansas at Little Rock

***SOME ELECTRON MICROSCOPICAL OBSERVATIONS ON GREEN AND APPARENT ALBINO SEEDLINGS OF THE TRIFOLIATE ORANGE, *PONCIRUS TRIFOLIATA*.**

Betty Stallings, University of Arkansas at Little Rock

***EFFECT OF LIMESTONE ON SPRING WEED POPULATIONS IN A FERTILIZED COSTAL BERMUDAGRASS SOD.**

H. C. Fulcher and L. F. Thompson, University of Arkansas at Fayetteville

***EFFECT OF FERMIX-ZINC SEED COATINGS ON GERMINATION AND EARLY GROWTH OF RICE PLANTS.**

D. A. Famotemi and L. F. Thompson, University of Arkansas at Fayetteville

SOME LICHENS FROM THE ARCHEOLOGICAL SITES, SOMERSET ISLAND, NORTHWEST TERRITORIES, CANADA.

Nancy McCartney, University of Arkansas at Fayetteville

SCANNING ELECTRON MICROSCOPICAL OBSERVATIONS ON THE DEVELOPMENT OF CORK WINGS IN *EUMONYMUS ALATUS*.

William Bowen and Danny Lieblong, University of Arkansas at Little Rock

SCALED CHRYSOPHYSCAE OF ARKANSAS. II.

Robert A. Andersen, University of Arkansas at Fayetteville

Arkansas Academy of Science

LIGHT INDUCED ATYPICAL ENLARGEMENT OF MAIZE MESOCOTYLS.

Pamela J. Camp and James L. Wickliff, University of Arkansas at Fayetteville

THE COMPOSITION AND ABUNDANCE OF VEGETATION IN THE WATER-LEVEL FLUCTUATION ZONES OF THREE OZARK LAKES.

James R. Sullivan, Jr., University of Arkansas at Fayetteville

THE EFFECTS OF THE McCLELLAN-KERR NAVIGATION PROJECT ON VEGETATION COMMUNITIES OF THE ARKANSAS RIVER.

Edward E. Dale, Jr., University of Arkansas at Fayetteville

MONARDA STIPITATOGLANDULOSA IN ARKANSAS.

Gwen Barber, University of Arkansas at Fayetteville

THE VASCULAR PLANTS OF MISSISSIPPI COUNTY, ARKANSAS.

Edward L. Richards and Thad Wyatt, Arkansas State University

AN ATLAS AND ANNOTATED LIST OF THE VASCULAR PLANTS OF ARKANSAS.

Edwin B. Smith, University of Arkansas at Fayetteville

RELATIVE DOMINANCE AND DISTRIBUTIONAL PATTERNS OF DIATOM SPECIES IN THE BUFFALO RIVER, ARKANSAS.

Neil Woomer and Richard L. Meyer, University of Arkansas at Fayetteville

ENVIRONMENTAL AND ENGINEERING SCIENCES II SECTION

Chairman: John K. Beadles

CHANGES IN SPECIES COMPOSITION AND ABUNDANCE OF FISHES IN BEAVER RESERVOIR LAKE FOR THE FIRST 15 YEARS OF IMPOUNDMENT.

William C. Rainwater, U. S. Fish and Wildlife Service

*AN AIR MONITORING PROGRAM IN BENTON COUNTY, ARKANSAS.

C. B. Richardson, M. A. Newbold, and J. W. Moore, University of Arkansas at Fayetteville

RENOVATION OF NITROGENOUS WASTEWATER VIA LAND APPLICATION.

J. T. Gilmour, A. C. Peer and D. C. Regan, University of Arkansas at Fayetteville

PRIMARY PRODUCTIVITY, WATER QUALITY, AND LIMITING FACTORS IN LAKE CHICOT.

Edmond J. Bacon, University of Arkansas at Monticello

ANTHROPOLOGY/SOCIOLOGY SECTION

Chairman: Timothy C. Klingner

EFFECTS OF THULE ESKIMOS ON SOILS AND VEGETATION AT SILUMIUT, NORTHWEST TERRITORIES, CANADA.

Nancy G. McCartney, University of Arkansas at Fayetteville

FRESHWATER BIVALVE SHELLS AS INDICATORS OF PRE-HISTORIC SEASONALITY: EXPERIMENTAL RESULTS.

Robert H. Ray, University of Arkansas at Fayetteville

ALPHA-RECOIL TRACK DATING OF ARCHEOLOGICAL CERAMICS.

Daniel Wolfman and Thomas M. Rolniak, Arkansas Tech University and the University of Arkansas at Fayetteville

EXPERIMENTAL MODIFICATIONS OF THE THIN-SECTION TECHNIQUE UTILIZING ARCHAEOLOGICAL BONE.

Jay Sperber, University of Arkansas at Fayetteville

METHODOLOGY FOR ANALYSIS OF DIET GRIT SIZE ON MOLAR ATTRITION FOR FOURCHE MALINE AND CADDO PEOPLE.

Judith C. Stewart, Mary Powell, and J. C. Rose, University of Arkansas at Fayetteville

ADDITIONAL MORTUARY INFORMATION FROM THE MILLERS CROSSING SITE, 35VLO, SEVIER COUNTY, ARKANSAS.

Michael P. Hoffman, University of Arkansas at Fayetteville

FAMILY AND COMMUNITY ON THE NEW ENGLAND FRONTIER: FAMILY RECONSTRUCTION, SETTLEMENT PATTERN, AND "THE COMMUNITY AT PALMERS RIVER".

Leslie C. Abernathy III, University of Arkansas at Pine Bluff

SOCIOBIOLOGY AND ITS APPLICATION IN SOCIOLOGY.

Robert Bolin and Susan Bolton Bolin, Arkansas State University

REHABILITATION OF THE 'RUINED WOMAN': ZAPOTEC PEASANTS COPE WITH DEVIANCE.

Judith M. Brueske, University of Arkansas at Fayetteville

POWWOW ROOTS: THE GRASS DANCE/DREAM DANCE MOVEMENT.

Gloria A. Young, Indiana University

GEOLOGY SECTION

Co-Chairmen: Norman F. Williams and Ronald H. Konig

GEOCHEMISTRY OF A CARBONATITE IN MONTGOMERY COUNTY, ARKANSAS.

George H. Wagner and Ronald H. Konig, University of Arkansas at Fayetteville and Michael D. Jones, Lucky McUranium Corp.

PETROLOGY OF IGNEOUS AND METAMORPHIC XENOLITHS IN CARBONATITE INTRUSION, WEST CENTRAL ARKANSAS.

John R. Mitchell, University of Arkansas at Fayetteville

PETROLOGY OF THE HATTON TUFF (STANLEY GROUP, MISSISSIPPIAN), SOUTHWEST ARKANSAS AND SOUTHEAST OKLAHOMA.

James W. Langford, University of Arkansas at Fayetteville

LITHOSTRATIGRAPHY AND PETROGRAPHY OF THE CLIFTY FORMATION (MIDDLE DEVONIAN) AT ITS TYPE LOCALITY, BENTON COUNTY, ARKANSAS.

Marcus Borengasser, University of Arkansas at Fayetteville

STRUCTURAL GEOLOGY OF THE BRENTWOOD-ST. PAUL AREA, NORTHWEST ARKANSAS.

Mikel R. Shinn, University of Arkansas at Fayetteville

GEOMETRY AND DEPOSITIONAL SYSTEMS OF THE ORR AND PATTERSON SANDS, BLOYD FORMATION (PENNSYLVANIAN), EASTERN FRANKLIN AND WESTERN JOHNSON COUNTIES, ARKANSAS.

Michael E. Corbin, University of Arkansas at Fayetteville

DEPOSITIONAL SYSTEMS OF THE SELLS AND CECIL SANDSTONES, ATOKA FORMATION (PENNSYLVANIAN), EASTERN CRAWFORD AND WESTERN FRANKLIN COUNTIES, ARKANSAS.

Christopher A. Cardneaux, University of Arkansas at Fayetteville

GENESIS OF PLEISTOCENE CLAYS IN NORTHCENTRAL MISSOURI.

M. J. Guccione, University of Arkansas at Fayetteville

Arkansas Collegiate Academy of Science

William H. Casson
President

Bettina Casson
Secretary

Teri Garner
Treasurer

Sponsor: Mr. Joe Guenter
Co-Sponsor: Dr. Glen Good

MINUTES OF THE FIRST BUSINESS MEETING, 31 MARCH 1978

The first business meeting of the Arkansas Collegiate Academy of Science was called to order by the presiding president, William Casson. The minutes were read by the secretary, Bettina Casson. The minutes were approved. The financial report was submitted by Rich Brown, as the treasurer was unable to attend the meeting. The Collegiate account contained \$37.50.

The following officers were elected for 1978-79:

President	-Rich Brown, Ouachita Baptist University
Secretary	-Sandra Thompson, Ouachita Baptist University
Treasurer	-David Dube, Ouachita Baptist University
Sponsor	-Mr. Glen Good, Ouachita Baptist University

At this meeting we had as our guest speaker Dr. Ronald Canterna of Louisiana State University, who presented a program on the origin of the Universe. The meeting was adjourned by the presiding president.

MINUTES OF THE SECOND BUSINESS MEETING, 1 APRIL 1978

The second business meeting of the Arkansas Collegiate Academy of Science was called to order by the presiding president, William Casson. A motion was made, seconded, and passed that Mr. Glen Good should request \$175 from the Senior Academy.

The following officers were elected for 1978-79:

President-elect	-Frank Brown, Harding
Co-Sponsor	-Dr. Ed Wilson, Harding

The new president, Rich Brown, took charge of the meeting. A discussion of the previous day's activities followed. There was also a discussion concerning the planning of activities for the next Arkansas Collegiate Academy meeting.

The names of the winners for the paper presentation were announced at this meeting.

In the Biological Science section the first place certificate was awarded to Danna Rosell. In the Physical Science section, the first place certificate was awarded to Gary D. Henson. The following got an honorable mention: Harral Burris, Betty Stallings, and Freda Miller. The meeting was adjourned by the new president, Rich Brown.

Respectfully submitted,

Bettina Casson

Approved by Rich Brown

ABSTRACTS OF PAPERS PRESENTED BY COLLEGIATE ACADEMY MEMBERS

Editor's Note: Not included in the following abstracts are those of H. C. Fulcher and Charles Hughes, whose papers were accepted for publication and are presented elsewhere. Titles of papers presented by Collegiate Academy members are identified in the preceding Section Programs by *.

ELECTRON IMPACT EXCITATION OF TRIPLET STATES OF H₂

R. J. Anderson and R. L. Day, Department of physics, University of Arkansas; F. A. Sharpston, Department of Physics, Northwest Nazarene College

The electron impact excitation of the H₂ triplet states (1so) (npn)³n_g (n=3,4,5) is studied through observations of the radiative transitions (1so) (npn)³n_g → (1so) (2pn)³Σ⁺. Rotational lines corresponding to the (v' = 0 → v'' = 0)Q1, (v' = 1 → v'' = 1)Q1, (v' = 2 → v'' = 2)Q1 and (v' = 3 → v'' = 3)Q1 transitions are isolated at a spectral resolution of Δλ < 3 Å FWHM and are studied using the optical method and delayed-coincidence techniques. Optical excitation functions are obtained for the electron energy range 0-500 eV at H₂ target gas pressure < 50 mtorr. Intensity measurements of the rotational lines at 25 eV are characterized by a linear dependence upon H₂ gas pressure and are placed on an absolute scale by direct comparison with the H_α and H_β spectral lines produced by dissociative excitation of H₂. Radiative lifetime measurements for the rotational transitions yield values in the range approximately 35 to 50 nanoseconds.

THE PROJECTION BLINKING COMPARITOR "PROBLICOM".

Maurice L. Ayers, Physics Department, University of Central Arkansas, Conway, Arkansas 72032

The function, design and construction of Mr. Ben Mayer's original comparitor (details published in "Sky and Telescope", January, 1976) are described. The instrument has been adopted into the University of Central Arkansas astronomy program. When properly used, this device enables one to confirm, or discover all or some of the following astronomical objects or events: variable stars, comets, asteroids, novae, and supernovae. The comparitor operation is demonstrated using transparencies made by astronomy students at U.C.A.

TEMPORAL PULSE CONTROL OF A MODELOCKED DYE LASER.

James A. Berry, Mark A. Newbold and G. J. Salamo, Dept. of Physics, University of AR, Fayetteville, AR 72701

The introduction of a time varying loss into an active laser cavity is known to produce a fixed phase relation between the oscillating modes in the laser cavity. While theories have been developed to explain the resulting locking process and predict temporal pulse lengths for any number of modes participating in the locking process, experiment has generally focused on the temporal pulse length resulting from a laser operating with only slight restriction to its bandwidth. Bandwidths of dye lasers operating in this manner are typically on the order of 100 GHz with mode spacing of about 0.1 GHz. Consequently, a large number of modes are generally oscillating. Few attempts have been made, however, to utilize the relation between bandwidth and pulse length for pulse length control. Our literature search reveals that no experiment resulting in pulse length control by control of mode number has been reported. The purpose of this research is to explore the possibility of pulse length control through control of the laser bandwidth by the use of inter-cavity Fabry-Perot etalons.

THE TEMPERATURE DEPENDENCE OF THE ELASTIC MODULI OF A MACHINABLE GLASS-CERAMIC.

J. A. Brewer, S. N. Harrington*, and D. O. Pederson, Physics Department, University of Arkansas, Fayetteville, AR 72701

The velocity of longitudinal and transverse ultrasound at a frequency of 10 MHz has been measured in a machinable ceramic (Code 9658, Macor, Glass-Ceramic Dept., Corning Glass Works, Corning, N.Y.). The glass-ceramic is a glassy matrix containing about 50% (volume) mica crystallites which are approximately 2μ thick and $5-10\mu$ square. Measurements were made using a pulse-echo overlap technique from 4.2 to 300K. The elastic moduli calculated from the sound velocities are in general agreement with the technical values specified at room temperature for this material. The general temperature dependence of the elastic moduli is characteristic of a glassy material.

*Present Address: Rice University, Houston, TX 77001

SOME ELECTRON MICROSCOPICAL OBSERVATIONS OF THE CHLOROPLASTS OF UNICELLULAR GREEN ALGA, *FREMOSPHAERA VIRIDIS*.

Harral Burris and Danna Rosell, Dept. Biology, University of Arkansas at Little Rock, Little Rock, Arkansas 72204

The vegetative cells of *Fremosphaera viridis*, a fresh-water alga found in acidic habitats, are relatively large. Each cell is highly vacuolate and contains numerous chloroplasts. The chloroplasts possess a typical algal membrane system of elongated thylakoids and one or more pyrenoids. Transmission electron microscopical observations of the interrelationship between the thylakoids and the pyrenoid will be discussed.

LOIS: A LASER OPERATED ION SOURCE.

M. R. Carruth, R. H. Hughes, R. J. Anderson, and L. Gray, Physics Dept., University of Arkansas, Fayetteville, Ark. 72701

A novel, pulsed heavy-ion source is being developed at the University of Arkansas. Ions are extracted from the blowoff produced by focussing a 25 megawatt pulse of 1.06 micron radiation from Nd:Yag Q-switched laser onto solid targets. Experiments are now being performed on commercially pure aluminum targets. Aluminum ions are stripped from the dense plasma plume at a gridded high potential extraction gap. A gridded Einzel lens is then used to focus the resulting space-charge-limited ion beam. Some preliminary results will be presented.

EFFECT OF FERMIX-ZINC SEED COATINGS ON GERMINATION AND EARLY GROWTH OF RICE PLANTS.

D. A. Famotemi and L. F. Thompson, University of Arkansas, Fayetteville

Zinc deficiency in rice (*Oryza sativa* L.), a common problem in Arkansas' calcareous rice soils, can generally be controlled by the broadcast application of 10 kg/ha of Zn, as $ZnSO_4$, at planting time. In recent years there has been an interest in the rice plant's response to much smaller quantities of Zn coated directly onto the rice seed. Concomitant with the interest in Zn seed coatings, the question of the effect of seed coatings on germination and early plant growth has been raised. In this investigation the seed of three rice cultivars was coated with FERMIX-Zinc (a Zn lignosulfonate) at the rate of 7.3 kg/100 kg seed (1 kg Zn/100 kg seed). The seed was grown for 21 days, in a calcareous silt loam (pH 7.3) in the greenhouse. Daily counts on plant stands showed that plants from coated seed were almost a day slower in emerging than plants from uncoated seed, but by the 9th day counts from the treated and untreated seed were virtually the same.

By the 11th day more plants had emerged from the coated seed than from the uncoated seed. Data on plant height, dry weight yields, and the Zn content of the rice tissue, taken 21 days after planting, showed the Zn-coated seed to produce superior results.

A SCIENCE WORKSHOP FOR HIGH SCHOOL STUDENTS.

Gary D. Henson, Dept. Physics, University of Central Arkansas, Conway, Arkansas 72032

The planning, preparation, and staging of a High School Workshop in the fields of Physics, Chemistry, Biology, and Mathematics as done by the students representing each field at the University of Central Arkansas will be presented. A slide show of this year's Workshop will also be shown with the presentation.

Ed. Note: This paper won the annual Second Place award

STANDARD VUV RADIATION FROM ELECTRON IMPACT ON METALS.

Tim Heumier and R. H. Hughes, Dept. of Physics, University of Arkansas, Fayetteville, AR 72701

An optical standard in the vacuum ultraviolet is proposed, namely, the light emitted from fast (100 keV) electrons as they impact on metal surfaces. This standard would have the qualities desirable in a standard optical source: ease of handling, continuous spectrum of adequate intensity, isotropic angular distribution, stability and reproducibility, scalability, and being generated directly in the vacuum. A secondary standard using 10 keV electrons would have application in orbiting observatories and other space-related endeavors. Qualitative aspects of the theory are discussed and a description of the experimental apparatus is given.

EFFECT ON MODIFICATION OF LYSINE 88 ON CYTOCHROME C REACTIVITY.

Freda Miller, Dept. of Chemistry, The College of the Ozarks, Clarksville, Arkansas 72830 and F. S. Millett, Dept. of Chemistry, University of Arkansas, Fayetteville, Arkansas 72701

A sample of trifluoroacetylated lysine 88 cytochrome c was purified by means of ion-exchange chromatography. Assays were performed to observe the effect of modification of lysine 88 in cytochrome c on reactions with cytochrome c reductase and cytochrome oxidase.

The results of these assays indicated that lysine 88 is involved in the binding of the cytochrome c reductase and cytochrome oxidase. The question as to whether the binding site for cytochrome c reductase and cytochrome oxidase are one and the same or two separate sites is still under investigation.

THE INHIBITORY ACTIVITIES OF COLICINOGENIC STRAINS OF *ESCHERICHIA COLI*.

Leo Paulissen and Benny Green, Department of Botany and Bacteriology, University of Arkansas, Fayetteville, Arkansas 72701

Several strains of *Escherichia coli*, capable of producing an antibiotic-like substance called colicin, have been isolated. Colicins differ from classical antibiotics by their narrow spectrum of activity, their action on strains closely related to the colicin producer, and their chemical complexity.

Several of the isolated strains are active against notably pathogenic bacteria such as *Salmonella enteritidis* and *Shigella paradysenteriae*.

Colicinogenic strains can be established in the microflora of white mice by the oral route. The course of residency can be monitored by the sampling of mouse feces for bacterial having colicinogenic activity.

Studies are underway to determine if the presence of colicin-producing bacteria in the mouse intestine will increase the resistance of the mice to pathogens susceptible to the colicin.

SOME ULTRASTRUCTURAL OBSERVATIONS OF THE GELATINOUS MATRIX OF THE UNICELLULAR GREEN ALGA, *HAEMATOCOCCUS*.

Danna Rosell and Harral Burris, Dept. Biology, University of Arkansas at Little Rock, Little Rock, Arkansas 72204

The presence of a distinct "gelatinous matrix" between the cellulosic cell wall and the plasma membrane distinguishes motile species of *Haematococcus* from the other unicellular genera of the Volvo-

cales. Preliminary transmission electron microscopical observations of the gelatinous matrix in one or more species of *Haematococcus* will be discussed.

Ed. Note: This paper won the annual First Place award

SOME MICROSCOPICAL OBSERVATIONS ON GREEN AND APARENT ALBINO SEEDLINGS OF THE TRIFOLIATE ORANGE, *PONCIRUS TRIFOLIATA*.

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A collection of seeds from a native Arkansas tree of trifoliolate orange, *Poncirus trifoliata*, produced some apparent albino seedlings as well as the expected green seedlings. Histological preparations of leaves from both types of seedlings were examined with light and transmission electron microscopy. The most obvious differences between the two seedlings involved chloroplast structure. Preliminary observations on this aspect will be discussed.