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especially in its genetic, evolutionary, involuntary and structural aspects. And secondarily, how the same may be made to do duty for the generality of physical structures. (4) Its application to the structure of the earth (dynamic and static) will be illustrative of the general intent of the proper theory.

University of Arkansas School of Medicine 
Little Rock

Biological Science Section - Friday, May 6, 2 P.M.


4. The Influence of Injectable Liver Extract Upon Ascaridia galli infections in Chicks. Cecilia K. Keith, J.R. Totter and E. Sadun, University of Arkansas, School of Medicine, Little Rock.


Medical Science Section - Friday, May 6, 2 P.M.


5. Medical Applications of Nuclear Physics. P.J. Rosenbaum, University of Arkansas School of Medicine.
6. An Attempt to Produce Rheumatic Like Lesions in Mice. A. Nettleship, M.D., University of Arkansas School of Medicine.

7. Intestinal Changes Secondary to Pelvic Irradiation Therapy. M.S. Craig, Jr., M.D., University of Arkansas School of Medicine.

8. Recent Advances in the Treatment of Diabetic Coma. D.F. Agar, M.D., University of Arkansas School of Medicine.

Physical Science Section - Friday, May 6, 2 P.M.


2. Effect of Percentage of Catalyst on length of Polymer in Styrene. R. Stringer, Arkansas State College.

3. A Random Wave Form Generator. Z.V. Harvalik, Institute of Science and Technology, University of Arkansas.

4. Loudness Measurements and Their Bearing on the Non-linearity of the Hearing Function. L.B. Ham, University of Arkansas.

5. X-ray Study of Magnesium Coating. P.C. Sharrah, University of Arkansas.

6. Qualitative Radiochemical Analysis for Uranium and Thorium in Ore Samples. R.R. Edwards, Institute of Science and Technology, University of Arkansas.

7. Radioactivity and Mineralization in Rhyolite Porphyry. P.E. Damon, Institute of Science and Technology, University of Arkansas.


Psychology Section - Friday, May 6, 2 P.M.


2. Level of Aspiration and Attainment. H.W. Sundwall, University of Arkansas.

3. Factors Contributing to Reliability of Personality Questionnaire Items. W. Kimbrough, University of Arkansas.

4. Reliabilities and Intercorrelations of the Scales of the Minnesota Multiphasic Personality Inventory. W. Krinsky, University of Arkansas.

6. A New Color-blindness Test. Z.V. Harvalik, University of Arkansas, ODARK Research Project.

Social Science Section - Friday, May 6


3. The Place of the Area Course in the Study of the Natural Sciences. Elizabeth Clalborne, College of the Ozarks.

Evening Session - Friday, May 6, 7:45 P.M.

Lecture: "Studies on the Biochemistry of Blood Cell Formation." Dr. Paul L. Day, Head, Department of Physiological Chemistry, University of Arkansas School of Medicine.

Saturday, May 7, 9:15 A.M.

Geology Symposium


7. Detailed Stratigraphy at Norfork Dam, Baxter County, Arkansas. R.E. Whitla, U.S. Army Engineers.

Saturday, May 7, 2 P.M.

Field Trip - Buaxite Region. Conducted by Harold Foxhall, State Geologist of Arkansas, Little Rock.
1. **Sanitary Survey of Shallow Wells and Springs.** A.L. Ludy and I.A. Wills, John Brown University, Siloam Springs.

   Standard methods for testing water were used, and tests were carried to the Eosin Methylene Blue Agar stage: (1) Samples in most cases were collected in person under approved methods. (2) Samples were taken from 19 springs and 37 wells in Benton and Washington counties. (3) Findings for the most part have proved that springs and shallow wells carry E.Coli, the intestinal organisms from either man or animals. All wells under 40 feet were found to be contaminated except four. Wells over 40 feet were pure except in five cases which possibly, were due to faulty pressure systems or poor curbing. Deep wells showing pollution are still under observation, and steps have been taken to correct these systems. (4) As a service, information concerning treatment of water supplies to make them safe for human consumption, has been distributed to those persons having contaminated water supplies.


   A. The potential of reproduction or sterility in *Aspergillus niger* is in the function of the concentration of magnesium in the cultivating medium.

   B. Magnesium is an indispensable element for germination, evolution and reproduction of the chlorophytic plants.

   C. Magnesium is an indispensable element for conception, pregnancy and embryological evolution of the rat.

   D. Female rats, submitted to a partial absence of magnesium remained sterile; in the case of an administration of magnesium, however, after a certain time interval, they conceive and carry the pregnancy to termination.

3. **The Influence of Injectable Liver Extract Upon Ascaridia galli Infections in Chicks.** Cecilia K. Keith, J.R. Totter and E. Sadun, University of Arkansas, School of Medicine, Little Rock.

   Preliminary experiments indicated that chicks reared on a highly purified diet adequate for good growth, harbored only extremely small worms, upon autopsy three weeks after infection with *Ascaridia galli*. Control chicks on a commercial diet had worms at least 4-6 times the length of those on a purified diet. Further experiments were carried out with the addition to one group of 8 ml. of 15 unit injectable liver extract per kilo of purified diet, and to another group 2% of whole dried liver. The chicks were infected with about 600 parasite eggs at about one week of age and autopsied three weeks later. The average lengths of the worms found were as follows: Commercial diet group 27.7 mm., whole dried liver group 3.4 mm., injectable liver extract group 11.1 mm. This indicated that there is a substance present in the liver extract necessary in relatively large amount for the normal growth of the worms. This substance may be vitamin B₁₂ or the animal protein factor.

A. In the process of cellulary synthesis of cellulose, magnesium is indispensable, potassium and zinc are necessary; iron can be useful; the presence of the ions of these elements exercise an important action.

B. In the medium Raulin certain concentrations of magnesium, potassium, zinc, and iron increase the power for cellulary synthesis of cellulose by various respective percentages.

C. The presence of these elements in the nutritional solution at higher concentrations may transform them into cellulary toxics.

D. These elements exercise their catalytic action on cellulary synthesis of cellulose independent of each other.

E. The presence or absence of any of the above elements can be substituted by the presence or absence of another, but the action of one completes and supplements the action of the others, if the ionic synergism results in the catalytic action of increasing the potency for cellulary synthesis of cellulose.

F. Potassium cannot be substituted by sodium ammonium or magnesium in its catalytic action on cellulary synthesis of cellulose.

**Medical Science Section**


   Diabetes was produced in thirty animals by the use of alloxan, which causes necrosis of the Islets of Langerhans of the pancreas. These animals were given an adequate diet containing 70 per cent glucose as the source of carbohydrate. Ten normal control animals were given the same diet. Ten were given a similar diet with 35 per cent xylose replacing a like amount of glucose and ten were placed on a diet containing 35 per cent galactose. Ophthalmoscopic examinations of the eyes were made every three days and blood sugar determinations were made twice a week. The development of cataract in each group was studied in relation to blood sugar level and duration of hyperglycemia. The control untreated animals receiving only the carbohydrate glucose did not show cataract, whereas animals receiving xylose or galactose all developed cataract. The alloxan-treated rats became severely diabetic, also showed cataract. Although the average blood sugar levels in the severely diabetic alloxan-treated rats were much higher than in the xylose- or galactose-fed rats, the development of cataract was much slower.

2. **Clinical Evidences of Nutritional Deficiencies in Alaskan Eskimos.** C.F. Shukers, J.R. Totter, University of Arkansas School of Medicine, and Christine A. Heller, Territorial Department of Health, Juneau, Alaska.

   A nutrition survey of Alaskan Eskimos in six villages, four of them north of the Arctic Circle, was conducted at the request of the Territorial Department of Health under a grant from the U.S. Public Health service. Laboratory data are reported elsewhere. Physical inspection of eyes, face, teeth,
tongue, gums and skin were made on 1065 persons, one-twelfth of the total eskimo population. Blood pressures, height, weight, knee jerks and vibratory sense were recorded.

There was no evidence of protein or caloric insufficiency. Two instances of iron deficiency anemia were found. Dental caries was prevalent and extensive. Rickets was uncommon. From 16 to 69% of all persons examined in the six villages gave evidence of vitamin A deficiency. Ten percent had signs of vitamin C deficiency. Evidence of vitamin B group deficiency, except riboflavin was noted in lesser percentage.

The Arctic is rich in food resources including animal sources, berries, leaves and greens.


Data were gathered on the blood levels of vitamin A, carotene, vitamin C, hemoglobin and plasma proteins of approximately 100 Alaskan Eskimos from several villages.

Nearly 1/3 of all of the subjects had serum vitamin A levels below a minimum value compatible with good health. More than 1/2 of the subjects had plasma vitamin C values below the lower limits of normal for the American population. Hemoglobin values were slightly low while plasma protein levels were slightly above average for Americans; the data show satisfactory correlation with estimated dietary intakes.

4. **A Method of Measuring Iodine - I 131 in Urine and Other Liquids.** W.A. Reilly, M.D., R.R. Edwards, and R.G. Holmes; University of Arkansas School of Medicine.

The rate of excretion of radiiodine (8 day I 131) by patients administered tracer doses (5-50 microcuries) is being determined by means of direct counting of the gamma radiations emitted from an aliquot portion of urine, employing a thin glass-walled dipping counter. Values so obtained are compared with standards prepared by addition of a known amount of radiiodine to normal urine, and the concentration of I 131 in the unknown is then expressed in microcuries per milliliter. Total radiiodine output for a given time period is then obtained simply by multiplying by the total specimen volume. For samples collected over a period of several days, the usual corrections for radioactive decay must be applied.

5. **Medical Applications of Nuclear Physics.** P.J. Rosenbaum, University of Arkansas School of Medicine.

This paper includes definitions and explanation of terms used to describe work done with radioisotopes. The use of a specific isotope, I 131 is described. The role of radioactive iodine in hyperthyroidism and its use as a diagnostic tool is included. In hyperthyroidism the uptake and excretion of I 131 are above normal whereas in hypothyroidism the uptake is barely perceptible. These facts suggest the use of I 131 in diagnosis of thyroid disorders.

The theory involved and the use of I 131 in treatment of carcinoma of the thyroid is discussed. Present indications are not favorable for its use in most cases of this condition.

Danger associated with the use of radioactive materials is emphasized.
6. **An Attempt to Produce Rheumatic-Like Lesions in Mice.** A. Nettleship, M.D., University of Arkansas School of Medicine.

The etiological agent which produces rheumatic fever is not known. Rheumatic fever is still one of the largest killers of people under the age of forty. It is important therefore, to attempt to find out what the etiological agent may be.

The present day concept revolves around bacteria as being primarily the cause of the disease or some sensitivity reaction.

It was the purpose of the author, in this instance, to test the sensitivity aspect in mice. Both non-specific and specific antigens were used in two separate groups of mice with adequate control. The non-specific antigen was egg white in sterile distilled water. The specific antigen was a stock strain of B-hemolytic streptococcus. The result showed that by injection of specific and non-specific antigens rheumatic-like lesions could be produced in mice. These had Aschoff nodules and cells. The experiments were complicated by an epidemic of para-typhoid which occurred in the animals.

7. **Intestinal Changes Secondary to Pelvic Irradiation Therapy.** M.S. Craig, Jr., M.D., University of Arkansas School of Medicine.

The introduction of radium and roentgen rays as therapeutic agents in the treatment of extra-rectal pelvic conditions is responsible for the development of a previously nonexistent type of lesion in the rectum and sigmoid colon.

This paper is an abstract of a study of 200 patients who developed irradiation damage in the rectum or sigmoid colon following irradiation therapy for benign or malignant extra-rectal pelvic conditions. The post-irradiation lesions in the bowel were diagnosed at proctosigmoidoscopic examination. These lesions have a typical appearance when observed through the proctosigmoidoscope. Although the majority of post-irradiation lesions occur in women, they also have developed in men after the irradiation of tumors of the bladder and prostate gland.

The symptoms due to a post-irradiation reaction in the lower bowel are usually very distressing and demoralizing. The most frequent symptoms are rectal bleeding, rectal tenesmus, pain and diarrhea.

**Physical Science Section**


Oxidation of glucose-galactose mixture and lactose in weak acid solution at 60°C. at different pH levels (3.2-6.8) was studied over periods of time from 1-2400 hours.

Oxidizing solutions of copper acetate, copper acetate-copper oxide, silver acetate, and silver acetate-silver oxide were used. After the desired period of oxidation the reaction mixture was analyzed for the unchanged sugar, osone, glycollic acid, formic acid, oxalic acid, carbon dioxide, and the oxygen consumed. Calculations and graphs were made to show rates of formation of the above products with time.
2. **Effect of Percentage of Catalyst on Length of Polymer in Styrene.** R. Stringer, Arkansas State College.

Styrene was synthesized by using cinnamic acid. The extent of its polymerization as a function of time was then followed by viscosity measurements using both catalyzed and uncatalyzed samples. Standinger and Kraemer were followed in calculation of average molecular weights.

3. **A Random Wave Form Generator.** Z.V. Harvalik, Institute of Science and Technology, University of Arkansas.

An electric generator is described which produces any wave-form of periodic recurrence, required for certain studies of noise, or in physiology (as stimulator) or in psychology, etc.

The generator is based upon the following principle: the intensity of a light source is varied by a rotating paper mask shaped of the desired wave form, and applied to a barrier-layer photocell.

In case the output of the generator is too low, the current can be amplified electronically to any desired level.

4. **X-ray Study of Magnesium Coating.** P.C. Sharrah, University of Arkansas.

X-ray diffraction studies of powdered magnesium are being made to obtain information about the coating formed on magnesium metal after exposure to air of varying degrees of humidity. The detection of additional lines on a Debye-Scherrer pattern of powdered magnesium after exposure to moist air would serve to establish the nature of the coating formed. A slight displacement of the lines produced by the magnesium would result if the coating merely distorted the lattice due to an insertion or substitution in the lattice. Large Bragg angle Debye-Scherrer patterns or back reflection patterns may prove to be necessary if the latter proves to be the case since the positions of the diffraction lines are unusually sensitive to slight changes in the lattice constants for large values of Bragg angle. A special X-ray camera is being built now so that the samples of magnesium can be held in moist or dry air or in a vacuum during the X-ray exposure.

5. **Qualitative Radiochemical Analysis for Uranium and Thorium in Ore Samples.** R.R. Edwards, Institute of Science and Technology, University of Arkansas.

Extraction of finely powdered ore samples with hot concentrated hydrochloric acid leads to (perhaps incomplete) removal of radium. Filtration and dilution of the resulting solution to an acid strength of about 1 M is followed by precipitation of about 20 mg of BaSO4 (excess sulfate). The precipitate is washed and dried, and its radioactivity followed as a function of time. If the original sample contained thorium, the precipitate will contain Ra226 (MsTh) and and Ra224 (ThI), and will exhibit relatively rapid radioactive growth characteristic of the 6 hour MsTh and the 10 hour ThB. Uranium-containing ores will yield only Ra226, which will exhibit a longer growth period, characteristic of the 3.8 day Ra222. Application of the procedure has demonstrated appreciable activity derived from uranium associated with deposits near the springs at Hot Springs National Park.

6. **Radioactivity and Mineralization in Rhyolite Porphyry.** P.E. Damon, Institute of Science and Technology, University of Arkansas.
Measurements of the hard gamma radiation from the pre-Cambrian rhyolite porphyry of the Bourbon, Missouri, well core show a direct relationship between mineralization and radioactive content. Low activities are, in general, associated with high mineral density, whereas the mineral density is a function of the magnetite content. The low activities are most probably due to a leaching out of the potassium content. This indicates that gamma-ray well logs should be capable of accurately measuring the location of mineral deposits in potassium rich rock.

8. Seismic Prospecting for Petroleum in the Magnolia Area.
   D.P. Schafer, University of Arkansas.

   Seismic methods are used in attempts to map contours on sub-surface beds; they determine the depth of beds below the point of observation, and probably constitute the only method which gives possibilities of being equivalent to core drilling.

   In considering sections 1, 2 and 3, T.17S., R.21 W. and sections 34, 35 and 36, T.16 S., R.21 W. Columbia County, Arkansas we find from records on the Buckner Field and the Magnolia Field that the weathering zone is narrow and key horizons rather shallow. The Glen Rose anhydrite and Reynolds oolitic limestone, of the Smackover formation, will show reflections.

   Computations of the seismograms are such that we may plot graphically the depth of image points, in terms of time in seconds and horizontal distance in feet, on reflection beds below each shot point. Each shot hole will be shot in two or more directions with a spread distance of 1320 feet.

   The Glen Rose anhydrite lies 4300 feet above the Smackover. Contour maps of both horizons show an anticlinal structure in section 35, T.16 S., R.21 W., Columbia County, Arkansas.


   A buried southwestern extension of the Ouachita Mountains has been traced through Texas in the direction of Austin Austin and San Antonio, thence westward to the Big Bend of the Rio Grande. Also it is believed that the Ouachitas extend underground to the southeastward, through southern Arkansas, northeastern Louisiana, Mississippi and into Alabama, where they emerge as the southern end of the Appalachian Mountains.

   A number of attractive structures in Southwest Texas, within the belt of the buried Ouachitas, have been drilled for oil. Metamorphosed shales, sandstones and marbles have been found underlying the Trinity sands at depths ranging from 900 feet to several thousand feet. At some localities the number of tests is sufficient to map topography on these metamorphics. It has been found that there is a correspondence between structural elevations and this topography.

   The author has concluded that, in some cases at least, the structures are due to differential compaction of varying thicknesses of Trinity sediments, which were first laid down in the old valleys and gradually buried the ridges and hills.
The possibility is suggested that similar relations may exist elsewhere within the belts of the buried Ouachita Mountains.

Psychology Section

4. Reliabilities and Intercorrelations of the Scales of the Minnesota Multiphasic Personality Inventory. W. Krinsky, University of Arkansas.

This study was undertaken to determine the reliabilities and intercorrelations of the various scales of the MMPI on both the group and individual forms of the Inventory for the purpose of determining its usefulness in the selection, counseling, and guidance of college students.

This inventory is at present one of the most frequently used personality questionnaires. A survey of research reports indicates the lack of a statistical analysis of the instrument. This is particularly true with reference to its use with college students. The use of the MMPI for personality evaluation can be justified only on the basis of favorable results from validity determinations.

Subjects for the experiment were 120 students at the University of Arkansas. Both individual and group forms were used. Split-half reliabilities were computed for 11 scales and total score along with intercorrelations of the 9 diagnostic scales for each form of administration.

The results were essentially negative. No scale had high enough reliability to insure individual prediction and many scales were so low as to allow prediction little better than chance. Only two scales showed significant differences between group and individual forms. Very few intercorrelations showed significant differences between the two forms of administration; however, many correlations were above .33, the maximum for independent factors.

It is felt therefore, that in its present form the MMPI is useless for diagnostic purposes with college students. This is concluded from the low reliabilities reducing prediction and the high intercorrelations indicating that possibly the Inventory is measuring much the same factor in all scales and hence is not diagnostic.


The problem of perception has been a principal one in psychology for many years. We may trace, in present literature, a return to prominence of the problem in an attempt to study perception as a complex interpretive process which is extant in all responses. Such a conception of perception leads us to inquire into the relationships between perception and attitude, preference, motivation, etc. A study now in progress is designed to investigate one of these relationships, i.e. the relationship between spectral color preference and spectral typical color characterizations. The data show a close correspondence between these two variables. This result tends somewhat to support the position that attitudes and motivations are largely functions of past experience.

6. A New Color-blindness Test. Z.V. Harvalik, University of Arkansas, ORDARK Research Project.
An individual is tested for color perception with a spectrometer. The wavelengths of transitions of colors are recorded and tabulated. The length of the yellow ridge, its positions in the spectrum, and ratio to the width of the green and the orange range is determined. The evaluation of this information indicates the type and degree of color blindness.

This method permits the discrimination between two types of red-green color blindness; the green-expense and the red-expense color blindness.

Temporary color blindness, produced by pre-exposure to colored light sources, including fluorescent light, is also discussed.

Geology Symposium
Saturday Morning 9:15 A.M.


The Magnet Cove area, Hot Spring County, Arkansas, consists of a rudely elliptical basin and a surrounding rim that are underlain principally by syenitic rocks injected into the surrounding folded Paleozoic sediments in Upper Cretaceous time. The important rutile deposit at Magnet Cove is exposed in an abandoned open pit mine in the northern Cove basin and consists of a series of feldspar-carbonate-pyrite-rutile veins in fractures in an aegirine phonolite porphyry country rock. Clay minerals predominate due to hydrothermal alteration of both the country rock and veins. Rutile is the principal titanium mineral in the veins but leucoxene is also present.


Quartz crystals have been mined in Arkansas for many years, first by the Indians who shaped them into arrowheads and more recently by white men who have used them for making optical equipment and jewelry. In recent years, especially during World War II, there was a great demand for oscillator quartz. At that time quartz crystal mining was greatly accelerated by individuals, the Diamond Drill Carbon Company, and the U.S. Government. Clear crystals of oscillator grade are, however, so scarce that only about 5 tons of this grade were produced during the war years. This quantity was very small in comparison with the war-time requirements of 2,000 tons, nearly all of which was imported from Brazil.

Although the quartz crystals are abundant and are found at numerous places in Arkansas, vein quartz is even more abundant and more widely distributed. Most of the veins and crystals are restricted to a belt, 30 to 40 miles wide, extending in a west-southwesterly direction from Little Rock, Arkansas, to northern McCurtain County, Okla., a distance of about 150 miles.

The quartz veins and crystals and their associated minerals are hydrothermal deposits of probably magmatic origin. They were formed during the closing stage of the Pennsylvanian orogeny that deformed the thick Paleozoic sequence of the Ouachita Mountains. At this time metamorphic changes of the rocks were produced by dynamic movement and heat to which was added the heat of the hydrothermal solutions. These processes produced varying degrees of
metamorphic changes in the rocks not only throughout the Ouachita Mountains but also in the adjoining coal field of southeastern Oklahoma and western Arkansas. The belt of greatest metamorphism lies along the axis of the main anticlinorium of the Ouachita Mountains, and this belt contains not only the largest exposures of pre-Pennsylvanian rocks but also most of the vein quartz. The regional arching of the strata to form the anticlinorium apparently took place after the major structural deformation and metamorphism of the strata of the depositional geosyncline of the Ouachita Mountains. The upwarping apparently developed the tensional fractures through which the hydrothermal solutions passed and deposited the quartz and other minerals of the quartz veins. The metalliferous deposits of the Ouachita Mountains—those of lead, zinc, antimony, and quick-silver—appear to have been formed at the time of quartz deposition. Also the time of quartz deposition should be considered in the dating of lead and zinc mineralization in other areas of the Mississippi Valley region.


Three of the major physiographic divisions of the United States are represented in Arkansas: Ozark Plateau, Ouachita Province and Gulf Coastal Plain. An attempt has been made to subdivide these divisions into physiographic sections. The Ozark Plateau consists of 3 divisions, Springfield Plateau, Salem Plateau and Boston Mountains. The Springfield Plateau is divided into 4 sections. No attempt has been made to divide the Salem Plateau or the Boston Mountains into sections. The Ouachita Province is conventionally divided into the Arkansas Valley, Ouachita Mountains and Athens Piedmont Plateau. In this study the Arkansas Valley is divided into 11 sections. The Fourche Mountains, the second division of the Ouachita Mountains, is divided into 7 sections. The Novaculite Uplift which occupies the center of the Ouachita Mountains is divided into 10 sections. No attempt has been made to subdivide the Athens Plateau. The eastern part of Arkansas is occupied by the Mississippi Alluvial Plain which is subdivided into 4 sections. The southern part of the State is occupied by the West Gulf Coastal Plain which is divided into 3 large sections. The classification proposed is purely tentative and subject to modification as the study progresses.


Arkansas is not only a geologist's paradise, but it is also particularly fortunate in possessing a wide variety of mineral resources. These resources may be arbitrarily divided into (1) non-metalliferous deposits; (2) metalliferous deposits; (3) fuels; and (4) water. The most abundant and most widespread deposits are those classed as non-metalliferous.

Limestone and dolomite suitable for a wide variety of uses are abundant in north Arkansas. Chalk of sufficient purity to be utilized as an agricultural lime crops out in southwest Arkansas. Clays and shales of almost every type are found throughout the state and especially in central and south-central Arkansas. Silica occurs in several forms—(1) as glass sand in the St. Peter formation of north Arkansas; (2) as tripoli in northwest and central Arkansas; (3) as novaculite in central Arkansas; (4) as chert in north Arkansas, and (5) as quartz crystals in central Arkansas. Large barite deposits of central Arkansas assure the state of

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leadership in the production of this mineral for many years.

Gypsum deposits of Pike County are being mined, while strontium deposits of Howard County were mined during World War II.

Nepheline syenite in the Little Rock area is presently employed in the manufacture of roofing granules and in the future may be used as a flux by the ceramic industry.

Sand and gravel, potash-bearing marl, phosphate-bearing shale, vermiculite, asphalt, and diamonds should also be included in the list of the state's non-metalliferous deposits.


A considerable portion of the land area of southern Arkansas is covered with Tertiary sediments. From a ceramic viewpoint, the most important of these sediments is the Wilcox formation, which has been for many years a major source of high quality clays. Large basin and lenticular deposits of clay in the Wilcox occur with lignite and are often interbedded with sand. Several kinds of clay, including ball clays, refractory bond clays, fire clays, saggar clays, wad clays, stoneware clays, etc., are commonly found in the same deposit. Also found in the Wilcox formation in Arkansas are the residual kaolins of the bauxite region near Little Rock, and the transported sandy kaolins of Ouachita and Dallas counties.

Chemical analyses of Wilcox formation clays in Arkansas reveal that the silica content of representative dark and gray-colored samples ranges from 43.34 to over 70 percent, the alumina content from 16 to 34.59 percent, and that the iron oxide content is usually less than one percent in the better quality clays. Many of the clays burn to white or ivory colors, and a number of them develop essentially zero porosity when fired to cone 12 (2390 F.). All exhibit good plasticity and workability, showing good green strength when dry. While a few of the clays examined exhibited abnormally high total shrinkage after firing, the general trend was along the lines of satisfactory shrinkage characteristics as based on a utility viewpoint. Fusion points ranged from cone 26 to cone 32.

Examination of the clays was made by chemical analyses, petrographic and electron microscopes, X-ray diffraction equipment, fusion point furnace, and other laboratory equipment at the Midwest Research Institute in Kansas City, Missouri.