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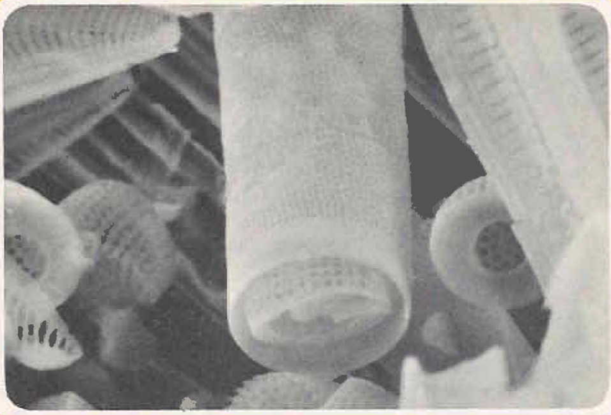

OKLAHOMA GEOLOGY NOTES

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Cover Picture

The Scanning Electron Microscope

The cover photograph of Pliocene diatoms from Beaver County was taken with a scanning electron microscope at an original magnification of x3,000; the printing-scale magnification is approximately x2,500. With a higher resolving power (less than 250 angstroms) and a greater depth of focus than the optical microscope, the scanning electron microscope is able to provide a much sharper picture than has previously been possible. Most scanning electron microscopes have a magnification range from x20 to x140,000, and, unlike the preparation needed with the conventional transmission electron microscope, specimens for the new microscope require only a metallic coating. Thin films of specimens are unnecessary, and a bulky specimen can be observed directly.

By July 1969 The University of Oklahoma School of Geology and Geophysics is scheduled to receive the first operational scanning electron in an institution of higher learning in the State.

—*William H. Bellis*

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Prepared by Alex. Nicholson and Patricia W. Wood

Bibliography—pages 27-41

Index—pages 41-54

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Nur, Amos, *see* Simmons, Gene, and Nur, Amos (137).
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176. Zietz, Isidore, and Kirby, John R., 1968, Transcontinental geophysical survey (35°-39° N)—Magnetic map from 87° to 100° W longitude: U. S. Geol. Survey, Misc. Geol. Inv. Map I-534-A, scale 1:1,000,000.

177. Zietz, Isidore, and Kirby, John R., 1968, Transcontinental geophysical survey (35°-39° N)—Magnetic map from 100° to 112° W longitude: U. S. Geol. Survey, Misc. Geol. Inv. Map I-533-A, scale 1:1,000,000.

INDEX

New Theses Added to O. U. Geology Library

The following Master of Science theses were recently added to the Geology and Geophysics Library at The University of Oklahoma:

Upper Arbuckle (Ordovician) outcrops in the Richards Spur-Kindblade ranch area, northeastern Wichita Mountains, Oklahoma, by Harry E. Brookby.

Experimental determination of partition coefficients for calcium, strontium, and barium in aragonite precipitated from sea water at low temperatures, by Edward Leighman Gafford, Jr.

Calcined Petroleum Coke Produced at Enid

Calcined petroleum coke, a high-purity carbon material used in certain metals and chemical industries, is being produced in Oklahoma at the Enid plant of the Great Lakes Carbon Corporation for a world-wide market. It is made from petroleum coke, a heavy residue from distillation of crude oil, by a controlled heating process that drives off moisture and volatile matter. The plant is 8 miles north of Enid near the small town of Kremlin, Garfield County, on the Chicago Rock Island and Pacific Railroad.

Production started late in 1964; it doubled in 1967 when a second calcining unit was added, and the Enid plant is now one of the largest independent coke-producing facilities in the world. About 50 persons are employed to keep the plant operating 24 hours a day, 7 days a week. This is the first and the only coke-calcining plant in Oklahoma and is one of five such facilities operated in the United States by the Carbon Division of Great Lakes Carbon Corporation.

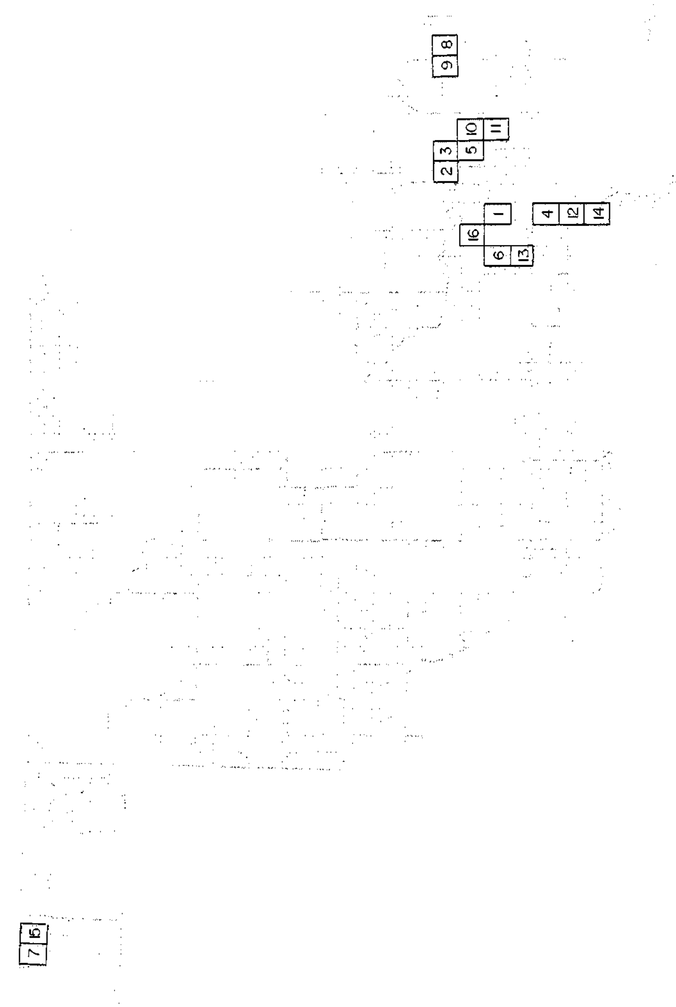
Petroleum coke is a petroleum-refining byproduct and is produced in coking units by thermal cracking of heavy residual oils at about 450° to 500°C. It generally has a fixed-carbon content of 90 to 95 percent, with the remaining constituents being moisture, ash, and volatile hydrocarbons. Cokes used for aluminum smelting and graphite production generally have especially low percentages of sulphur, vanadium, and iron. The Enid plant receives its raw petroleum coke principally from Oklahoma refineries, such as those operated by Champlin Oil and Refining Company and Continental Oil Company, but also imports some from other states.

Calcination takes place in two gas-fired rotary kilns, each about 180 feet long and 10½ feet in diameter. By heating petroleum coke at about 1,250°C in a controlled atmosphere, a nearly pure carbon product is produced. Moisture and volatile hydrocarbons are almost totally removed. Most of the calcined petroleum coke is then sent by rail for use throughout the United States; some is shipped overseas.

Calcined petroleum coke from the Enid plant is used principally to produce aluminum and manufacture graphite, with other uses being for titanium, magnesium, and steel processing and calcium carbide and silicon carbide manufacturing. Its significance in the electrolytic production of aluminum is apparent, as 0.5 pound of coke is consumed to produce 1 pound of aluminum; alumina (Al_2O_3), in a bath of molten cryolite, is reduced to aluminum at the cathode as the carbon anode is oxidized to carbon dioxide. Graphite is manufactured by mixing ground calcined petroleum coke with pitch binder, extruding or molding the mixture into desired forms, and baking the material; by then subjecting the forms to intense electric heat for several weeks, the carbon atomic configuration is changed to that of graphite.

Appreciation is expressed to Mr. Roy O. Young, Enid plant superintendent, and to Mr. Edward J. Forshay, publications manager at the company's New York City offices, for information about company operations.

—*Kenneth S. Johnson*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9
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12
14
16
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13
15
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New Oklahoma Topographic Maps

Forty-seven quadrangles are in advance proof and are expected to be in print by April. Four photorevised sheets (Tulsa, Lake Sahoma, Sand Springs, and Keystone Dam) have been published since December.

Complete coverage of the State would require 1,162 7½-minute quadrangles. Of these, 338 have been published and 193 are in progress. The equivalent area of 300 quadrangles has been issued on 15-minute quadrangles, and 324 quadrangles are neither mapped nor scheduled.

In the December issue of the *Notes*, 10 new topographic quadrangles were noted. Since December the following 7½-minute sheets have been published (numbers refer to map, opposite page; county names are in parentheses):

1. Ahloso (Pontotoc)
2. Allen (Hughes, Pontotoc, Seminole)
3. Calvin W (Hughes)
4. Connerville (Johnston)
5. Gerty (Hughes, Coal)
6. Hart (Garvin, Pontotoc, Murray)
7. Hooker NW (Texas)
8. Krebs (Pittsburg)
9. McAlester (Pittsburg)
10. Non (Hughes, Coal)
11. Parker (Coal)
12. Reagan (Johnston)
13. Sulphur N (Murray, Pontotoc)
14. Tishomingo (Johnston, Marshall)
15. Tyrone (Texas)
16. Vanoss (Pontotoc)

—*Carl C. Branson*

List of Mineral Producers Available

The Oklahoma Geological Survey's 1968 list of mineral producers in Oklahoma has recently been compiled for the Oklahoma Economic Development Foundation, Inc. Assistance on the project was provided by the Foundation and chambers of commerce, county assessors, and producing companies throughout the State.

The list is divided into two parts: producers by mineral products and producers by counties. The first section is broken into 18 categories of mineral products: bentonite, cement, chat, clay, coal, copper, dimension stone, dolomite, glass sand, granite, gypsum, lead and zinc, lime, limestone, salt, sand and gravel, tripoli, and volcanic ash.

Copies, which have been reproduced by multilith, can be obtained from the Survey, The University of Oklahoma, 830 South Oval, Room 163, Norman, Oklahoma 73069.

OKLAHOMA ABSTRACTS

University of Cincinnati

Bifoliate Cryptostomata of the Simpson Group, Arbuckle Mountains, Oklahoma

GEORGE THOMAS FARMER, JR., University of Cincinnati, Ph.D. dissertation, 1968.

The Simpson Group of the Arbuckle Mountains, Oklahoma, includes the following formations (in ascending order, from oldest to youngest): Joins, Oil Creek, McLish, Tulip Creek, and Bromide. The oldest two formations are considered Whiterockian in age. The youngest three formations are considered Chazyan in age. Each of the formations has a basal sandstone, which usually contains Bryozoa, in the area studied. The Simpson Group contains one of the oldest abundant and well-preserved bryozoan faunas in the world.

The oldest bryozoans to make their appearance in rocks of the Simpson Group are the trepostomatous forms, which first appear near the base of the Oil Creek. The first bifoliate cryptostomatous forms appear near the base of the McLish Formation and form a substantial element of the fauna in the McLish, Tulip Creek, and Bromide Formations.

The Simpson Group contains a varied and well-preserved fauna, except for the sandstone units, which have yielded only a few specimens. The brachiopods have been described by Cooper (1956). The ostracodes have been described by Harris (1957). Except for a short paper by Loeblich (1942), the Simpson bryozoan fauna has never been described. This report represents an attempt to describe the majority of the bifoliate cryptostomes. Three new genera, *Amalgamoporus, Cystostictoporus,* and *Cricodictyum,* and fifteen new species are proposed. Two subgeneric categories are proposed (*nomina translata*). The bifoliate cryptostomes similar to *Escharopora* Hall, 1847 (similar to those assigned to the "Escharoporid group" of Phillips, 1960), will be described at a later date.

Simple statistics are employed to substantiate the proposed species. No elaborate statistical analysis of the bifoliate cryptostome fauna was attempted.

Three stratigraphic sections are described from the south flank of the Arbuckle Mountains: West Spring Creek-Spring Creek, Murray County, Oklahoma; U. S. Highway 77, Carter County, Oklahoma; and the west branch of Sycamore Creek, Johnston County, Oklahoma.

OKLAHOMA ABSTRACTS is intended to present abstracts of recent unpublished papers on Oklahoma geology. The editors are therefore interested in obtaining abstracts of formally presented or approved documents, such as dissertations, theses, and papers presented at professional meetings, that have not yet been published.

Each of these sections begins at or near the top of the McLish Sandstone. The Simpson Group is best developed at the West Spring Creek-Spring Creek section, where the bifoliate cryptostome element is best represented in the area studied.

Phylogenetic considerations are discussed where possible for genera, subgenera, and species.

The lack of complete colonies of bifoliate cryptostomes from the Simpson Group and the highly fragmentary nature of the fauna indicates that the majority of the fauna has been subjected to current action that occurred shortly after death or could possibly have caused death. A detailed paleosynecological analyses of the Simpson Group is not possible at the present due to a lack of knowledge of the taxa, especially those of the Bryozoa.

Previously proposed, informal, supergeneric categories (e. g., "Stictoporid group") could not be used in the present study. All forms in the present work are referred to the family Rhinidictyidae Ulrich, 1893, which is badly in need of a detailed revision. This, however, is deemed beyond the scope of the present work.

Three basic types of interspaces are recognized in the present work based on the nature of the partitions found within the interspaces of the Simpson bifoliate cryptostomes. There are: (1) tabulate, (2) distally cystose, and (3) laterally cystose, each of which is defined in the present work.

A new growth habit that involves the trifurcation of the median plane of bifoliation at regular intervals during zoarial growth is described.

(Reprinted from Dissertation Abstracts,
Pt. B, vol. 29, no. 2, p. 1728-B)

The University of Oklahoma

Carbonate Petrography of the Red Eagle Limestone (Lower Permian), Southern Kansas and North-Central Oklahoma

HASHIM AL-KHERSAN, The University of Oklahoma, Ph.D. dissertation, 1969.

The Red Eagle Limestone in southern Kansas and north-central Oklahoma is considered as a single stratigraphic unit that conformably overlies the Johnson Shale and underlies the Roca Shale. It consists of carbonate rocks interbedded with thin laminae of shale.

Four major facies are recognized in the carbonate rocks. These are: biomicrosparite, intrapelsparite-pelsparite, biosparite, and pelmicrosparite. The biomicrosparite facies is the best developed facies, with algae, bryozoans, crinoids, fusulinids, ostracodes, and brachiopods comprising the dominant fossil content. Fossil fragmentation is common and probably was done by burrowing organisms.

The microspar was probably formed by abrasion of skeletal fragments and/or directly precipitated from sea water in a slightly agitated environment. The dolomite in the southern part of the area originates from secondary replacement.

Terrigenous minerals, such as illite, chlorite, and quartz, are the main constituents of the shale and the insoluble residue fraction of the carbonate rocks. These minerals were derived from a sedimentary source area to the south.

Trace-element analysis shows a linear relationship between boron and the insoluble-residue content. A positive relationship between the amount of insoluble residue and zirconium was also determined. The relationship of strontium and the diagenetic fabric in the carbonate rocks is obscure.

The Red Eagle Limestone was probably deposited in a broad, shallow shelf in an environment fluctuating between carbonate and terrigenous sediment deposition and within the zone of abundant marine-animal activity and processes of photosynthesis.

Stratigraphic Study of the Cherokee and Marmaton Sequences, Pennsylvanian (Desmoinesian), East Flank of the Nemaha Ridge, North-Central Oklahoma

JOSEPH GLENN COLE, The University of Oklahoma, Ph.D. dissertation, 1968.

A succession of rocks, bounded at the base by a truncating unconformity and at the top by a persistent carbonate unit (Checkerboard Limestone), was investigated in the subsurface of north-central Oklahoma. An area of approximately 7,000 square miles was investigated utilizing 1,029 electrical well logs augmented by 77 sample well logs. Correlations were established from stratigraphic profiles constructed so as to form a control network throughout the entire area.

As defined, this succession constitutes the Cherokee and Marmaton Groups of Pennsylvanian (Desmoinesian) age. This succession was subdivided, using marker beds, into a lower and an upper sequence, herein called the Cherokee and Marmaton genetic sequences of strata, respectively. The base of the Oswego lime subdivides the succession over the northern portions of the area but disappears into the Calvin Formation in the southern portions; the top of this latter unit (although slightly higher in the section) was utilized for subdivision to the south.

Within the Cherokee sequence, six smaller subdivisions were delineated and herein designated Gilcrease, Booch, Bartlesville, Red Fork, Skinner, and Prue-Calvin genetic increments of strata, being named for the predominant sandstone body within each increment. Isopach maps of each increment indicated east and southeast thickening toward the Cherokee and McAlester (Arkoma) basins, respectively. Isolith maps showed the pattern and distribution of sandstone bodies within each increment. For the most part these exhibited characteristics of alluvial sand bodies, which constituted part of a sediment dispersal system that alluviated the Cherokee and McAlester (Arkoma) basins.

Within the Marmaton sequence, incremental subdivision was not

possible due to change in sedimentation pattern, whereby most of the northern portion of the area became a domain of widespread carbonate accumulation. Carbonate units, Oswego, Oologah, and Lenapah, give way southward to a thick shale section that becomes intercalated with northwestward-projecting sandstone tongues of the Wewoka Formation. Within the shale section is a thick, elongate, westward-trending sand body, the Cleveland, that exhibits characteristics similar to the postulated alluvial sand bodies of the Cherokee. Each carbonate unit grades southward into shale and exhibits a tendency to thicken (bank development) along a belt parallel to the terminus. Each successive pinch out is progressively northward, reflecting terrigenous influx from a southerly direction.

Strata of the Cherokee-Marmaton sequence were deposited upon an eroded, stream-dissected surface formed on southeasterly tilted older rocks, where pre-Desmoinesian faulting and folding along the Seminole-Cushing complex and Nemaha ridge exposed rocks as old as Arbuckle limestone. The Cherokee sequence represents an oscillatory inundating phase; whereas, the Marmaton sequence represents an inundated phase whereby the Central Oklahoma arch became a site of widespread carbonate accumulation, the geographic limits of which fluctuated due to terrigenous influx from southern-bordering source areas.

(Reprinted from Dissertation Abstracts,
Pt. B, vol. 29, no. 2, p. 657-B)

Geometry and Depositional Environments of Pennsylvanian Reservoir Sandstones, Northwestern Oklahoma

MOAYAD HAMID KHAIWKA, The University of Oklahoma, Ph.D. dissertation, 1968.

Four major lenticular sandstone bodies of Pennsylvanian age are delineated in the subsurface of northwestern Oklahoma. They include the multiple members of the Morrow, Tonkawa, Endicott, and "Hoover" (Wabaunsee) sandstones.

The geometry of these sandstone bodies was determined from cross sections and isopachous maps. Their depositional environments were interpreted from stratigraphic relations and petrographic analyses.

The Morrow formation, the basal unit of Pennsylvanian age, is a marine, cyclic-transgressive genetic sequence. The Morrow contains numerous reservoir sandstones, each having been deposited during a stillstand of the shoreline. The sandstone bodies were deposited in marginal marine and nearshore environments; accordingly, they are composed of fluvial, deltaic, swamp, lagoonal, and littoral deposits. Morrowan sandstones are orthoquartzitic in composition and reflect different energy levels. The fluvial and deltaic sandstones are submature, reflecting a low energy level, whereas, the shore and nearshore sandstones reflect both high and low energy levels. Depositional conditions during stillstands of Morrowan shorelines were similar to those along the western part of the present Texas Gulf Coast.

The upper member of the Tonkawa sandstone is a submature orthoquartzite that is porous and micaceous and deltaic in origin. The Endicott sequence consists of interbedded, submature, orthoquartzitic sandstone, siltstone, and shale; it also is deltaic in origin. The distribution patterns of the upper Tonkawa and Endicott sandstones suggest that they were deposited in the Anadarko basin by southward-flowing streams. The two sandstones represent individually restricted, regressive, prograding sequences.

The "Hoover" sandstone of Late Pennsylvanian age is part of a stratigraphic sequence illustrating undaform, clinoform, and fondoform conditions within a starved basin. It illustrates "cyclo-phase" deposition under conditions of cyclic marine transgression. This sandstone is an immature subgraywacke occurring within the rocks of the clino-fondo environment after having been transported across the undaform.

Structure had little or no influence in localizing gas accumulation in Morrow sandstones, whereas, structure and stratigraphy (facies changes) were equally responsible for localizing gas accumulation in the "Hoover" and upper Tonkawa sandstones. The Endicott sandstone is water-bearing in the study area.

The Central Kansas uplift and the Nemaha ridge were the principal source areas for these Pennsylvanian terrigenous sediments.

(Reprinted from Dissertation Abstracts,
Pt. B, vol. 29, no. 2, p. 659-B, 660-B)

The University of Tulsa

Sequential Measurement of Longitudinal and Shear Velocities of Rock Samples Under Triaxial Pressure

KANTILAL PANACHAND DESAI, The University of Tulsa, Ph.D. dissertation, 1968.

To obtain accurate and realistic elastic properties of rocks it is necessary to measure longitudinal and shear velocities under identical conditions of stress distribution and stress history. In this study a laboratory measuring system that can precisely and sequentially measure both the longitudinal and shear velocities of a rock sample under triaxial pressure without disturbing the experimental setup between measurements was designed. The system uses lead titanate zirconate transducers for measuring the longitudinal wave velocity and AC-cut quartz transducers for measuring the shear wave velocity.

This new system was tested using samples of standard material, such as aluminum, steel, brass, and lucite. Measurements obtained were accurate within 1 percent.

A Burbank sand sample was tested to show the hysteresis effect on the velocity-pressure characteristics of rock. Ten samples of Berea sandstone and two samples of Bartlesville sandstone were studied, and it was found that:

1) Both longitudinal and shear velocities increased with an increase in applied external pressure.

2) Longitudinal velocity depends upon both external (P_e) and internal (P_i) pressure, while shear velocity depends upon the differential pressure ($P_{ne} = P_e - P_i$).

3) The nature of the fluid saturant had little effect on longitudinal velocity, while shear velocity decreased with an increase in the density of the saturant.

4) The Berea sandstone indicated very little anisotropy, while the Bartlesville sandstone showed definite anisotropy.

From these measurements of velocities and density data, elastic constants were calculated using theoretical relationships developed for homogeneous, isotropic material.

Finally, longitudinal and shear velocities of a granite sample were measured under laboratory generated in situ conditions. These measured values agreed reasonably well with the values determined from an actual "3-D" field log.

(Reprinted from Dissertation Abstracts, Pt. B, vol. 29, no. 2, p. 2093-B, 2094-B)

GSA Southeastern and Cordilleran Section Meetings

The two abstracts given below were photographically reproduced from the respective programs of the 1968 annual meetings of the Southeastern and Cordilleran Sections of the Geological Society of America. The permissions of the Society and the authors to reproduce the abstracts are gratefully acknowledged.

Oklahoma Geology Notes should not be given as primary source in citations of or quotes from the abstracts. Reference should be to the appropriate program; the program page number is given in brackets at the end of each abstract.

Southeastern Section Meeting, Durham, North Carolina April 4-6, 1968

Biostratigraphy of the "Fernvale" Formation of Oklahoma

LEONARD P. ALBERSTADT, Vanderbilt University, Nashville, Tennessee.

The rock unit in Oklahoma commonly referred to as the "Fernvale" Formation (calcarenite) has been interpreted by many workers to be of Richmondian age and unconformable above the Viola Formation of Trentonian age. The "Fernvale" Formation crops out extensively in the Arbuckle Mountains of south-central Oklahoma and in a few isolated areas in northeastern Oklahoma. At many localities the "Fernvale" has a large brachiopod fauna consisting of 17 species (7 new). Many of the species are represented by numerous silicified specimens.

Litho- and biostratigraphic evidence indicates that the Viola-"Fernvale" sequence in the Arbuckle Mountains represents one of continuous carbonate deposition. However, in northeastern Oklahoma there is strong evidence that the "Fernvale" is unconformable above the Fite Limestone. Conclusive age determination based only on brachiopods is not completely satisfactory at this time because of the lack of reliable information regarding the distribution of Cincinnatian brachiopods in the type areas of the Ohio Valley. At present, the combined evidence of brachiopods, graptolites, and conodonts indicates that the lower part of the "Fernvale" Formation in the Arbuckle Mountains may be of pre-Richmondian age.

A comparison of the brachiopod faunas of the "Fernvale" of Oklahoma and the Cape Limestone of southeastern Missouri reveals marked over-all differences which may indicate that they are not the same formation. [19]

Cordilleran Section Meeting, Tucson, Arizona April 11-13, 1968

Wrench Faulting in Southern Oklahoma

CHARLES H. THORMAN, Olympic College, Bremerton, Washington.

Left-slip displacement of approximately 40 miles along the Washita Valley Fault in the Arbuckle Mountains was reported by Tanner (1967) on the basis of offset Ordovician Simpson sandstones. Structural evidence is strongly suggestive of left-slip movement along several west-northwest trending faults in the area. The fault system is approximately 16 miles wide at the east end of the mountains (R6E) narrowing to about 6 miles at the west end (RlW). Faulting occurred primarily during the Pennsylvanian.

Three fault blocks comprise the western Arbuckle Mountains: the Arbuckle block (on the south) overrides the Tishomingo block along the Washita Valley Fault and the Tishomingo block overrides the Mill Creek block along the Reagan Fault. The Tishomingo block is cut out to the west where the two faults converge (R1W). Structures within the Tishomingo block increase in number and complexity to the west as the block narrows and are believed due to stresses caused by left-slip and vertical movement. Folds trend northwest-southeast and are at angles of 30° to 40° to the bounding faults, indicating northeast-southwest compression which is expected with left-slip movement. Overturning and reverse faulting is to the northeast, in agreement with the relative vertical and lateral movement of the three blocks involved—the southern block the highest and the northern the lowest. In addition, fold axes are warped parallel to the faults as they approach them, the warping indicating left-slip displacement. Similar deformation of the Caddo anticlinal axis occurs a few miles south of the Arbuckle Mountains. [122]

Amarillo Geological Quadrangle Published

The Texas Bureau of Economic Geology has issued the Amarillo sheet of the 1:250,000-scale Geologic Atlas of Texas, the fourth sheet of the series to abut or include parts of Oklahoma. The eastern border of the sheet adjoins Beckham, Roger Mills, and Ellis Counties. Other sheets of the Texas atlas that adjoin Oklahoma are Texarkana, Sherman, and Plainview. All are available from the Oklahoma Geological Survey at $2.50 per copy.

Crinoid Discovered in Drill Core

The unique discovery of a large, complete crinoid infrabasal circlet (fig. 1), spread out over most of a parting surface in a drill core, was made by P. H. Heckel, geologist for the Kansas State Geological Survey. The core was taken from Kansas Survey hole G in SE¼ SW¼ SW¼ sec. 33, T. 30 S., R. 14 E., Wilson County, Kansas. The specimen was found at a depth of 97.8 feet in the Stoner Limestone Member of the Stanton Formation (Pennsylvanian), in a shale interbedded with limestone.

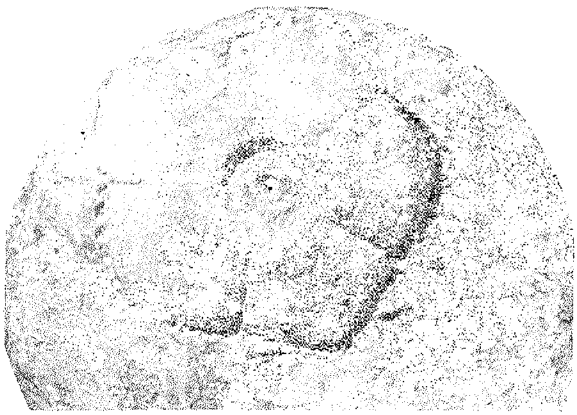

Figure 1. Basal view of infrabasal circlet of Ulocrinus **cf.** U. convexus **from the Stoner Limestone of Kansas. Diameter of specimen, 30 mm.**

Although identification based on infrabasal circlets is often difficult, this specimen can be readily identified as *Ulocrinus* and may be *Ulocrinus convexus* (Strimple). The type locality for *Ulocrinus* is "The Mound," just west of Bartlesville, Oklahoma, in SE¼ sec. 3, T. 26 N., R. 12 E., in what is currently called the Wann Formation and is similar in age to the Stanton Formation.

—*Harrell L. Strimple*

Pipeline Mileage and Fill in Oklahoma

Mileage of pipelines for transporting crude oil and refined petroleum products in Oklahoma totaled 22,250 on January 1, 1968, according to the triennial report released December 23, 1968, by the U. S. Department of Interior, Bureau of Mines. These pipelines, 10.6 percent of the 209,478 miles in the United States, consist of 12,544 miles of gathering lines, 3,208 miles of product lines, and 6,498 miles of trunk lines.

Total mileage is down 6.5 percent from January 1, 1965, but total pipeline fill of 6,606,000 barrels is down only 5.4 percent, reflecting replacement of older pipelines with larger pipe.

The American Gas Association, Inc., reports 25,910 miles of natural-gas utility gas mains in Oklahoma on January 1, 1969. These mains, 3 percent of the 828,270 miles in the United States, consist of 6,590 miles of field and gathering mains, 8,270 miles of transmission mains, and 11,050 miles of distribution mains. Service pipe is not included.

The total mileage of pipe transporting hydrocarbons in Oklahoma is 48,160.

New Core Catalog Issued

The University of Oklahoma Core and Sample Library has issued its new *Core Catalog 3,* March 1969, which supersedes all earlier lists.

Since the issue of *Core Catalog 2* in February, 1968, cores from 64 wells have been added to the library. These cores are from recently drilled wells in all sectors of the State and consist of rocks that range in age from Permian to Ordovician.

The Core and Sample Library is in building 139, Jenkins Avenue south of Constitution Street, South Campus, The University of Oklahoma, Norman. It now has on file more than 78,600 feet of core from 984 wells. Well-cutting samples from approximately 28,000 wells are also on file, but only those not obtainable through commercial libraries are available for examination.

Mr. Wilbur E. Dragoo is manager of the library, which is open 8:00 A.M. to 12:00 noon and 1:00 P.M. to 5:00 P.M., Monday through Friday. His phone is area code 405, 325-4386. Additional information is available from John F. Roberts, Oklahoma Geological Survey, 830 South Oval, Room 163, Gould Hall, phone area code 405, 325-3031.

Cores may be examined at the library for a service charge of $1.00 per box or can be shipped to the borrower, who pays all shipping charges, for a service charge of $1.50 per box for 21 days.

Cores are added to the library through automatic contribution by numerous operators as the cores become available. Other operators, particularly those with storage problems, are urged to avail themselves of the storage facilities at the library (where the cores will be readily accessible) through donation of their Oklahoma cores. As the library is a nonprofit organization, assumption of the delivery costs by the donor would benefit both the donor and the library.

—*John F. Roberts*

Beyond the State Line*

State boundaries are unnatural barriers that rarely correspond to realistic delineations of earth science problems. Consequently, in order to accomplish its mission, a state geological survey must devote part of its effort to investigations in concert with other state surveys and geological organizations. The Oklahoma Geological Survey is currently engaged in three such programs.

The first activity involves the Southern Interstate Nuclear Board (SINB), a compact agency that includes 17 southern and Midcontinent states, which is sponsoring a systematic assessment of uranium occurrences within the SINB area, with the cooperation of the geological surveys in member states. The Oklahoma portion of the project was recently completed and the results forwarded to the Board. The conclusions are that, of the 124 occurrences of uraniferous or radioactive rock, water, oil, or asphalt in the State, only one area suggests potential, although marginal, economic possibilities.

Next, the American Association of Petroleum Geologists is sponsoring a Geothermal Survey of North America (GSNA) with the major goal of publishing a contour map showing the variation of the geothermal gradient throughout the continent and the continental shelves. As the principal source of the basic data is the temperatures measured in boreholes drilled for oil and gas, the task of assembling the raw data requires the cooperation of numerous oil companies, as well as state geological surveys and educational institutions. Oklahoma, exclusive of the Panhandle, has been designated GSNA District 15, with John F. Roberts of the Survey staff, as district chairman. Mr. Roberts has secured the cooperation of numerous oil companies in gathering data for Oklahoma and expects to have the task completed by July 1970. The map will be published in July 1972.

The third program is the applications study of the GIPSY (Generalized Information Processing System) computer program in cooperation with the University of Oklahoma Computer Center and the U. S. Geological Survey. Considerable progress has already been made by Dr. L. R. Wilson in establishing a palynological data base; another pending project is the addition of a bibliography of Oklahoma geology to the system. As GIPSY is ideally suited for a central geological-information center, the feasibility of establishing an International Earth Science Data Depository is under study. The American Geological Institute has been invited to participate in the effort and is currently considering the proposal.

* Reprinted from **The Sooner Geologist**, vol. 2, no. 2, p. 12-13.

Palynological Translations

Four papers on microplanktons have recently been translated from the foreign literature as a project of the Dinoflagellate/Acritarch Section of the Mesozoic Palynology Committee. The translations, by

William A. S. Sarjeant and David M. Patrick, have been reproduced by xerography and made available through the cooperation of the School of Geology and Geophysics of The University of Oklahoma. The format of the series is double-spaced typescript on legal-size (8½ x 14 inches) paper. Copies may be purchased from:

Oklahoma Geological Survey
The University of Oklahoma
830 South Oval, Room 163
Norman, Oklahoma 73069

The translated titles and prices are:

1. Alberti, Gerhard, 1961, Towards the knowledge of Mesozoic and Early Tertiary dinoflagellates and hystrichospheres from north and central Germany, as well as some other European localities. Translation from German by William A. S. Sarjeant; preamble and systematic section only; 64 pages. $2.50.
2. Brito, Ignacio Machado, 1967, A new subgroup of Acritarcha from the Devonian of Maranhão. Translation from Portuguese by D. M. Patrick; 6 pages. $0.50.
3. Menéndez, Carlos Alberto, 1965, Fossil microplankton of Tertiary and Cretaceous sediments from northern Tierra del Fuego (Argentina). Translation from Spanish by D. M. Patrick; 14 pages. $0.75.
4. Pothé de Baldis, Elba Diana, 1966, Microplankton from the Tertiary of Tierra del Fuego. Translation from Spanish by D. M. Patrick; 15 pages. $0.75.

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In This Issue