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AGRICULTURE SECTION

Chairman: J. L. Lancaster, University of Arkansas

A-1-1

Relative Biological Value of the Proteins in Cereal Grains, Buckwheat, and Grain Sorghums. Barnett Sure, University of Arkansas.

This study was conducted on the Wistar-strain albino rat. The period of experimentation was 10 weeks. The yardstick for evaluation was protein efficiency ratios (PER), expressed as gains in body weight per gram of protein intake. There were 24 animals in each group.

On 9 per cent protein intake, the PER for whole hard-wheat flour was 1.05, and for whole rye flour, 1.45. On 5 per cent protein intake, the PER for the wheat was 0.95; rye, 1.95; and whole yellow corn, 0.50. On 8 per cent protein intake, the PER for rolled oats was 1.67; Wisconsin whole buckwheat, 2.03; Wisconsin buckwheat flour, 2.06; Arkansas grain sorghum, 0.43; and Oklahoma grain sorghum, 0.29.

It is evident from this investigation that the proteins in rye are much more efficient than those in wheat, and as rye can grow on much poorer soils than wheat, more of this cereal grain should be cultivated for livestock and human consumption on millions of acres of waste lands.

But the most surprising revelation from this study is that the proteins in buckwheat have such a high biological value. Therefore, serious consideration should be given to increased production of this crop. It is apparent also that the proteins in the grain sorghums are of very poor biological value.

A-2-2

A Cladosporium Leaf Blight of Oats Apparently New to Science. H. R. Rosen, University of Arkansas.

A highly destructive disease of oats was first observed at the University Farm near Fayetteville in March, 1953, on a new oat variety, Woodward Composite, C15106. Of over 1,500 oat varieties and selections, this variety was the only one found infected, indicating that the disease and its causal agent is highly selective. By late March, fully 50 to 75 per cent of the leaf area was killed on all plants of this variety, including every row of three randomized replicates with three-rod rows in each replicate. The lowermost leaves were completely killed, but as the disease progressed upwards dead areas on sheaths and blades became less abundant.

Individual lesions appear at first as small, grayish-green, depressed, irregular spots which dry rapidly into dead, tan-colored areas. When such spots coalesce, large, reddish-yellow halos surround them so that two-thirds or more of the blade becomes discolored. In young infections there are no surface signs of any pathogen, but on older infections dark-colored tufts appear, representing the fruiting stage of a species of Cladosporium. Single-spore isolates grow readily on standard PDA, producing dark-colored, slow-growing colonies at temperatures around 20°C. When a spore suspension of such colonies in steril water is sprayed on young seedlings of Woodward Composite, numerous leaf infections appear.

A-3-3

Modification of the Environment as a Factor in the Control of Cotton Diseases. V. H. Young, University of Arkansas.

Many diseases of cotton are severe under certain environmental conditions such as suboptimal temperatures and malnutrition due to soil deficiencies. Our

work with cottom diseases has involved determination of the effect of environment on the etiology of cotton diseases, and the amelioration of unfavorable conditions through cultural practices.

Earlier work dealt with Fusarium-wilt control by reducing potash hunger or "rust." Fusarium wilt was brought under satisfactory control except where root-knot was a serious factor. Our recent work with soil fumigants indicates that they can now be recommended for control of the Fusarium-wilt/root-knot complex.

Work on Verticillium wilt is incomplete but certain facts have emerged. Deep cultivation causes root injury, rendering cotton susceptible to the disease. Elimination of anything beyond shallow scraping greatly reduces the incidence and severity of the disease and gives increased yields. Fertilizer studies show that high nitrogen applications render cotton more susceptible to attacks of Verticillium wilt. Applications of complete fertilizers seem more promising, but severe wilt conditions have not arisen since this work was started, and definite recommendations await more severe tests. Similar work on other parasitic and non-parasitic diseases is planned.

A-4-4

Methods for Estimating the Clay Mineral Content of Certain Arkansas Soils. C. E. Lee and C. L. Garey, University of Arkansas.

A study is being conducted to identify the minerals in the clay fraction of several Arkansas soils. Methods of study now in use in other soil laboratories have been adopted and modified with certain improvements to give greater accuracy and to reduce the amount of labor required.

X-ray analysis, differential-thermal analysis, and total-exchange-capacity measurements have been made on each sample of clay being studied. Standard mixtures of known, relatively pure clays have been prepared and studied by these methods. By proper control of the procedures, the ratios of intensity of the major peaks of kaolinite, montmorillionite, and quartz have been related to the percentage composition of each in the mixture. By comparing the data from soil-clay separates with that from the pure mineral mixtures, an estimate of the amount of each mineral group in the soil can be made.

This information may be useful in providing a better understanding of the chemical and physical reactions which take place in the soil, and in assisting in the future solution of soil problems.

A-6-6

Ionic Exchange in Soils: II. Measurement of Cation Exchange between Soil Colloids and Plant Roots. D. A. Brown and J. C. Noggle, University of Arkansas.

The desirability of developing techniques for measuring the exchange reaction between soil colloids and plant roots has been previously reported. More recently techniques have been perfected which enable a quantitative measurement of the exchange reaction between the soil and growing plant roots.

The purpose of this paper is to report the effects of nutrient status of the soil upon the suite of cations taken up by plants. Soybeans were grown for four weeks in Crowley silt-loam soil and Sharkey clay. These soils had been treated to give 5 levels of magnesium saturation (0, 3, 6, 12, 18%) and repeated for 3 levels of potassium saturation, 1.5, 3.0, and 6.0% for the Crowley soil, and 0.75, 1.5, and 3.0% for the Sharkey soil. Data are reported in terms of the suite of cations adsorbed by plant roots, and their absorption into the roots and tops of the plants. The suite of cations was altered markedly as either the magnesium or potassium levels in the soil were changed. The influence of the type of clay mineral upon the exchange of potassium, calcium, and magnesium from the soil to the plant roots was also quite evident for any given degree of cation saturation. The significance of these data in fertilizer practices is discussed.

A-8-8

The Quality of Water from the Arkansas River for Irrigation Purposes. Cecil Blackwell, University of Arkansas.

According to surveys conducted by the Water Resources Laboratory of the University of Arkansas, water from the Arkansas and Red Rivers may be unsafe for

irrigation purposes at certain times during the year. In general, the dissolved-mineral-salts content can be expected to be higher during periods when the Arkansas River is at low stage. This does not always hold true. However, since the time that irrigation water is most needed usually coincides with low stage of the river, it is generally considered unsafe to use this water for irrigation.

In the fall of 1953, a preliminary experiment was initiated in the greenhouse at Fayetteville involving three soil types and three sources of water. The soils were sandy loam, silt loam, and silty-clay loam taken from river bottom land in Sebastian County near Van Buren. The water sources were distilled water, tap water and water from the Arkansas River at Van Buren. These waters were analyzed for conductance and mineral-salts content by the Water Resources Laboratory and the soil samples were analyzed by the Soil Testing Laboratory. This study is designed to determine the possible interaction of soil type and water source on the performance of snap beans and their absorption of nutrients. It is also hoped to obtain some indication of the effects of river water on the physical and fertility condition of these soils. These data are still in the analysis stage, and it is not possible to give a complete summary of the results at this time. Arkansas River Water has caused a stunting of plant growth, and on one soil the plants developed a marginal leaf burn which may prove to be sodium toxicity or possibly a potassium deficiency due to the excessive uptake of sodium.

A-9-9

The Control of White Tip of Rice by Seed Treatments. G. E. Templeton and E. M. Cralley, University.

White tip (*Aphelenchoides* sp.), a serious disease of rice, is caused by a seed-borne nematode. Previous work has shown that the organism is not soil borne. Therefore, experiments are in progress to determine the effect of various nematocides, applied as seed treatments, on the severity of the disease.

N-244 (3 -p- chlorophenyl-5methyl rhodanine), applied to rice seed at the rate of one and one-fourth ounces per bushel (40% formulation), has effectively controlled white tip of rice growing under greenhouse and field conditions. HL737 (2 - nitro l- furylephylene), applied at the rate of four ounces per bushel (10% formulation), and Ridsaan II (p-phenylene bisrhodanine), applied at the rate of one-half ounce per bushel (technical grade) showed promise for the control of white tip in screening tests.

The above compounds have not been toxic to rice seedlings when applied at the rates specified. Preliminary tests with N-244 indicate that this compound is compatable with seed-treatment fungicides such as Arasan and Ceresan M. which are commonly applied for the control of seedling diseases. Yields of susceptible rice varieties, when the seed is heavily infested with nematodes, have been increased by five to ten bushels per acre by seed treatments with N-244.

BIOLOGY SECTION

Chairman: Robert S. Fairchild, University of Arkansas

B-1-11

Notes on Arkansas Amphibians and Reptiles. Herndon G. Dowling, University of Arkansas.

A summary of the knowledge of Arkansas amphibians and reptiles, with discussion of the work now in progress. The distribution of several of the forms within the state is indicated.

B-3-13

A Description of the Larvae of the Salamander *Ambystoma Annulatum*. Robert S. Chase, Jr., University of Arkansas.

The larvae of the salamander *Ambystoma annulatum* have not been described in their early stages of development because of the lack of information about both range and life history of the species. However, eggs were laid and the described larvae cultured in the laboratory, removing any doubt as to their origin. None of the larvae survived beyond 48 days after hatching. The description is based on these individuals.

B-5-15

Observations on *Anemone* in Arkansas. Dwight M. Moore, University of Arkansas.

Anemone quinquefolla, a species of the eastern and northern states, has been found in a very restricted habitat at Blanchard Spring, Stone County.

Anemone coroliniana, common in many other states, is widely distributed in Arkansas. Another species, assigned to *Anemone decapetala* Ard., is native to Chile and other South American countries. The specimens found in Marion, Fulton, and Little River counties seem to differ from material from those countries. This species listed in the Seventh Edition as "doubtfully distinct", has been excluded from the Eighth Edition of Gray's Manual, but as our material is distinct from *A. caroliniana* and also appears to differ from the South American *A. decapetala*, it must be considered as either a variety of that species, or as a new or a different species. Studies are being continued on its exact nature. Other collections of these are solicited.

B-8-18

Preliminary Report on Investigations of "Maternal Effects" in the Growth of Hybrid Corn Embryos. Robert S. Fairchild, University of Arkansas.

The nature and magnitude of the effects of genetically different endosperms on the growth of reciprocal hybrid corn embryos might be determined by observations of the growth of excised embryos in nutrient cultures.

Reciprocal crosses involving inbreds of dent, pop, and sweet corn were made, and both inbred and hybrid embryos were transferred to nutrient agar-culture media when less than ten days old. Macroscopic observations of comparative growth were made.

B-9-19

Evolution in the Western North American Cleomoideae. Hugh H. Iltis, University of Arkansas.

The four genera of western North American Cleomoideae (Capparidaceae) can be arranged in a phylectic-reduction series based on fruit, raceme, and bract structure. This series, from the primitive *Cleome*, sect. PERITOMA (6 spp.) through the progressively more specialized *Cleomella* (9ssp.) and Wislizenia (1 sp.) to the highly specialized *Oxystylis* (1 sp.) is remarkably complete. The reduction runs from many-seeded siliques through few-seeded silicles to two-seeded schizocarps, and from open, bracteate racemes through denser, ebracteate ones to congested, ebracteate raceme-clusters.

The geographic distributions imply these reductions to be due to adaptive evolution through selection by an arid environment. The primitive forms are widely distributed in more mesic climates; the specialized have progressively smaller, essentially equiformal areas centering about the Death Valley of California where *Oxystylis* is endemic. The ranges and relationships of individual taxa within each genus follow a pattern corresponding to their morphology. The taxa of the primitive (therefore oldest) genus *Cleome* are all sympatric and sharply distinct; of the more specialized genus *Cleomella* both allopatric and sympatric and less sharply distinct; and of the monotypic, polymorphic *Wislizenia*, allopatric with closely related populations. The most specialized (therefore youngest) monotypic *Oxystylis* is monomorphic.

The suggestion is made that in evolution through isolation, taxa of a genus have to be allopatric before they can become sympatric, and that by studying the ranges of the genera, we can corroborate geographical distinction with the morphology and relative age of a genus. The fact that there are different kinds of genera can in part be explained by the differences in their age. A concept of "accelerative evolution" concommitant with increased specialization of morphology and habitat is suggested by this series.

B-10-20

The Vegetation of the White River Basin to be Affected by the Table Rock Dam and Reservoir. Dwight M. Moore, University of Arkansas.

During the summer of 1953 the writer, with the very capable cooperation of Dr. Hugh Iltis and the assistance of one of our students, James Mize, made a

study of the area to be affected by the building of Table Rock Dam on White River in Taney County, Missouri. The lake to be formed will cover an area of approximately 52,300 acres at the flood-control level, and the White River will be backed up for a distance of approximately 77 miles to a point near the present crossing of that river by U. S. Highway 62, about ten miles west of Eureka Springs.

Much of the area affected is in the Cotter dolomite, and this has shown marked effects on the vegetation. Striking differences are observable on contrasting slopes such as those facing north or east in contrast to those facing south or west. Representative stations were selected from near the dam site up to the head of the lake, and those were studied in considerable detail.

Of the plants found in the area, the following table is fairly indicative of the variety observed:

Pteridophytes	17 genera, including 26 species
Gymnosperms	3 (2 genera).
Monocots	110 species representing 12 families, including 70 grasses in 33 genera, of which 19 were species of *Panicum*.
	Fourteen species of *Cyperaceae*, and 26 other species.
Dicots	433 species from 79 families. Of these there were 70 *Compositae*, 39 *Leguminosae*, 20 *Labiatae*, 18 members of the *Euphorbiaceae*, 16 *Umbelliferae*, 15 *Ranunculaceae* and *Scrophulariaceae*, with smaller numbers in other families.

Some new distribution records were made, of which the most unexpected was a large stand of overcup oak (*Quercus lyrata*) in an old oxbow of Long Creek, less than two miles above the dam site.

B-11-21

An Ecological Study of the Massard Prairie. Ruth Armstrong, Fort Smith Junior High School.

This paper presents a study of the vegetation of Massard Prairie and conditions existing there over the growing season. Seasonal rainfall, temperature, evaporation, length of daylight, and flower appearance were studied. A list of plants found on the prairie is included.

CHEMISTRY SECTION

Chairman: Joseph E. Pryor, Harding College

C-1-25

Partial Vapor Pressures and Classical Acid Constant of Hydrogen Chloride. C. W. McCarty, Ouachita College.

The partial vapor pressures of hydrogen chloride, over aqueous solutions, were determined from electromotive-force data at 10, 25, 40, 50, and 60° C. The values so obtained compare favorably with the experimental values recorded in the International Critical Tables, especially at 25°. The deviation of these calculated and experimental values seem to be a function of the temperature.

The concentration of the undissociated portion of the hydrogen chloride was determined from the calculated partial vapor pressure, assuming that Raoult's law holds. Using these concentrations and the activity coefficients as determined by Harned and Ehlers, the values for the classical acid constant were determined.

$t^{\circ}C$	10	25	40	50	60
$K^{\circ} \times 10^{-6}$	6.13	1.287	0.313	0.132	0.0589

The slope of the straight line graph of Log K° against 1/T gave a value of -17,200 calories for ΔH. This indicates that a decrease in temperature favors dissociation, and that heat is liberated in the dissociation process.

C-3-27

Large Carbon-Ring Compounds. L. I. Diuguid, Du-Good Chemical Laboratory, St. Louis.

In the last two decades considerable interest has been developed in the synthesis of large-ring compounds in the fields of medicine and in the perfume industry. Muscone and civetone are important bases that have been synthesized by Hamsdieker, Ruzicha, Ziegler and others.

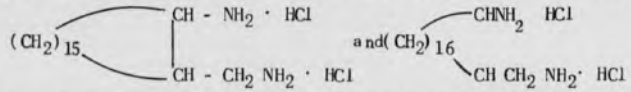
Also, work is being directed towards the synthesis of large-ring compounds having anti-leprosy properties. In connection with pharmaceuticals, this paper outlines the synthesis of some large-ring compounds of the perfume type, and some prepared for antimalarial tests. Other large-ring compounds conteining as many as C_{34} have been synthesized.

The Ziegler method of cyclization at infinite dilution in a solvent such as ether was used, starting with even-numbered and odd-numbered carbon straight-chain dinitriles having C_{17}, C_{18}, and C_{19} carbon atoms.

A new method is described for a more direct method for the synthesis of odd-numbered carbon, straight-chain dibasic acids, via the Ketene synthesis (Wedekinds method) in high yields. The method was published in the Journal of American Chemical Society, Vol. 74 (1952) 4203-4.

The even-numbered aliphatic dibasic acids were synthesized electrolytically via the Kolbe method.

The large-ring carbon compounds described in this paper are as follows:



2-Aminocycloheptedecane methylamine dihydrochloride

2-Aminocyclooctadecane methylamine dihydrochloride

C-4-28

A Possible Role of Radioactivity in Petroleum Genesis. R. R. Edwards and P. K. Kuroda, University of Arkansas.

As the extensive studies of Whitehead, *et al.*, on the action of radiation on marine sediments have developed essentially negative results, it appears that the petroleum-genesis problem might be re-evaluated in terms of radiation-induced polymerization reactions on light hydrocarbons produced by bacterial action. Some recent experimental results of measurements of radioactivity in natural gases and petroleum brines will be discussed as related to this possibility. Samples of brines from the Burbank field, Osage County, Oklahoma, have shown radium concentrations up to 10^{-9} curies per liter, which approaches one thousand times the radium concentration values in the Arkansas Hot Springs.

C-6-30

A Product Study of the Distribution of C^{14} Produced During Neutron Irradiation of Sodium Cyanide. Arthur Fry, University of Arkansas.

The products formed in the irradiation of a sample of solid sodium cyanide in the Oak Ridge graphite reactor have been investigated in considerable detail. The most striking result of the investigation is that approximately fifty per cent of the total activity produced in the $N^{14}(n,p)C^{14}$ reaction is found as sodium cyanide. This indicates a high probability that the recoiling C^{14} atom initially formed will displace carbon from cyanide ion. Most of the rest of the activity ends up in fractions which contain carbon-carbon bonds, possibly derived from displacement of nitrogen from cyanide ion. However, the resulting fragment does not end up as acetylene or sodium acetylide as might be expected, but as more complicated organic compounds, most of which are acidic in nature.

C-8-32

The Reaction of Triphenylsilane with Arganolithium Compounds. H. W. Melvin, Arkansas A. M. and N. College.

Triphenylsilane, $(C_6H_5)_3SiH$, was found to react with RLi compounds to yield tetrasubstituted silanes of the type $(C_6H_5)_3SiR$.

An analogous reaction occurred when lithium amides were caused to react with triphenylsilane, resulting in derivatives of the type $(C_6H_5)_3SiNR_2$.

A proposed explanation for these reactions is based upon relative electronegativities.

C-9-33

Radium Isotopes in Uranium Minerals. P. K. Kuroda and R. R. Edwards, University of Arkansas.

It was found that the ratio Ra-223 to Ra-226 is a carbon-uranium mineral (asphaltite from Temple Mountain, Utah) was slightly different from that in pitchblende (Great Bear Lake, Canada). Nuclear-geochemical factors which affect this ratio in natural uranium minerals will be discussed.

GEOGRAPHY SECTION

Chairman: C. M. Strack, Henderson State Teachers College

G-2-36

Geography of Arkansas: A Resource Unit. Clarence S. Williams, Arkansas State Teachers College.

The need for this type of unit is based on a survey of the curriculum offerings in the junior and senior high schools of Arkansas, and on the lack of consolidated Arkansas geographic materials for teacher use. A resource unit is one that not only offers background material pertaining to a specific subject, but also presents to the teacher various methods by which this material may have maximum usability.

The background materials on the geography of Arkansas have been assembled from various sources and will be compiled on an inventory basis. The inventory approach is used so that the teacher may select any part of the whole as a separate unit of study. The teaching aids will be based primarily on how this background material may be integrated into the existing curriculum, forms of motivation, and evaluation.

Even though the resource unit will be written for teacher use, the objectives of the unit are student-centered. It is hoped that this unit will lead to: a better understanding of the physical and cultural aspects of the state; an appreciation of the interaction of these aspects; and the development of the students' abilities to interpret both physical and cultural phenomena.

GEOLOGY SECTION

Chairman: Kern C. Jackson, University of Arkansas

G1-1-40

The Stratigraphy of the Monticello Ridge. Frank E. Onellion, University of Arkansas.

Located in southeastern Arkansas, the Monticello Ridge extends southward from southern Lincoln County, across Drew County, into northern Ashley County.

The Jackson formation, consisting of light-gray to bluish-gray clay in this area, crops out at places near the base of the ridge. The material that makes up most of the ridge consists of reddish-brown to yellowish-orange silt, silty sand and gravel, and orange to grayish-purple clay. The maximum thickness of the material is about 60 feet.

The sand and gravel is more or less cross bedded, and the nature of the deposits suggest deposition by water. Apparently the source of the material was from the northwest. The gravel, found as lenses and stringers in the sand beds,

consists almost wholly of chert pebbles. Fossils in the pebbles show that the chert is of Paleozoic age. In general, the gravel in the northern part of the ridge is coarser than that in the southern part.

Relationships are not known, but the material in the ridge apparently is not a part of the Jackson formation. It is similar to the sand and gravel that underlies the loess in Crowleys' Ridge.

The gravel in Monticello Ridge is used for road material. The sand and gravel deposits furnish water to many domestic wells and springs, but because of the topographic position and the limited extent of the deposits, they will never be a source of large amounts of ground water.

G1-2-41

A Heavy-Mineral Study of the Latest Cretaceous and Earliest Tertiary Formations of Central Utah. Kwang-yuan Lee, University of Arkansas.

The heavy-mineral study of the latest Cretaceous and earliest Tertiary sediments has aimed (1) to determine the value of mineralogical composition of the sediments as a basis for differentiating the North Horn formation from the Price River formation as well as the overlying member of the Paleocene Flagstaff Limestone, and (2) to determine the mineralogical and lithological variations regionally and stratigraphically.

The mineral assemblages consist chiefly of tourmaline, zircon, garnet, staurolite, rutile, biotite, hornblende, apatite, corundum, spinel, fluorite, dolomite, glauconite, barite, iron-oxide, and leucoxene. Among them tourmaline, zircon, garnet, dolomite and iron-oxides are the principal minerals. Colorless overgrowths of tourmaline are attached to the brown and pink tourmalines at the negative poles of the crystals. Some zircons take the form of tooth-like serrations attached to the prism face. Intensely etched staurolites are noticed. On the basis of the heavy-mineral suite, five mineral zones are tentatively proposed for the purpose of correlation; these sediments were originally derived from acid to intermediate plutonic terraine and, to a minor extent, to some pre-Cambrian metamorphics in the Wasatch Mountain region. As a whole, the bulk composition of the sediments have passed through more than one cycle of erosion and deposition.

G1-3-42

Carbonate Fillings in Solution Cavities of Pre-Atoka Age. Kern C. Jackson and James E. Case, University of Arkansas.

A group of interesting carbonate masses in the Brentwood limestone (Morrow Age) are described. They are interpreted as having resulted from ground-water deposition in solution cavities. Their development is placed in the time interval represented in nearby areas by the Woolsey shale and Kessler limestone (Morrow Age).

G1-4-43

Stratigraphy of the Hale Formation in Madison, Newton, Boone, and Carroll Counties, Arkansas. Douglas Scougale, University of Arkansas.

The paper is a lithologic study of 25 stratigraphic sections of the Hale formation, measured at intervals of approximately six miles, in Madison, Newton, Boone and Carroll Counties.

As a result of the study, a detailed description of the regional stratigraphy plus a graphic cross section of the area, based on lithologic correlation, has been compiled.

G1-6-45

The Petrogenetic Significance of Quartz Twins. Kern C. Jackson, University of Arkansas.

Quartz twinning in granites was studied in order to determine if any interpretation of the origin of the granite could be made. Brazil-type twinning was found to be almost entirely lacking in rocks in which the granitizing processes had been carried to completion, and was found to be present in incompletely granitized and magmatic rocks. The explanation of this was sought in a consideration of the energy on the composition planes of brazil and dauphine twins.

HISTORY AND GOVERNMENT SECTION

H-3-48

The Idea of Progress in Recent Philosophy of History. Georg G. Iggers, Philander Smith College.

Beginning with the seventeenth century, the conception of history in terms of linear progress became a dominant force in historical and philosophical thought. If in the eighteenth century this progress was still conceived as primarily intellectual and moral in character (Voltaire, Kant, Condorcet), nineteenth century philosophers of history, under the impact of Romantic conceptions of history, increasingly viewed progress in terms of total social development. Under the impact of Hegelianism, Marxian materialism, and post-Darwinian social evolutionism, the idea of inevitable social progress and of the possibility of applying the methods of the natural sciences to history became so dominant that even pragmatic historians and explicitly non-philosophic works, like the Cambridge Modern History, accepted the progressive character of history as a scientific fact.

This paper is concerned primarily with some phases of the revolt against the linear conception of progress since the nineteenth century. Rather than to give a scanty survey of the literature in twenty minutes, it will attempt to point out a number of problems contained in several basic concepts, such as "society," "culture," "civilization," "causation," "growth," and "decline," found in the works of three thinkers. Spengler and Toynbee are representative of modern cyclical theories which, while rejecting the idea of linear progress in human history, hold that within individual societies laws of development may be scientifically formulated. Jacob Burckhardt was representative of the skepticism concerning the possibility of a philosophy of history and the applicability of the methods of the natural sciences.

H-4-49

Relationship of Planning and Zoning in the Arkansas Zoning Cases. Nathalie Georgia, University of Arkansas.

Zoning is a tool to implement land-use plans. It is the purpose of this paper to discover, through a study of planning and zoning legislation and the court cases, how the Arkansas State Legislature and Supreme Court have observed this relationship. The State Legislature did not recognize the relationship at first, but subsequently enacted legislation which did. The decisions rendered by the Supreme Court, although not always consistent, show a trend toward recognition of the relationship.

H-5-50

The Know Nothings. Charles G. Hamilton, College of the Ozarks.

Nativism existed in the nation for many years before it found an organized expression in the Know Nothing Party. This party gained rapidly in the middle of the 1850's, and in the 1856 election it held the balance of power in several salient states.

The Republican Party sought these votes in state races as well as in the national arena. The nomination of a presidential candidate in 1860 by that party was influenced by those seeking to obtain the Know Nothing vote. The campaign also was marked by appeals to the Know Nothings. A study of the vote by counties, in such salient states as California, Indiana, Illinois, New Jersey, New York, Ohio, and Pennsylvania suggests that the Know Nothing votes of 1856 decided the election of 1860.

MATHEMATICS SECTION

M-1-51

Derivation and Integration of Functions of Intervals. William R. Orton, University of Arkansas.

I. Fundamental Definitions
   A. Intervals
      1. Elementary System and Subdivision
      2. Norm and Parameter of Regularity

B. Functions of Intervals
   1. Extensions to More General Sets
   2. Continuity, Absolute Continuity, and Bounded Variation

C. Theorems Concerning Fundamental Properties
   1. Covering Theorems
   2. Interrelations of Properties

II. Derivation of Functions of Intervals

A. Ordinary Derivates

B. Examples of Derivable Functions

C. Theorems on Derivable Functions

III. Integration of Functions of Intervals

A. General Burkill Integral

B. Examples of Integrable Functions

C. Properties of the Integral

IV. Theorems Relating to Differentiation and Integration

M-3-53

A Newcomer's Views on The Teaching of Elementary College Mathematics. Lowell R. Tappan, University of Arkansas.

The views and problems presented in this paper are those of one who looks at the problematic situation from the double viewpoint of student and teacher.

Attention is focused upon these three particular questions:

(1) What can be expected of students in elementary college mathematics courses in the way of background knowledge?

(2) To what extent should 'grading on a curve' prevail in the elementary college mathematics courses?

(4) Should students enrolled in different curricula of the various colleges be graded on the same basis in their elementary college mathematics courses?

The views here presented have been reached from experience in high-school teaching and subsequent knowledge of the state of mathematical training of the typical college freshman.

In the light of these views, certain personal opinions are offered in regard to the teaching of elementary college mathematics to such students.

M-4-54

Let's Give Them What They Need. T. M. Simpson, Henderson State Teachers College.

The paper presents suggestions for modifications of the problem content of the traditional freshman courses, and of the courses in General Education. It emphasizes the versatility and universality of mathematics as a tool. A plea is made for a substantial reduction in the proportion of problems from the areas of the physical sciences, and for a corresponding increase in that from biology, social studies, music and other fields.

M-5-55

A Report on the Summer Conference on Collegiate Mathematics. Lyle J. Dixon, Arkansas State College.

The University of Colorado was host to the Summer Conference on Collegiate Mathematics from June 15 to August 8, 1953, sponsored by the National Science Foundation.

The conference was divided into two parts. The first part consisted of two series of lectures for the entire eight weeks of the conference. One series was on Modern Developments in Algebra, by Professor Emil Artin, Princeton University. The other was on the Introduction to Modern Foundational and Topological Concepts via the Notion of Curve, by Professor R. L. Wilder, University of Michigan.

The second part of the conference consisted of a series of short lectures by various mathematicians. Of particular interest in regard to our own problems

was a short lecture series by Dr. Carroll V. Newsom, Assistant Commissioner of Education for the State of New York. These lectures were on the undergraduate curriculum in mathematics. In addition to his many interesting and pertinent remarks on this topic, Dr. Newsom outlined an entirely new curriculum for undergraduate majors in mathematics.

MEDICINE AND PHARMACY SECTION

Chairman: Dr. Jacob Sacks, University of Arkansas

MD-2-57

Studies on the Metabolism of Chick Bone Marrow. Dr. James S. Dinning, University of Arkansas School of Medicine.

Chick-bone marrow exhibits choline oxidase and succinoxidase activities and incorporates choline into phospholipids *in vitro*. The latter reaction requires ATP. Choline oxidase is reduced or abolished by prior treatment of the animals with x-ray, urethane, or aminopterin. Bone marrow from folic-acid-deficient chicks is devoid of choline oxidase, but incorporates choline into phospholipids at an accelerated rate.

MD-3-58

A Study of Eclampsia With an Appraisal of the Current Therapy. Dr. Donal E. Barlow, University of Arkansas School of Medicine.

The problem of Eclampsia is defined and briefly discussed. The etiology is still unknown in its entirety. Therefore, it seemed wise to review the literature with the principal objective of consolidating recent findings of other observers and combining these with the findings of a controlled study made by the Department of obstetrics and Gynecology, University of Arkansas School of Medicine. This study, completed in December, 1953, includes 107 patients with Eclampsia.

Eclampsia has three major clinical manifestations -- edema (swelling), hypertension (high blood pressure), and convulsions that are followed by coma. The principal objective of our study was to determine the effect on the course of Eclampsia when each of these manifestations was controlled -- one at a time. A fourth group of patients was studied, with the treatment limited to hospitalization and bed rest only. This review and comparative study has given us a different concept of Eclampsia.

MD-4-59

The Preparation of Cell-free Enzymes from the Photosynthetic Bacterium *Rhodopseudomonas Gelatinosa*. Arthur A. Smith and Dr. Jack M. Siegel, University of Arkansas School of Medicine.

Cells of *Rhodopseudomonas gelatinosa* catalyze the carboxylation of acetone to acetoacetate and the cleavage of acetoacetate to acetate. Preliminary efforts have been made to obtain cell-free enzyme preparations for a more detailed study of these reactions. The methods of preparation that have been attempted include grinding with powdered glass, preparation of acetone powders, and grinding with alumina. Of these, the alumina-grinding technique gave the highest enzyme activity. This preparation can be stored in the frozen state for a week or more without loss of activity, and is stable for several hours at 30°C. The decomposition of acetoacetate by this preparation was stimulated by the addition of adenosine triphosphate (ATP) and succinate, but not by the addition of coenzyme A. The effect of added ATP, however, was obscured by the presence of an active ATPase.

MD-5-60

Energy Requirement in Bacterial Photosynthesis. Dr. Jack M. Siegel, University of Arkansas School of Medicine.

The present investigation deals with the effect of organic substrates on energy requirements in bacterial photosynthesis. The discussion will be limited primarily to the results of 3 experiments. (1) In the absence of oxygen and light, the bacteria catalyse a reversible cleavage of acetoacetate to acetate. The reverse reaction, however, is stimulated by light. (2) The incorporation of acetate into more complex substances, in the absence of oxygen and light, is

greatly stimulated by the presence of acetoacetate. (3) The photosynthetic rate versus light-intensity curve consists of two distinct components below light saturation. The two components correspond to a high quantum-yield process at low light intensities, and to a low-quantum yield process at high light intensities. When the acetate is generated metabolically from another substrate, only the low quantum-yield process is observed. These results are consistent with the hypothesis that light is required for the activation of acetate, but that certain compounds (*e.g.* acetoacetate) can replace this requirement. Additionally, it is proposed that the initial slope of the rate versus light-intensity curve represents the quantum yield for the activation of acetate.

PHYSICS SECTION

Chairman: J. Robbins, Hendrix College

P-2-62

Applications of Atmospheric Radioactivity to Meteorological Problems. Paul E. Damon, University of Arkansas.

The necessity of monitoring nuclear explosions has produced a renewed interest in the radioactivity of the atmosphere and hydrosphere. In this case, as in many other cases, a virtue can be made of necessity.

For instance, informatiin of value concerning the following meteorological problems can be obtained:

(1) The lifetime of charge particles and molecular or atomic ions in the atmosphere

(2) The function of ions in the condensation and precipitation process

(3) The mechanism and rate of removal of particulate matter from the atmosphere.

(4) The migration of air masses and currents and the attaining of atmospheric equilibrium.

P-3-63

The Design and Use of a Cosmic Ray Telescope. C. C. Allen, University of Arkansas.

The operation of a cosmic ray telescope using coincidence Geiger tubes and proportional tubes are described and demonstrated.

P-4-64

A New Condenser Method for Determining Amplitudes of Light Diaphragmatic Materials. Lloyd B. Ham, University of Arkansas.

The exact mode of vibration of light diaphragmatic material is very difficult to determine experimentally since the probe used to make the amplitude measurement increases the load impedance seriously.

Recently, a new condenser method has been devised in which neither side of the condenser is located on the Vibrating diaphragm. The condenser probe consists of a small central disk surrounded by an insulated ring both mounted on the end of a cylindrical piece of bakelite. The terminals for this condenser are connected in parallel with two other condensers associated with the oscillator. The oscillating field for the probe is furnished by use of a very thin plate glued to the diaphragm or by use of sprayed silver paint. The probe is placed about 1 mm distant from the prepared diaphragmatic surface.

An oscillator is designed to operate at 10.7 MC on the Hartley oscillator principle. The two condensers mentioned above are used to adjust the oscillator frequency for a variety of conditions found in the probe. Any oscillation in the tile will cause a slight change in frequency of the oscillator. The frequency-modulated signal is passed through a 6SG7 limiter tube so that a relatively constant amplitude is presented to the discriminator transformer.

The discriminator transformer is designed to transfer equal amplitude signals to each of the plates of the 6H6 tubes at 10.7 MC. There will be no voltage output at this frequency since the output voltages are equal and 180° out of phase.

For a small linear capacity change in the oscillator, there will be both a linear frequency change, and a linear voltage output change. The exact distance between the probe and the tile surface need not be known. After a satisfactory setup is obtained, an experimental calibration of magnitude of change in frequency (*i.e.* amplitude) versus discriminator output voltage may be obtained without knowledge of the exact distance between condenser and diaphragmatic surface.

P-5-65

Reflectivity of Metal Films Deposited at Various Low Pressures. Zaboj V. Harvalik, University of Arkansas.

It was observed that some metals deposited at certain low pressures form specularly reflecting films, while the same metals deposited at somewhat higher pressure form diffusely reflecting films. When deposition pressures are varied, it was shown that at a distinct pressure the transition from the specularly to diffusely reflecting films occur. This "transition pressure" is typical for each metal.

A correlation of the "transition pressure" and certain physical properties of the metals under investigation will be attempted.

PSYCHOLOGY SECTION

Chairman: Merrell E. Thompson, University of Arkansas

Ps-1-66

Reminiscence as a Joint Function of Directions and Distribution of Practice. Merrell E. Thompson, University of Arkansas.

PROBLEM: To determine the joint effect of ego-orientation and distribution of practice on performance scores as well as the amount of reminiscence.

POPULATION: Forty male students.

PROCEDURE: The apparatus consisted of a Koerth type pursuit-roter revolving at 60 r.p.m., two Hunter decade interval timers, and an electric stop clock. The study consisted of a 2 by 2 factorial design as shown below.

			10 Trials		Interpolated	3 Trials	
Group	N	Instructions	Trial	Rest	Rest	Trial	Rest
1	10	Ego	30 Sec.	5 Sec.	10 Min.	30 Sec	30 Sec.
2	10	Ego	30 Sec.	30 Sec.	10 Min.	30 Sec.	30 Sec.
3	10	Task	30 Sec.	5 Sec.	10 Min.	30 Sec.	30 Sec.
4	10	Task	30 Sec.	30 Sec.	10 Min.	30 Sec.	30 Sec.

RESULTS: The results show that the performance of the distributed practice groups is significantly superior to that of the massed practice groups during the original learning period. An analysis of the trials after rest indicates a significant difference for both variables. The two-ego oriented groups showed more reminiscence than the two task-oriented groups and the two massed groups showed more reminiscence than the two distributed groups.

Ps-2-67

The Effect of Time of Exposure to an Anxiety-Arousing Conditioned Stimulus. Robert S. Hicks, University of Arkansas.

PROBLEM: To determine whether or not differential amounts of anxiety result from varying the time during which a subject is detained in the presence of an anxiety-arousing conditioned stimulus.

POPULATION: 12 albino rats, assigned to 3 groups on a rough matched-trio basis in regard to age, sex, and weight.

APPARATUS: The experimental chamber consisted of a black wooden box 14x5x4½ inches, divided into two 7 inch compartments by a barrier 1½ inches high across the center, and with a grid floor wired to deliver shock to the occupant. A drop door on the barrier could be lowered and thus control the exit of the animal from either compartment.

The CS's used were a blinking light and an intermittent tone of 2000 c.p.s. frequency.

PROCEDURE: Each S was given 22 training trials, each consisting of a 9-second presentation of the CS with the US being administered during the last 6 second of this period.

Testing began immediately after the completion of training. Testing involved presenting the CS, and after a varying period of time allowing the animals a means of escape from it by raising the drop door. When the animal crossed the barrier into the opposite compartment, the door was lowered and the CS ceased.

The 0-second delay animals were allowed to escape immediately upon presentation of the CS, while 3-second and 6-second animals were detained for those lengths of time before the drop door was raised.

Fifty test trials weregiven, with latency values being taken as the measure of response strength.

DATA AND RESULTS: Latencies were combined for each experimental group into 5-trial units, and a single median latency computed.

The Chi-square test for small samples was made to determine the significance of the differences between each 5-trial median latency for the three experimental groups.

It was found that, for trials 1 to 35, between the 0-second and 3-second groups, 4 of the 7 differences were significant at or below the 2.5 per cent level.

For trials 21 to 40, between the 0-second and 6-second groups, 3 of the 4 differences were significant at or below the 2.5 per cent level.

CONCLUSION: Although the evidence from this study is not clear-cut, strong trends have been manifest which indicate that animals detained in the presence of an anxiety-arousing CS may experience an increment of anxiety over those allowed an immediate escape from it.

Ps-3-68

The Medical College Admissions Test Score as a Criterion for Admission to Medical School. Edmond F. Erwin, University of Arkansas.

The Medical College Admissions Test is the official test of the Association of American Medical Colleges for use with applicants to medical school. The purpose of the Medical College Admissions Test is to give the medical college an independent current common index for all of its applicants. This index reflects certain established abilities and aptitudes, and has been used with the idea that success in medical school can be predicted from it.

The evidence from several studies which correlated scores of the Medical College Admissions Test with grades attained in medical school is conflicting. Some have reported a high degree of predictive value, and others have failed to confirm this.

In the present study, scores on the Medical College Admissions Test were correlated with premedical grades, with grades in medical school, and with the results of the National Board examinations. Several classes of medical students were used. Relationships among the various factors are presented, and recommendations for the use of the test are made.

SOCIOLOGY AND ANTHROPOLOGY SECTION

Chairman: Fred W. Voget, University of Arkansas

S-3-72

Land Tenure Process in the Arkansas Coastal Plain. J. L. Charlton, University of Arkansas.

The people who reside on farms in the Arkansas Coastal Plain compete for the operatorship and ownership of the land. They also acquire during working age property in the dwelling and other materials used in family living. An adverse tendency is the low rate of ownership transmission between generations in the stem family. Also unfavorable is the higher rate of migration of owner children than of tenant children, of those who have attended high school, and from families having the more adequate material level of living. Marked rise on the agri-

cultural ladder during the working age of the operator must occur if agriculture is to remain stable and ownership be maintained or increased.

S-4-73

The American Indian in Transition. F. W. Voget, University of Arkansas.

Faced with the realities of conquest and a sense of failure, the American Indian has turned to solutions that may be termed ethico-religious. The characteristic features of these reformative efforts, based on a survey of Plains Indian Peyotism, Northwest Coast Shakerism, and the Iroquoian "Long House" are as follows:

1. A prophetic teaching in which the Creator reveals his abiding interest in the Indian People and seeks to heal them, make them better individuals, and preserve them in the face of the overwhelming power of the European.

2. A rejection of the aboriginal system as a model for the new life, and the adoption of an accommodative and syncretic solution to current problems.

3. A type of ceremony which in form is predominantly "Indian", but which in meaning allows for substantial reinterpretation within the Christian framework.

4. A missionary program designed to spread the new religion to adjacent Indian groups and to unite them into a common religious brotherhood.

5. A new social order that comprises organizational statuses from the dominant American society in association with specific tribal and general "Indian" statuses.

6. A political program designed to achieve religious and civil equality for the Indian within the framework of the dominant society.