OKLAHOMA GEOLOGY



Cover Picture

CONVOLUTE BEDDING IN THE THURMAN SANDSTONE COAL COUNTY, OKLAHOMA

The Thurman Sandstone (Desmoinesian) crops out over parts of Pittsburg, Hughes, Coal, and Pontotoc Counties. In Coal County a fluviatile depositional environment has been interpreted for parts of the Thurman. The cover photograph was taken along U. S. Highway 75 in sec. 8, T. 3 N., R. 10 E., and shows prominent convolute bedding in the upper part of the formation. This type of bedding has a controversial history, having been ascribed at various times to point-bar deposition, levee deposition, and turbidity currents.

At the photograph locality, sub-environments of a fluviatile complex can be recognized. These are represented by main channel deposits and floodplain deposits. The convolute-bedded member shown on the cover rests on floodplain siltstones and shales and grades laterally into a main channel facies. Because of these spatial relationships, this member has been interpreted as a levee deposit. Deformation of the bedding probably occurred before lithification and while the sediment had a high fluid content.

-В. D. Hare

BIBLIOGRAPHY AND INDEX OF OKLAHOMA GEOLOGY 1969

Prepared by Kenneth S. Johnson and Alex. Nicholson

Bibliography—pages 19-32 Index—pages 32-39

BIBLIOGRAPHY

 Alberstadt, Leonard P., 1969, Biostratigraphy of the Viola and "Fernvale" Formations, in Arbuckle Mountains field trip: Ft. Worth Geol. Soc., Field Trip Guidebook (April 26-27, 1969), p. 20-23.

2. Allgood, Ferris P., Conradi, Arlin J., Rhoads, Clifford E., and Brinlee, R. C., 1968, Soil survey of Major County, Oklahoma: U S. Dept. Agriculture, Soil Conserv. Service and Okla. Agr. Expt. Sta., 84 p., 30 figs., 8 tables, 84 maps.

 American Gas Association, Inc., 1969, Gas facts, a statistical record of the gas utility industry in 1968: Amer. Gas Assoc.,

218 p., 179 tables, 19 charts.

 American Gas Association, Inc., American Petroleum Institute, and Canadian Petroleum Association, 1969, Reserves of crude oil, natural gas liquids, and natural gas in the United States and Canada as of December 31, 1968: Amer. Gas Assoc., Amer. Petroleum Inst., Canadian Petroleum Assoc., vol. 23, 306 p., 62 tables, 5 charts, 5 maps.

 Amsden, Thomas W., 1969, A widespread zone of pentamerid brachiopods in subsurface Silurian strata of Oklahoma and Texas Panhandle: Jour. Paleontology, vol. 43, p. 961-975,

11 figs., 3 pls.

Andress, B. O., see Disney, R. W., Andress, B. O., Chenoweth,

P. A., and Schramm, M. W., Jr.

 Atkins, Robert L., 1969, Oklahoma oil and gas development 1968, part I of Exploration, in International oil and gas development: Internat. Oil Scouts Assoc., vol. 39, p. 244-254.

 Austin, C. T., 1969, Aeromagnetics in the Anadarko basin: Oil and Gas Jour., vol. 67, no. 33 (Aug. 18), p. 106-108, 4 figs.

(Study of Custer City N field, Custer County.)

8. Averitt, Paul, 1969, Coal resources of the United States, January 1, 1967: U. S. Geol. Survey, Bull. 1275, 116 p., 11 figs., 10 tables. (Includes data on Oklahoma.)

Baker, N. M., see Randolph, J. R., Baker, N. M., and Deike, R. G.

Bartolina, Donald G., see Fisher, C. F., Bartolina, D. G., and Rieke, D. L.

9. Bell, Robert E., 1969, Oklahoma archaeology: an annotated bibliography: Univ Okla. Press, 99 p.

 Berg, Orville Roger, 1969, Cherokee Group, west flank of the Nemaha ridge: Okla. City Geol. Soc., Shale Shaker, vol. 19, p. 94-110, 5 figs., 8 pls. Bernard, Joseph L., see Rittenhouse, Gordon, Fulton, R. B.,

III, Grabowski, R. J., and Bernard, J. L.

Bertoni, Sandro Saitta, 1969, Environment of deposition of an ancient delta: the Bluejacket Formation in northeastern Oklahoma: Asociacion Venezolanan de Geologia, Mineria y Petroleo, Boletin Informativo, vol. 12, 109-150, 19 figs., 1 table.

 Bingham, Roy H., 1969, Springs in the Ozark region, northeastern Oklahoma: Okla. Geol. Survey, Okla. Geology Notes,

vol. 29, p. 135-145, 7 figs., 3 tables.

 Blackwell, Phillip W., Morrison, Jack L., and Smith, Wayne E., Jr., 1969, GIPSY computer retrieval of geologic literature: Okla. Geol. Survey, Okla. Geology Notes, vol. 29, p. 6-14, 1 fig.

 Bolt, John R., 1969, Lissamphibian origins: possible Protolissamphibian from the Lower Permian of Oklahoma: Science,

vol. 166, p. 888-891, 4 figs.

 Bond, T. A., 1969, Corrections of diatom misidentifications: Micropaleontology, vol. 15, p. 504. (Holocene flora from Caddo County.)

 Branson, Carl C., 1969, Historic Wilson Rock—a Keota Sandstone outcrop: Okla. Geol. Survey, Okla. Geology Notes,

vol. 29, p. 14-17, 3 figs.

 Branson, Carl C., 1969, New Oklahoma topographic maps: Okla. Geol. Survey, Okla. Geology Notes, vol. 29, p. 56-57, 1 fig.

 Branson, Carl C., 1969, Recently issued topographic maps: Okla. Geol. Survey, Okla. Geology Notes, vol. 29, p. 146-147, 1 fig. Brinlee, R. C., see Allgood, F P., Conradi, A. J., Rhoads, C. E., and Brinlee, R. C.

19. Brobst, Donald A., and Ward, Frederick N., 1965, A turbidimetric test for barium and its geologic application in Arkansas: Econ. Geology, vol. 60, p. 1020-1040, 6 figs., 7 tables. (Analysed samples of Mississippian Stanley Shale and Cretaceous Trinity Group taken just outside southeastern Oklahoma.)

 Brown, Harold A., 1969, Hunton stratigraphy in eastern Oklahoma and western Arkansas, in Arbuckle Mountains field trip: Ft. Worth Geol. Soc., Field Trip Guidebook (April 26-27,

1969), p. 29-32, 1 fig., 1 map.

21. Burdick, D. W., and Strimple, H. L., 1969, Revision of some Chesterian inadunate crinoids: Kans., Univ., Paleont. Contr., Paper 40, 14 p., 2 figs., 1 pl., 2 tables. (Includes

some specimens from Oklahoma.)

22. Burke, W. H., Otto, J. B., and Denison, R. E., 1969, Potassium-argon dating of basaltic rocks: Jour. Geophys. Research, vol. 74, p. 1082-1086, 1 fig., 1 table. (Includes 6 samples from Comanche and Kiowa Counties, Wichita Mountains.)

23. Byars, Carlos, 1969, Technology, steel stretched to limit in drilling world's second deepest hole: Oil and Gas Jour., vol. 67, no. 18 (May 5), p. 109-114, 5 figs., 1 table. (Drilling of Glover-Hefner-Kennedy 1-1 Green, Beckham County.)

- Cambridge, Thomas R., 1969, Marmaton oil production: future potential, western Anadarko basin: Okla. City Geol. Soc., Shale Shaker, vol. 20, p. 64-71, 6 figs.
- 25. Cannon, Philip Jan, 1969, The physiography of southwestern Oklahoma: Compass, vol. 47, p. 23-26.
- Cannon, Ralph S., Jr., and Pierce, Arthur P., 1969, Lead isotope guides for Mississippi Valley lead-zinc exploration: U. S. Geol. Survey, Bull. 1312-G, p. G1-G20, 13 figs. (Includes data on Tri-State district, Ottawa County.)

Chelf, John V., see Fisher, C. F., and Chelf, J. V.

27. Chenoweth, Phillip A., 1969, Reply, to Meyerhoff, H. A., Early Paleozic (Arbuckle) overlap, southern Mid-continent, United States: discussion: Amer. Assoc. Petroleum Geologists, Bull., vol. 53, p. 1520-1521.

Chenoweth, P. A., see Disney, R. W., Andress, B. O., Cheno-

weth, P. A., and Schramm, M. W., Jr.

Clabaugh, Patricia S., see Muehlberger, W. R., and Clabaugh, P. S.

Clark, Tim W., 1969, Some petroglyphs from the Black Mesa area of Cimarron County, Oklahoma: Okla. Acad. Science,

Proc. 1967, vol. 48, p. 138-141, 16 figs.

Cocke, J. M., 1965, Occurrence of a Carboniferous coral not previously reported from North American rocks: Compass, vol. 42, p. 180-187, 4 figs. (Specimens of Koninickocarina collected from Dewey Formation in Washington County.)
 Cocke, J. M., see Heckel, P. H., and Cocke, J. M.

Cole, J. Glenn, 1969, Cherokee Group, east flank of the Nemaha ridge, north-central Oklahoma, Part I: Okla. City Geol. Soc., Shale Shaker, vol. 19, p. 134-146, 4 figs., 6 pls.

31. Cole, J. Glenn, 1969, Cherokee Group, east flank of the Nemaha ridge, north-central Oklahoma, Part 2: Okla. City. Geol. Soc., Shale Shaker, vol. 19, p. 150-161, 2 figs., 6 pls.

32. Collins, A. Gene, 1969, Chemistry of some Anadarko basin brines containing high concentrations of iodide: Chemical Geology, vol. 4, p. 169-187, 10 figs., 5 tables.

Conradi, Arlin J., see Allgood, F. P., Conradi, A. J., Rhoads, C. E., and Brinlee, R. C.

E., and Diffiee, It. C.

28.

Croneis, Carey, see Park, D. E., Jr., and Croneis, Carey.

 Cutolo-Lozano, Francisco, 1969, Subsurface geology of the Seminole area: Oklahoma City Geol. Soc., Shale Shaker, vol. 19, p. 118-130, 4 figs., 6 pls.

34. Daly, Eleanor, 1969, A new procolophonoid reptile from the Lower Permian of Oklahoma: Jour. Paleontology, vol. 43, p. 676-687, 7 figs.

Deike, R. G., see Randolph, J. R., Baker, N. M., and Deike, R. G.

35. Dellwig, Louis F., MacDonald, Harold C., and Kirk, J. Norman, 1968, The potential of radar in geological exploration: Tulsa Geol Soc., Digest, vol. 36, p. 26-42, 12 figs. (Includes radar imagery of Potato Hills in Ouachita Mountains.)

- 36. Denison, R. E., Hetherington, E. A., Jr., and Otto, J. B., 1969, Age of basement rocks in northeastern Oklahoma: Okla. Geol. Survey, Okla. Geology Notes, vol. 29, p. 120-128, 3 figs., 2 tables.
- Denison, R. E., see Burke, W. H., Otto, J. B., and Denison, R. E. 37. Derby, James R., 1969, Revision of Lower Ordovician-Middle
- Ordovician boundary in western Arbuckle Mountains, Oklahoma, in Ham, W. E., Regional geology of the Arbuckle Mountains, Oklahoma: Okla. Geol. Survey, Guide Book 17, p. 35-37, 1 table.
- 38. Dickey, Parke A., 1969, Increasing concentration of subsurface brines with depth: Chemical Geology, vol. 4, p. 361-370, 7 figs. (Includes data on Oklahoma brines in Pennsylvanian and Ordovician strata.)
- 39. Disney, R. W., Andress, B. O., Chenoweth, P. A., and Schramm, M. W., Jr., 1968, The mineral industry in Oklahoma: Tulsa Geol. Soc., Digest, vol. 36, p. 89-90.
 - England, C. B., see Holtan, H. N., England, C. B., Lawless, G. P., and Schumaker, G. A.
 - Faul, H., see Naeser, C. W., and Faul, H.
- 40. Fay, R. O., 1969, Geology of the Arbuckle Mountains along Interstate 35, Carter and Murray Counties, Oklahoma: Ardmore Geol. Soc., Guidebook, 75 p. (incl. ads.), 8 figs., 2 pls.
- Fay, Robert O., and Graffham, A. Allen, 1969, Bromide Formation on Tulip Creek and in the Arbuckle Mountains region, in Ham, W. E., Regional geology of the Arbuckle Mountains, Oklahoma: Okla. Geol. Survey, Guide Book 17, p. 37-39, 1 fig.
- Feder, Allen M., 1964, Let's use more of the electromagnetic spectrum: Gulf Coast Assoc. Geol. Soc., Transactions, vol. 14, p. 35-49, 18 figs. (Includes side-looking radar display mosaics of Arbuckle Mountains.)
 - Feemster, W. E., see Van Hook, W. A., and Feemster, W. E.
- 43. Fischer, Alfred G., and Teichert, Curt, 1969, Cameral deposits in cephalopod shells: Kans., Univ., Paleont. Contr., Paper 37, 30 p., 8 figs., 4 pls. (New observations on Pennsylvanian material from Buckhorn asphalt deposit, Murray County.)
- 44. Fisher, Carl F., Bartolina, Donald G., and Rieke, Duane L., 1968, Soil survey of Blaine County, Oklahoma: U. S. Dept. Agriculture, Soil Conserv. Service and Okla. Agr. Expt. Sta., 84 p., 9 figs., 8 tables, 80 maps.
- 45. Fisher, Carl F., and Chelf, John V., 1969, Soil survey of Oklahoma County, Oklahoma: U. S. Dept. Agriculture, Soil Conserv. Service and Okla. Agr. Expt. Sta., 56 p., 14 figs., 8 tables, 62 maps.
- Forgotson, James M., Jr., 1969, Factors controlling occurrence of Morrow sandstones and their relation to production in the Anadarko basin: Okla. City Geol. Soc., Shale Shaker, vol. 20, p. 24-38, 15 figs.

- 47. Ft. Worth Geological Society, 1969, Arbuckle Mountains field trip: Ft. Worth Geol. Soc., Field Trip Guidebook (April 26-27, 1969), 70 p., illus. (Includes articles listed separately in this bibliography under the following authors: L. P. Alberstadt, H. A. Brown, Ft. Worth Geol. Soc., Lloyd Gatewood, G. C. Glaser, R. L. Harvey, J. L. Walper, and R. A. Worthing.)
- 48. Ft. Worth Geological Society, 1969, Mississippian strata of south central Oklahoma, in Arbuckle Mountains field trip: Ft. Worth Geol. Soc., Field Trip Guidebook (April 26-27, 1969), p. 42-43, 1 fig.
- Ft. Worth Geological Society, 1969, Stratigraphy of the Simpson Group in southern Oklahoma, in Arbuckle Mountains field trip: Ft. Worth Geol. Soc., Field Trip Guidebook (April 26-27, 1969), p. 12-17, 3 figs.

Frey, Robert W., see Hattin, D. E., and Frey, R. W.

Friedman, Irving, see Hall, W E., and Friedman, Irving.

Fulton, Robert B., III, see Rittenhouse, Gordon, Fulton, R. B., III, Grabowski, R. J., and Bernard, J. L.

Gatewood, Lloyd, 1969, The Arbuckle—still Oklahoma's greatest mystery, in Arbuckle Mountains field trip: Ft. Worth Geol. Soc., Field Trip Guidebook (April 26-27, 1969), p. 4-8, 2 figs.

Gibson, A. M., see Meyers, A. J., Gibson, A. M., Glass, B. P., and Patrick, C. R.

Glaser, Gerald C., 1969, Lithostratigraphy and carbonate petrography of the Viola Formation, in Arbuckle Mountains field trip: Ft. Worth Geol. Soc., Field Trip Guidebook (April 26-27, 1969), p. 18-19.

Glass, Bryan P., see Myers, A J., Gibson, A. M., Glass, B. P., and Patrick, C. R.

- Gonzalez-P., Gustavo C., 1969, Reservoir study, Red Fork Sandstone in the Oakdale field, Woods County, Oklahoma: Okla. City Geol. Soc., Shale Shaker, vol. 19, p. 170-179, 4 figs., 5 pls.
- 53. Gordon, Mackenzie, Jr., et al., 1969, Revision of some of Girty's invertebrate fossils from the Fayetteville Shale (Mississippian) of Arkansas and Oklahoma: U. S. Geol. Survey, Prof. Paper 606, 59 p., 2 figs., 9 pls.

Grabowski, Robert J., see Rittenhouse, Gordon, Fulton, R. B.,

III, Grabowski, R. J., and Bernard, J. L.

Graffham, A. Allen, see Fay, R. O., and Graffham, A. A.

Gray, Fenton, see Yeck, R. D., and Gray, Fenton.

54. Hagni, Richard D., and Saadallah, Adnan A., 1965, Alteration of host rock limestone adjacent to zinc-lead ore deposits in the Tri-State district, Missouri, Kansas, Oklahoma: Econ. Geology, vol. 60, p. 1607-1619, 8 figs.

55. Hall, Wayne E., and Friedman, Irving, 1969, Oxygen and carbon isotopic composition of ore and host rock of selected Mississippi Valley deposits, in Geological Survey research 1969: U. S. Geol. Survey, Prof. Paper 650-C, p. C140-C148, 7 figs., 4 tables. (Study includes part of Tri-State district.)

56. Ham, William E., 1969, Regional geology of the Arbuckle Mountains, Oklahoma: Okla. Geol. Survey, Guide Book 17, 52 p., 41 figs., 1 pl., 1 table. (Includes contributions by James H. Stitt, James R. Derby, Robert O. Fay, and A. Allen Graffham, cited elsewhere in this bibliography.)

57. Ham, W. E., and Rowland, T. L., 1969, Burial cementation in the Wapanucka Limestone (Pennsylvanian) of Oklahoma: Bermuda Biol. Sta. for Research, Spec. Publ. 3, p. 152-

157, 1 fig., 2 pls.

Ham, William E., see McDougal, R. B., and Ham W. E.

Ham, William E., see Patrick, D. M., and Ham, W. E.

58. Hamblin, W. Kenneth, 1969, Marine paleocurrent directions in limestones of the Kansas City Group (Upper Pennsylvanian) in eastern Kansas: Kans., State Geol. Survey, Bull. 194, pt. 2, 25 p., 19 figs. (Parts of study continued into Oklahoma.)

Harlton, Bruce H., 1969, Relation of fault systems to oil accumulation on eastern margin of Arbuckle Mountains, southeastern Oklahoma: Amer. Assoc. Petroleum Geologists,

Bull., vol. 53, p. 2290-2298, 5 figs.

60. Harvey, Ralph L., 1969, Hunton mystery solved? in Arbuckle Mountains field trip: Ft. Worth Geol. Soc., Field Trip Guidebook (April 26-27, 1969), p. 33-41, 2 figs., 5 maps. (Study in Anadarko basin, including West Campbell field in Major County.)

 Hattin, Donald E., and Frey, Robert W., 1969, Facies relations of Crossopodia sp., a trace fossil from the Upper Cretaceous of Kansas, Iowa, and Oklahoma: Jour. Paleontology, vol. 43, p. 1435-1440, 2 figs., 1 table. (Includes four specimens

from Cimarron County.)

62. Hayes, C. J., and McCasland, W., 1969, Engineering classification of geological materials and (related soils), Oklahoma Highway Department Maintenance Division Three: Okla. Hwy. Dept., Research and Devel. Div., 398 p., 9 figs., 7 charts. (Parts of central and south-central Oklahoma.)

63. Hayes, C. J., and McCasland, W., 1969, Engineering classification of geological materials and (related soils), Oklahoma Highway Department Maintenance Division Five: Okla. Hwy. Dept., Research and Devel. Div., 343 p., 10 figs., 7 charts. (Includes southwestern and west-central Oklahoma.)

64. Hayes, C. J., and McCasland, W., 1969, Engineering classification of geological materials and (related soils), Oklahoma Highway Department Maintenance Division Six: Okla. Hwy. Dept., Research and Devel. Div., 240 p., 9 figs., 7 charts. (Includes northwestern Oklahoma and the Panhandle.)

65. Hayes, C. J., and McCasland, W., 1969, Engineering classification of geological materials and (related soils), Oklahoma Highway Department Maintenance Division Seven: Okla.

Hmy. Dept., Research and Devel. Div., 302 p., 10 figs., 7 charts. (Includes parts of south-central and southwestern

Oklahoma.)

 Heckel, Philip H., and Cocke, J. M., 1969, Phylloid algal-mound complexes in outcropping Upper Pennsylvanian rocks of Mid-Continent: Amer. Assoc. Petroleum Geologists, Bull., vol. 53, p. 1058-1074, 12 figs.

Hetherington, E. A., Jr., see Denison, R. E., Hetherington, E. A., Jr., and Otto, J. B.

- 67. Heyl, Allen V., 1968, Minor epigenetic, diagenetic, and syngenetic sulfide, fluorite, and barite occurrences in the central United States: Econ. Geology, vol. 63, p. 585-594, 5 figs. (Includes reference to copper and lead-zinc deposits in Oklahoma.)
- Holtan, H. N., England, C. B., Lawless, G. P., and Schumaker, G. A., 1968, Moisture-tension data for selected soils on experimental watersheds: U. S. Dept. Agriculture, ARS 41-144, 609 p., 1 fig., 2 tables. (Includes soil data in Muskogee and Noble Counties.)

69. Irwin, James H., and Morton, Robert B., 1969, Hydrogeologic information on the Glorieta Sandstone and the Ogallala Formation in the Oklahoma Panhandle and adjoining areas as related to underground waste disposal: U. S. Geol, Sur-

vey, Circ. 630, 26 p., 4 figs., 4 pls., 2 tables.

Johnson, J. Harlan, 1969, Algal stromatolites from the Wellington Formation of Kansas and Oklahoma, part 2 of Tasch, Paul, et al., Lower Permian algal stromatolites from Kansas and Oklahoma: Kans., Univ., Paleont. Contr., Paper 43, p. 9-19, 5 figs., 2 tables.

 Johnson, Kenneth S., 1969, Calcined petroleum coke produced at Enid: Okla. Geol. Survey, Okla. Geology Notes, vol. 29,

p. 55.

72. Johnson, Kenneth S., 1969, Oklahoma mineral raw materials for chemical industry (exclusive of petroleum and coal): Okla. Geol. Survey, Okla. Geology Notes, vol. 29, p. 100-106, 6 figs.

Keith, John R., see Vine, J. D., Tourtelot, E. B., and Keith,

J. R.

Kidson, Evan, see Tasch, Paul, and Kidson, Evan.

73. King, Philip B., 1969, Tectonic map of North America: U. S. Geol. Survey, scale 1:5,000,000 (1 inch equals 80 miles).

74. King, Philip B., 1969, The tectonics of North America—a discussion to accompany the tectonic map of North America, scale 1:5,000,000: U. S. Geol. Survey, Prof. Paper 628, 95 p., 14 figs., 3 tables.

Kirk, J. Norman, see Dellwig, L. F., MacDonald, H. C., and Kirk, J. N.

75. Kjellesvig-Waering, Erik N., 1969, A new phalangiotarbid (Arachnida from the Pennsylvanian of Oklahoma: Jour. Paleontology, vol. 43, p. 1280-1282, 2 figs.

76. Kornfeld, Joseph A., 1969, Oklahoma's Green 1-1 discovery

sparks Anadarko basin activity: World Oil, vol. 168, no. 7 (June), p. 107-110, 1 fig.

Lawless, G. P., see Holtan, H. N., England, C. B., Lawless, G. P., and Schumaker, G. A.

Long, Roscoe M., 1968, Soil survey of Hughes County, Oklahoma: U. S. Dept. Agriculture and Okla. Agr. Expt. Sta., 48 p., 19 figs., 8 tables, 74 maps.

78. MacDonald, Harold C., 1969, Remote sensing will refine exploration science: World Oil, vol. 169, no. 2 (August 1), p. 48-52, 7 figs. (Includes radar imagery of Tuskahoma syncline, Pushmataha County, Ouachita Mountains.)

MacDonald, Harold C., see Dellwig, L. F., MacDonald, H.

C., and Kirk, J. N.

79. Mamay, Sergius H., 1969, Cycads: fossil evidence of late Paleozoic origin: Science, vol. 164, p. 295-296, 1 fig. (Some specimens from Permian of Oklahoma.)

80. Mankin, Charles, J., 1969, Oklahoma Geological Survey, annual report, July 1, 1968-June 30, 1969: Okla. Geol. Survey,

Okla. Geology Notes, vol. 29, p. 111-116.

81. Marcher, Melvin V., 1969, Reconnaissance of the water resources of the Fort Smith quadrangle, east-central Oklahoma: Okla. Geol. Survey, Hydrologic Atlas Map HA-1, scale 1:250,000, with text. (Set of four maps.)

32. Matuszak, David R., 1965, Adjustment of electric log values for preparation of subsurface facies maps: Amer. Assoc. Petroleum Geologists, Bull., vol. 49, p. 126-138, 11 figs., 1 table. (Examples show Pennsylvanian units in Carter County.)

83. McCasland, Willard (princ. invest.), 1968, Potential material sites, 1968 edition: Okla. Hwy. Dept., Research and Devel. Div., 180 p. (Inventory of fine and coarse aggregates in Oklahoma for highway construction.)

McCasland, W., see Hayes, C. J., and McCasland, W.

84. McDougal, Robert B., and Ham, William E., 1968, The mineral industry of Oklahoma, vol. 3 of Area Reports: domestic, in Minerals yearbook 1967: U. S. Bur. Mines, p. 645-661, 1 fig., 22 tables.

85. McMahan, Arel B., 1969, The mineral industry of Oklahoma in 1968 (preliminary): Okla Geol. Survey, Okla. Geology

Notes, vol. 29, p. 3-5, 1 table. (Statistics.)

Merriam, D. F., see Sackin, M. J., Sneath, P. H. A., and Mer-

riam, D. F.

86. Meyerhoff, Howard A., 1969, Early Paleozoic (Arbuckle) overlap, southern Mid-continent, United States: discussion:
Amer. Assoc. Petroleum Geologists, Bull., vol. 53, p. 15191520.

87. Moore, Carl A., 1969, Geologic factors which may affect the occurrence of natural gas in the Oklahoma Panhandle:
Okla. City Geol. Soc., Shale Shaker, vol. 20, p. 49-55, 7 figs.

88. Mocre, Raymond C., and Strimple, Harrell L., 1969, Explosive evolutionary differentiation of unique group of Mississippian-Pennsylvanian camerate crinoids (Acrocrinidae):

Kans., Univ., Paleont. Contr., Paper 39, 44 p., 24 figs. (Includes Pennsylvanian specimens from Oklahoma.)

Morrison, Jack L., see Blackwell, P. W., Morrison, J. L., and Smith, W. E., Jr.

Morrison, Jack L., see Wilson, L. R., Morrison, J. L., and Reid, W. E.

Morton, Robert B., see Irwin, J. H., and Morton, R. B.

89. Mose, Douglas, 1969, The age of the Hatton Tuff of the Ouachita Mountains, southeastern Oklahoma: Geol. Soc. America, Bull., vol. 80, p. 2373-2378, 5 figs.

90. Muehlberger, William R., and Clabaugh, Patricia S., 1968, Internal structure and petrofabrics of Gulf Coast salt domes, in Diapirism and diapirs, a symposium: Amer. Assoc. Petroleum Geologists, Mem. 8, p. 90-98. (Includes comparison with Permian salt from Beaver County.)

91. Myers, Arthur J., Gibson, A. M., Glass, Bryan P., and Patrick, Carol R., 1969, Guide to Alabaster Cavern and Woodward County, Oklahoma: Okla. Geol. Survey, Guide Book 15,

38 p., 41 figs.

 Naeser, C. W., and Faul, H., 1969, Fission track annealing in apatite and sphene: Jour. Geophys. Research, vol. 74, p. 705-710, 7 figs. (Includes dating of samples from Tishomingo Granite in Arbuckle Mountains.)

 Nicholson, Alex., and Wood, Patricia W., 1969, Bibliography and index of Oklahoma Geology, 1968: Okla. Geol. Survey, Okla. Geology Notes, vol. 29, p. 27-54.

94. Oakes, Malcolm C., 1969, Hugh Dinsmore Miser, 1884-1969: Okla. Geol. Survey, Okla. Geology Notes, vol. 29, p. 129-130, 1 fig.

 Oklahoma Geological Survey, 1969, Flood-prone areas in urban Oklahoma: Okla. Geol. Survey, Okla. Geology Notes, vol. 29, p. 98-99. (List of quadrangle maps prepared for Oklahoma City and Tulsa areas.)

 Oklahoma Geological Survey, 1969, Kerr-McGee begins coal production: Okla. Geol. Survey, Okla. Geology Notes, vol. 29, p. 131-132, 1 fig. (Brief description of Choctaw Mining

Facility near Stigler, Haskell County.)

97. Oklahoma Water Resources Board, 1968, Appraisal of the water and related land resources of Oklahoma—Region Three:
Okla. Water Resources Board, Pub. 23, 131 p., illus. (Embraces Washita River watershed below Caddo-Grady County line.)

98. Oklahoma Water Resources Board, 1969, Appraisal of the water and related land resources of Oklahoma—Region Four: Okla. Water Resources Board, Pub. 24, 127 p., illus. (Area drained by Washita River and its tributaries from Texas Panhandle-Oklahoma State line to eastern Caddo County.)

 Oklahoma Water Resources Board, 1969, Appraisal of the water and related land resources of Oklahoma—Regions Five and Six: Okla. Water Resources Board, Pub. 27, illus. (Embrace

- the lower Red River watershed in southeastern Oklahoma below Lake Texoma and Washita River.)
- Orange, Arnold S., 1969, Granitic rock: properties in situ: Science, vol. 165, p. 202-203. (Discussion of Troy Granite in southern Oklahoma.)
 - Otto, J. B., see Burke, W. H., Otto, J. B., and Denison, R. E. Otto, J. B., see Denison, R. E., Hetherington, E. A., Jr., and Otto, J. B.
- 101. Padgett, Ward, 1968 [1969], Sixtieth annual report, Department of Mines Chief Mine Inspector: Okla., Dept. Mines, 52 p.
- 102. Park, David E., Jr., and Croneis, Carey, 1969, Origin of Caballos and Arkansas novaculite formations: Amer. Assoc. Petroleum Geologists, Bull., vol. 53, p. 94-111, 18 figs., 1 table.
- 103. Patrick, David M., and Ham, William E., 1969, Oklahoma, in Uranium in the southern United States: Southern Interstate Nuclear Board and U. S. Atomic Energy Commission, p. 36-56, 3 figs., 3 tables. (Tabulation and bibliography of anomalous uranium occurrences in Oklahoma.)
 - Patrick, Carol R., see Myers, A. J., Gibson, A. M., Glass, B. P., and Patrick, C. R.
 - Pierce, Arthur P., see Cannon, R. S., Jr., and Pierce, A. P. Pojeta, John, Jr., see Gordon, Mackenzie, Jr., et al.
- 104. Polone, Dock J., 1968, Soil survey of Washington County, Oklahoma: U. S. Dept. Agriculture, Soil Conserv. Serv., and Okla. Agr. Expt. Sta., 41 p., 15 figs., 9 tables, 41 maps.
- 105. Quackenbush, W. M. (chm.), 1969, Pre-Pennsylvanian geology of the western Anadarko basin: Panhandle Geol. Soc., 34 p., 2 figs., 12 pls.
- Randolph, J. R., Baker, N. M., and Deike, R. G., 1969, Bibliography of hydrology of the United States and Canada, 1964: U. S. Geol. Survey, Water-Supply Paper 1864, 232 p.
- 107. Ray, James D., 1969, Anadarko basin drilling—an operating challenge: World Oil, vol. 168, no. 5 (April), p. 89-90, 2 figs.
 - Reid, William E., see Wilson, L. R., Morrison, J. L., and Reid, W. E.
 - Rhoads, Clifford E., see Allgood, F. P., Conradi, A. J., Rhoads, C. E., and Brinlee, R. C.
 - Rieke, Duane L., see Fisher, C. F., Bartolina, D. G., and Rieke, D. L.
- Rittenhouse, Gordon, Fulton, Robert B., III, Grabowski, Robert J., and Bernard, Joseph L., 1969, Minor elements in oil-field waters: Chemical Geology, vol. 4, p. 189-209, 8 figs., 5 tables. (Includes data on Oklahoma.)
- Roberts, John F., 1969, Directory of mineral producers in Oklahoma, 1969; Okla. Geol. Survey, 50 p.
- Roberts, John F., 1969, Statistics of Oklahoma's petroleum industry, 1968: Okla. Geol. Survey, Okla. Geology Notes, vol. 29, p. 91-98, 4 figs., 4 tables.
 - Rowland, T. L., see Ham, W. E., and Rowland, T. L.
 - Saadallah, Adnan A., see Hagni, R. D., and Saadallah, A. A.

111. Sackin, Michael J., Sneath, Peter H. A., and Merriam, Daniel F., 1965, ALGOL program of cross-association of nonnumeric sequences using a medium size computer: Kans., State Geol. Survey, Spec. Distrib. Pub. 23, 37 p., 4 figs., 10 tables. (Sample problems show attempted correction of Pennsylvanian units in Osage County with those in Kansas.)

Sando, William J., see Gordon, MacKenzie, Jr., et al.

Schramm, M. W., Jr., see Disney, R. W., Andress, B. O., Chenoweth, P. A., and Schramm, M. W., Jr.

Schumaker, G. A., see Holtan, H. N., England, C. B., Lawless, G. P., and Schumaker, G. A.

112. Singler, Charles R., 1965, Preliminary remarks on the stratigraphy of the Pleasanton Group (Pennsylvanian) in the northern Midcontinent: Compass, vol. 42, p. 63-72, 1 fig.

Smith, Wayne E., Jr., see Blackwell, P. W., Morrison, J. L., and Smith, W. E., Jr.

Sneath, Peter H. A., see Sackin, M. J., Sneath, P. H. A., and Merriam, D. F.

Sohn, I. G., see Gordon, Mackenzie, Jr., et al.

113. Stewart, Wendell J., 1968, The stratigraphic and phylogenetic significance of the fusulinid genus *Eowaeringella*, with several new species: Cushman Found. Foram. Research, Spec. Pub. 10, 29 p., 2 figs., 7 pls. (Includes specimens from Pennsylvanian rocks of Carter County.)

114. Stiles, M. F., Jr. (chm.), 1969, Oklahoma oil and gas development 1968, part II of Production United States and Canada, in International oil and gas development: Internat. Oil

Scouts Assoc., vol. 39, p. 301-376.

115. Stitt, James H., 1969, Late Cambrian and earliest Ordovician trilobite faunas, western Arbuckle Mountains, Murray County, Oklahoma, in Ham, W. E., Regional geology of the Arbuckle Mountains, Oklahoma: Okla. Geol. Survey, Guide Book 17, p. 29-31, 1 fig.

 Strimple, Harrell L., 1969, New lecanocrinid from Pennsylvanian of Oklahoma, part 1 of Strimple, H. L., et al., Fossil crinoid studies: Kans., Univ., Paleont. Contr., Paper 42, p. 1-6, 2 figs. (Specimens from Seminole Formation, Tulsa County.)

117. Strimple, Harrell L., 1969, Pennsylvanian crinoids from Ohio and Oklahoma, part 3 of Strimple, H. L., et al., Fossil crinoid studies: Kans., Univ., Paleont. Contr., Paper 42, p. 11-17, 2 figs. (Includes specimens from Pumpkin Creek Limestone, Love County.)

Strimple, H. L., see Burdick, D. W., and Strimple, H. L. Strimple, Harrell L., see Moore, R. C., and Strimple, H. L.

Summers, Fred C., Jr., 1969, Exploration in Oklahoma and Panhandle of Texas in 1968: Amer. Assoc. Petroleum Geologists, Bull., vol. 53, p. 1241-1243, 1 fig., 3 tables.

119. Tasch, Paul, and Kidson, Evan, 1969, Paleoecological observations on Wellington algal stromatolites from Kansas and Oklahoma, part 1 of Tasch, Paul, et al., Lower Permian algal stromatolites from Kansas and Oklahoma: Kans., Univ., Paleont. Contr., Paper 43, p. 1-9, 5 figs., 1 table. (Includes specimens from Kay and Noble Counties.)

120. Taugourdeau, Ph., 1969, Sur un assemblage partiel (Scolécodonte) de *Polychetaspis oklahomensis* n. sp.: Paris, Revue de Micropaléontologie, vol. 11, p. 176-180, 3 figs., 1 pl.

Teichert, Curt, see Fischer, A. G., and Teichert, Curt.

121. Toomey, Donald F., 1969, Stratigraphy, paleogeography, and sediment facies relationships, part I of The biota of the Pennsylvanian (Virgilian) Leavenworth Limestone, Midcontinent region: Jour. Paleontology, vol. 43, p. 1001-1018, 5 figs., 3 pls., 3 tables. (Study extends south to Osage County, Oklahoma.)

122. Toomey, Donald Francis, 1969, Distribution of algae, part 2 of The biota of the Pennsylvanian (Virgilian) Leavenworth Limestone, Midcontinent region: Jour. Palentology, vol. 43, p. 1313-1330, 1 fig., 4 pls., 2 tables. (Includes specimens

from Osage County.)

Tourtelot, Elizabeth B., see Vine, J. D., Tourtelot, E. B., and Keith, J. R.

123. Troell, Arthur R., 1969, Depositional facies of Toronto Limestone Member (Oread Limestone, Pennsylvanian), subsurface marker unit in Kansas: Kans., State Geol. Survey, Bull. 197, 29 p., 13 figs., 2 tables. (Includes data from Osage County, Oklahoma.)

124. U. S. Bureau of Mines, 1969, Pozzolanic raw materials resources in the central and western United States: U. S. Bur. Mines,

Info. Circ. 8421, 117 p., 24 figs., 17 tables.

U. S. Geological Survey, 1968, Quality of surface waters for irrigation, western states, 1960: U. S. Geol. Survey, Water-Supply Paper 1746, 152 p., 2 figs., 1 pl.

126. U. S. Geological Survey, 1968 [1969], Quality of surface waters for irrigation, western states, 1961: U. S. Geol. Survey, Water-Supply Paper 1886, 154 p., 2 figs., 1 pl.

127. U. S. Geological Survey, 1969, Bibliography of North American geology, 1965: U. S. Geol. Survey, Bull. 1235, 1144 p.

128. U. S. Geological Survey, 1969, Lower Mississippi River basin and western Gulf of Mexico basins, parts 7, 8 of Quality of surface waters of the United States, 1964: U. S. Geol. Survey, Water-Supply Paper 1957, 602 p., 1 fig.

129. U. S. Geological Survey, 1969, Quality of surface waters for irrigation, western states, 1964: U. S. Geol. Survey, Water-

Supply Paper 1960, 144 p., 2 figs., 1 pl.

130. U S. Geological Survey, 1969, Arkansas River basin, vol. 2 of Lower Mississippi River basin, part 7 of Surface water supply of the United States, 1961-65: U. S. Geol. Survey, Water-Supply Paper 1921, 878 p., 1 fig., 1 pl.

131. Van Hook, W. A., and Feemster, W. E., 1969, New completion methods are being used in Anadarko basin: Oil and Gas Jour., vol. 67, no. 24 (June 16), p. 67-70, 7 figs.

132. Vine, James D., 1969, Element distribution in some Paleozoic

black shales and associated rocks: U. S. Geol. Survey, Bull. 1214-G, p. G1-G32, 5 figs., 11 tables. (Includes samples of Pennsylvanian shales from northeastern Oklahoma.)

133. Vine, James D., Tourtelot, Elizabeth B., and Keith, John R., 1969, Element distribution in some trough and platform types of black shale and associated rocks: U. S. Geol. Survey, Bull. 1214-H, p. H1-H38, 5 figs., 10 tables. (Includes samples of Pennsylvanian rock from northeastern and east-central Oklahoma.)

134. Visher, Glenn S., 1965, Fluvial processes as interpreted from ancient and recent fluvial deposits, in Middleton, Gerard M. (ed.), Primary sedimentary structures and their hydrodynamic interpretation: Soc. Econ. Paleontologists and Mineralogists, Symposium, Spec. Pub. 12, p. 116-132, 13 figs., 2 tables. (Examples include Pennsylvanian strata from Oklahoma.)

135. Visher, Glenn S., 1969, Grain size distributions and depositional processes: Jour. Sed. Petrology, vol. 39, p. 1074-1106, 21 figs., 1 table. (Examples include Pennsylvanian sandstones and Arkansas River sands from Oklahoma.)

136. Visher, Glenn S., 1969, How to distinguish barrier bar and channel sands: World Oil, vol. 168, no. 6 (May), p. 106-113 (incl. ads), 2 figs. (Includes Pennsylvanian sandstone from Oklahoma as fluvial example.)

 Walper, Jack L., 1965, Some thoughts on the structural evolution of southern Oklahoma: Oklahoma City Geol. Soc., Shale Shaker, vol. 15, p. 180.

138. Walper, Jack L., 1969, Tectonic evolution of the Arbuckle area, in Arbuckle Mountains field trip: Ft. Worth Geol. Soc., Field Trip Guidebook (April 26-27, 1969), p. 1-3, 4 figs. Ward, Frederick N., see Brobst, D. A., and Ward, F. N.

139. Williams, Alwyn, 1968, Evolution of the shell structure of articulate brachiopods: Palaeont. Assoc. London, Spec. Paper Palaeontology, no. 2, 55 p., 27 figs., 24 pls. (Includes electron micrographs of Ordovician and Devonian specimens from Oklahoma.)

140. Wilson, L. R., Morrison, Jack L., and Reid, William E., 1969, Computer research in palynology demonstrated by use of Oklahoma University General Information Processing System (GIPSY), Permian palynology of North America and some associated problems: Okla., Univ., Info. Science Series, Monograph 2, 143 p.

141. Wingerter, H. R., 1968, Greenwood gas field, Kansas, Colorado, and Oklahoma, part B of Natural gas in Kansas, in Beebe, B. W. (ed.), Natural gases of North America, vol. 2: Amer. Assoc. Petroleum Geologists, Mem. 9, p. 1557-1566, 6 figs., 2 tables.

142. Withrow, Jon R., 1969, Geology of Cromwell Sandstone Member, Franks Graben area, Coal and Pontotoc Counties, Oklahoma: Amer. Assoc. Petroleum Geologists, Bull., vol. 53, p. 2299-2313, 9 figs., 4 tables.

- 143. Withrow, Philip C., 1969, Hunton geology of the Star-Lacey field: Okla. City Geol. Soc., Shale Shaker, vol. 19, p. 78-88, 10 figs.
 - Wood, Patricia W., see Nicholson, Alex., and Wood, P. W.
- 144. Worthing, Robert W., 1969, SE Hoover—Arbuckle dolomite production, in Arbuckle Mountains field trip: Ft. Worth Geol. Soc., Field Trip Guidebook (April 26-27, 1969), p. 9-11, 2 figs.
- 145. Yeck, Ronald D., and Gray, Fenton, 1969, Preliminary studies of opaline phytoliths from selected Oklahoma soils: Okla. Acad. Science, Proc. 1967, vol. 48, p. 112-116, 1 fig., 2 tables. Yochelson, Ellis L., see Gordon, MacKenzie, Jr., et al.

INDEX

Alabaster Cavern, Woodward County, 91 algal-mound complexes, 66 algal stromatolites, Permian, 70, 119 ANADARKO BASIN:

aeromagnetic study, Custer City N field, 7 brines, 32, 108 drilling for petroleum, 107 Green 1-1 gas test, 23, 76

Hunton Group, 60

Marmaton Group, oil production, 24

Morrow sandstones, 46

new well-completion methods, 131 north flank, Cherokee Group, 10

western part, pre-Pennsylvanian geology, 105

world's second deepest hole, 23

annual report: Oklahoma Department of Mines, 101; Oklahoma

Geological Survey, 80

Arbuckle Group: early Paleozoic overlap, 27, 86; geology, 50; Hoover SE field, 144

ARBUCKLE MOUNTAINS:

Bromide Formation, 41

cephalopods, 43

dating apatite and sphene, 92

fault systems and oil accumulation, 59

field trips, 40, 47, 56

geology along I-35, guidebook, 40

Ordovician boundaries, 37

radar imagery, 42

regional geology, 56

tectonic evolution, 138

trilobites, 115

Viola Formation, 51

archaeology: bibliography, 9; petroglyphs, Black Mesa area, 28 Arkansas novaculite, 102 Arkansas River sands, grain size, 135

Arkoma basin, Hunton stratigraphy, 20

barium, geochemical prospecting, 19

basement rocks: electrical and seismic properties, 100: radiometric

dating, 22, 36, 92

bibliographies: computer applications, 13; hydrology, 106; North American geology, 127; Oklahoma archaeology, 9; Oklahoma

geology, 93: uranium in Oklahoma, 103

Black Mesa area, petroglyphs, 28

black shales, geochemistry, 132, 133

Blueiacket Formation, depositional environment, 11

brines: Anadarko basin, 32, 108; concentration increases with depth, 38 CAMBRIAN:

Arbuckle Group, 50

trilobites, 115

chemical industries, mineral raw materials, 72 Cherokee Group, subsurface geology, 10, 30, 31

coal: Kerr-McGee mine near Stigler, 96: resources, 8

computer applications, 13, 111, 140

copper deposits, 67

COUNTIES:

Adair: invertebrate fossils, 53

Atoka: fault systems and oil accumulation, 59

Beaver: hydrogeology, 69; salt, 90

Beckham: world's second deepest hole, 23, 76 Blaine: soil survey, 44; Star-Lacev field, 143

Caddo: diatoms, 15

Carter: fusulinids, 113; geology along I-35, guidebook, 40;

subsurface facies maps. 82 Cherokee: invertebrate fossils, 53

Cimarron: Greenwood gas field, 141; hydrogeology, 69; petroglyphs from Black Mesa area, 28; trace fossil, 61

Coal: Cromwell Sandstone, 142; fault systems and oil accumula-

tion, 59

Comanche: dating basaltic rocks, 22; vertebrate fossils, 14

Creek: Pleasanton Group, 112

Custer: aeromagnetic study, Custer City N field, 7

Garfield: coke plant, 71 Haskell: coal production, 96 Hughes: soil survey, 77

Johnston: fault systems and oil accumulation, 59

Kay: algal stromatolites, 70, 119 Kingfisher: Star-Lacey field, 143 Kiowa: dating basaltic rocks, 22

Love: crinoids, 117

Major: Campbell W field, 60; soil survey, 2

Mayes: invertebrate fossils, 53 McCurtain: barium prospecting, 19

Murray: cephalopods, 43; geology along I-35, guidebook, 40;

Hoover SE field, 144; trilobites, 115

Muskogee: soils, 68

Noble: algal stromatolites, 70, 119; soils, 68

Nowata: algal mounds, 66
Okfuskee: subsurface geology, 33
Oklahoma: flood-prone areas, 95; soil survey, 45
Okmulgoe: areabaid 75

Okmulgee: arachnid, 75

Osage: algal mounds, 66: Leavenworth Limestone, biota, 121, 122; Pennsylvanian correlations, 111; Toronto Limestone, deposi-

tional facies, 123

Ottawa: lead-zinc, 26, 54, 55 Pittsburg: Wapanucka Limestone, 57

Pontotoc: Cromwell Sandstone, 142; fault systems and oil accumu-

lation, 59

Pottawatomie: subsurface geology, 33 Pushmataha: radar imagery, 78

Seminole: Pleasanton Group, 112; subsurface geology, 33

Sequovah: Wilson Rock, 16

Texas: Greenwood gas field, 141; hydrogeology, 69

Tillman: Permian reptile, 34

Tulsa: algal mounds, 66; crinoids, 116; flood-prone areas, 95;

Pleasanton Group, 112

Washington: algal mounds, 66; corals, 29; soil survey, 104

Woods: Oakdale field, 52

Woodward: Alabaster Cavern, guidebook, 91

CRETACEOUS:

Trinity Group, barium prospecting, 19 Upper, trace fossil, 61

Criner Hills, scolecodont, 120

Cromwell Sandstone, Franks Graben area, 142 delta environment, Bluejacket Formation, 11 depositional processes, grain-size distribution, 135

DEVONIAN:

Arkansas novaculite, 102

brachiopods, 139

Hunton stratigraphy, 20, 60

Star-Lacey field, 143

Dewey Formation, corals, 29

directory of mineral producers in Oklahoma, 109

early Paleozoic overlap, 27, 86

east-central Oklahoma, geology and water resources, 81

ECONOMIC GEOLOGY:

barium prospecting, 19 coal, 8, 96

coke plant, 71

construction materials, 62, 63, 64, 65, 83

copper deposits, 67 lead-zinc, 26, 54, 55, 67

mineral producers in Oklahoma, directory, 109

mineral statistics, 39, 84, 85, 101

pozzolanic raw materials, 124 raw materials for chemical industries, 72 southeastern Oklahoma, 99 uranium, 103

Washita River watershed, 97, 98

engineering classification, rocks and soils, 62, 63, 64, 65

environmental geology: flood-prone areas, urban Oklahoma, 95;

hydrology, Fort Smith quadrangle, 81; underground waste disposal, Panhandle, 69

fault systems and oil accumulations, eastern Arbuckle Mountains, 59 Fayetteville Shale, invertebrate fossils, 53

"Fernvale" Formation, 1

field trips, Arbuckle Mountains, 40, 47, 56

fluvial deposits, Pennsylvanian, 134, 136

Franks Graben, Cromwell Sandstone, 142

general geology: bibliography, 93; North America tectonics, 73, 74; southeastern Oklahoma, 99; southern Oklahoma, 137; Washita River watershed, 97, 98

geochemistry: barium prospecting, 19; black shales, 132, 133;

oxygen and carbon isotopes, Tri-State district, 55

geomorphology, southwestern Oklahoma, 25

geophysics: aeromagnetics in Anadarko basin, 7; electrical and seismic properties, Troy Granite, 100

GIPSY, Permian palynology of North America, 140

Glorieta Sandstone, hydrogeology, 69

granite, electrical and seismic properties, 100

gypsum, Alabaster Cavern, 91

Hatton Tuff, Ouachita Mountains, radiometric age, 89

highway materials: engineering classification, 62, 63, 64, 65; inventory, 83

Holocene, diatoms, 15

Hunton Group, 5, 20, 60, 143

HYDROLOGY:

bibliography, 106

brine concentration increases with depth, 38

east-central Oklahoma, 81 flood-prope areas urban Ok

flood-prone areas, urban Oklahoma, 95

Fort Smith quadrangle, 81

Glorieta Sandstone, 69

iodide-bearing brines, Anadarko basin, 32

Ogallala Formation, 69

oil-field waters, minor elements, 108

Panhandle, 69

quality of surface water, 125, 126, 128, 129

southeastern Oklahoma, 99 springs in Ozark region, 12

surface water supply, Arkansas River, 130

Washita River watershed, 97, 98

Interstate-35, Arbuckle Mountains geology, 40 iodide-bearing brines, Anadarko basin, 32

Kansas City Group, paleocurrent directions, 58

Keota Sandstone, 16

Kerr-McGee, coal production, 96

lead isotopes, guide in lead-zinc exploration, 26 lead-zinc, isotopic composition of ore and host rock, 55 lead-zinc deposits, 67 Leavenworth Limestone, biota, 121, 122 limestone alteration, lead-zinc ores, 54 limestone cementation, Wapanucka Limestone, 57 maps: geology and hydrology, Fort Smith quadrangle, 81; tectonic, North America, 73, 74; topographic, 17, 18 Marmaton Group, oil production, Anadarko basin, 24 memorial, Hugh Dinsmore Miser, 94 mineral industries: coal, 8, 96; coke plant, 71; directory of producers, 109: raw material for chemical industries, 72; statistics, 39, 84, 85, 101, 110 Miser, Hugh Dinsmore, memorial, 94 MISSISSIPPIAN: Arkansas novaculite, 102 crinoids, 21 Stanley Shale, barium prospecting, 19 strata of south-central Object invertebrate fossils, 53 strata of south-central Oklahoma, 48 Morrow sandstones, occurrence and production, Anadarko basin. 46 Nemaha ridge: east flank, 30, 31; west flank, 10 north-central Oklahoma, Cherokee Group, 30, 31 northeastern Oklahoma: basement rocks, age, 36; springs, 12 Ogallala Formation, hydrogeology, 69 Oklahoma Geological Survey, annual report, 80 Oklahoma geology, bibliography, 93 opaline phytoliths, Oklahoma soils, 145 ORDOVICIAN: Arbuckle Group, 50 boundaries in Arbuckle Mountains, 37 brachiopods, 139 Bromide Formation, 41 "Fernyale" Formation, 1 scolecodont, 120 Simpson Group, 49 trilobites, 115

Viola Formation, 1, 51

Ouachita Mountains:

age of Hatton Tuff, 89 Arkansas novaculite, 102 Potato Hills, radar imagery, 35 Tuskahoma syncline, radar imagery, 78

Wapanucka Limestone, 57

Ozark region, springs, 12 PALEOBOTANY:

> algal mounds, 66 algal stromatolites, 70, 119 biota of Leavenworth Limestone, 121, 122 computer applications, 13, 140

diatoms, 15

Permian cycads, 79 Permian palynology of North America, 140 Paleozoic, early, overlap, 27, 86 PALEOZOOLOGY: arachnid, 75 biota of Leavenworth Limestone, 121, 122 brachiopods, 5, 139 cephalopods, Buckhorn asphalt deposit, 43 corals, 29, 53 crinoids, 21, 88, 116, 117 Crossopodia sp., 61 Eowaeringella, 113 fusulinids, 113 gastropods, 53 Gerty's fossils, revision, 53 ostracodes, 53 pelecypods, 53 Polychetaspis oklahomensis n. sp., 120 Protolissamphibian, 14 reptile, Lower Permian, 34 scolecodont, 120 trilobites, 53, 115 vertebrate fossils, 14 Panhandle: hydrogeology of Glorieta Sandstone and Ogallala Formation, 69; natural gas, 87 PENNSYLVANIAN: algal mounds, 66 arachnid, 75 black shales, geochemistry, 132, 133 Bluejacket Formation, 11 Carter County, subsurface facies maps, 82 cephalopods, 43 Cherokee Group, 10, 30, 31 corals, 29 crinoids, 88, 116, 117 Cromwell Sandstone, 142 fluvial deposits, 134, 136 fusulinids, 113 Greenwood gas field, 141 Hatton Tuff, radiometric age, 89 Keota Sandstone, 16 Leavenworth Limestone, biota, 121, 122 Marmaton Group, oil production, 24 Morrow sandstones, occurrence and production, 46 natural gas, Panhandle, 87 Osage County, correlations, 111 paleocurrent directions, 58 Pleasanton Group, 112 Red Oak Sandstone, reservoir study, 52 sandstones, grain size, 135

Toronto Limestone, depositional facies, 123

Wapanucka Limestone, burial cementation, 57 PERMIAN: algal stromatolites, 70, 119 cycads, 79 Glorieta Formation, hydrogeology, 69 palynology, North America, 140 reptile, 34 salt, 90 vertebrate fossils, 14 Woodward County and Alabaster Cavern, 91 Petroleum: Anadarko basin: drilling, 107; Green 1-1 gas test, 23, 76; pre-Pennsylvanian geology, 105 brines, 32, 38, 108 calcined petroleum coke, 71 Campbell W field, 60 Cherokee Group, 10, 30, 31 Cromwell Sandstone, Franks Graben area, 142 Custer City N field, aeromagnetics, 7 fault systems and oil accumulation, 59 Greenwood gas field, 141 Hoover SE field, 144 Marmaton Group, Anadarko basin, 24 Morrow sandstones, occurrence and production, 46 natural gas in Panhandle, 87 new well-completion methods, Anadarko basin, 131 Oakdale field, Red Oak Sandstone, 52 Panhandle, natural gas, 87 Seminole area, 33 Star-Lacey field, 143 statistics, 3, 4, 6, 84, 85, 110, 114, 118 subsurface facies maps, Carter County, 82 underground waste disposal, Panhandle, 69 world's second deepest hole, 23 physiography, southwestern Oklahoma, 25 pozzolanic raw materials, 124 Precambrian: northeastern Oklahoma, isotopic age, 36 Troy Granite, electrical and seismic properties, 100 radar imagery: Arbuckle Mountains, 42; Ouachita Mountains, 35, 78 radiometric dating, 22, 36, 89, 92 Red Oak Sandstone, reservoir study, 52 salt, Beaver County, 90 SEDIMENTATION: Blueiacket Formation, 11 depositional facies of Toronto Limestone, 123 fluvial deposits, 134, 136 grain size and depositional processes, 135 paleocurrent directions, Kansas City Group, 58 SILURIAN: brachiopods, 5

Hunton stratigraphy, 20, 60 Star-Lacey field. 143

Simpson Group, stratigraphy, 49

soil surveys: Blaine County, 44; Hughes County, 77; Major County, 2; Oklahoma County, 45; Washington County, 104

soils: engineering classification, 62, 63, 64, 65; moisture tension, 68;

opaline phytoliths, 145

southwestern Oklahoma, physiography, 25 springs, Ozark region of northeastern Oklahoma, 12

STRATIGRAPHY:

Arbuckle Group, 50 Arkansas novaculite, 102

Bromide Formation, Arbuckle Mountains, 41

"Fernvale" Formation, 1

Hunton, 20, 60

Leavenworth Limestone, 121

Mississippian strata, south-central Oklahoma, 48

Ordovician: Arbuckle Mountains, 37; Seminole area, 33

Paleozoic, Arbuckle Mountains, 40, 56

Pennsylvanian, Seminole area, 33 Pleasanton Group, 112

pre-Pennsylvanian, western Anadarko basin, 105

Simpson Group, 49

Viola Formation, 1, 51 structural evolution, southern Oklahoma, 137 structure, Potato Hills, radar imagery, 35

tectonic map, North America, 73, 74

tectonics: Arbuckle area, 138; southern Oklahoma, 137

Tertiary, Ogallala Formation, hydrogeology, 69

topographic maps, 17, 18

Tri-State district, lead-zinc, 26, 54, 55

uranium in Oklahoma, 103

Viola Formation, 1, 51

Wapanucka Limestone, burial cementation, 57

Wichita Mountains: dating basaltic rocks, 22; Lower Permian vertebrate fossils, 14

National Magazine to Publish Environmental Supplement

If you missed seeing the total eclipse of the sun on March 7, don't worry. "You can always see the other one. The one created by man. The one called environmental pollution."

With this introduction the editors of Saturday Review have launched a new monthly supplement called Environment and the Quality of

Life begun in the March 7 issue of the national weekly. The section has been initiated in an effort to provide the public with an authoritative world coverage of the situation created by environmental contamination of all types. This problem is seen by the editors as not national, but worldwide, "not less universal in its causes and effects than war and peace and therefore not less demanding in the scope and pace of counterattack needed to deal with it."

The new supplement will present articles dealing with the philosophical, historical, and scientific aspects of contamination. For example, included in the first supplement of Environment and the Quality of Life is an editorial on "A Philosophy of Environment," by Editor Norman Cousins, followed by articles on "Prospects of Spaceship Man," by G. L. Stebbins, "The Politics of Ecology," by Harvey Wheeler, "New York's Fight Against Pollution," by Mr. Cousins, and "The Enemy is Us," by Saturday Review's science editor, John Lear.

Oklahoma Topographic Maps in 1970

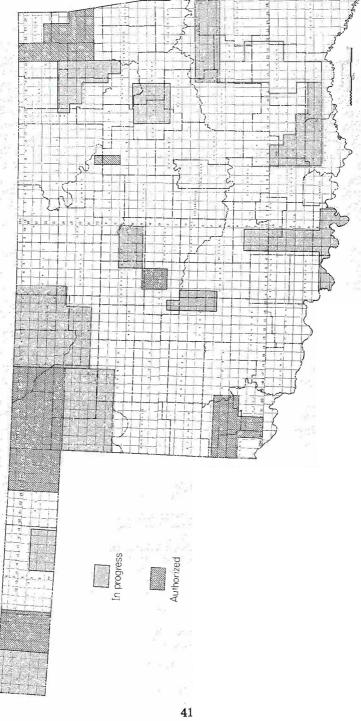
The U. S. Geological Survey has been preparing and printing topographic maps for 70 years. Before statehood and until 1912, Oklahoma maps were on 30-minute sheets, but since 1964 all maps have been on 7½-minute sheets. The entire State seems likely to be mapped within 6 years. At present, 105 15-minute sheets, equal to the area of 402 7½-minute sheets, have been published. Complete coverage on the 7½-minute scale (2 inches = 1 mile) would require 1.216 quadrangles.

The current status of published maps is: published—375; in pro-

gress-205; authorized-134 (see map, opposite page).

Photorevised maps have a purple overprint to show recent changes in drainage and culture. The 13 quadrangles of the Tulsa area have been published, and the 13 quadrangles of the Oklahoma City area are in preparation.

-Carl C. Branson



THE OCCURRENCE OF Onychaster strimplei IN OKLAHOMA

HARRELL L. STRIMPLE*

Discovery of a specimen (SUI 34338) of Onychaster strimplei Biork, Goldberg, and Kesling (1968), in material excavated during the spring of 1969 near Vinita, Craig County, Oklahoma, is considered to be of considerable significance. The occurrence of ophuiroids in Oklahoma does not appear to have been previously recorded. The species O. strimplei has previously been known only from a single locality near Anna, in southwestern Illinois, a distance of some 360 miles from Vinita, and is the youngest species of the genus to be found in North America. The Illinois exposure is considered to be the Haney Formation, Golconda Group, Chesterian Stage.

The exposure near Vinita is a dark shaley facies of the Fayetteville Formation and is located in the SW1/4 sec. 11, T. 25 N., R. 21 E.,

which is also the type locality for the following species:

Phanocrinus alexanderi Strimple (1948) Alcimocrinus ornatus Strimple (1949) Aphelecrinus planus Strimple (1951a) Aphelecrinus exoticus Strimple (1951a) Heliosocrinus aftonensis Strimple (1951b) Scytalocrinus aftonensis Strimple (1951a) Ulrichicrinus chesterensis Strimple (1949)

In addition, the following species have been reported from the area:

Zeacrinites peculairis (Miller & Gurley) (Strimple, 1962, p. 307) Phanocrinus cylindricus Miller & Gurley (Strimple, 1951, p. 291)

Although the fauna is not identical with that from the exposure near Anna, Illinois, a very close relationship is readily apparent. The Favetteville echinoderm fauna appears to be middle Golconda in age.

References Cited

Bjork, P. R., Goldberg, P. S., and Kesling, R. V., 1968, New ophuiroid from Chester Series (Mississippian) of Illinois: Jour. Paleontology, vol. 42,

northeastern Oklahoma: Jour. Paleontology, vol. 22, p. 492-493, pl. 77,

1949, Studies of Carboniferous crinoids, pt. IV. On new species of Alcimocrinus and Ulrichicrinus from the Fayetteville Formation of Oklahoma: Palaeontographica Americana, vol. 3, p. 27-30, pl. 5.

Strimple, H. L., 1951a, Notes on Phanocrinus cylindricus and description of some new species of Chester crinoids: Jour. Wash. Acad. Sci., vol. 41, p. 291-294, figs. 1-12.

-1951b, New Carboniferous crinoids: Jour. Paleontology, vol. 25,

p. 669-676, pl. 98.

——1962, Zeacrinites in Oklahoma: Okla. Geol. Survey, Okla. Geology Notes, vol. 22, p. 307-316, pl. 1, figs. 1-7.

^{*}Curator, Department of Geology, The University of Iowa, Iowa City.

New Core Catalog Issued

The University of Oklahoma Core and Sample Library issued its new Core Catalog 4 in March 1970, which supersedes all earlier lists. The catalog is available on request from the Oklahoma Geological Survey.

Since the issue of *Core Catalog 3* in March 1969, cores from 110 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 Cambrian.

The Core and Sample Library is in Building 139, 2725 Jenkins Avenue, South Campus, The University of Oklahoma, Norman. It now has on file more than 85,092 feet of core from 1,094 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 Van Vleet 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

New Theses Added to O. U. Geology Library

The following masters' theses and doctoral dissertations were recently added to the Geology and Geophysics Library at The University of Oklahoma:

Master of Science Theses

Field joint study of the Potato Hills structure, by L. Randle Flud.

Subsurface geology of northeastern Young County, Texas, by Andrew J. Robinson.

Doctoral Dissertations

Petrography, mineralogy, and geochemistry of the Chamositic iron ores of north-central Louisiana, by Hershel Leonard Jones.

Clay petrology of the Atoka Formation, eastern Oklahoma, by Her Yue Wong.

OKLAHOMA GEOLOGY NOTES

Volume 30

April 1970

Number 2

IN THIS ISSUE

	Page
Bibliography and Index of Oklahoma Geology, 1969	
Kenneth S. Johnson and Alex Nicholson	19
The Occurrence of Onychaster strimplei in Oklahoma	
HARRELL L. STRIMPLE	42
Convolute Bedding in the Thurman Sandstone,	
Coal County, Oklahoma	18
National Magazine to Publish Environmental Supplement	39
Oklahoma Topographic Maps in 1970	40
New Core Catalog Issued	43
New Theses Added to O. U. Geology Library	43