

GEOLOGIST PLANS NEXT YEAR'S WORK

Spittle 2-26-28

Program to Be More Comprehensive Than Any Since 1892, He Says.

Although the additional severance tax levied by the 1927 legislature to support the state Geological Department has fallen nearly 40 per cent short of appropriations based on estimates of what the tax should produce, the department has undertaken a more comprehensive geological program than has been attempted in the state since 1892, says the annual report of the department, filed with Governor Martineau by G. C. Branner, state geologist.

The new law, Act No. 142 of 1927, provides for an increase of a tenth of one per cent ad valorem tax on all minerals except coal and manganese. A tax of a mill on each ton of manganese ore is provided. Coal was exempted from any increase. More than 98 per cent of the department's funds derived from this act come from oil and gas production. A little more than one per cent comes from bauxite and less than a half of one per cent from all other minerals.

Actual receipts for the second and third quarters of 1927, April to September, inclusive, totaled \$18,601.02, of which \$18,301.88 came from gas and oil production. Assuming that this rate of revenue will continue, \$37,200 should be available for the fiscal year 1927-28, the report says. This is nearly \$24,000 short of appropriations made for that period.

Activities undertaken by the department last year included geological and topographical surveys, stream gaging work and increased office administration.

Geological Surveys Begun.

Geological surveys undertaken were: Survey of the oil and gas possibilities, coastal plain area of southern and eastern Arkansas, field work completed and report and maps to be published in 1928. A report on the upper cretaceous formations of southwestern Arkansas, field work completed and report to be published in 1928. A study of structural conditions favorable for gas accumulations in the Arkansas river valley region of western Arkansas, field work completed and report to be published in 1928. A study of the zinc and lead area of north Arkansas, field work now in progress and to be completed in 1928. Compilation and publication of a state geological map, which will be completed this year. Publication, through co-operation with W. N. Wilkes, commissioner of mines, manufactures and agriculture, of a booklet, "Outlines of Arkansas' Mineral Resources." Preparation of a base map of the state, showing location of all oil and gas wells, producing fields, etc., work done in co-operation with Department of Conservation and Inspection.

Topographical work undertaken last year included an area of about 250 square miles in Union county. This work was done on a co-operative basis with the United States Geological Survey.

Stream gaging work was undertaken on a co-operative basis to make available information for water power and flood prevention projects. Fourteen stations were established last year and others will be established this year.

The following projects are being planned for 1928, the number and amount of work to depend upon the amount of money available: Detailed work on oil and gas geology; a survey of the commercial clays of the state; a survey of the sand and gravel deposits of the state; a survey of the building stones of the state; a survey of the phosphate-bearing rocks of northern Arkansas; a study of soil losses due to erosion and its prevention; a survey of the tripoli deposits of the state; a survey of the underground water conditions in the rice district.

Services Maintained. The report says the following services have been maintained as a part of the routine work of the department:

1. Requests for information answered: During the past year the survey has handled approximately 1,500 requests for geological, mineralogical and industrial information bearing on the mineral, soil and water power resources of the state, and has sent out approximately 2,000 publications, reports and maps. Complete chemical analyses have been made of specimens submitted when believed advisable. An index is kept of the names of owners of mineral properties, who report the existence of certain mineral deposits and ask for a market outlet. Their names are submitted to those who inquire for the location of such mineral deposits, and also to buyers and manufacturers who may be interested in the purchase or development of Southern mineral properties.

2. Tax reports: This department has compiled the state severance tax quarterly reports and the tax reports of sand and gravel removed from state owned stream beds and the information contained in them is classified for reference. Quarterly statistics are now kept which give the name of the producer, the quantity and the value of each mineral product in the state since

Mr. Branner to Attend Meeting of Geologists at Washington.
Spittle 2-25-28
George C. Branner, state geologist, has gone to Washington, D. C., to attend the annual meeting of the American Association of State Geologists, which will be held this week at the office of the director of the United States Geological Survey. Co-operative measures between the state and federal geological surveys will be discussed at the meeting. Mr. Branner said federal co-operative funds available in connection with the work of the Arkansas Geological Survey during the present year amounted to \$17,900, or approximately 48 per cent of the estimated annual tax income for support of the department during the fiscal year ending next June 30. While in Washington, Mr. Branner will make arrangements for publication of a detailed state geological map which has been in the course of preparation for the past three years.

April 23, 1923. The items involved are classified under the following heads: Oil, gas, natural gas, gasoline, coal, bauxite, clay, lime, manganese, sand, stone, gravel, diamonds, chalk, zinc and lead.

3. Other statistics relative to the mineral production of the state kept on file in this office are derived from the following sources: (1) United States Geological Survey, (2) American Petroleum Institute, (3) United States Department of Commerce, (4) United States Census Bureau, and (5) various trade publications.

4. Well, log file: A collection of miscellaneous well logs is maintained by the survey. These are logs of wells which were drilled prior to the establishment of the state Well Log Division on April 23, 1923, which division has now been transferred to the Department of Conservation and Inspection. This collection augments the log file of the state Department of Conservation and Inspection. There are now approximately 450 logs on file here.

5. Geologic library: A geologic library containing over 800 books and pamphlets bearing on the minerals, soils and water power of Arkansas and other states is maintained for reference. This library is being continually increased by the addition of state, federal and other reports as published.

6. Bibliography of the geology of Arkansas: A subject and author index of all books, pamphlets, reports, etc., bearing on Arkansas geology is maintained. This index includes about 759 books and articles and is of assistance in locating reports and records which have been made of the different minerals and soils, water power, etc.

7. Mineral collection: A collection of the various representative minerals of the state is kept. This now includes over 200 representative mineral specimens labeled.

8. Representative core collection: A collection of cores from wells drilled in southern Arkansas is maintained by the survey. This includes about 800 feet of core and is being increased from time to time. The report closes with a recommendation that the severance tax collecting office be furnished with funds and personnel sufficient to permit that office to make field checks of the quantities and values of minerals produced in Arkansas and reported to that office, and to make an active search for firms that are escaping payment of proper severance taxes.

WONDER STATE MINERAL BEDS ARE SURVEYED

H. Smith Times Record

George C. Branner, Geologist, Makes Report of His Work, Much of Which Has Been In Western Arkansas

(Special News Service)
Little Rock, Ark., Feb. 25.—Western and Northwest Arkansas come in for much attention in the annual report, just made public of George C. Branner, state geologist.

The report covers the period from Dec. 1, 1926 to Dec. 1, 1927, and is of significance because it is the record of the first work done under the new "state geologist's fund" provided by the last session of the legislature through an increase in the severance tax on minerals. This amounts to an added one-tenth of 1 per cent ad valorem on all minerals excepting manganese and coal. The additional tax is one mill for each ton of ore produced, while coal is exempted from increased taxation.

"Through the passage of this bill," says the report, "the state geological survey has been enabled to undertake a more comprehensive program of geological, topographical and stream gaging work than has been undertaken by an Arkansas geological survey since 1892."

The program of the survey has been divided into four classes:

Seven Subjects Given
The seven subjects considered under the geological work are: A survey of oil and gas possibilities of the lowland or coastal plain area of Southern and Eastern Arkansas; a report on the upper cretaceous formations of Southwestern Arkansas; a study of the structural conditions favorable for gas accumulations in the Arkansas river valley region of Western Arkansas; a study of the zinc and lead area of Northern Arkansas; the compilation and publication of a geological map of Arkansas; a publication, "Outlines of Arkansas' Mineral Resources," issued during the first part of 1927; a base map of Arkansas, showing the location of all oil and gas wells and producing fields, being prepared by the department.

Regarding the report of the Upper Cretaceous formations of Southwestern Arkansas, including Little River, Sevier, Howard, Hempstead, Pike, Clark and Nevada counties, the report says:

The principal economic value of this report lies in the fact that the formations which outcrop in this portion of the state are associated with the petroleum and natural gas accumulation of Southern Arkansas and a detailed study and classification of them will prove of immediate assistance to intelligent prospecting for oil and gas in the southern and eastern portions of the state. The study includes a detailed description of the physical and paleontological characteristics of these beds so that careful prospectors will be assisted in the identification of these formations when they are reached by the drill and will be able to locate their positions with reference to the more favorable producing horizons. The report will contain about 350 pages of text, areal geological maps, sections, etc., and probably will be ready for distribution in July, 1928.

Gas Prospects Studied

Discussion of the study of structural conditions favorable for gas accumulations in the Arkansas river valley region of Western Arkansas, is as follows:

This work has been undertaken by Mr. Carey C. Cronels, at present instructor in the department of geology, Harvard university. Mr. Cronels has been assistant professor of geology in the University of Arkansas and has given considerable time and attention to the study of the geological formations of Western Arkansas and is the author of studies on the geological formations of Northwest and Western Arkansas. Mr. Cronels has been assisted in his field work by Mr. Homer L. Anderson, Mr. Bryan Parks and Mr. Cecil Robinson, all of whom are graduates of the department of geology, University of Arkansas.

The object of the survey is to work out the structural conditions in the Arkansas river valley and from this information, to designate the structures which are favorable for the accumulation of natural gas. Approximately 200 townships or 8,000 square miles were covered in this survey, which included an area from

the Arkansas-Oklahoma line, east to the Coastal Plain or lowland area of Eastern Arkansas and from Township 23 N. to Township 12 N. inclusive. Either all or portions of the following counties were included: Crawford, Franklin, Sebastian, Logan, Scott, Yell, Perry, Johnson, Pope, Van Buren, Conway, Pulaski, Cleburne, White and Lonoke. Over 50 anticlinal structures were mapped in the valley. It is anticipated that this report will be of value to the prospector for natural gas in this region. It is believed that there are considerable supplies of natural gas available in this area which have not yet been discovered which may be turned to industrial uses.

The topographical work of the department, the report says, is of special interest to the city of El Dorado because of the surveying of the El Dorado quadrangle, and is of general interest to the highway department and to geologists.

Stream Gages Installed

Stream gaging work was carried on, the report continues, "for the estimate of available waterpower" at some points, while at other stations the information "is necessary for determining run-off data for flood control purposes."

The stations installed for the purpose of accumulating flood control data on the White river at Clarendon and Newport on the St. Francis river at Marked Tree, at Big Lake outlet at Minilla and on the Arkansas river at Van Buren were installed with the approval of the Arkansas Flood Control association, General John R. Fortye acting head.

An accompanying table shows that the gaging station at Van Buren was established on the highway bridge, Oct. 4, 1927, and that the chain gage is read daily.

The report also deals with additional services of the department, which has handled approximately 1,500 requests for information; has sent out approximately 2,000 publications, reports and maps; has made chemical analyses of specimens submitted "when believed advisable"; has made an index of the names of owners of mineral properties who report the existence of certain mineral deposits and ask

for a market outlet; has compiled quarterly state severance tax reports; has furnished other statistics on mineral production of Arkansas; maintains a well log file, a geologic library, a bibliography of the geology of Arkansas, a mineral collection and a representative core collection.

Future Work Is Outlined

Future work of the department includes publication of the reports on work already done and publication of a geologic map and a detailed test well map of Arkansas. The following new geological projects, depending on the amount of money available, are being planned:

Detailed work on oil and gas geology. A survey of the commercial clays of the state.

A survey of the sand and gravel deposits of the state.
A survey of the building stones of the state.
A survey of the phosphate-bearing rocks of Northern Arkansas.
A study of soil losses due to erosion and its prevention.
A survey of the tripoli deposits of the state.
A survey of the underground water conditions in the rice district of Eastern Arkansas.
In addition it is planned to investigate: (a) the antimony region of Southwestern Arkansas; (b) the black marble area of Northern Arkansas; (c) certain parts of iron-bearing area of Northern Arkansas.
New stations which may be installed in the stream gaging work include: Coassatot river near DeQueen; Ouachita river near Camden or Felsenthal; Black river at Black Rock; Bartholomew bayou

near Snyder; Saline river near Warren; Cache river near McCrory.

It is also planned, says the report, "to begin co-operative county soil survey work with the Arkansas university Agricultural Experiment station and the United States department of agriculture as soon as co-operative funds are available."

The report concludes with a statement of the expenditures of the department. Receipts include the appropriation under act No. 329 of the acts of 1927, providing for a sum of \$61,180 for the fiscal year ending June 30, 1928; the increase in severance taxes, which for the second and third quarters of 1927 amounted to \$18,601.02; and funds from co-operative agencies, amounting to \$18,240.

Legislative recommendations deal with means for securing more information and better methods for collecting the state severance tax.

Map Shows Gas and Oil Wells

Spittle of State. 4/15/28

A base map, showing locations of all gas and oil wells in the state for which permits have been issued since the permit system was adopted in March, 1923, has been practically completed by the state Geological Department and the state Department of Conservation and Inspection.

The map is seven by eight feet in size and is drawn on a scale of three miles to the inch. It will be printed in two sections and can be obtained from the state geologist. The original drawing will be sent to Shreveport this week for W. C. Spooner, deputy state geologist, to insert all wells drilled before creation of the Conservation Department in Arkansas. Mr. Spooner has been in Louisiana several weeks gathering information and records concerning wells drilled in this state prior to that time.

G. C. Branner, state geologist, is preparing and compiling data for a new state topographic map which will be published in a few months as a state-federal co-operative undertaking. The state Geological Department will pay for printing the map and the United States Geological Survey will do the technical work in preparing the map for printing. It will show elevation details, coast geodetic and geological surveys, etc. It will be on a scale of six miles to the inch. The map will be of great importance to engineers and others interested in the contour of various sections of the state.

To Geologists' Conference.

G. C. Branner, state geologist, left last night for Fayetteville where he will attend a field conference of the Tulsa Geological Society, held at the University of Arkansas yesterday and today, under auspices of the Tulsa society and the Geological Department of the university. The conference was arranged by Dr. A. W. Giles, head of the Geological Department at the university, and its purpose is to study relation of formations in northwestern Arkansas to formations in the Tulsa region. *Spittle 5/13/28*

Geologists Make Study in North Arkansas Counties.

Spittle 6/2/28
G. C. Branner, state geologist, has returned from a 10-day trip through northern Arkansas counties, where geologists representing Arkansas, Missouri and the United States Geological Survey, made a study of geological subjects. E. O. Ulrich, paleontologist for the federal Geological Survey; Mr. Branner, H. A. Beuhler, Missouri state geologist; A. T. McKnight, who has been doing co-operative work for the state and federal geological departments in Marion county, and several geologists from the Missouri Geological Survey were members of the party. The tour included Pocahontas, Black Rock, Smithville, Hardy, Salem and Mountain Home, Yellville, St. Joe and

Geologist, State Field Trip

Geological Report

Formations in River Valley Region of Gas Which May Be Turned to Industrial Uses

Zinc and Lead Area Also to Be Surveyed With Help of Federal Scientists

THE annual report of the state geologist affords an interesting insight into what Dr. George C. Branner and his associates are doing to pave the way for the future development of Arkansas. The report was briefly summarized in these columns last Sunday, the day after it was submitted to the governor, but in order to properly appreciate the value and significance of the work, a more detailed presentation is necessary.

It is no reflection on the intelligence of the people to assert that the average citizen is distressingly ignorant of the practical value of a geological survey in relation to the development of new sources of wealth in a state as richly endowed with minerals of commercial value as Arkansas. As a matter of fact, some of our most eminent statesmen—men who were supposed to be well informed in all things pertaining to the general good of the state—have betrayed a woeful lack of understanding on the subject.

This fact was strikingly revealed several years ago when a prominent member of the upper house took the floor in opposition to a proposed increase in the appropriation for the geological department, which was then struggling along on an allowance that did little more than cover the salary of the state geologist.

"I can't see the good of spending a lot of money just to have a geologist bore holes in the ground and tell us that this gumbo and that is hardpan," he naively declared. Others saw the matter in a different light, however, and the increase was granted, but not without a vigorous fight on the part of its proponents.

Last year the Arkansas Geological Survey fared better at the hands of the legislature, the appropriation being increased from \$7,500 to \$61,000 a year. But the allowance was based on an estimate of the revenue that a slight increase in the severance tax on certain mineral products, principally oil and natural gas, would produce, and unfortunately production dropped to a point that gave the department actual receipts that fall close to 40 per cent short of the estimate.

Old Department Revived.
The available funds, however, have enabled the state survey to undertake a comprehensive program of geological, topographical and stream gauging work and put new life into a department that had lain dormant for 35 years for lack of financial support.

The state geologist's concise account of what his department has been able to accomplish as a result of the funds made available through the additional severance tax shows in a very positive and assuring way that the Arkansas Geological Survey, far from being a drain on the state treasury, will actually enrich it by contributing to the development of the state's natural resources, especially oil and natural gas.

The report says, in part, as follows: "The geological surveys carried on during the year have been:

1. A survey of the oil and gas possibilities of the lowland or coastal plain area of southern and eastern Arkansas. This important work is in charge of William C. Spooner. Mr. Spooner has a wide knowledge of the oil and gas geology of the coastal plain of Arkansas and Louisiana, and is the author of many studies on the subject.

Mr. Spooner's work embraces a study of the surface and sub-surface structural and stratigraphic conditions in southern and eastern Arkansas. His report will include the publication of three sub-surface maps and several sections which will show the depth to which the oil- and gas-producing horizons of southern Arkansas can be found in many of the coastal plain counties. These include (a) a sub-surface contour map on the top of the Nacatoch formation; (b) a similar map on the top of the Trinity formation, and (c) a contour map on the top of the basement rocks underlying a portion of the coastal plain.

In addition, the report will contain detailed descriptions of the stratigraphic and structural conditions, a detailed description of the paleontology of the sub-surface beds, separate field studies including the Smackover, Irma, Stephens and South El Dorado fields, together with depletion data on these fields, and a fairly complete list of elevations in the lowland counties of the state.

Value of Report.

"It is anticipated that this report bution for the use of the prospector, geologist and appraisal engineer, and it is hoped that it will lead to more intelligent and economic prospecting in the portions of the coastal plain where there is a reasonable amount will be a practical and useful contribution of information now available.

"The logs of approximately 700 wells were studied in making these maps and sections. Mr. Spooner has unquestionably collected much more information concerning the wells drilled and formations penetrated in southern Arkansas than has heretofore been accumulated. The report will be the first of its kind and will fill a long felt need.

"2. A report on the Upper Cretaceous formations of southwestern Arkansas. This work was originally planned as a co-operative project between the federal and state surveys. Lack of funds in 1925 made it impossible for the state survey to carry out its part of the co-operative plan and the federal survey decided to carry it out as an independent project. The field work, completed in 1926, and the report are both the work of Carl H. Dane of the U. S. Geological Survey.

"After the passage of Act No. 142 of the 46th general assembly it became apparent that funds would be available for this work and inasmuch as the publication of the report by the federal survey would have been delayed for two years or more, it was agreed that the publication and issue would be made by the Arkansas survey.

"This report is principally a detailed study of the surface outcrops of the Upper Cretaceous formations of southwestern Arkansas including Little River, Sevier, Howard, Hempstead, Pike, Clark and Nevada counties. Its principal economic values lies in the fact that the formations which outcrop in this portion of the state are associated with the petroleum and natural gas accumulations of southern Arkansas, and a detailed study and classification of them will prove of immediate assistance to intelligent prospecting for oil and gas in the southern and eastern portions of the state. The study includes a detailed description of the physical and paleontological characteristics of these beds, so that careful prospectors will be assisted in the identification of these formations when they are reached by the drill, and will be more able to locate their position with reference to the more favorable producing horizons.

Report Ready in July.
"The report will contain about 350 pages of text, a areal geological maps, sections and the like, and will probably be ready for distribution in July, 1928.

"3. A study of the structural conditions favorable for gas accumulations in the Arkansas river valley region of western Arkansas. This work has been undertaken by Carey G. Creneis, at present instructor in the department of geology, Harvard University. Mr. Creneis was formerly assistant professor of geology in the University of Arkansas and has given considerable time and attention to the study of the geological formations of western Arkansas, and is the author of studies on the geological formations of northern and western Arkansas.

"The object of this survey is to work out the structural conditions and from this information to designate the structures which are favorable to the accumulation of natural gas.

"Approximately 250 townships, or 9,000 square miles, were covered in this survey, which included an area from the Arkansas-Oklahoma line east to the coastal plain, or lowland, area of eastern Arkansas. Either all or portions of the following counties were included: Crawford, Franklin, Sebastian, Logan, Scott, Yell, Perry, Johnson, Pope, Van Buren, Conway,

Faulkner, Pulaski, Cleburne, White and Lonoke. Over 85 anticlinal structures were mapped. It is anticipated that this report will be of value to the prospector for natural gas in this region. It is believed that there are considerable supplies of natural gas available in this area which have not yet been discovered and which may be turned to industrial uses.

"4. A study of the zinc and lead area of northern Arkansas. A co-operative arrangement has been made with the U. S. Geological Survey which will cover a detailed study of the zinc and lead areas of northern Arkansas. Under this arrangement the federal survey has agreed to contribute \$5,000 and the Arkansas survey \$5,000 to cover the cost of field work. The field work was started the first week in September, 1927, under the direction of E. T. McKnight of the U. S. Geological Survey, and will probably continue until the fall of 1928.

"The work will include a detailed survey of the aerial and structural geology of the region insofar as they bear on lead and zinc ore deposits. Detailed maps of the prospects, openings, shafts and underground workings will be made.

Counties to Be Reported On.

"It is planned to make this report of immediate usefulness with the expectation that it will help to bring about economic development. The report will cover portions of Boone, Marion, Newton, Searcy, Stone, Independence, Izard, Sharp, Lawrence and Randolph counties. Co-operative funds were made available for this project in response to a request made upon the federal survey by Senator Caraway.

Other projects undertaken and well on the way to completion include the compilation and publication of a large scale geological map of the state and a base map showing the location of all oil and gas wells and producing fields.

Another valuable contribution to an intelligent understanding of the opportunities that await the investor in this state was the publication of a work by Dr. Branner entitled "Outlines of Arkansas' Mineral Resources." The major portion of the publication expense, amounting to about \$3,800, was borne by the department of mines, manufacturers and agriculture as the result of Commissioner W. H. Wilkes' friendly interest in the project. An edition of 5,000 copies was printed, and the book has been in constant demand by people interested in the state's mineral deposits. The book lists all mineral deposits of commercial value, giving their locations, the quantity and quality of the ores produced, statistics concerning past production, market values and the names and addresses of producing firms.

Under the heading of topography the report shows the extent to which the state survey is co-operating with the federal survey in the preparation of standard topographic maps of Arkansas. Only about 8 per cent of the total area of the state has thus far been mapped, and many years will be required to complete the work. The area now being mapped is a quadrangle of 250 square miles in the oil fields, centering roughly on El Dorado.

Stream Gauging Work.

The state department has also made considerable progress in stream gauging work within the last year, the report shows. Seven new stations were established with the co-operation of the United States Weather Bureau and various private agencies, including railroad companies and hydro-electric power firms. The object of these stations is to obtain accurate data on available water power and also to determine "run-off" figures as a basis for flood control measures.

As a part of the routine work of the department the following services have been maintained:

An information bureau for the benefit of those interested in Arkansas geology and mineralogy. During the year more than 1,500 requests for information of this nature were handled, and over 2,000 maps, reports and other publications have been sent out to interested parties. Chemical analyses of specimens submitted have been made when the nature of the substance was in doubt.

An index of the names of owners of mineral properties is kept. It includes all who have reported the existence of mineral deposits and asked for a market outlet. These names are furnished when promoters, buyers and manufacturers who make inquiries.

(Continued on Page 3, Mag. Sec.)

Zinc and Lead Area Also to Be Surveyed With Help of Scientists

(Continued From Page 1, Mag. Sec.)

quiry concerning certain miners. The department has compiled the state severance tax quarterly report and the tax reports of sand and gravel removed from state-owned stream beds. The information is classified for reference purposes. Quarterly statistics are kept giving the name of the producer, the quantity and value of all minerals produced since 1923, when the Arkansas geological survey was re-established.

Other statistics relative to mineral production include files of reports from the following sources: United States Geological Survey, American Petroleum Institute, United States Department of Commerce, United States Census Bureau and various trade publications.

A miscellaneous collection of well logs is maintained. These are logs of wells drilled prior to the estab-

lishment of the state well log division of the Arkansas Railroad Commission in 1923. This collection augments the log file of the state department of conservation and inspection. It includes 450 logs.

Geological Library.
A geological library containing over 600 books and pamphlets bearing on the minerals, soils and water power of Arkansas is maintained for reference purposes. It is being continually increased through the addition of state, federal and other reports as they are published.

A collection of cores from wells drilled in southern Arkansas is also maintained. It now includes about 800 feet of core and is being increased from time to time.

In conclusion the report recommends a field check on mineral production in connection with the collection of severance taxes.

"In order that this survey may receive the full taxes due under the provisions of Act No. 142, and that more accurate statistical information concerning mineral production and

value may be available to this office," the report explains, "it is believed that the severance tax collecting office should be furnished with sufficient funds and personnel to permit the making of field checks, and to conduct an active search for firms which are now severing minerals but do not pay a severance tax and are not listed on the tax department books.

"It is believed that in this way some increase in the tax revenue for the support of this department can be brought about. This suggestion applies particularly to oil and gas producers. In some instances the tax records do not state the unit measurement of the mineral, do not include the value of the quantity severed, do not include figures indicating the quantity of any unit, and do not list firms who are reported to be severing minerals. It is thus often impossible to check the records of the severance tax office against the quantity and value records of other statistical agencies, and in many instances impossible to know whether the tax paid is correct or not."

Geological, Water Resources, Topographical, Are Three Branches of Report

WITH the completion and publication within the next few months of the reports of projects begun by the Arkansas Geological Survey, a study so exhaustive in nature and so comprehensive in scope as to mark new advancement in geological analysis in the South and Southwest, will have been successfully rounded out for the fiscal year, according to George C. Branner, state geologist.

Water Resources.

Turning to water resources, Mr. Branner outlined the following projects which have been carried on co-operatively with the United States Geological Survey and private agencies:

1. Readings are being made daily of 12 gauging stations, which are located on the Little Red river, Ouachita river, Little Missouri river, White river, St. Francis river, Red river and Arkansas river. H. C. Beckman, district engineer of the United States Geological Survey, Rolla, Mo., is in charge of the field work.

The Arkansas Power and Light Company has also co-operated in connection with this work during the fiscal year 1927-1928. It is planned to make the stations permanent for the purpose of supplying information on available water power and flood control. Three more stations will probably be added to the above number during the fiscal year 1928-29.

2. A survey of the underground water resources of the rice district of eastern Arkansas. This is a combined federal-state private co-operative project the field work of which will cover a period of two years. Work was begun during the past summer and will probably be completed sometime next year. The object of this survey is to determine the amount of available water in the rice district, the danger of exhaustion and the feasibility of recharging the water bearing sands if such action is required.

The field work of this survey is in charge of David G. Thompson of the water resource branch, United States Geological Survey. Mr. Thompson is taking readings of about 75 wells in the rice district and has been accumulating detailed information concerning the sub-surface conditions throughout that district, which includes, principally, Arkansas, Lonoke and Prairie counties, where there is some question as to the quantity of the underground water supply.

Topographic Mapping.
Topographic mapping, the third of the major divisions of the survey work, has been advanced entirely on a federal-state co-operative basis, Mr. Branner stated.

"One 15-minute quadrangle, including about 250 square miles, was completed during the fiscal year 1927-28," he said. "This quadrangle includes the city of El Dorado, the South El Dorado oil and gas field, a portion of the Lisbon field and a portion of the new Champagnolle field."

A lithographic proof of the map has been completed, the geologist said, and copies are being distributed by Mr. Branner free of charge.

Explaining this map, which will be one of the most vitally important accomplishments included in the survey, Mr. Branner said "that it shows the location of all producing wells in the area, together with the location of all the oil and gas pipe lines." The correct sheet is being engraved by the United States Geological Survey and will probably be ready for distribution by January 1. The scale of the completed map will be one to 62,500 or approximately one mile to the inch.

A second topographic quadrangle, probably in Union county, will be undertaken as a co-operative project during the fiscal year 1928-29, Mr. Branner indicated.

Locations of Oil Wells.

In addition to the above projects a map has just been completed which shows the locations of all the wild-cat wells and producing wells in Arkansas. This map is planned on a scale of three miles to the inch and will be 7x8 feet in size. The names of operators, leases, depths and permit numbers are also shown on this map, according to the geologist.

The state department of conservation, of which Parker C. Ewan is commissioner, co-operated in making the above map, Mr. Branner said. Copies may be obtained at the geologist's office.

Revised and enlarged reprints have been made from the text of the booklet, "Outlines of Arkansas' Mineral Resources," which was issued by the geology department. The reprints are as follows:

1. "An Outline of the Physical Features of Arkansas."
2. "An Outline of the Petroleum and Natural Gas Resources of Arkansas."
3. "An Outline of the Metallic Minerals of Arkansas."

A new reprint, "An Outline of the Non-Metallic Minerals of Arkansas" will be ready for publication in the near future, Mr. Branner said.

Oil and Gas.

1. Preparation of a report on the oil and gas possibilities of southern and eastern Arkansas, by W. C. Spooner. This report is nearing completion and will contain about 500 pages of text and a large number of maps, correlation charts and geologic sections. The report will probably be ready for distribution about the middle of December. Large base maps to be included in this report are now complete.

2. Preparation of a report on the gas possibilities of the Arkansas River Valley Province of Arkansas by Carey G. Creneis. The base maps showing the structural axes in the Arkansas river valley have been completed as well as have the north-south and east-west sections of the area. The text is being prepared at the present time. The report will probably contain about 400 pages and will probably be ready for distribution sometime in January next.

3. A report on the St. Peter and Related Sandstones of north Arkansas by A. W. Giles is being prepared. This report will cover the geology, structure and economic possibilities of these valuable sandstone beds of north Arkansas. This sand is now being used as a glass sand, but has never been mapped in any detail up to the present time. The report will contain numerous detailed analysis charts of the sand together with a geologic map showing the distribution, thickness, etc. Dr. Giles has been at work on this report for the last year. It will probably contain about 200 pages and the text has just been completed. It should be ready for distribution about December 1.

4. A detailed geological map of Arkansas is being prepared. Work on this map has been delayed pending the completion of the new Arkansas base map which is being prepared by the United States Geological Survey. The geology will be placed on this new base. The scale will be one to 500,000 or about eight miles to the inch. The contract for the engraving has been awarded to S. J. Kubel, chief engraver of the United States geological survey, who is to undertake the work at cost. The map will be printed in Washington and will be completed in about three months. The compilation of data for this map has been proceeding for the last three years. It will be on the same scale as the geological maps of Oklahoma, Missouri and Tennessee, and will make a unit with these maps. In addition to geology, the map will show mines, quarries, oil and gas fields, oil and gas lines.

The following geological projects, said Mr. Branner, are being handled on a co-operative basis with the United States Geological Survey and other agencies:

1. The zinc and lead survey of north Arkansas, which is a federal-state co-operative project, and which was launched in October, 1927. The field work has been proceeding steadily and will probably be completed sometime next summer. This report covers the entire zinc and lead area, including portions of Boone, Marion, Searcy, Stone, Independence, Izard, Sharp and Randolph counties. The field work is in charge of E. T. McKnight of the United States geological survey. The finished report will contain detailed geologic maps, sections and detailed economic information.

2. A report on the upper cretaceous formations of southwestern Arkansas by Carl H. Dane, of the United States Geological Survey. The field work on this report was completed by the United States Geological Survey and the publication has been undertaken by the state survey. The text is now in the hands of the printer. The report will be accompanied by a detailed surface geological map of the upper and lower cretaceous area of southwestern Arkansas, including portions of Little River, Sevier, Howard, Pike, Hempstead and Nevada counties. The map has been printed and is now ready for inclusion in the report, which will probably be ready for distribution about December 1.

DR. BRANNER WAS FOND OF ARKANSAS

Noted Geologist Interested in
State, Says His Wife,
Visiting Here.

June 13-1931

Arkansas and Little Rock always held a special place in the affections of the late Dr. John C. Branner, who was the first state geologist of Arkansas from 1887 to 1893, says Mrs. Branner, who is the guest here of her son, George C. Branner, present state geologist.

Dr. Branner came here from the University of Indiana, where he was head of the Geology Department, to make a geological survey. As a matter of fact, it was hoped at that time that deposits of gold and silver would be found in the Hot Springs area and Dr. Branner was asked specifically to conduct this survey. Far from finding the wealth of the Indies hidden away under Hot Springs mountain, Dr. Branner reported that there was no trace of these precious metals, but that Arkansas was rich in other geological formations which, at least to a geologist were far more valuable and interesting than those which the survey hoped to establish. During his five years in Arkansas, he compiled and published approximately 15 bulletins on Arkansas geology, and made the first comprehensive geological surveys of the state.

He made a great impression on the people of Arkansas, so strong that even today men and women who knew him at that time speak of him as though it were only yesterday that he was striding over the Arkansas hills with the group of young geologists who came here to work with him under the charm of his presence and his fame as a geologist. He was obliged to make ends meet, in putting through the surveys for money did not come readily for the work, and was successful in interesting young graduates from the Eastern colleges, especially Cornell, his own alma mater, in coming to Arkansas, so that he accomplished a great deal of work with as little expense as possible. Mrs. Branner came with him to Arkansas and has many pleasant memories of her life here.

Called to Stanford.

In 1895, Dr. Branner was called to Leland Stanford University, California as head of the Geological Department. Dr. David Starr Jordan, now president emeritus of Leland Stanford, had been made president of the newly established university, and in joining his faculty, Dr. Branner picked up threads of friendship that dated back to his Cornell days. It was at Cornell that he and Dr. Jordan met as fraternity brothers in the new college. When Dr. Jordan was appointed president of the University of Indiana, he had urged Dr. Branner to take the chair of geology, and it was on leave from these duties that he came to Arkansas in '87. Hence it was with a warm feeling for his friend of so many years that he again took the chair of geology in the California university, where he spent the remainder of his days as faculty member, as vice president and, after Dr. Jordan's retirement, as president and later president emeritus of the university.

Dr. and Mrs. Branner spent more than 40 years at Leland Stanford University, and Mrs. Branner has her home at Stanford now. She was married to Dr. Branner in 1883, after his return from South America where the then young scientist accompanied Prof. Charles Fred Hart of Cornell on the Imperial Geological Expedition of Brazil. Professor Hart died and that expedition dissolved, but Dr. Branner made several other trips as geologist to South America serving as engineer and interpreter for the South Cyriaco Mining Company, in Brazil, as special botanist

and as representative for the U. S. Department of Agriculture in Brazil in 1882-83; director of the Agassiz expedition to Brazil in 1889, special assistant of the Geological Survey of Brazil in 1907 and director of a special scientific expedition to Brazil in 1911. It was doubtless his admiration for Professor Hart and the interest in geology created by that first South American expedition, that fixed his interest in geology as a life work, Mrs. Branner says, for he was extremely versatile and was in his earlier years quite as much interested in botany and other sciences as in geology.

Famous Student.

It was at Leland Stanford that he had as a student a young man who was destined to become pretty well known throughout the world. Herbert Hoover came to Leland Stanford in its early days. At that time, the newly-established university was anxious to secure students and held competitive examinations in various cities along the Western coast. One of the Oregon entrants was Herbert Hoover. He did not succeed in passing all the exams that first time, but those that he did pass showed a well-organized mind and sufficient keenness of intellect to induce Dr. Swain to urge the young student to enter the University.

During the first two years, Mrs. Branner says, he was very busy, for he earned his way through the University and stood well in his classes. One of the first things which brought him to general attention was his work as class treasurer. The finances, as class finances sometimes do, became somewhat involved, and young Hoover was appointed class treasurer. He spent much time over the problem, and was able to pull the class out of the hole and show a clean sheet at the end of the year.

Mrs. Hoover was also in Dr. Branner's classes, a clever, out-of-door girl, who seemed perfectly happy tramping the hills after geology specimens and making and keeping her friends wherever she found them.

These two young students are perhaps the most famous today, of any who attended Dr. Branner's classes, but he lived in close touch with many other young men and women during his years at the University, Mrs. Branner says, for he had a fondness for people.

He was indeed many-sided. In his reading, he enjoyed novels, history and biography, as well as scientific treatises. He wrote countless bulletins and reports on geology, yet could find time to write a grammar of the Portuguese language, since he learned when he went to South America, that no such text book existed, and he also wrote out for his children, the "How and Why Stories," which set down the Negro folk-stories he himself heard as a boy on his father's plantation in Eastern Tennessee. These last two books are still in print, and the Portuguese grammar is considered a standard textbook on this difficult language.

Versatile Man.

Two qualities aided Dr. Branner in carrying out a program which would have exhausted many another man, Mrs. Branner says. He knew how to make the best use of his own time and he also knew how to utilize other people's abilities.

He lived a regular life and never seemed hurried or crowded, seldom sat up over-late nor allowed himself to get over-tired, and yet he found time to head a great University, to write innumerable scientific bulletins, to be an active member of such organizations as the Geological Society of America, of which he was president in 1904; the Geological Society of London; the Societe Geologique de France, the National Academy of Sciences, and the Seismological Society of America which he served as president in 1911, and to act as associate editor of the Journal of Geology.

In 1911, he was asked to come to Arkansas to conduct a most important

geological survey of the oil area, and at that time he was accompanied to Arkansas by his son, who has been here ever since as state geologist. Mrs. Branner will return to Stanford at the close of her visit here.



The accompanying map shows two of the important projects included in Arkansas' geological survey work in the state, which will be set out in full detail in reports which are to be ready for distribution in a few months. The southern and eastern section of Arkansas, as is shown by the map, is included in a report on the oil and gas possibilities which is being prepared by W. C. Spooner. This report, which will be some 500 pages in length and including maps, charts, etc., will probably be ready for distribution about the middle of December. The northern and western portion shows the area included in a survey of gas possibilities in the Arkansas river valley provinces. This survey is being made by Carey G. Cronies.

Gazette 2-3-29
LET THE STATE GEOLOGIST REMAIN UNDISTURBED.

There is a bill in the legislature which would make the state Geological Survey a part of the Department of Mines, Manufactures and Agriculture. This bill says the commissioner of this department shall appoint the geologist, although the constitution provides that this official shall be appointed by the governor.

The Gazette is convinced that the best interests of the state demand that the geologist be left undisturbed to continue his invaluable work.

The first comprehensive geological survey of this state was made under the direction of the late Dr. John C. Branner, who was one of America's most distinguished geologists. After some years his son, George Branner, succeeded to the office in which his father had rendered so notable service. He is now prosecuting surveys and preparing reports which should be of the greatest potential and practical value for the development of this state. The United States Geological Survey contributes \$10,000 a year, or one-third of the total amount spent by the Arkansas survey. Mr. Branner has been engaged in this work ever since the geological survey was re-established, in 1923. The progress made has been proportional to the amount of funds the state has made available for the purpose. At present 11 men are employed and six reports are under way.

The state Geological Survey cannot be transferred to the Department of Mines, Manufactures and Agriculture without danger of disturbance and disorganization of the peculiarly valuable and essential work that is being done for the Arkansas of today and tomorrow. Every two years there may be a heated political campaign over the office of commissioner of Mines, Manufactures and Agriculture. The positions in the Geological Survey, which should of course be filled by persons specially qualified for this work, might under these conditions become political patronage. Under four governors the state geologist has been left undisturbed as a scientific and technical officer of the state government should be. He should be left undisturbed for the future.

Gazette 2-3-29
STATE GEOLOGIST'S REPORT SUBMITTED

2-3-29
Shows Work Accomplished During Year and Projects Now Under Way.

Six projects are under way in the State Geological Department for the year beginning January 1, 1929, according to the annual report yesterday of George C. Branner, state geologist, and nine other new projects are contemplated, most of which are dependent on available funds for the purpose.

- The six projects under way are:
1. Publication of the report on the oil and gas possibilities of the lowland or coastal plains area of southern and eastern Arkansas, by W. C. Spooner.
 2. Publication of the report on the conditions favorable for gas accumulations in the Arkansas river valley region of western Arkansas by Carey G. Cronies.
 3. Publication of the report on the upper cretaceous formations of southwestern Arkansas by Carle H. Dane (co-operative).
 4. Completion of field work in connection with the ground water conditions in the rice irrigation district of eastern Arkansas (co-operative).
 5. Completion of field work in connection with the zinc and lead report on northern Arkansas (co-operative).
 6. Publication of a state geological map.

Projects Proposed.
 Projects that are planned include a survey of the commercial clays of the state, detail work on oil and gas geology, survey of sand and gravel deposits, survey of building stones, with special reference to black marble, survey of phosphate-bearing rocks of northern Arkansas, study of soil loss due to erosion and its prevention, survey of tripoli deposits, survey of antimony region of southwestern Arkansas, survey of certain parts of the iron-bearing region of north Arkansas.

All topographic maps made during the year will be combined federal-state projects, and the co-operative stream gauging work begun in 1927 will be continued through 1929.

The appropriations for the department for the period ending December 1, 1928, totaled \$61,180, and the receipts of the department totaled \$32,829.15 for the same period.

Mr. Branner declares that the supplemental appropriation from the general revenue fund is not a practical procedure, and suggests that increased revenue for support of the department be obtained by increases in the severance tax. The recommended increases are: Tax on minerals, except coal and manganese, from \$.026 to \$.027; increase in tax on coal from \$.01 per ton to \$.011 per ton; increase in tax on manganese from \$.101 to \$.102 per ton, and increase in tax on timber from \$.07 per 1,000 feet to \$.071 per 1,000 feet.

During the year nine projects were carried out by the department, including surveys in various sections of natural resources, and many such surveys now are in progress, according to the report. These surveys and the field forces in charge are described in detail. The state geologist has been in attendance at various conferences during the year and during the year the department has handled about 4,500 requests for geological, mineralogical and industrial information, and information is continually supplied regarding possibilities of commercial development of the mineral products of Arkansas.

The department analyzes various mineral specimens and makes the state severance tax statistical tables, besides other statistical figures; keeps a collection of well logs, a geologic library and a bibliography of the geology of the state, a collection of the various minerals of the state and representative core collections.

Gazette 2-6-29
Says Geological Survey Should Not Be Disturbed.

To the Editor of the Gazette:
 I wish to congratulate you on your editorial of February 3, relative to the bill proposed to put the Geological Survey under the Department of Mines, Manufactures and Agriculture, an elective office, which would give that department supervision over the Geological Survey and make appointments.

The Geological Survey should by all means be kept out of politics, and as it is functioning properly and must have a specialist at its head, we don't see why any other department is entitled to supervise something that it knows less about.

I wish to enter a protest against another feature of the bill which proposes that the commissioner of mines, manufactures and agriculture take over the State Plant Board. This department is more important to the welfare of Arkansas than many people in the state imagine. It protects the general public in buying nursery stock by having nurseries and all their stock inspected with a view of seeing that purchasers get nursery stock free from insect pests and fungus diseases. Their inspection is absolutely necessary to the 96 nurseries in the state, in that they cannot ship their nursery stock into other states because of their laws, without this stock bearing an inspector's certificate from the Plant Board.

It may not be generally known, but strawberry plants are shipped out of this state in car lots and they cannot move without being inspected. They also inspect cottonseed and a whole carload was rejected on account of the seed being inferior.

The Plant Board is also necessary to the fruit and truck shippers in that we cannot have federal and state inspection without the federal inspector co-operating with this department. Last year they inspected 1,100 cars of

fruit and truck and one of the biggest buyers in the state, Hugh Rouw & Co. of Van Buren, would not buy a car of produce unless it received federal and state inspection, this certificate being prima facia evidence that the car is up to standard, should it be refused at the point of delivery.

They also may co-operate with the Federal Pure Food Department in certifying that the arsenical residue has been removed from fruit so as to comply with the federal requirements.

As the knowledge necessary in this department is technical and requires an entomologist and chemist to superintend this work, we think it the height of folly to put it under any other department. The time is coming when buyers are going to demand that all fruit shipped in car lots be inspected at the loading point, and they are already insisting everywhere that the arsenical residue put on fruit in spraying, in excess of the government requirements, shall be removed.

As the law now is, the State Plant Board is composed of the following: J. R. Alexander, chairman, cotton grower, Scott; V. H. Young, secretary, plant pathologist of the experiment station, Fayetteville; I. R. Rothrock, fruit grower, Springdale; W. J. Baerg, entomologist of the experiment station, Fayetteville; Earl Page, commissioner of mines, manufactures and agriculture, Little Rock.

They employ the chief inspector, who carries out the provisions of the Plant Board Act.

E. N. Plank,
 Representative from Benton County.

The state geologist's report shows that Arkansas' oil production dwindled from 77,398,000 barrels, valued at \$68,000,000, in 1925 to 32,011,000 barrels, valued at \$29,450,000, in 1928. The estimated production for this year is 24,000,000 barrels; for 1930 16,000,000 barrels, and for 1931, 10,000,000 barrels. There is little prospect for any material departure in these future estimates unless large new oil fields are discovered, the state geologist believes.

Future Work.
 Turning to the question of budget for future work, the report says: "It is estimated that the income for the support of this department under Act 142 of the General Assembly of 1927, for the fiscal year 1929-30, will be approximately \$23,500. The total estimated expenditures for the department for the fiscal year 1929-30 include co-operative work proceeding according to contract, office maintenance and the publication of completed reports, as follows:

Survey of ground waters in rice district	\$ 2,000
Stream gage installation and maintenance	2,500
Topographic map of coastal plain area	1,250
Topographic map of entire	

Democrat 2-3-29
Fall in Severance Oil and Gas Production, on That Less Than Tells Governor Legislative Relief Necessary if New Work to Be Completed

UNLESS the legislature makes some provision for increasing the revenue of the Arkansas Geological Survey, all plans for new work during the coming year will have to be abandoned, according to the annual report of the state geologist, submitted to Governor Parnell yesterday. It will also be necessary to curtail the publication of some of the geological reports for which material has already been accumulated, several of which are regarded as having a distinctly important bearing on the future development and prosperity of the state.

This unfortunate situation, the geologist points out, is due to the fact that oil and gas production, on which the geological survey is almost wholly dependent for support, has dropped so far below expectations that less than half the anticipated revenue is actually available. When Act No. 142 was passed two years ago there was good reason to believe that it would produce ample revenue for the maintenance of the department and on this assumption appropriations amounting to about \$60,000 annually were granted. But last year the department's share of the severance taxes actually amounted to only \$28,000 or \$32,000 short of the appropriation, with prospects indicating a further decline in revenue for the future.

If the decline in oil and gas production continues at the same rate reported during the last two years, the income of the geological department from this source will be reduced by about 25 per cent each succeeding year, bringing the income for 1931 to the insignificant sum of about \$10,000 the state geologist estimates.

While conceding that the future of the state's oil and gas production is, of course, uncertain, Dr. Branner points out that it is necessary to assume "for the sake of safety" that the decrease will be relatively constant in computing the future income of the department under the provisions of Act No. 147.

The state geologist recommends a further slight increase in the severance tax as "the most logical and feasible" means of providing the revenue necessary for the department to continue to "function as a reasonably effective public department." He estimates the minimum requirements of the department for the fiscal years of 1929-30 to be \$46,800.

Suggested Increases.
 The following suggested increases in severance taxes seem to indicate that the state geologist's proposal would work little hardship on the producers:

1. An increase in the tax on all minerals, except coal and manganese from \$.026 to \$.027.
2. An increase in the tax on coal from \$.01 per ton to \$.011 per ton.
3. An increase in the tax on manganese from \$.101 to \$.102 per ton.
4. An increase in the tax on timber from \$.07 per thousand feet to \$.071 per thousand feet.

Far from creating a surplus, such increases would still leave a large and steady decline in the revenue of the department each year, assuming the petroleum production of Arkansas will continue to decrease. Dr. Branner estimates that under this program the income for the fiscal year 1929-1930 would be about \$50,000; for 1930-31, \$35,000; for 1931-32, \$24,405.

Survey of building stones of Arkansas with special reference to black marble	3,500
Study of strip coal mining possibilities of certain areas	2,000
	\$18,050

"In summary of this section, the amount required for co-operative work, office maintenance and the publication of completed reports is \$28,750, the amount required for new work, \$18,050. The sum of these is \$46,800, which is the total required for carrying on the necessary work of this survey for the fiscal year, 1929-30.

More Income Needed.
 "The operation of Act 142 of the General Assembly of 1927 has proved

inadequate for the support of this department, due to the rapid decrease in the state oil production. In order that the office of state geologist may function as a reasonably effective public department, it is necessary that the income of this department be augmented. Three lines of procedure are suggested to accomplish this. These are (1) a supplemental appropriation from the general revenue fund, (2) an increase of the severance tax on minerals now taxed for the support of this department, and (3) an increased severance tax on coal and timber which have not previously contributed to the support of the department.

"It is not believed that the supplemental appropriation from the general revenue fund is a practical procedure. It is believed, however, that an increased revenue for the support of this department from the severance tax is both logical and feasible and it is recommended that legislation be enacted to this end.

In order that the survey may receive the full taxes due under the provisions of Act No. 142, and that more accurate statistical information concerning mineral production and values may be made available, the report recommends that the department of revenues, severance tax division, should be furnished with the funds and personnel sufficient to permit that office (1) to make field checks of the quantities and values of the minerals produced in Arkansas as reported to them; (2) to conduct an active search for operating firms not now listed on the severance tax records, and (3) to make a more careful check of records submitted to that office both as to the accuracy of data and the allocation of funds to this department." These suggestions apply particularly to the records of oil and gas producers, the report adds. "It is believed that these recommendations, if carried out, will cause an increase in tax-revenue for the support of this department. These recommendations have been discussed with David A. Gates, commissioner of revenues, and he is in entire agreement with them."

Oil and Gas Survey.

Discussing the survey of structural conditions favorable for gas and oil accumulations in the Arkansas river valley region of western Arkansas, the report says:

"The field work of this survey was completed in the latter part of 1927. The preparation of maps, sections and text, has been carried on by Mr. Carey G. Cronis and these are now nearing completion. Mr. Cronis has submitted one sectionized structure map of the Arkansas valley region which in that area extends from the north line of township two north to the north line of township 12 north, a total area of about 9,000 square miles. This covers what appears to be the most promising portion of northern and western Arkansas from an oil and gas standpoint. The structure map referred to shows approximately 73 anticlines, 61 synclines and 34 faults which have been mapped. Structure maps of the entire Ozark plateau and Ouachita mountain regions are also being compiled to supplement this. The combination of these maps will illustrate the structural relationship between the Ozark plateaus, the Ouachita mountain region, and the Arkansas river valley area. Mr. Cronis has also submitted to this office four cross sections of the area in question and two columnar sections of the region. A portion of the text is now in the hands of the printer. The report should be ready for distribution about April 1, 1929.

"Active prospecting in the Arkansas river valley has been stimulated by the successful development of the Clarksville gas field and in addition to this, operators are preparing for some deep oil prospecting in the northern portion of the valley. The report by Mr. Cronis will fill an increasing need for structural information on the valley. There has been a continual demand at this office for the field information assembled by this survey."

Zinc and Lead Survey.

Referring to a survey of the zinc and lead area of northern Arkansas the report says:

"The federal-state co-operative arrangement for the survey of the zinc and lead region of Arkansas, which was begun during the fiscal year 1927-28, is being continued as planned during the fiscal year 1928-29. Both the federal and state surveys are contributing \$5,000 annually toward the cost of the field work. E. T. McKnight, who is doing the necessary field work in connection with this report, states that the detailed mapping of the area and structural geology of the Yellville quadrangle, which covers an area of approximately 975 square miles in the zinc and lead region, will be completed by the end of January, 1929. The report of this survey will include available data relative to the prospects, openings, shafts and underground workings and production in this region. Upon completion of his work in this quadrangle Mr. McKnight expects to make an economic survey of the remaining portion of the zinc and lead area, including portions of Marion, Boone, Newton, Carroll, Madison, Searey, Stone, Independence, Izard, Sharp, Lawrence and Randolph counties.

"W. C. Mendenhall, chief geologist of the United States Geological Survey; H. D. Miser, geologist in charge of the fuels division of the United States Geological Survey, and E. F. Burchard, geologist in charge of the iron and steel division of the United States Geological Survey, spent several days with Mr. McKnight in the field during the summer of 1928.

"The preparation of the text of the report on this area will probably be begun during the fall of 1929. No arrangement has yet been made for its publication."

Services Maintained.

The following services have been maintained as a part of the routine work of the department, the report states:

"Requests for information answered: During the past year the survey has handled approximately 4,500 requests for geological, mineralogical and industrial information bearing on the mineral, soil and water power resources of the state, and has sent out approximately 2,000 publications, reports and maps. Information has been continually supplied by this office concerning the possibilities of the commercial development of the mineral products of Arkansas.

"Complete analyses are made of minerals specimens submitted when believed advisable. An index is kept of the names of owners of mineral properties who report the existence of certain mineral deposits and ask for assistance in their development as well as an index of mining organizations, manufacturers and buyers who inquire concerning the location of mineral properties.

"Tax reports: This department has compiled the state severance tax statistics every quarter since March 23, 1923, and the monthly tax reports of sand and gravel removed from state-owned stream beds. These statistics are arranged to give the name of the producer, the quantity and the value of each mineral product in the state. These items include oil, gas, natural-gas gasoline, coal, bauxite, clay, lime, manganese, sand, stone, gravel diamonds, chalcys, zinc and lead.

"Other Statistics—Other statistics relative to the mineral production of the state kept on file are taken from the following sources: U. S. Geological Survey, American Petroleum Institute, U. S. Department of Com-

merce, U. S. Census Bureau, and various trade publications.

"Well Log File—A collection of miscellaneous well logs is maintained by the survey. These for the most part are the logs of wells which were drilled prior to March 23, 1923, at which time the law first provided that they be filed with a state department. There are now approximately 500 logs in this file.

"Geological Library—A geologic library containing over 700 books and pamphlets bearing on the minerals, soils and water power of Arkansas and other states is maintained for reference.

"Bibliography of the Geology of Arkansas—A subject and author index of all books, pamphlets, reports, etc., bearing on Arkansas geology is maintained. This index includes about 800 books and articles and is of assistance in locating reports and records which have been made of the different minerals and soils, water power, etc.

"Mineral Collection—A collection of the various representative minerals of the state is kept which now includes over 300 representative specimens.

"Representative Core Collection—A collection of cores from wells drilled in southern Arkansas is maintained which now includes about 800 feet of core.

"Publications on Hand—The following publications are now on hand in the office of state geologist for distribution to the public. They are sent on receipt of postage and include:

- "Marbles and Other Limestones," by T. C. Hopkins, Ann. Rpt. Ark. Geol. Survey, 1890, Vol. IV, Atlas accompanying report on marbles.
- "Mineral Waters of Arkansas," by J. C. Branner, Ann. Rpt. Ark. Geol. Sur., 1891, Vol. I.
- "Miscellaneous reports by various authors, Ann. Rpt. Ark. Geol. Sur., 1891, Vol. II.
- "Tertiary Geology of Southern Arkansas," by Gilbert D. Harris, Ann. Rpt. Ark. Geol. Sur., 1892, Vol. III.
- "States of Arkansas," by A. H. Purdue, with a bibliography of the geology of Arkansas, by J. C. Branner, Ark. Geol. Sur., 1909.
- "Coal Mining in Arkansas," Part 1, by A. A. Steel, Ark. Geol. Sur., 1910.
- "Outlines of Arkansas Mineral Resources," by George C. Branner, Ark. Geol. Sur., 1927.
- "An Outline of the Physical Features of Arkansas, Reprint from '7' above, 1927.
- "An Outline of the Petroleum and Natural Gas Resources of Arkansas," reprint from '7' above, 1927.
- "An Outline of the Metallic Mineral Resources of Arkansas," reprint from '7' above.

"S. B. No. 137 (George and others). To create the Arkansas Development Commission as a branch of the Department of Mines, Manufactures and Agriculture. Passed, 26 to 5.

"S. B. No. 278 (Raney). Biennial an-

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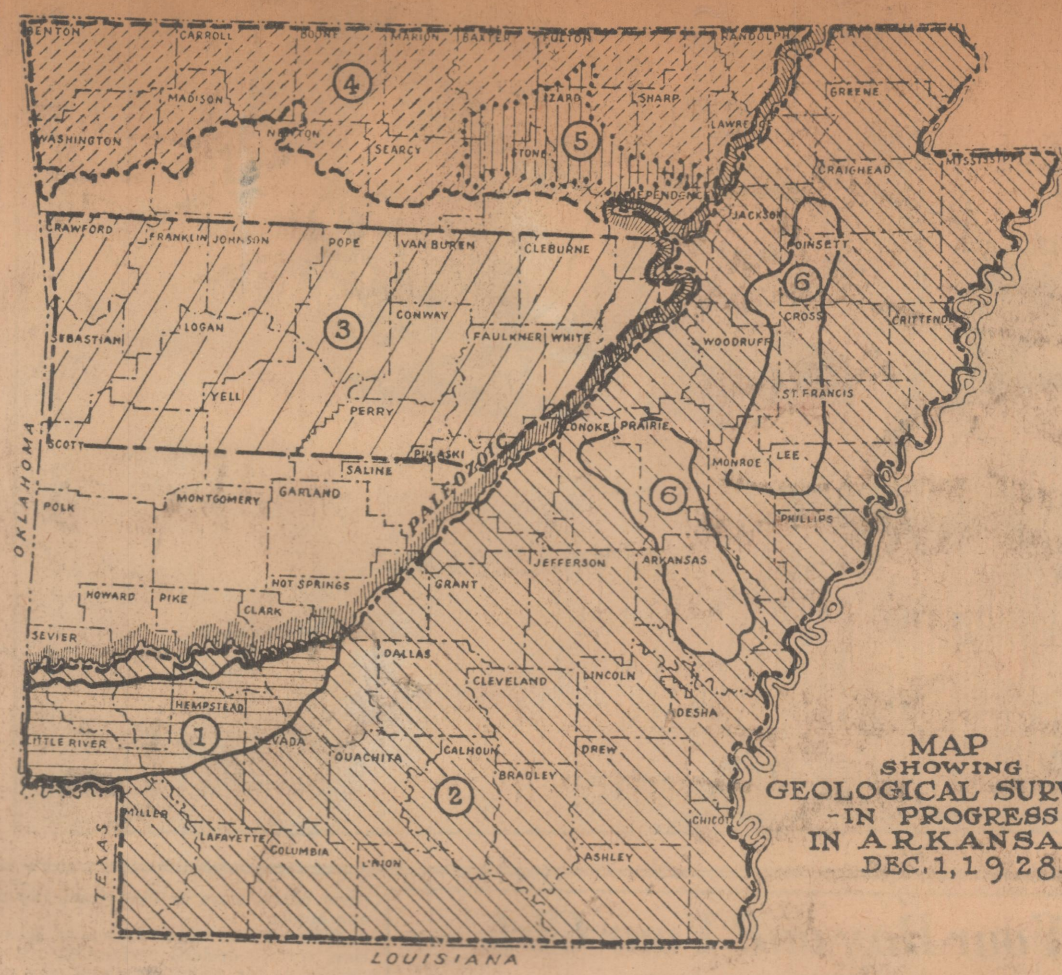
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MAP SHOWING GEOLOGICAL SURVEYS IN PROGRESS IN ARKANSAS DEC. 1, 1928.

The above map shows the geological surveys which are now in progress in Arkansas. These are:

1. A survey of the Upper Cretaceous formations of southwestern Arkansas, by Carle H. Dane.
2. A survey of the Possible Oil and Gas Resources of the Lowland or Coastal Plain Area of southern and eastern Arkansas, by W. C. Spooner.
3. A survey of the Structural Conditions Favorable

for Gas and Oil Accumulation in the Arkansas river valley region of western Arkansas, by Carey G. Cronis.

4. A survey of the St. Peter and older ordovician sandstones of north Arkansas, by Dr. Albert W. Giles.
5. A survey of the Zinc and Lead area of northern Arkansas, by Edwin T. McKnight.
6. A survey of the Ground Water Conditions in the rice district of Arkansas, by David G. Thompson.

3-3-29 Bills Introduced, 3-3-29
H. B. No. 551 (Johnston). To amend Act No. 138 of 1915, as amended by Act No. 296 of 1917, regulating the funds devoted to the office of the state geologist. Read twice and referred to the Oil and Gas Committee.

Book on Early Shell Fish in State Published.

A booklet on the "Upper Cretaceous Ostracoda of Arkansas," written by Merle C. Israelsky, paleontologist of Shreveport, La., has been published by George G. Branner, state geologist. The booklet contains descriptions and pictures of 26 species of small prehistoric shell fish, or ostracods, found in subsurface formations in Arkansas. The book will enable geologists and paleontologists to identify formations found in drilling cores at various depths and will help them to determine whether drilling should be carried to a greater depth to reach known formations. The booklet was written as a chapter in another publication to be printed soon by the state Geological Department, "Stratigraphy and Structure of the Gulf Coastal Plain of Arkansas," by V. C. Spooner, an assistant state geologist.

THEORY OF CREATION OF THE WORLD IS EXPLAINED

George C. Branner, State Geologist, is Principal Speaker at Meeting of Stargazers.

6-21-29
The theory of "How the Earth Came to Be" was discussed by George C. Branner, state geologist, in an address which featured the meeting of the Stargazers at the Hotel LaFayette last night.

Mr. Branner explained the planetesimal hypothesis, or the theory of the creation of the earth in the cycles of the disintegration and building up of matter. He discussed the disintegration of matter from the chemical standpoint.

The geologist gave a detailed account of the different stages of the origin of the earth according to the theory, including the development of the earth as it passed through the paleozoic, mesozoic and cenozoic areas.

His discussion included an explanation of how the history of the earth's development applied to Arkansas in particular. In illustrating the origin and extent of the rocks of the different eras in Arkansas, Mr. Branner exhibited a new map showing the rock formations on the surface. This was the first time the map has been exhibited as it represents three years' work by the state geologist. It has not been completed.

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Special to the Gazette.
Carthage, March 23.—The two-acre sink hole on the property of Ben Ross, six miles west of here has puzzled all geologists who have studied the phenomenon. More than 2,000 persons have viewed the gaping hole in the midst of a timber tract.

There are two versions as to how the sinking occurred. A man who lives about two miles from the Ross farm says that the soil took the eight-foot drop in one night. He said he was awakened by a roaring sound about two weeks ago. He said the noise was similar to a log wagon rumbling over a wooden bridge. He said that the next morning he investigated and discovered that Ross' field had sunk.

Mr. Ross, however, said that the land did not sink all at once. He said there were three distinct faults, and that he heard the rumblings each time. The first drop, he said, occurred about two weeks ago and the others several days later.

The sink hole presents a peculiar spectacle since the entire tract was covered with timber and some of the small trees barely protrude above the adjoining land. The soil is covered with gravel and was high before the fault occurred. There has been no water.

A geologist from El Dorado was among those who made an investigation yesterday but he was unable to explain how the sinking occurred. There is no body of water in that section and it is several miles from any stream. This is the first fault ever known in this section, it was said.

The spot is accessible since there is a lateral road extending from the county highway and the visitors swarm the road in automobiles looking at the "sunken field." A neighboring farmer said tonight that he had inspected the ground but that he had not remained in the hole very long. The earth surrounding the hole has cracked into huge fissures 10 to 15 feet apart.

Further investigations will be made and the matter will be presented to George G. Branner, state geologist, who has been invited here.

FUNDS ASKED FOR ARKANSAS SURVEY

Congressmen and State Geologist Urge Hoover to Recommend Work.

(From the Gazette's Correspondent.)
Washington, June 6.—Accompanied by Representatives Otis Wingo, Heartwell Ragon and Tilman Parks, George A. Branner, state geologist of Arkansas, called upon President Hoover at the White House today in the interest of topographical survey work in Arkansas.

The president was urged to use his influence with the director of the budget to include in his next estimates to Congress an item of \$500,000 annually for 10 years to complete the topographical survey of the United States. Authorization for the expenditure of this amount is provided in the Temple bill passed in 1925.

As an alternative it was suggested to the President that Arkansas be allowed \$20,000 annually for three years to complete the triangulation and elevation surveys of the state.

The president's attention was called to importance of this work in connection with the great road building program in Arkansas, flood control work, and the potential development of water power. Already familiar with flood control and highway construction in Arkansas, the president was reported by the visitors as having listened sympathetically.

Mr. Branner was invited to remain at the White House for luncheon, which he did.

The party later called upon Dr. Julius Klein, assistant secretary of commerce. At the suggestion of Dr. Klein an appointment was made with Col. R. S. Patton, chief of the coast and geodetic survey.

Bill Creating Development Board Passed

Senate Approves Measure Intended to Aid State's Growth.

The Arkansas senate, by a vote of 26 to 5, Thursday afternoon approved a bill introduced by Senators George, Caldwell, Tate McGehee and Purkins, creating the Arkansas development commission and a bureau of commerce and industry by reorganizing the bureau of mines, manufactures and agriculture and making the elected commissioner to that office chairman of the new body.

Primarily the commission is sought to be formed for the advertising of Arkansas in other states, for a survey of this state's natural resources and

for a concerted and definite movement to secure the location of new industries in Arkansas. The new commission will entail an annual expenditure of approximately \$10,000 in excess of the regular appropriations for the department of mines, manufactures and agriculture in the employment of a director, two field industrial engineers and clerical help. The present personnel of the department of mines, manufactures and agriculture is retained in the administration of the work.

By adopting a house amendment the state geologist's office and the state plant board are exempted from inclusion in the formation of the new commission. It was originally planned to take over the duties of these offices and combine them with the commission.

Objections to the bill were based on the contention that the governor should be chairman of the development commission. By the terms of the bill four other members to serve without pay are to be named on the commission.

The taking of sand and gravel from the state would be prohibited under a bill by Senator McKennon, except where permits had been secured from the state department of revenue. The bill was referred to the revenue and taxation committee.

Theoretical Restoration Shown of the Parent Nebula of the Solar System



Theoretical restoration of the parent nebula of the solar system. The nuclei of the several planets may be identified by their distances from the center. The dimensions of the inner parts are made disproportionately large. (From a College Textbook of Geology by T. C. Chamberlin and R. D. Salisbury, 1909.)

History of the Earth's Growth Constantly Is Being Modified

As Worked Out Little by Little by Astronomers and Geologists, Is Not Settled Manner by Any Means, Mr. Branner Declares.

In a talk before the Little Rock Astronomical Club recently, George C. Branner, state geologist, discussed some of the theories of geologists and astronomers regarding the formation, growth and development of the earth. It appears that there are two principal "schools" among astronomers one dating from 1796 when an astronomer named Laplace evolved the nebular theory of the earth's origin, and the other, or Planetesimal hypothesis, having its origin about 1906.

At the request of the Gazette, Mr. Branner revamped his talk, eliminated some of the ultra-technical sections and reduced it to newspaper dimensions.

The revised discussion of the origin of the earth follows:

The history of the earth's growth and development, as worked out little by little by astronomers and geologists, is not a settled matter by any means, and conceptions of it are undergoing modifications from time to time with the accumulation of new facts.

According to the present conception, the stages of the earth's development are usually divided very generally into three groups. These are: 1, the stage of growth or the hypothetical stages which are largely speculative, explanations of which must conform to relatively few known facts; 2, the stages of transition which are partially known and explanations of which must conform to a greater number of known facts; and 3, the stages of maturity which are fairly well known, the history of which must conform to a large number of known facts.

Stages Described.

The history of the earth's development studied from this viewpoint is a subject of extraordinary interest in that it covers an enormous period of time. It begins under conditions when the earth had no separate existence our conception of which must be necessarily speculative, and extends over the period during its growth as a separate body, and later the progressively less speculative period during which changes have occurred which bring the story down to the present day.

The stage of growth or hypothetical stage is considered first.

In accounting for the origin of the earth, astronomers are of the opinion that the solar system was evolved from a nebula of some form. No universal agreement has been reached, however, as to the character of the nebula and the method by which the evolution took place.

Some of the facts which must be explained by any hypothesis of the origin of the solar system are:

1. The orbits of all the planets are elliptical but nearly circular;
2. The orbits lie in nearly the same plane;
3. Their direction of revolution about the sun is the same;
4. The direction of rotation of the sun is the same as the direction of revolution of the planets.
5. The direction of the planets' rotation is the same as that of their revolution.
6. With two or three exceptions the satellites revolve in the direction of the rotation of their planets.

Two Principal Theories.

Of the hypotheses advanced to account for the earth's origin two are well known, the Nebular hypothesis of Laplace (1796) and the Planetesimal hypothesis of Moulton and Chamberlain (1906 and later).

During the last century the nebular hypothesis enjoyed wide acceptance and numerous conceptions regarding the early history of the earth were built about it. This hypothesis holds that the sun, the planets, and the satellites were once part of a highly heated, rotating, spheroidal, gaseous nebula which was of sufficient size to include the whole solar system. The nebula is assumed to have slowly cooled and diminished in size. This progressive shrinkage and consequent increase in the velocity of rotation at the equator finally resulted in the formation of an equatorial ring separate from the central mass. As the ring also cooled and contracted it was disrupted and its substance gathered into a planet whose orbit lay in the plane the ring had occupied. Successive rings in this way formed several planets and the central mass formed the sun. Further cooling and shrinkage of the planets caused equatorial zones and some of them formed rings which eventually became satellites.

According to many astronomers this theory does not conform to known facts and to the laws of celestial dynamics. The following objections among others, have been raised:

1. Nearly all known nebulae are spiral and not spheroidal.
2. These nebulae do not consist of gas but of liquid or solid particles.
3. Some satellites do not revolve in the same direction of rotation as their planets.
4. The matter of the rings would

probably not have gathered as planets. Hypothesis Explained.

When the objections to the Laplacian hypothesis became increasingly clear, the Planetesimal hypothesis was at length evolved as a more satisfactory alternative. The hypothesis assumes that the sun was originally the nucleus of a spiral nebula, which was formed from the gaseous mass of the sun by the passage of a star near the sun. The passage of the star is assumed to have raised an extraordinary tide in the gaseous matter of the sun and eventually to have drawn this matter from it. At the same time a similar tide and separation of matter took place on the opposite side of the sun, the body of the sun being attracted away from the surface matter there, just as the moon causes the tides of the sea to rise their highest on the opposite sides of the earth at the same time. Under the influence of this moving star the separated matter moved away from the central mass of the sun and as the attraction of the passing star diminished the greater portion of the matter from the sun gradually assumed the position of two spiral arms. Finally when the passing star had largely lost its power to attract, spiral orbits of the planetary bodies or planetesimals gradually assumed a nearly circular orbit around the sun. This material moving about the sun was denser in some points than in others and due largely to crossing orbits these "knots" increased in size by slow accretion of planetesimals. Thus the planets were slowly built up.

The early history of the earth according to this theory is radically different from that of the Nebular hypothesis. According to the Nebular hypothesis the contracting earth nebula became eventually a molten mass with a thin crust of solid material. According to the Planetesimal hypothesis the earth slowly grew in size by the accumulation of particles and masses of cold planetesimal matter and is still accumulating that matter at a very slow rate.

Structure in Detail.

According to the latter hypothesis, which has much the best support today, W. H. Hobbes has worked out a detailed description of the earth's structure. Under his theory the earth has a central core of meteoric iron with a density of 6.9. Surrounding this is a zone of meteoric iron with a density of 7.6. Surrounding this another zone of meteoric stone of density 3.6 and about this, the surface rocks of the earth forming a thin rind of mixed sediments and volcanic rock of density 2.7.

According to the planetesimal hypothesis, seven stages of earth growth are usually conceived of. The first four are those referred to above as the growth or hypothetical stages, the fifth as the transitional or partially known, and the sixth as the mature or better known. These seven stages are: (1), the nuclear stage in which the earth is conceived as a knot in a spiral nebula which, by gradual accretion and condensation became a small slowly growing planet; (2), the atmospheric stage in which the earth attained, by virtue of its growing size, sufficient gravity to slowly accumulate an atmosphere. The gases of the atmosphere are assumed to have come both from without the earth, and from the rock forming processes in the earth, the heavier gases being the first retained. (3) The first volcanic stage. Increase in the self-compression of the earth arising from its own increasing gravity is assumed to have produced much internal heat which when conducted outward caused the liquefaction of the near surface rocks which, being under less pressure, have a lower melting point. Radioactivity and the heat insulating property of the atmosphere would contribute to this condition.

(4) The Initial Hydrospheric Stage: During the early stages of the earth's development, water vapor which, in the form of a gas, is light and active, had escaped, but during the growth of the earth eventually more and more was held as part of the atmosphere, until at length conditions of saturation occurred and water was progressively precipitated on the earth to form the oceans. A portion of this water gas probably came from without and a portion from within the earth during the formation stage. Because of unequal growth the surface of the earth was probably never perfectly spherical, so that the accumulation of water on the surface was irregular and served to depress the already low areas and elevate the higher land areas.

Initial Life Stage.

(5) The Initial Life Stage: Suitable conditions for life probably did not exist until after a rather advanced development of the atmosphere and the oceans, but since these were gathered about the earth at a relatively early stage, it is possible that life first began at this relatively early stage. If we accept the planetesimal hypothesis, the time during which life may have existed on the earth is consequently much longer than the time assumed under the Nebular hypothesis.

(6) The sixth stage which is the transitional or partially known stage before referred to, is usually known to geologists as the Archean. There are a considerable number of facts available to the geologist today to permit him to reconstruct at least a part of the history of that era. It is assumed to have been primarily an era of volcanic action. The earth had attained very nearly its present size and the internal pressures had become approximately what they are today. Heat generated due to increased internal pressure had been conducted to the near surface rocks and resulted in a period of unusual volcanic action. This was attended by great deformation of the surface.

The Archean rocks where exposed are always crystalline and usually highly altered. Their thickness is at least tens of thousands of feet and their base has never been found. The volcanic rocks invariably greatly predominate over those which were formed by sedimentation. No fossils have been found in the sedimentary rocks of that time. In the eastern half of Canada the Archean rocks are exposed and cover an area of about 2,000,000 square miles and extend southward into Wisconsin and Minnesota. This is often designated as the Laurentian shield.

(7) The seventh stage is the better known era of relative maturity referred to. This covers the period during which earth growth had practically ceased, molten rock no longer buried large areas and the interplay of the forces of mountain building and erosion became much as it is today. For this reason the stage is called gradational. It is usually divided into four eras which have as an ultimate basis of division the character of fossils found in the rocks formed during the respective eras. These are respectively the Proterozoic, Paleozoic, Mesozoic and Cenozoic eras.

Most of the facts of geology as we know them today are based on the study of the rocks laid down during the last four eras, and evidences of the history of these times are continually about us almost everywhere we travel. For instance in northern and western Arkansas there were probably more than 38,000 feet of Paleozoic rocks deposited as sediments in fresh or salt water bodies during that era. These rocks cover slightly less than half of the area of the state. In southwestern Arkansas there is a section of over 3,000 feet of Mesozoic sedimentary rocks and in southern and eastern Arkansas there is a section of possibly 3,000 feet of Cenozoic. The total area covered by the rocks of these last two eras in Arkansas makes up slightly more than half of the area of the state.

State Geologist Will Attend Field Meeting.

G. C. Branner, state geologist, will go to the Sherman, Tex., Friday to join the annual field meeting of the National Association of State Geologists. Members of the organization will make a tour of the gas and oil sections of Texas and Oklahoma from Friday until Tuesday, completing the tour at Tulsa, where they will attend the International Petroleum Exposition. Dr. Charles W. Gould, state geologist of Oklahoma, will be in charge of the field trip.

Carl M. Blacklock, draftsman for the Geological Department, will go to Tulsa tomorrow to install an Arkansas geological exhibit. He will remain in Tulsa through the exposition, October 5 to 12, and will be in charge of the Arkansas exhibit.

The exhibit will include an oil and gas map of the state, charts and drawings taken from the report of Dr. Carey Cronies on the oil and gas possibilities of the Arkansas river valley region, from W. C. Spooner's report on the coastal plains region, and from Albert W. Giles' report on the St. Peter sandstones in northwestern Arkansas. The new geological map of the state will be displayed and copies offered for sale to the public, as will the published report of Carl H. Dane on the Upper Cretaceous Formations of Southwestern Arkansas.

A similar exhibit is being prepared for display at the Arkansas State Fair and will be in charge of Miss Lucy Marlon, clerk in the Geological Department.

Mr. Branner Returns From Field Meeting of Geologists.

G. C. Branner, state geologist, has returned from the annual field meeting of the National Association of State Geologists, which was concluded with a visit to the International Petroleum Exposition at Tulsa, Okla., last week. The geologist made an automobile tour from western Texas to Tulsa, inspecting oil fields and various geological formations en route.

The association adopted a resolution requesting Congress to make provision for carrying on coast and geodetic survey work in states which have not been surveyed completely. This work is necessary before detailed geological surveys can be made satisfactorily and economically, Dr. Branner said. He was appointed on a committee to confer with proper officials at Washington regarding increased appropriations for the work. Other members of the committee are H. A. Buehler, geologist of Missouri; George H. Ashley of Pennsylvania, and F. Bevan of Virginia. Approximately half of the area of Arkansas has not been surveyed by the Coast and Geodetic Survey, Dr. Branner said.

New Journal by Geologists Makes First Appearance.

The first issue of the Journal of the Association of American State Geologists has been distributed by George C. Branner, editor and state geologist for Arkansas. Publication of the journal was authorized at the annual meeting of the association at Ardmore, Okla., last October. It will be issued quarterly. For the present it will be mimeographed at the office of the state geologist.

The first issue contains 15 pages. It will be distributed only to members of the association. It is intended to afford state geologists a medium for exchange of ideas and to enable them to know what work other state geological surveys are doing.

Among the contributors to the first issue are: Raymond C. Moore, Kansas; E. F. Bean, Wisconsin; G. E. Gondra, Nebraska; C. L. Cooper, Oklahoma; George C. Branner, Arkansas; Charles N. Gould, Oklahoma; Walter F. Pond, Tennessee; W. Bowle of the U. S. Coast and Geodetic survey.

Branner Editor of New Geological Magazine

The Journal of the Association of American State Geologists, a quarterly publication edited by George C. Branner, state geologist for Arkansas, made its initial appearance this week. The publication was authorized last October at a meeting of the association held at Ardmore, Okla. It is published in mimeograph form at the office of Mr. Branner. The first issue con-

tains 15 pages and is distributed only to members of the association, affording a means for exchange of ideas between members and print the news of various state geological departments. Contributors to the first issue include: Raymond C. Moore, Kansas; E. F. Bean, Wisconsin; G. E. Gondra, Nebraska; C. L. Cooper, Oklahoma; George C. Branner, Arkansas; Charles N. Gould, Oklahoma; Walter F. Pond, Tennessee, and W. Bowle of the U. S. Coast and Geodetic Survey.

State Geologist Honored by National Society.

George C. Branner, state geologist, was elected secretary of the National Association of State Geologists at its recent conference in Washington, D. C., from which he returned yesterday noon. E. F. Bean of Wisconsin was chosen president.

The state geologists conferred with the director of the National Geological Survey and officials of other organizations co-operating with their work, then went to New York to attend the annual meeting of the American Institute of Mining and Metallurgical Engineers.

In Washington, Mr. Branner aided in final preparations for publication of the new topographic map of Arkansas. The map, the first of its kind of Arkansas, will be off the press in about two months.

GEOLOGISTS' MAGAZINE OUT.

The second quarterly number of the Journal of the Association of State Geologists has been issued by G. C. Branner, Arkansas geologist, who was elected secretary of the national association and editor of the journal at the annual meeting of the association last fall. The journal, issued in mimeograph form, is distributed only to state geologists. The current issue contains 18 pages and articles written by 16 state geologists. Mr. Branner said the object of the publication is to

increase the administrative efficiency of the various state geological surveys.

1-15-31

Insurance Committee.

S. B. No. 27 (Counts).—For an act to make appropriations of funds to redeem \$3,000 in vouchers issued under the deficiency proclamations of the

governor on December 27, 1929, for benefit of the state geologist. Referred to Budget Committee.

S. B. No. 28 (Counts).—For an act

SUBSCRIPTION RATES—By carrier, Daily and Sunday, in Little Rock, 20c per week; outside of Little Rock, 25c per week, or 85c per month. By mail to Arkansas addresses, payable in advance, \$7.50 for one year; \$4.25 for six months; \$2.50 for three months; 85c for one month.

TELEPHONE— ALL DEPARTMENTS

CITY GOVERNMENT IN ARKANSAS.

Dr. Morgan Smith, member of the Pulaski legislative delegation, has announced that he is drafting a bill permitting cities of Arkansas to adopt the commission form of government to replace the aldermanic form.

Financial Starvation Cripples

While Neighboring States Appropriate From Three to Five Times as Much as We Will Have Only About \$15,000 to Carry On

January 18, 1931

Has Been Greatly Handicapped By Steady Dwindling of Severance Tax Funds

By WILLIAM JOHNSON.

Out at the state capitol building, in an office on the fourth floor, there is a financially starved activity which, if it were given sufficient funds, would go far to get for Arkansas the bigger and better payrolls we need. This activity is the State Geological Survey, over which Dr. George C. Branner presides. Even handicapped by meager working capital as the survey has been, it has revealed the existence of hundreds of millions of dollars worth of minerals in the soil of Arkansas, and has helped substantially to bring about development of these riches which now pay the state around \$45,000,000 a year. Thus Dr. Branner's office is no experimental thing for the practical citizens to view askance. Its worth is proved by dollar-and-cent results. And as a consequence of shriveling its functions down to the size of a picky allowance of cash, we are using only a fraction of the power that the survey could throw behind our industrial progress.

Let's look at some comparatively figures of expenditures for geological offices in Arkansas and other states, remembering that this state has a potential wealth of minerals which few others equal and still fewer exceed. For the fiscal year 1930-31 the Arkansas Survey will have had, it is estimated, only \$15,608 to spend. Nearly four times that much, \$55,000 to be exact, was appropriated from the severance taxes, but only part of the appropriation ever materializes, and the amount actually obtained has dwindled steadily. During the same fiscal year Alabama's Geological Survey will have \$70,000, Kentucky's \$148,500 and Missouri's \$48,425. The average for the 41 states which maintain geological surveys is \$32,700—twice the amount that Arkansas with all its vast mineral deposits will spend on exploring that wealth and making it known to the investing world. Moreover, it should be remembered that most of the other states which possess minerals plentifully have maintained surveys longer than Arkansas has had one in an effective way, with the result that their resources are now pretty well mapped and charted.

The first serious geological survey effort in Arkansas began in 1887 with the appointment of Dr. John C. Branner as state geologist. He held that position until 1893, doing much valuable service for the state, including the discovery of bauxite which has brought the state \$2,000,000 or more annually for several years. After 1893 geological work by the state lapsed until 1907, when professors at the University of Arkansas were conferred a sort of honorary title as state geologists. They issued three helpful reports on mineral deposits but had no appropriation with which to work. It was the popular idea at that time that the mineral deposits of Arkansas were confined pretty much to the northwest corner, and that mining was a sort of wildcat proposition anyhow, the miner just exploring around and finding what he sought if he was lucky.

But a more correct view began to displace the old one. It became understood that Arkansas was widely supplied with minerals and that the location of these deposits and the character of them could be ferreted out by the geologist's science. So in 1923 the present survey was created with Dr. George C. Branner in charge. However, it was not until 1927 that sufficient funds were provided to carry on any actual research. Only \$1,000 was available for each of the first two years. But in 1927-28 the survey had \$32,829, the next year \$28,608 and in 1929-30, \$26,988, and with these limited sums noteworthy work has been done.

Five Studies Since 1927.

Five studies of the state's mineral wealth have been made since 1927 and distributed where they would do the most good—to mining engineers and men who invest in and develop such properties. The office of the State Geological Survey has a list of several thousand names of such men all over the country to whom its findings are sent. The titles of these published studies have a forbiddingly technical sound to the plain citizen, but they are the language that the mining engineer speaks and respects. Some of the things he wants to know cannot be put in simple words. Among these five studies have been revelations of rich deposits of glass sand along the Arkansas river, of far larger bauxite areas than the state was supposed to possess and of indications of untapped supplies of gas and oil. The survey has also pointed out rich clay deposits in Arkansas for pottery, tile and numerous other clay products. And it has issued geological maps which give to the mining engineer an X-ray picture of the state's rock and soil structure as a guide to his search for minerals.

At the present time the State Survey has five studies of Arkansas mineral wealth ready for publication, but which cannot be printed and distributed now with the small funds available. One of these deals with the oil fields of coastal Arkansas, another with the lead and zinc region of north Arkansas, a third with the black marble deposits of north Arkansas, a fourth with the north Arkansas oil shales and the fifth is a "dictionary of elevations in Arkansas." Here is a tremendous total of information on resources of the state which are of interest to a far range of investors— which might well be the means of bringing in new industries, or expanding existing ones, exactly as the same sort of information has done heretofore. Holding up such vital work by financially starving the Geological Survey seems to be a wrong kind of economy.

It is true the state must now watch the expenditure of its funds with a thrifty eye. But there would seem to be an opportunity to care for so careful a thing as the work of the Survey by a better distribution of the state's money. The Democrat recently pointed out that three public activities, roads, education and pensions, are absorbing 94 per cent of the state's income, leaving only six per cent for all other affairs. Vital as these three services are, this sizes up as a lop-sided situation. We see the result of it in the financial pinching of the Geological Survey—an activity which richly merits support for the reason that its work translates into the larger payrolls which Arkansas needs so keenly, payrolls that would make us better able to build roads, maintain schools and pay pensions.

Arkansas is heavily over-agriculturalized. We are economically all out of balance. More than 70 per cent of our people live by farming—and an archaic type of farming at that, in its being centered too heavily around one production, cotton. Farming is depended on for better than half of the state's entire income. An industrial development such as our mineral wealth makes feasible would provide larger towns and cities for a diversified farm program. It would also create jobs for the excess of population which every farming region produces. Now that excess must either leave the state—a direct human loss—or by turning to farming it must carry still further the unbalanced condition of our economic structure.

No state, or nation, has ever achieved wealth and financial security by agricultural production alone. Denmark may be pointed to as an exception, but the agriculture of Denmark is essentially a manufacturing enterprise in its concentration on such finished foods as butter, bacon and eggs. Denmark sells no strictly raw farm production. And the nations that do, those that depend chiefly on the income from basic farm-stuffs, such as wheat and cotton, are all poor. India, China, Argentina and others instance this truth. And even in the United States, the states that live chiefly by growing farm staples, as the Dakotas with wheat and flax, and Arkansas and Oklahoma with cotton and wheat, are periodically in financial trouble.

Mr. Hand's Opinion.

The remedy is in large part bigger and better payrolls, and the State Geological Survey has its undivided attention on that goal. Let's have a few words from J. H. Hand, of Yellville, member of the board of governors for Arkansas in the southern division of the American Mining Congress, in regard to the wisdom of giving the state survey more funds:

"Every mining state in the union except Arkansas has made liberal provision for funds to enable their geological surveys to dig out the facts of their mineral resources, and they have also made it the duty of these officials and have given them the financial means to publish the facts to the world.

"The state geologist of Alabama was a material factor in the upbuilding of the Birmingham district as one among the most prosperous mining and manufacturing centers in the United States. He promulgated the policy that the function of a state geologist is not only to perform work of a scientific character in determining facts of mineral deposits, but also to act as an industrial agent of his state in broadcasting such information and encouraging enterprises to develop the resources. Alabama has backed up that policy with liberal support of its geological survey, and has realized millions in new wealth and labor payrolls by doing so.

"Practically every mining state except Arkansas has a school of mines for the training of its young men in mining work, so they may be able to safely guide local enterprises in this field.

"While Arkansas industry is now chiefly agricultural and stands in favorable comparison with other great farming states, her potential mining industry ranks with the greatest mineral states. Some 50 counties in Arkansas have deposits of staple minerals that are essential raw materials in the manufacture of products of daily necessity. Clays, gravel, cement, lime, glass sand, coal, gas, oil, asphalt, phosphate, marble, manganese, zinc, lead, copper, iron, pyrites, byrite, rare crystals and even diamonds are among the minerals that exist in this state. In manganese deposits Arkansas ranks second among the states of the union. In zinc and lead we have the greatest undeveloped field known in the United States.

"The potential and actual hydro-electric power resources of Arkansas stand unexcelled in the Southwest, and offer to mining and manufacturing the facilities of economic power which is primarily essential to the prosperity of these industries.

"When mining becomes established in a district it lasts for many years. Large payrolls are maintained and benefits are shared by everyone.

Inexhaustible Deposits.
"As a rule the minerals in Arkansas are so deposited as to be susceptible of cheaper extraction than is the case with the same minerals in other fields. With inexhaustible deposits of staple minerals to support a mining industry and payrolls into the hundreds of millions annually, and with cheap current available for electrolytic smelting and manufacturing mineral products, Arkansas holds the key to future prosperity. By supporting measures for making these resources more widely and correctly known to the world, I believe Arkansas would reap a rich harvest of industrial prosperity in the next few years."

Men who are competent to pass an opinion on the subject say that the State Geological Survey could use profitably to the state an annual fund of \$100,000. It is asking for an appropriation of \$87,930 for each of the next two years. If granted, the question will be whether the money is actually received. The severance tax from which its funds are derived, its allowance being one-tenth of one per cent on all minerals except coal and manganese and one-tenth of one cent per ton on manganese, must be stretched over much need. As before stated the survey has heretofore received only part of the sums appropriated. It receives nothing from coal, though that mineral pays a severance tax of one cent per short ton. Nor does it get anything from timber which is taxed seven cents per thousand feet.

Then there is the sand and gravel tax of two and one-half cents a cubic yard on sand and five cents on gravel, which now goes into the general fund. This has been totaling \$12,000 to \$15,000 a year, but ran up to about \$25,000 last year with the increase of road building. A bill will be introduced in the legislature, if it has not been introduced, to transfer the sand and gravel tax to the geological survey. Even if this were done the survey would have in sight a total of only about \$40,000 a year at the outside—a modest sum in comparison with what other mineral-rich states are spending in the same way.

Movement of Industry.

Now would seem to be a propitious time to expend the state survey's work. Industry in decentralizing, experts tell us, and moving out over the country in smaller units to raw material, power and markets. The this shift, and if Arkansas intends south has been gaining heavily by to share in that gain it appears vitally necessary that the state put its mineral resources in the national show window, so to speak, by exploring the deposits and taking an accurate inventory of them for the investor's eye.

Pure "booster stuff" has little effect on the engineers and manu-

facturers who create industries. They want to know exactly what a region possesses—in the case of a mineral, where it is, how much of it there is, the depth at which it lies and its composition and character. In other words these men demand exactly the kind of information that the biological survey alone can supply—and that only if it is properly financed.

An especially useful line of survey work is the exploration of the state's fuel deposits, its oil, gas and coal. Fuel breathes the breath of life into modern industry. And Arkansas, with its large reserves of this necessity and in addition its enormous hydro-electric power, is happily situated to bid for a great range of factories, mills and plants. The state survey has gone far in presenting this advantage to the nation. Its recent study of the Arkansas valley resulted in evidence of huge quantities of gas yet untapped, perhaps enough to supply the growing needs of the state for 50 to 100 years to come. In the opinion of State Geologist George C. Branner, the gas thus far used amounts to little more than a good healthy sampling of the whole amount with which nature dowered the state.

Arkansas is fortunate in having as state geologist a man with Dr. Branner's practical economic mind. His rock-searching department operates entirely from the viewpoint of dollar-and-cent utility to the state. He thinks of its researches in terms of industries and payrolls, a fact which is evident from the publications his office puts out. They have an economic slant. They are addressed in a definite way to men who are searching scientifically for industrial opportunities in the mineral field. Arkansas has the assurance that any funds given its geological survey will be used to the fullest to present to the nation a picture of the state as it is—a vast mineral treasure chest waiting to be opened.

George C. Branner Reappointed State Geologist.

Governor Parnell yesterday reappointed George C. Branner as state geologist for a term of two years, his term having expired. The appointment will be sent to the Senate within a few days. Other appointments announced yesterday by Governor Parnell were: Gen. M. D. Vance, member of the War Memorial Commission, for six years; Mrs. Lula Gillum, treasurer of Columbia county, appointed because she had failed to qualify within the time prescribed by law, following her election to the office last November; Mrs. C. J. Braim of Stuttgart and Mrs. J. L. Rosencrantz of Goldman were reappointed as members of the Arkansas Post State Park Commission for four year terms.

Dr. Branner Is Reappointed As Geologist

Parnell Sends Several Other Appointments to Senate. 1-27-31

George C. Branner was reappointed Tuesday by Governor Parnell as state geologist for another two-year term, following the expiration of his term this week.

The appointment will be certified by the governor to the senate for confirmation along with several other department and commission appointments recently made, including several board members which have not been passed upon by the senate, but which were certified last week.

Mrs. C. J. Braim of Stuttgart and Mrs. J. L. Rosencrantz of Goldman, were re-appointed by the governor Tuesday to four-year terms as members of the Arkansas Post State Park Commission.

Mrs. Lula Gillum of Magnolia, regular nominee for Columbia county treasurer, was appointed Tuesday by the governor to that office, effective immediately. The appointment became necessary when the nominee failed to qualify and file official bond by January 20. A certificate filed with the governor Tuesday by the Columbia county clerk stated that the required bond had been filed and approved by the county judge.