

STATE OF OHIO  
JAMES A. RHODES, Governor  
DEPARTMENT OF NATURAL RESOURCES  
HERBERT B. EAGON, Director  
DIVISION OF GEOLOGICAL SURVEY  
RALPH J. BERNHAGEN, Chief

INFORMATION CIRCULAR 32

BIBLIOGRAPHY OF OHIO GEOLOGY

1951 -- 1960

By  
Pauline Smyth

A SUPPLEMENT TO BULLETIN 52

COLUMBUS

1963



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## INTRODUCTION

This publication is intended as a supplement to Bulletin 52, "Bibliography of Ohio Geology, 1819-1950." It covers the period from 1951 through 1960 and also includes a few references which were omitted from Bulletin 52. The first part is a bibliography of books and articles which contain information about Ohio geology, listed in alphabetical order by author. Under the name of each author the citations are arranged chronologically.

## EXPLANATION OF INDEX

The second part of this publication is an index to the subjects covered by the articles listed in the bibliography. Each article is referred to under as many headings as seemed necessary to cover the subjects discussed in the article or publication. The form of the index is similar to that used in the U. S. Geological Survey bibliographies of North American geology and is almost identical to the form used in Ohio Geological Survey Bulletin 52. Abbreviations used in the bibliography and index are explained on pages 4 and 5.

The main headings in the index are names of subjects of various kinds. They include areas (Belmont County, Southwestern Ohio); subdivisions of geology (Engineering geology, Mineralogy); geologic ages (Ordovician, Pennsylvanian); mineral products (Oil and gas, Sandstone); or specific subjects (Concretions, Quarries). Examples of main headings are the following:

Acid mine drainage	Field guides
Belmont County	General geology
Bibliography	Glacial geology
Cincinnati area	Mineral collecting
Coal	Mississippian
Conservation	Paleontology, invertebrate
Economic geology	Stratigraphy (general)

Some main headings have only a cross reference to another main heading and no references listed under them:

Fossils: See Paleobotany; Paleontology.

or a main heading may have a cross reference to a related main heading in addition to a list of entries:

Limnology: See also Lake Erie.  
Bibliography: Verber, 1955a.  
Electrical resistivity methods: Mayhew, 1960.  
Sedimentation: Mohler, 1958.

A cross reference which begins "See under" or "See also under" indicates that the subject matter sought as a main heading will be found as a subheading under another main heading:

Analyses: See under names of materials or methods.  
Stream flow: See under Water.

In addition to the kinds of major subject headings used in Bulletin 52, the present index also lists counties. References which contain information on specific counties are listed under the county name as well as under the subject or subjects discussed. For example the report "Coal Reserves of the Pittsburgh (No. 8) Bed in Belmont County, Ohio," by Henry L. Berryhill, Jr., (1955), is indexed under the subheadings "Belmont County," "Pittsburgh (No. 8) coal bed," and "Reserves" under the major heading "Coal," and also under the subheading "Coal" under the major heading "Belmont County."

For each county, cross references are also given to subject headings under which information about that county might be found. For instance, after "Licking County," cross references are given for "Mississippian" and "Oil and gas." Under the main heading "Mississippian" are references to phases of Mississippian geology in Ohio which would include Licking County because rocks of that age lie at the surface in the county.

There are two kinds of subheadings under the main headings: geographic, and subject. The geographic headings are names of counties, quadrangles, and less exact portions of the State such as "Cincinnati area," "Northeastern Ohio," or "Southern Ohio." The subheading "General" describes publications which deal with Ohio as a whole.

Subject subheadings may be related subjects under one main heading:

Oil and Gas:  
Fields and pools  
Production statistics  
Shale gas

or subjects under a geographic heading:

Preble County:  
Elkhorn formation  
Ground water.

The paper titled "Insoluble Residue Studies of the Columbus and Delaware Limestones in Ohio," by Charles H. Summerson (1957), is indexed under the subheadings "Columbus limestone" and "Delaware limestone" under the main headings of the names of all counties in which samples were taken. The paper is also indexed under the main headings "Devonian" and "Insoluble residues."

Stratigraphic divisions such as formations or beds are indexed under names of the geologic ages. For example, "Cleveland shale," "Detroit River group," and "Hillsboro sandstone" are subheadings under the main heading "Devonian." Stratigraphic divisions may also be listed as subheadings under the main heading of a county name if the article describes the formation or bed in that county.

Fossils are indexed under the three main headings: "Paleobotany," "Paleontology, invertebrate," and "Paleontology, vertebrate." A paper titled "Ostracods from the Middle Devonian Dundee Limestone in Northwestern Ohio," by Robert V. Kesling (1954), is indexed under the sub-subheading "Devonian" under the subheading



"Ostracoda" under the main heading "Paleontology, invertebrate," and also under the subheading "Paleontology" under the main heading "Lucas County" (all the localities where collections were made were in Lucas County).

Theses and dissertations about Ohio geology are also included in this bibliography. Most of these are not published but may be seen in the libraries of the colleges for which they were written. The Ohio Division of Geological Survey has copies of a few of these theses on file, and these may be examined in the Survey office. A notation of this fact follows the bibliographic reference if the thesis is available at the Survey. A few theses not seen by the author of this bibliography are listed and indexed as far as the subject matter can be judged by the title.

Users of this bibliography are urged to send corrections and additions to the Ohio Division of Geological Survey, Department of Natural Resources, Columbus, Ohio. Any articles or books published prior to 1961 which contain information on Ohio geology and which are not listed in this report or in Bulletin 52 will be included in future bibliographies if brought to the attention of the Ohio Geological Survey.

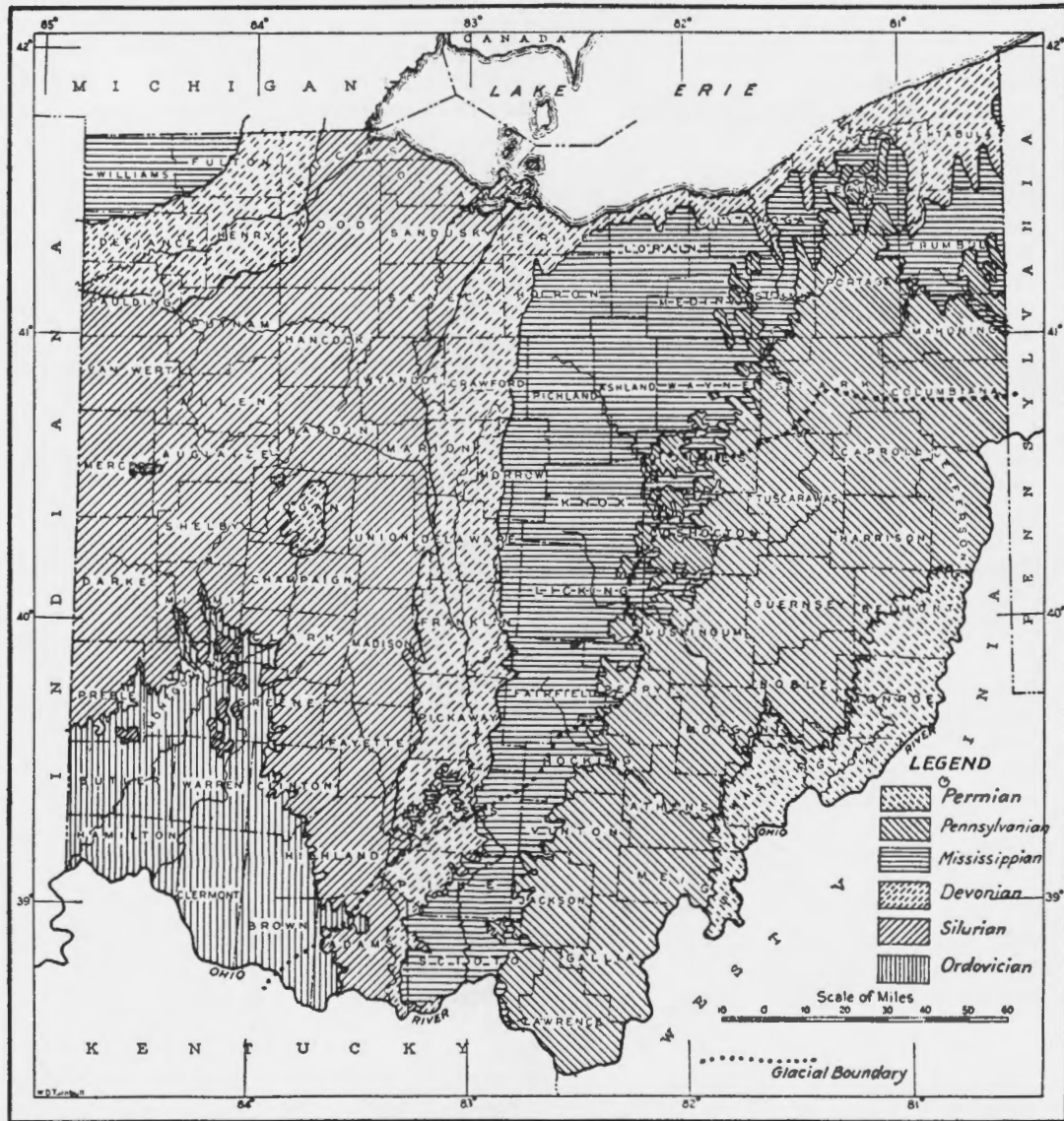
## ABBREVIATIONS

Abst. - - - - -	Abstract, abstracts
Agri.	Agriculture
Agri. Exp. Sta.	Agricultural Experiment Station
Am.	American
Am. Assoc. Petrol. Geol.	American Association of Petroleum Geologists
Am. Ceramic Soc.	American Ceramic Society
Am. Geophys. Union	American Geophysical Union
Am. Inst. Min. Met. Eng.	American Institute of Mining and Metallurgical Engineers
Am. Jour. Sci.	American Journal of Science
Am. Soc. Civil Eng.	American Society of Civil Engineers
Am. Water Works Assoc.	American Water Works Association
Ann. Rept.	Annual Report
Bull. - - - - -	Bulletin
Bull. Am. Paleon.	Bulletins of American Paleontology
Chap. - - - - -	Chapter
Chicago Nat. Hist. Mus.	Chicago Natural History Museum
Cin. Mus. Nat. Hist.	Cincinnati Museum of Natural History
Circ.	Circular
Cleve. Mus. Nat. Hist.	The Cleveland Museum of Natural History
Conf.	Conference
Cong. Strat. Carbonifere Heerlen, c. r.	Congrès pour L'avancement Des Etudes de Stratigraphie Carbonifère Heerlen, Compte Rendu
Contr.	Contribution, contributions
Dept. - - - - -	Department
Denison Univ. Sci. Lab.	Denison University, Scientific Laboratories
Dissert. Abst.	Dissertation Abstracts
Div.	Division
Econ. Geog. - - - - -	Economic Geography
Econ. Geol.	Economic Geology
ed.	editor
exp.	experiment
geol. - - - - -	geologic, geological
Geol. Abst.	Geological Abstracts
Geol. Soc. Amer.	Geological Society of America
GeoSci. Abst.	GeoScience Abstracts
il. - - - - -	illustrated
incl.	including, includes
Info. Circ.	Information Circular
Internat. Geol. Cong.	International Geologic Congress
internat.	international
Jour. - - - - -	Journal
Jour. Geol.	Journal of Geology
Jour. Paleo.	Journal of Paleontology
Jour. Sed. Petrol.	Journal of Sedimentary Petrology
Ky. Geol. Survey - - - - -	Kentucky Geological Survey
Mem. - - - - -	Memoir
Misc. Publ.	Miscellaneous Publication
Mon.	Monograph

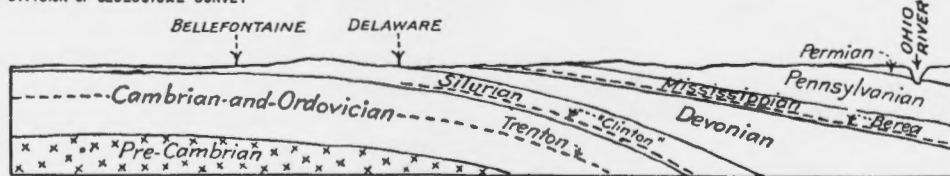


ABBREVIATIONS

Mus.	Museum
n. d. - - - - -	no date
n. s.	new series
Nat.	National, Natural, Naturalist
no.	number
Ohio Acad. Sci. - - - - -	Ohio Academy of Science
Ohio Div. Lands and Soil	Ohio Division of Lands and Soil
Ohio Div. Mines, Dept. Industrial Relations	Ohio Division of Mines, Department of Industrial Relations
Ohio Div. Shore Erosion	Ohio Division of Shore Erosion
Ohio Div. Water	Ohio Division of Water
Ohio Geol. Survey	Ohio Division of Geological Survey
Ohio Jour. Sci.	Ohio Journal of Science
Ohio St. Univ.	Ohio State University
Ohio St. Univ., Eng. Exp. Sta.	Ohio State University, Engineering Experiment Station
Ohio St. Univ., News in Eng.	Ohio State University, News in Engineering
Oil and Gas Jour.	The Oil and Gas Journal
p. - - - - -	page, pages
Pa. St. Univ., Min. Indust. Exp. Sta.	Pennsylvania State University, Mineral Industries Experiment Station
pl., pls.	plate, plates
port.	portrait
Proc.	Proceedings
Prof. Paper	Professional Paper
Prog. Rept.	Progress Report
pt.	part
publ.	publication
Rept. - - - - -	Report
Rept. Inv.	Report of Investigations
sec. - - - - -	section
ser.	series
Sess.	Session
Smiths. Inst. Misc. Coll.	Smithsonian Institution, Miscellaneous Collection
Soc.	Society
Soc. Géol. France	Société Géologique de France
Spec. Paper	Special Paper
Spec. Rept.	Special Report
St.	State
Sta.	Station
Tech. - - - - -	Technical, Technology
Trans.	Transactions
U. S. Army - - - - -	United States Army
U. S. Bur. Mines	United States Bureau of Mines
U. S. Dept. Agri.	United States Department of Agriculture
U. S. Geol. Survey	United States Geological Survey
U. S. Nat. Mus.	United States National Museum
Univ.	University
Univ. Mich. Mus. Paleo.	University of Michigan Museum of Paleontology
vol. - - - - -	volume
W. Va. Geol. Survey - - - - -	West Virginia Geological Survey
Zentr. Geol. Pal.- - - - -	Zentralblatt für Geologie und Palaontologie
Zool. Soc. London Proc.	Zoological Society of London Proceedings



OHIO DIVISION OF GEOLOGICAL SURVEY



GEOLOGIC MAP OF OHIO



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- Chillicothe test core:** Carman, 1955.
- Champaign County:** See also Glacial geology; Silurian.  
 Columbus limestone: Summerson, 1957.  
 Field guide: Goldthwait, 1952a; Nave, 1956.  
 Ground water: Schmidt, James J., 1960e; Walker, 1960, 1960b, 1960c.  
 Strontium in water: Feulner, 1960.  
 Teays valley: Norris, 1958.
- Cincinnati arch:** See also structure.  
 Freeman, 1951; Green, 1957.
- Cincinnati area:** See also county names; Ordovician; Southwestern Ohio.  
 Field guide: Slaughter, 1953.  
 Fracture study: Keller, 1957.  
 Paleontology: Caster, 1955; Flower, 1946; Hall, D. D., 1960; Pogue, 1954, 1954a; Pulse, 1959; Shaw, 1960.  
 Pleistocene: Hays, 1951.  
 Sand and gravel: Schaleman, 1953.  
 Stratigraphy: Caster, 1955; Hyde, D. E., 1959; Kerr, D., 1951; Magorian, 1953, 1954; Slaughter, 1953; Weiss, M. P., 1960a.



- Cincinnati meteorite: Henderson, 1958.  
 Cincinnati, spawning ground of geologists: Caster, 1951a.  
 Clark County: See also Ordovician; Silurian.  
 Brassfield limestone: Pennell, 1952.  
 Field guide: Bernhagen, 1960; Goldthwait, 1952a; Nave, 1956; Smyth, 1955.  
 Geomorphology: Norris, 1951.  
 Ground water: Brown, E. H., 1960; Walker, 1960b, 1960c, 1960f.  
 Soil: Baker, F. J., 1960c.  
 Stream flow: Brown, E. H., 1960.  
 Structure: Kantrowitz, 1959.  
 Teays valley: Norris, 1958.  
 Water resources: Norris, 1952.  
 Clay: See also under the various geologic ages; county names.  
 Aggregates from: Bowen, C. H., 1955; Ehlers, E. G., 1958; Johnson, J. E., 1957.  
 Analyses: Austin, 1934; DePablo-Galen, 1955; McConnell, 1956; Stone, 1951; Thomas, H. F., 1959.  
 Athens County: Sturgeon, 1958.  
 Coshocton County: Lamborn, 1953.  
 General: Bowen, C. H., 1955; DePablo, 1960; Ohio Chamber of Commerce, 1953; Ohio Dept. Industrial Relations; Ohio Geol. Survey, 1959; Richardson, 1958; Slavens, 1928; U. S. Bur. Mines.  
 Jackson County: Morrow, 1956.  
 Mineralogy: Aukland, 1956; Droste, 1956, 1956a, 1956b; McConnell, 1956.  
 Perry County: Flint, N. K., 1951.  
 Production: Ohio Dept. Industrial Relations; U. S. Bureau Mines.  
 Refractory: Bole, 1951.  
 Tuscarawas County: Lamborn, 1956.  
 Underclay: Schultz, 1958.  
 Clermont County: See also Cincinnati area; Ordovician; Paleontology; Southwestern Ohio.  
 Cynthiana limestone: Edwards, 1957.  
 Eden group: Edwards, 1957; Norman, 1959; Sharp, E. R., 1957.  
 Fracture study: Keller, 1957.  
 Ground water: Walker, 1960i, 1960j, 1960k.  
 Paleontology: Bass, I., 1957; Pulse, 1959; Sweet, 1959; Turco, 1957; VanFossen, 1951; Warner, 1956; Wilkie, 1957.  
 Soil: Farnham, 1951.  
 Stratigraphy: Lattman, 1951, 1954; Weiss, M. P., 1960a.  
 Clinton County: See also Ordovician; Paleontology; Silurian.  
 Brassfield limestone: Hopkins, 1954.  
 Glacial geology: Lamar, F. S., 1900.  
 Ground water: Walker, 1960g, 1960h, 1960i.  
 Paleontology: Hazel, 1955.  
 Soil: Farnham, 1951; Ohio Div. Lands and Soil, 1953, 1956, 1957a, 1959a.  
 Stratigraphy: Weiss, M. P., 1960a.  
 Structure: Kantrowitz, 1959.  
 Coal: See also Economic geology; Pennsylvanian; Permian.  
 Acid mine drainage: Brant, 1959a, 1960a; Cole, 1955; Moulton, 1957, 1957a.  
 Allegheny group: Brant, 1956; DeLong, 1957; Denton, 1957.  
 Analyses: Aresco, 1953, 1953a, 1955, 1956, 1956a, 1957, 1958, 1959, 1960; Fieldner, 1952; Fraser, 1950; Kerr, T. H., 1948; Krumin, 1952, 1957; Snyder, 1953.  
 Coal - continued  
 Anderson coal bed: DeBrosse, 1957.  
 Ash analyses: Selvig, 1956.  
 Ashland County: Granchi, 1958.  
 Athens County: Brant, 1954a, 1956, 1960; DeBrosse, 1957; DeLong, 1955; Denton, 1960; Ford, Bacon & Davis, 1951; Smith, G. E., 1951, 1952; Smith, W. H., 1952; Sturgeon, 1958.  
 Bedford coal bed: Granchi, 1958.  
 Belmont County: Berryhill, H. L., 1955; Brant, 1956, 1960; DeBrosse, 1957; DeLong, 1955; Denton, 1960; Ford, Bacon & Davis, 1951; Smith, W. H., 1952.  
 Bibliography: Berryhill, L. R., 1951.  
 Brookville (No. 4) coal bed: DeLong, 1957.  
 Cannel: Bowen, 1951.  
 Carroll County: Brant, 1954a, 1956, 1960; DeBrosse, 1957; DeLong, 1955, 1957; Ford, Bacon & Davis, 1951.  
 Clarion (No. 4A) coal bed: DeLong, 1957.  
 Classification of Coal Measures: Wanless, 1959.  
 Columbiana County: Brant, 1954a, 1956, 1960; DeBrosse, 1957; Denton, 1957; Ford, Bacon & Davis, 1951; Granchi, 1958.  
 Conemaugh group: DeBrosse, 1957.  
 Coshocton County: Brant, 1954a, 1956, 1960; DeLong, 1957; Ford, Bacon & Davis, 1951; Granchi, 1958; Lamborn, 1953.  
 Dunkard group: Denton, 1960.  
 Federal Creek Field: Smith, G. E., 1951, 1952.  
 Fields of United States map: Trumbull, 1960.  
 Fishpot coal bed: Denton, 1960.  
 Gallia County: Brant, 1954a, 1956, 1960; Cross, A. T., 1956; DeBrosse, 1957; DeLong, 1955, 1957; Denton, 1930, Ford, Bacon & Davis, 1951.  
 Geauga County: Granchi, 1958.  
 General: Averitt, 1953; Brant, 1957a, 1960; Kerr, T. H., 1948; Ohio Chamber of Commerce, 1954; Ohio Dept. Industrial Relations; Ohio Geol. Survey, 1959; Smith, W. H., 1951; U. S. Bureau Mines.  
 Germanium in coal: Stadnichchenko, 1953.  
 Guernsey County: Brant, 1954a, 1956, 1960; Carmin, 1943; DeBrosse, 1957; DeLong, 1955; Ford, Bacon & Davis, 1951; Smith, W. H., 1952.  
 Harlem coal bed: DeBrosse, 1957.  
 Harrison County: Brant, 1954a, 1956, 1960; DeBrosse, 1957; DeLong, 1955; Denton, 1960; Fagerstrom, 1954; Ford, Bacon & Davis, 1951; Smith, W. H., 1952.  
 Heating values: Flynn, 1949.  
 Hocking County: Brant, 1954a, 1956, 1960; DeBrosse, 1957; DeLong, 1957; Granchi, 1958.  
 Holmes County: Brant, 1952a, 1956, 1960; DeLong, 1957; Ford, Bacon & Davis, 1951; Granchi, 1958.  
 Jackson County: Brant, 1954a, 1956, 1960; DeLong, 1957; Ford, Bacon & Davis, 1951; Granchi, 1958; Morrow, 1956.  
 Jefferson County: Brant, 1954a, 1956, 1960; DeBrosse, 1957; DeLong, 1955; Denton, 1960; Ford, Bacon & Davis, 1951; Limstrom, 1950a; Smith, W. H., 1952.  
 Lawrence County: Brant, 1954a, 1956, 1960; DeBrosse, 1957; DeLong, 1955, 1957; Ford, Bacon & Davis, 1951; Granchi, 1958.  
 Licking County: Brant, 1960; Granchi, 1958.  
 Lower Freeport coal bed: Brant, 1956.  
 Lower Kittanning (No. 5) coal bed: Brant, 1954a, 1956.  
 Mahoning coal bed: DeBrosse, 1957.

## Coal - continued

Mahoning County: Brant, 1954a, 1956, 1960; Ford, Bacon & Davis, 1951; Granchi, 1958.  
 Medina County: Brant, 1960; Granchi, 1958.  
 Meigs County: Brant, 1954a, 1956, 1960; Cross, A. T., 1956; DeBrosse, 1957; DeLong, 1955, 1957; Denton, 1960; Ford, Bacon & Davis, 1951.  
 Meigs Creek (No. 9) coal bed: Cady, 1955; Fagerstrom, 1954; Krumin, 1952, 1957; Smith, W. H., 1952.  
 Mercer coal beds: Granchi, 1958.  
 Middle Kittanning (No. 6) coal bed: Brant, 1956; Merrill, 1951.  
 Mine fires: Griffin, 1960.  
 Monongahela group: Denton, 1960.  
 Monroe County: Brant, 1960; DeBrosse, 1957; DeLong, 1955; Denton, 1960; Ford, Bacon & Davis, 1951; Smith, W. H., 1952.  
 Morgan County: Brant, 1954a, 1956, 1960; DeBrosse, 1957; DeLong, 1955; Denton, 1960; Ford, Bacon & Davis, 1951; Norling, 1958; Smith, W. H., 1952.  
 Muskingum County: Brant, 1954a, 1956, 1960; DeBrosse, 1957; DeLong, 1955, 1957; Ford, Bacon & Davis, 1951; Granchi, 1958; Smith, W. H., 1952.  
 New Straitsville mine fire: Griffin, 1960.  
 Noble County: Brant, 1954a, 1956, 1960; DeBrosse, 1957; DeLong, 1955; Denton, 1960; Ford, Bacon & Davis, 1951; Smith, W. H., 1952.  
 Ohio Geological Survey coal section: Klein, 1953; Smith, W. H., 1952a.  
 Perry County: Brant, 1954a, 1956, 1960; DeBrosse, 1957; Flint, N. K., 1951; Ford, Bacon & Davis, 1951; Granchi, 1958.  
 Petrology: Cady, 1954, 1955, 1955a, 1958; Parks, 1956.  
 Pike County: Brant, 1960; Granchi, 1958.  
 Pittsburgh (No. 8) coal bed: Berryhill, H. L., 1955; Cross, A. T., 1954; DeLong, 1955; Smith, G. E., 1951, 1952.  
 Pomeroy (No. 8A) coal bed: See also Redstone (No. 8A) coal bed.  
 Cross, A. T., 1956.  
 Portage County: Brant, 1960; Granchi, 1958.  
 Pottsville group: Granchi, 1958.  
 Production: Alloway, 1953, 1954, 1955, 1956; Brant, 1960; Kefauver, 1957, 1958, 1959, 1960; Klein, 1952; Ohio Dept. Industrial Relations; Ohio Geol. Survey, 1956; U. S. Bur. Mines.  
 Quakertown (No. 2) coal bed: Granchi, 1958.  
 Redstone (No. 8A) coal bed: See also Pomeroy (No. 8A) coal bed.  
 DeLong, 1955.  
 Replacement by clastics: Merrill, 1951.  
 Research: Brant, 1954; Cady, 1952, 1954; Denton, 1959; Klein, 1953; Smith, W. H., 1952a.  
 Reserves: Berryhill, H. L., 1955; Brant, 1954, 1954a, 1956, 1957, 1958, 1960; DeBrosse, 1957; DeLong, 1955, 1957; Denton, 1960; Ford, Bacon & Davis, 1951; Granchi, 1958; Keystone Coal Buyers; Smith, W. H., 1952.  
 Resources: Averitt, 1953; Brant, 1957a; Schanz, 1958; Wier, 1959.  
 Scioto County: Brant, 1954a, 1956, 1960; DeLong, 1957; Granchi, 1958.  
 Seams: Collins, H. R., 1960; Keystone Coal Buyers Manual  
 Sharon (No. 1) coal bed: Granchi, 1958.  
 Southeastern Ohio: Cross, A. T., 1954; Merrill, 1951.  
 Stark County: Brant, 1954a, 1956, 1960; DeLong, 1957; Ford, Bacon & Davis, 1951; Granchi, 1958.

## Coal - continued

Stratigraphy: Brant, 1960; Cross, A. T., 1954; Wier, 1959.  
 Strip-mine land: Copelan, 1959a; Dickman, 1960; Flaler, 1952; Knudsen, 1954; Miller, D. P., 1954, 1957, 1958; Riley, C. V., 1960.  
 Strip-mine overburden: Limstrom, 1950, 1950a, 1951, 1951a.  
 Studies: Smith, W. H., 1956.  
 Summit County: Brant, 1960; Granchi, 1958.  
 Thickness of seams: Young, 1952.  
 Tionesta (No. 3B) coal bed: Granchi, 1958.  
 Trumbull County: Brant, 1960; Granchi, 1958.  
 Tuscarawas County: Brant, 1954a, 1956, 1960; DeBrosse, 1957; DeLong, 1957; Ford, Bacon & Davis, 1951; Granchi, 1958; Lamborn, 1956.  
 Uniontown (No. 10) coal bed: Denton, 1960.  
 Upper Freeport (No. 7) coal bed: Brant, 1956; Carmin, 1943.  
 Vinton County: Brant, 1954a, 1956, 1960; DeLong, 1957; Ford, Bacon & Davis, 1951; Granchi, 1958; Moulton, 1957.  
 Washability: Krumin, 1952, 1957.  
 Washington (No. 12) coal bed: Denton, 1960.  
 Washington County: Brant, 1960; DeBrosse, 1957; DeLong, 1955; Denton, 1960; Ford, Bacon & Davis, 1951; Smith, W. H., 1952.  
 Wayne County: Brant, 1954a, 1956, 1960; DeLong, 1957; Granchi, 1958.  
 Waynesburg (No. 11) coal bed: Denton, 1960.  
 Wilgus coal bed: DeBrosse, 1957.  
 Coalified wood: Bregner, 1955.  
 Coal oil: Karrick, 1947; Krumin, 1951; Smith, W. H., 1951.  
 Coke and coal chemicals: U. S. Bureau Mines.  
 Columbiana County: See also Glacial geology; Oil and gas; Pennsylvanian.  
 Allegheny coal correlation: Denton, 1957.  
 Coal: Brant, 1954a, 1956, 1960; DeBrosse, 1957; Denton, 1957; Ford, Bacon & Davis, 1951; Granchi, 1958.  
 Glacial geology: White, G. W., 1951.  
 Ground water: Cummins, 1960, 1960b; Schmidt, James J., 1959b, 1959c.  
 Limestone: Lamborn, 1951.  
 Soil: Lessig, 1959, 1959b.  
 Strip-mine overburden: Limstrom, 1950.  
 Water resources: Cross, W. P., 1952.  
 Concretions: Clifton, 1957; Jackson, H. E., 1957; Seyfried, 1953; Anonymous, 1945.  
 Cone-in-cone: Horstman, 1954.  
 Conservation:  
 Caves: Smith, P. M., 1953a.  
 Natural resources: Leighton, 1953; Nave, 1956.  
 Strip-mine land: Cole, 1955; Copelan, 1959a; Dickman, 1960; Flaler, 1952; Miller, D. P., 1954, 1957, 1958; Riley, C. V., 1960.  
 Water: Crawford, 1951; Ohio Division Water, 1955; Youngquist, 1951.  
 Contorted beds: Brooks, H. K., 1958.  
 Correlation: Carpenter, 1960; Cross, A. T., 1956; Denton, 1957; Dunbar, 1960; Forsyth, 1960, 1960a; Gutstadt, 1958; Lieftinck, 1957; Meyerhoff, 1922; Shepps, 1952, 1953; Twenhofel, 1954; Uhri, 1954; Zumberge, 1960.  
 Coshocton County: See also Oil and gas; Pennsylvanian.  
 Coal: Brant, 1954a, 1956, 1960; DeLong, 1957; Ford, Bacon & Davis, 1951; Granchi, 1958.  
 General geology: Lamborn, 1953.

- Coshocton County - continued  
 Gravity anomaly: Mourad, 1959.  
 Limestone: Lamborn, 1951.  
 Strip-mine overburden: Limstrom, 1951.
- Crawford County: See also Devonian; Glacial geology.  
 Columbus limestone: Struble, 1952; Summerson, 1957.  
 Delaware limestone: Struble, 1952; Summerson, 1957.  
 Economic geology: Hall, J. F., 1956.  
 Glacial geology: Gregory, 1956.  
 Ground water: Schmidt, James J., 1960a, 1960b.  
 Cryptovolcanic structure: Bucher, 1933; Dietz, 1960; Sappenfield, 1951.
- Cuyahoga County: See also Devonian; Glacial geology; Lake Erie; Mississippian.  
 Buried valleys: Winslow, J. D., 1957a.  
 Cuyahoga formation: Szmuc, 1957, 1959.  
 Engineering geology: Kauer, 1956; Peck, 1955; Anonymous, 1960.  
 Field guide: Frank, 1958.  
 General geology: Pedry, 1951; Winslow, J. D., 1953.  
 Germanium: Bregner, 1955.  
 Glacial geology: Bagley, 1953; White, G. W., 1953; Winslow, J. D., 1958.  
 Lake Erie: Saville, 1953.  
 Lake Erie shore: Kleinhampl, 1952, 1953; Tinker, 1959; U. S. Army Corps Engineers, 1950, 1953a, 1954.  
 Mass wasting: Savage, 1951.  
 Mineral collecting: Williams, H. R., 1936.  
 Paleobotany: Winslow, M. R., 1954.  
 Paleontology: Harris, 1951; Leonard, 1953; Szmuc, 1957.  
 Radiocarbon dating: Suess, 1954.  
 Soil: Smith, T. R., 1960a; White, G. W., 1953.  
 Stratigraphy: deWitt, 1951.  
 Uranium: Bregner, 1955.  
 Water: Frost, 1959; Winslow, J. D., 1953.
- Cuyahoga River valley:  
 Foundation conditions: Peck, 1955.  
 Water inventory: Frost, 1959.
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- Darke County: See also Glacial geology; Silurian; Western Ohio.  
 Glacial geology: Smith, J. M., 1949; Thorp, 1957.  
 Ground water: Walker, 1960a.
- Deep wells: See Cambrian; Precambrian; Subsurface geology.
- Defiance County: See also Glacial geology; Oil and gas.  
 Glacial geology: Forsyth, 1960; Kahle, 1957.  
 Ground water: Ohio Div. Water, 1960; Walker, 1959f, 1959g, 1959h, 1959i.
- Delaware County: See also Devonian; Glacial geology; Limestone.  
 Columbus limestone: Moore, 1951; Summerson, 1957.  
 Delaware limestone: Moore, 1951; Summerson, 1957.  
 Field guide: Bond, 1959; Ohio Acad. Sci., 1953.  
 Ground water: Schmidt, James J., 1960a, 1960b, 1960c, 1960d.  
 Paleontology: Kelsey, 1957; Sinclair, 1956.  
 Soil: Ohio Div. Lands and Soil, 1960a; Smith, T. R., 1960b.
- Dessication cracks: Fagerstrom, 1955.
- Devonian (Stratigraphic geology): See also under Paleobotany; Paleontology; Petrology.  
 Adams County: Stephens, 1953; Thomas, R. N., 1955.  
 Black shale: See also Ohio shale.  
 Bregner, 1955; Cross, A. T., 1951; Strahl, 1959.  
 Bone bed: Stewart, 1956.  
 Boundary with Mississippian: Hyde, J. E., 1953; VerWiebe, 1918.  
 Chagrin shale: Hoover, 1960.  
 Cleveland shale: Collins, R. F., 1924; Hoover, 1960; Roberts, 1960.  
 Columbus limestone: Baltimore and Ohio Railroad Company; Moore, 1951; Morrison, G. A., 1943; Stauffer, 1957; Stewart, 1955; Struble, 1952; Summerson, 1957; Swartz, 1904.  
 Cuyahoga County: Pedry, 1951.  
 Delaware County: Moore, 1951.  
 Delaware limestone: Moore, 1951; Stewart, 1955; Struble, 1952; Summerson, 1957.  
 Detroit River group: Ehlers, G. M., 1950; Taylor, 1951; Tharp, 1945.  
 Franklin County: Moore, 1951.  
 Geauga County: Pedry, 1951.  
 General: Carman, 1955a; deWitt, 1951; Ehlers, 1951, 1952; Frank, 1958; LaRocque, 1955; Pedry, 1951.  
 Hillsboro sandstone: Brown, J. L., 1951.  
 Huron shale: Hoover, 1960.  
 Limestones: Jackson, R. R., 1952; Morrison, G. A., 1943; Stewart, 1955.  
 Logan County: Carman, 1955a; Stephens, 1953.  
 Lorain County: Rogers, 1953; Treuttner, 1954.  
 Lucas County: Carman, 1960; Ehlers, G. M., 1951, 1952.  
 Northern Ohio: Nelson, 1955, 1955a.  
 Ohio shale: Brown, J. L., 1951; Clifton, 1957; Hoover, 1956, 1960; Jillson, 1926; Rich, 1951, 1953; Seyfried, 1953; Shaler, 1877; Stephens, 1953.  
 Oil and gas: Hall, J. F., 1952a; Magbee, 1954; Thomas, R. N., 1951, 1955.  
 Olentangy shale: Hoover, 1960.  
 Oriskany sand: Brown, J. L., 1951; Hall, J. F., 1952a.  
 Ross County: Carman, 1955; Stephens, 1953.  
 Scioto County: Thomas, R. N., 1955.  
 Shale: Carman, 1960; Hoover, 1960.  
 Subsurface: Duggan, 1952; Fettke, 1952a; Flowers, 1952; Freeman, 1951; Rogers, 1953; Shearrow, 1957a; Treuttner, 1954.  
 Sylvania sandstone: Brown, J. L., 1951.  
 Tioga bentonite: Fettke, 1953a.
- Diamonds: Hobbs, 1899; Wuestner, 1938.  
 Dimension stone: See also Limestone; Sandstone; Stone. Ohio Dept. Industrial Relations.  
 Dolomites: See also Limestone.  
 Davis, 1957; Smith, R. W., 1957.  
 Dover quadrangle: Pepper, 1953.  
 Drainage basins: Krolczyk, 1954.  
 Drainage changes: Coffey, 1958; Dove, 1960; Focke, 1928; Hays, 1951; Janssen, 1953; Lamborn, 1953, 1956; Norris, 1951, 1959c; Stout, 1953.
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- Earthquakes: Heck, 1958; Walter, 1951; White, 1952.  
 Earth science teaching: Marple, 1955.

Eastern Ohio: See also county names.

Limestones: Lamborn, 1951.

Oil and gas: Mahaffey, 1954a.

East Liberty quadrangle: Baumiller, 1917.

Ecology of water areas in strip-mine land: Riley, C. V., 1960.

Economic geology: See also the names of specific mineral resources and products.

Athens County: Sturgeon, 1958.

Clays: DePablo, 1960; Johnson, J. E., 1957; Slavens, 1928.

Coshocton County: Lamborn, 1953.

Crawford County: Hall, J. F., 1956.

Geauga County: Bowen, C. H., 1952, 1953.

General: Alloway, 1954, 1955, 1956; Bowen, C. H., 1953a; Copeland, 1960; Hoover, 1957, 1959; Kah, 1960; Kaufman, 1956; Kerr, J. R., 1958, 1958a; Kieran, 1934; Krickich, 1959, 1959a, 1960; Lund, 1951; Melcher, 1957; Melvin, 1925b; Mote, 1955; Nold, 1954; Ohio Chamber of Commerce; Ohio Dept. Industrial Relations; Ohio Development and Publicity Commission, 1950; Ohio Geol. Survey, 1953, 1957, 1959; Reynolds, J., 1952; Robey, 1959; Stanchina, 1959, 1960; U. S. Bur. Mines; Watkins, D. G., 1953; Wright, A. J., 1953.

Guernsey County: Carmin, 1943.

Gypsum: Gutchick, 1956.

Iron ore: Carr, 1959.

Jackson County: Morrow, 1956.

Knox County: Root, 1958.

Lightweight aggregates: Bowen, C. H., 1955; Everhart, J. O., 1958; Johnson, J. E., 1957.

Lime: Johnson, L. E., 1951; Patterson, 1960

Marion County: Hall, J. F., 1956.

Monroe County: Arkle, 1953.

Morgan County: Norling, 1957, 1958.

Morrow County: Hall, J. F., 1956.

Ottawa County: Gutchick, 1956.

Perry County: Flint, N. K., 1951.

Portage County: Bowen, C. H., 1952, 1953; Cochran, 1959; Anonymous, 1953.

Refractory material: Bole, 1951.

Sand: Schaleman, 1953; Gilfillan, 1959.

Silica: Bowen, C. H., 1952, 1953; Cochran, 1959; Murphy, 1960; Anonymous, 1953.

Southeastern Ohio: Bengston, 1950; Bole, 1951.

Tax laws: Bowers, 1951.

Tuscarawas County: Lamborn, 1956.

Uranium: Hoover, 1956; Lamey, 1956.

Washington County: Smith, B. E., 1960.

Wayne County: Multer, 1955.

Wyandot County: Hall, J. F., 1956.

Electron micrography: Droste, 1958.

Engineering geology:

Foundation conditions: Peck, 1955.

Highway: Hyland, 1954; Kauer, 1956; Marshall, 1952, 1953; Mason, 1954; Norris, 1954; Philbrick, 1953; Supp, 1954; Woods, 1953.

Lake Erie: Pincus, 1960a.

Mass wasting: Savage, 1951.

Ohio shale: Anonymous, 1960.

Erie County: See also Devonian; Glacial geology; Lake Erie.

Beach sand: Lundahl, 1942; Ridge, 1932.

Columbus limestone: Struble, 1952; Summerson, 1957.

Delaware limestone: Struble, 1952.

Field guide: Coash, 1957.

Glacial geology: Campbell, 1955.

Erie County - continued

Lake Erie bottom deposits: Ohio Div. Shore Erosion, 1957a; Pincus, 1951a.

Lake Erie islands: Jackson, J. H., 1950.

Lake Erie shore: Pincus, 1960a; Tinker, 1959; U. S. Army Corps Engineers, 1952a.

Paleontology: Clark, 1958; Kelsey, 1957; Stumm, 1953, 1953a.

Radiocarbon dating: Rubin, 1958.

Sand dredging areas: Hartley, 1960; Ohio Div. Shore Erosion, 1956a, 1957.

Shore line processes: Bowman, 1953; Goodman, 1956; Metter, 1952, 1953; Pincus, 1951a.

Erosion: See Geomorphology; Shore erosion, under Lake Erie.

Stream: Lamar, W. L., 1956.

Evaporites: Briggs, 1958.

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Fairfield County: See also Glacial geology; Mississippian; Oil and gas.

Berne conglomerate: Swick, 1956.

General: Stout, 1958.

Glacial geology: Conley, 1956; Kempton, 1956, 1959.

Ground water: Schmidt, James J., 1960c; Walker, 1958a, 1958b.

Limestone: Lamborn, 1951.

Paleobotany: Sudia, 1952.

Paleontology: LaRocque, 1956.

Standing Stone: Stout, 1952.

Stratigraphy: Hyde, J. E., 1953.

Structure: Erickson, 1959; Kantrowitz, 1959.

Fayette County: See also Glacial geology; Silurian.

Field guide: Goldthwait, 1952a.

Greenfield formation: Miller, P. M., 1956.

Paleontology: Leutze, 1958.

Structure: Kantrowitz, 1959.

Tymochtee formation: Miller, P. M., 1956.

Field guides:

Adams County: Thomas, R. N., 1955.

Athens County: Sturgeon, 1954.

Belmont County: Cross, A. T., 1950.

Champaign County: Goldthwait, 1952a.

Clark County: Bernhagen, 1960; Goldthwait, 1952a.

Cuyahoga County: Frank, 1958.

Delaware County: Bond, 1959; Ohio Acad. Sci., 1953.

Erie County: Coash, 1957.

Fayette County: Goldthwait, 1952a.

Franklin County: Bond, 1959; Goldthwait, 1952a; Ohio Acad. Sci., 1953.

Geauga County: White, G. W., 1952.

Greene County: Bernhagen, 1960; Goldthwait, 1952a.

Logan County: Carman, 1955a.

Lucas County: Ehlers, G. M., 1951, 1952.

Monroe County: Cross, A. T., 1950.

Pickaway County: Goldthwait, 1952a.

Portage County: Pettit, 1954; White, G. W., 1952.

Route 40: Smyth, 1955.

Sandusky County: Coash, 1957.

Scioto County: Thomas, R. N., 1955.

Seneca County: Coash, 1957.

Southwestern Ohio: Goldthwait, 1955; Slaughter, 1953.

Summit County: Frank, 1958.

Washington County: Cross, A. T., 1950.

Field trip: Goldthwait, 1952b.

- Flint Ridge: Pagnucco, 1959; Riley, M. S., 1947; Schiefer, 1936; Zeitner, 1956; Anonymous, 1942.
- Flood control: Dawson, 1959; U. S. Army Corps Engineers, 1948.
- Floods: Archer, 1950; Cross, W. P., 1959a, 1959b; U. S. Geol. Survey, 1954, 1959.
- Fluxstone: Ohio Chamber of Commerce, 1957; Smith, R. W., 1957.
- Fluorite: Gunnell, 1933; Howard, C. L. H., 1959; Montague, 1948; Morrison, R. B., 1934; Anonymous, 1940.
- Fossil trails: Nosow, 1960.
- Fossils: See Paleobotany; Paleontology.
- Foundry sand: Ohio Chamber of Commerce, 1949, 1950; Williams, D. C., 1950.
- Franklin County: See also Devonian; Glacial geology; Mississippian.
- Columbus limestone: Moore, 1951; Summerson, 1957.
- Delaware limestone: Moore, 1951; Summerson, 1957.
- Electrical resistivity: Mayhew, 1960.
- Field guide: Bond, 1959; Goldthwait, 1952a; Ohio Acad. Sci., 1953; Smyth, 1955.
- Geodesy: Ryan, 1960.
- General geology: Schmidt, James J., 1958.
- Glacial geology: Schmidt, James J., 1958.
- Ground water: Norris, 1956, 1959; Schmidt, James J., 1958, 1960b, 1960d, 1960e.
- Mineral collecting: Anonymous, 1945.
- Paleontology: Aukeman, 1960; Cornejo, 1959.
- Photogrammetric map: Williamson, 1957.
- Radiocarbon dating: Rubin, 1956.
- Soil: Baker, F. J., 1960b.
- Structure: Kantrowitz, 1959.
- Free air anomaly map: Heiskanen, 1956.
- Fulton County: See also Glacial geology.
- Engineering geology: Kauer, 1956.
- Ground water: Ohio Div. Water, 1960; Walker, 1959g, 1959i, 1959j, 1959k.
- Oak openings: Shearer, 1951.
- Soil: Boyce, 1960.
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- Gallia County: See also Coal; Oil and gas; Pennsylvanian.
- Acid mine drainage: Cole, 1955.
- Coal: Brant, 1954a, 1956, 1960; Cross, A. T., 1956; DeBrosse, 1957; DeLong, 1955, 1957; Denton, 1960; Ford, Bacon & Davis, 1951.
- Economic geology: Bengston, 1950.
- General geology: Blake, 1952.
- Limestone: Lamborn, 1951.
- Strip-mine overburden: Limstrom, 1951a.
- Geauga County: See also Glacial geology; Mississippian; Pennsylvanian.
- Clay minerals: Droste, 1956a.
- Coal: Granchi, 1958.
- Cuyahoga formation: Szmuc, 1957.
- Field guide: White, G. W., 1952.
- General geology: Pedry, 1951.
- Glacial geology: Baker, J., 1957; White, G. W., 1952.
- Ground water: Cummins, 1960a; Pree, 1960, 1960a; Tague, 1953.
- Limestone: Lamborn, 1951.
- Geauga County - continued
- Paleontology: Bowen, A. S., 1951, 1951a.
- Sharon conglomerate: Bowen, C. H., 1952, 1953; Fuller, 1955.
- Soil: Smith, T. R., 1956.
- Stratigraphy: Bowen, A. S., 1951; deWitt, 1951.
- Water: Frost, 1959.
- General geology:
- Ashtabula County: Christopher, 1959.
- Athens County: Aukland, 1952; Schuh, 1953; Sturgeon, 1958.
- Belmont County: Smyth, 1955.
- Bibliography: King, R. R., 1955, 1956, 1957, 1957a, 1959, 1960; Watkins, D. G., 1953a.
- Butler County: Lind, 1957; Scheufler, 1956; Shafor, 1959; Smallwood, 1958.
- Clark County: Norris, 1952; Smyth, 1955.
- Coshocton County: Lamborn, 1953.
- Crawford County: Hall, J. F., 1956.
- Cuyahoga County: Winslow, J. D., 1953.
- Delaware County: Ohio Acad. Sci., 1953.
- Erie County: Coash, 1957.
- Fairfield County: Stout, 1958.
- Franklin County: Ohio Acad. Sci., 1953; Schmidt, James J., 1958; Smyth, 1955.
- Gallia County: Blake, 1952.
- Guernsey County: Smyth, 1955; Unklesbay, 1940.
- Harrison County: Fagerstrom, 1953, Lehman, 1954.
- Hocking County: Hall, J. F., 1951, 1952.
- Jackson County: Weiss, R. M., 1951.
- Knox County: Root, 1958.
- Lake County: Christopher, 1959.
- Lake Erie area: Hough, 1958.
- Licking County: Dove, 1960a; Franklin, 1953; Smyth, 1955.
- Logan County: Baumiller, 1917.
- Lucas County: Farnsworth, D. W., 1958.
- Madison County: Norris, 1959b; Smyth, 1955.
- Mahoning County: Galaida, 1941.
- Marion County: Hall, J. F., 1956.
- Miami County: Smyth, 1955.
- Monroe County: Arkle, 1953.
- Montgomery County: Smyth, 1955.
- Morgan County: Norling, 1957, 1958.
- Morrow County: Hall, J. F., 1956.
- Muskingum County: Smyth, 1955.
- Ohio: Keating, 1824; Lyell, 1845; Wright, A. J., 1953.
- Perry County: Flint, N. K., 1951.
- Pike County: Jessup, 1951.
- Portage County: Farnsworth, C., 1957; Winslow, J. D., 1957.
- Preble County: Lind, 1957; Smyth, 1955.
- Sandusky County: Coash, 1957.
- Seneca County: Coash, 1957.
- Summit County: Savage, 1951a; Smith, R. C., 1953a.
- Trenton quadrangle: Shafor, 1959.
- Tuscarawas County: Lamborn, 1956.
- Union County: Baumiller, 1917.
- Vinton County: Marple, 1954.
- Washington County: Kellenberger, 1960; Smith, B. E., 1960; Stearns, 1957.
- Wood County: Farnsworth, D. W., 1958.
- Wyandot County: Hall, J. F., 1956.
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- Geography: See also Economic geology.
- Lake Erie Islands: Jackson, J. H., 1950.
- Ohio: Wright, A. J., 1953.
- Geologic data: Smith, W. H., 1955.



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  - Champaign County: Nave, 1956.
  - Clark County: Nave, 1956.
  - Coshocton County: Lamborn, 1953.
  - Cuyahoga County: Frank, 1958; Pedry, 1951; Winslow, J. D., 1953.
  - Delaware County: Bond, 1959.
  - Erie County: Coash, 1957.
  - Franklin County: Bond, 1959.
  - Gallia County: Blake, 1952.
  - Geauga County: Pedry, 1951.
  - Greene County: Nave, 1956.
  - Harrison County: Fagerstrom, 1953; Lehman, 1954.
  - Highland County: Bowman, 1956.
  - Hocking County: Hall, J. F., 1951.
  - Jackson County: Weiss, R. M., 1951.
  - Knox County: Root, 1958.
  - Licking County: Crombie, 1952; Franklin, 1953.
  - Logan County: Carman, 1955a.
  - Morgan County: Norling, 1957, 1958.
  - Perry County: Flint, N. K., 1951.
  - Pike County: Jessup, 1951.
  - Sandusky County: Coash, 1957.
  - Seneca County: Coash, 1957.
  - Stark County: Baroffio, 1958; Gray, 1954; Seik, 1959.
  - Summit County: Frank, 1958.
  - Trumbull County: King, E. L., 1952.
  - Tuscarawas County: Lamborn, 1956.
  - Wayne County: Multer, 1955.
- Geologic names: Wilson, D., 1959.
- Geological research: Melvin, 1952; Pincus, 1960.
- Geomorphology: See also Drainage changes; Glacial geology.
- Athens County: Sturgeon, 1958.
  - Clark County: Norris, 1951.
  - Coshocton County: Lamborn, 1953.
  - Cuyahoga County: Kleinhampl, 1952, 1953.
  - Drainage pattern: Tritschler, 1956.
  - Erie County: Campbell, 1955.
  - General: Goldthwait, 1959; Horberg, 1956; Wright, A. J., 1953.
  - Greene County: Norris, 1951.
  - Hamilton County: Mase, 1952.
  - Hocking River valley: Kempton, 1956, 1959; Merrill, 1953.
  - Huron County: Campbell, 1955.
  - Knox County: Root, 1958.
  - Lake Erie shore: Humphris, 1952, 1953; Kleinhampl, 1952.
  - Landslide: Marshall, 1953; Mase, 1952.
  - Lorain County: Kleinhampl, 1952, 1953.
  - Madison County: Norris, 1951.
  - Montgomery County: Norris, 1951.
  - Morgan County: Norling, 1957, 1958.
  - New-Kanawa River system: Williams, L., 1935.
  - Ohio River valley: Carlston, 1957; Tight, 1902; Wayne, 1952.
  - Ottawa County: Humphris, 1952.
  - Perry County: Flint, N. K., 1951.
  - Physiographic map: Bier, 1956.
  - Sandusky Bay: Humphris, 1952.
  - Slope: Garrigus, 1958, 1959.
  - Southeastern Ohio: Hubbard, 1954.
- Geomorphology - continued
- Terraces: Hubbard, 1954; Kempton, 1956, 1959; Lessig, 1959a, 1959b.
  - Tuscarawas County: Lamborn, 1956.
  - Warren County: Tritschler, 1956.
- Geophysics:
- Gravity: Heiskanen, 1956; Kaula, 1954; Mourad, 1959.
  - Highway engineering: Mason, 1954.
  - Magnetic survey: Miller, H. D., 1951.
  - Resistivity methods: Spicer, 1954.
  - Seismography: Pakiser, 1956; Warrick, 1960.
  - Time of flow study: Straub, 1958.
- Germanium: Bregner, 1955; Ohio Chamber of Commerce, 1953; Stadnichchenko, 1953.
- Glacial geology: See also Drainage changes; Pleistocene and Recent deposits; and under names of the counties.
- Allen County: Kahle, 1957.
  - Ashtabula County: Christopher, 1959.
  - Athens County: Kempton, 1956, 1959.
  - Auglaize County: Kahle, 1957.
  - Beach ridges: Forsyth, 1959.
  - Buried soil: Forsyth, 1956a, 1958; Lessig, 1959.
  - Butler County: Breene, 1956, 1957; Flint, R. F., 1951; Shafor, 1959; Smith, J. M., 1949.
  - Carroll County: White, G. W., 1951.
  - Central Ohio: Forsyth, 1957a.
  - Champaign County: Goldthwait, 1952a; Nave, 1956.
  - Cincinnati area: Hays, 1951.
  - Clark County: Bernhagen, 1960; Goldthwait, 1952a; Nave, 1956; Norris, 1952.
  - Clinton County: Lamar, F. S., 1900.
  - Columbiana County: White, G. W., 1951.
  - Correlation of deposits: Forsyth, 1960, 1960a; Lieftinck, 1957; Shepps, 1952; Zumberge, 1960.
  - Crawford County: Gregory, 1956.
  - Cuyahoga County: Bagley, 1953; Frank, 1958; White, G. W., 1953; Winslow, J. D., 1958.
  - Darke County: Smith, J. M., 1949; Thorp, 1957.
  - Defiance County: Forsyth, 1960; Kahle, 1957.
  - Deglaciation: Antevs, 1953.
  - Eastern Ohio: Stout, 1953.
  - East Liberty quadrangle: Baumiller, 1917.
  - Erie County: Campbell, 1955; Coash, 1957.
  - Fairfield County: Conley, 1956; Kempton, 1956, 1959.
  - Fayette County: Goldthwait, 1952a.
  - Field guide: Carman, 1955a; Coash, 1957; Frank, 1958; Goldthwait, 1952a, 1955; Nave, 1956; White, G. W., 1952.
  - Franklin County: Goldthwait, 1952a; Norris, 1959c; Schmidt, James J., 1958.
  - Fulton County: Shearer, 1951.
  - Geauga County: Baker, J., 1957; White, G. W., 1952.
  - General: Coffey, 1958; Dove, 1960; Dreimanis, 1960; Flint, R. F., 1955, 1955a, 1956, 1957, 1957a; Forsyth, 1957; Geol. Soc. Amer., 1959; Goldthwait, 1953, 1954, 1958, 1959; Horberg, 1955, 1956; Martin, P. S., 1959; McGarey, 1960; White, G. W., 1952a.
  - Glacial boundary: Braun, 1951.
  - Glacial map: Geol. Soc. Amer., 1959.
  - Gravels: MacClintock, 1954.
  - Greene County: Bernhagen, 1960; Nave, 1956; Goldthwait, 1952a; Walton, 1960.
  - Hamilton County: Breene, 1956, 1957; Gilson, 1951.
  - Henry County: Kahle, 1957; Shearer, 1951.
  - Highland County: Forsyth, 1957.
  - Hocking County: Forsyth, 1957; Kempton, 1956, 1959.
  - Huron County: Campbell, 1955.

## Glacial geology - continued

- Illinoian boundary: Durrell, 1956.  
 Knox County: Forsyth, 1960a; Root, 1958.  
 Lake County: Christopher, 1959.  
 Licking County: Dove, 1960a; Jones, R. L., 1959.  
 Loess: Nat. Research Council, 1952; White, G. W., 1953.  
 Logan County: Baumiller, 1917; Carman, 1955a; Forsyth, 1956.  
 Lucas County: Shearer, 1951.  
 Madison County: Goldthwait, 1952; Norris, 1959b.  
 Mahoning County: White, G. W., 1951.  
 Montgomery County: Flint, R. F., 1951.  
 Muskingum County: Jones, R. L., 1959.  
 Northeastern Ohio: Droste, 1956; Focke, 1928; MacClintock, 1954; Shepps, 1952, 1953, 1958; Sitler, 1955, 1955a, 1957; White, G. W., 1951a, 1952b, 1957, 1960.  
 Northern Ohio: Forsyth, 1959; Zumberge, 1960.  
 Oak openings: Shearer, 1951.  
 Outwash terraces: Jones, R. L., 1959.  
 Paulding County: Baker, F. J., 1960.  
 Pickaway County: Goldthwait, 1952a; Schuster, 1952.  
 Portage County: White, G. W., 1952.  
 Preble County: Smith J. M., 1949; Thorp, 1957.  
 Putnam County: Kahle, 1957.  
 Radiocarbon dating: Flint, R. F., 1951, 1955, 1955a, 1956, 1957; Horberg, 1955.  
 Sandusky County: Coash, 1957.  
 Seneca County: Coash, 1957.  
 Shelby County: Forsyth, 1956, 1956a, 1958.  
 Southwestern Ohio: Durrell, 1956; Goldthwait, 1955; Gooding, 1959, 1960; Rich, 1956.  
 Stream flow: Brown, E. H., 1960.  
 Summit County: Frank, 1958.  
 Terraces: Jones, R. L., 1959; Kempton, 1956, 1959; Lessig, 1959, 1959a, 1959b.  
 Tills: Breene, 1956, 1957; Droste, 1956, 1956a, 1956b, 1957; Forsyth, 1960, 1960a; Gooding, 1959, 1960; Kahle, 1957; Rich, 1956; Shepps, 1952, 1953, 1958; Sitler, 1955, 1955a, 1957; White, G. W., 1952a, 1952b.  
 Trenton quadrangle: Shafor, 1959.  
 Union County: Baumiller, 1917.  
 Warren County: Tritschler, 1956.  
 Western Ohio: Forsyth, 1957a, 1960a; Goldthwait, 1958.  
 Glacial map: Geol. Soc. Amer., 1959.  
 Gold: Wuestner, 1938.  
 Gravity Anomaly: Mourad, 1959.  
 Gravity survey: Heiskanen, 1956.  
 Greene County: See also Glacial geology; Ordovician; Silurian.  
 Brassfield limestone: Pennell, 1952.  
 Field guide: Bernhagen, 1960; Goldthwait, 1952a; Nave, 1956.  
 Geomorphology: Norris, 1951.  
 Groundwater: Brown, E. H., 1960; Norris, 1957; Walker, 1960c, 1960f, 1960g; Walton, 1960.  
 Hydrology: Schneider, 1957.  
 Radiocarbon dating: Rubin, 1960.  
 Soil: Ohio Div. Lands and Soil, 1957; Roseler, 1960.  
 Stratigraphy: Freeman, 1953; Weiss, M. P., 1960a.  
 Structure: Kantrowitz, 1959.  
 Grenville boundary: Bass, M. N., 1960.  
 Ground water:

## Ground water - continued

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 Aquifer: Norris, 1957a.  
 Artesian: Tague, 1953; Toeppe, 1951.  
 Artificial recharge bibliography: Todd, 1959.  
 Ashtabula County: Cummins, 1960b, 1960c; Pree, 1960, 1960a, 1960b.  
 Athens County: Walker, 1958c, 1958d.  
 Auglaize County: Ohio Div. Water, 1960; Schmidt, James J., 1960; Walker, 1959, 1960a.  
 Belmont County: Schmidt, James J., 1959d, 1959e; Smith, R. C., 1955.  
 Bibliography: Todd, 1959; Vorhis, 1957.  
 Brown County: Ohio Div. Water, 1960a; Pree, 1960c, 1960e; Walker, 1960i, 1960k.  
 Buried valleys: Cummins, 1959; Norris, 1959c; Youngquist, 1958.  
 Butler County: Walker, 1960d, 1960e.  
 Carroll County: Schmidt, James J., 1959c.  
 Champaign County: Feulner, 1960; Schmidt, James J., 1960e; Walker, 1960, 1960b, 1960c.  
 Clark County: Brown, E. H., 1960; Norris, 1951, 1952; Walker, 1960b, 1960c, 1960f.  
 Clermont County: Walker, 1960i, 1960j, 1960k.  
 Clinton County: Walker, 1960g, 1960h, 1960i.  
 Columbiana County: Cross, W. P., 1952; Cummins, 1960, 1960b; Schmidt, James J., 1959b, 1959c.  
 Crawford County: Schmidt, James J., 1960a, 1960b.  
 Cuyahoga County: Winslow, J. D., 1953, 1957a.  
 Darke County: Walker, 1960a.  
 Defiance County: Ohio Div. Water, 1960; Walker, 1959f, 1959g, 1959h, 1959i.  
 Delaware County: Schmidt, James J., 1960a, 1960b, 1960c, 1960d.  
 Fairfield County: Schmidt, James J., 1960c; Walker, 1958a, 1958b.  
 Franklin County: Norris, 1956, 1959c; Schmidt, James J., 1958, 1960b, 1960d, 1960e.  
 Fulton County: Ohio Div. Water, 1960; Walker, 1959g, 1959i, 1959j, 1959k.  
 Geauga County: Cummins, 1960a; Pree, 1960, 1960a; Tague, 1953.  
 General: Lohr, 1954; Walker, 1958; Walton, 1955a.  
 Greene County: Brown, E. H., 1960; Norris, 1951, 1957; Walker, 1960c, 1960f, 1960g; Walton, 1960.  
 Guernsey County: Schmidt, James J., 1959a.  
 Hamilton County: Norris, 1957; Schmidt, James J., 1959; Walker, 1960e, 1960j, 1960k.  
 Hancock County: Ohio Div. Water, 1960; Walker, 1959d, 1959e.  
 Hardin County: Ohio Div. Water, 1960; Schmidt, James J., 1960; Walker, 1959c, 1959e; Walton, 1953.  
 Harrison County: Schmidt, James J., 1959c, 1959d.  
 Henry County: Ohio Div. Water, 1960; Walker, 1959f, 1959i, 1959j, 1959k.  
 Highland County: Ohio Div. Water, 1960a; Pree, 1960c, 1960d; Walker, 1960i.  
 Highway engineering: Norris, 1954.  
 Hocking County: Walker, 1958a, 1958b.  
 Jackson County: Walker, 1953a.  
 Jefferson County: Schmidt, James J., 1959c, 1959d; Smith, R. C., 1955.  
 Knox County: Schmidt, James J., 1960c.  
 Lake County: Pree, 1960a, 1960b.  
 Levels: Feulner, 1960a; Kaser, 1952, 1954, 1956, 1957, 1958; Schaefer, 1951, 1952, 1953; Van Tuyl, 1951, 1951a; Walton, 1955, 1956, 1956a.

## Ground water - continued

- Licking County: Dove, 1960a; Schmidt, James J., 1960c.  
 Logan County: Schmidt, James J., 1960, 1960e; Walker, 1960, 1960b.  
 Lucas County: Ohio Div. Water, 1960; Walker, 1959j, 1959k.  
 Madison County: Norris, 1951, 1956, 1959, 1959b; Schmidt, James J., 1960d, 1960e; Walker, 1960f.  
 Mahoning County: Cross, W. P., 1952; Cummins, 1960, 1960a, 1960b; Schmidt, James J., 1959b.  
 Marion County: Schmidt, James J., 1960, 1960a.  
 Medina County: Walker, 1959l.  
 Meigs County: Walker, 1958c, 1958d.  
 Mercer County: Ohio Div. Water, 1960; Walker, 1959.  
 Miami County: Walker, 1960a, 1960c.  
 Monroe County: Schmidt, James J., 1959a, 1959e.  
 Montgomery County: Norris, 1951, 1959a; Walker, 1960c, 1960d, 1960f.  
 Morgan County: Walker, 1958c.  
 Morrow County: Schmidt, James J., 1960b.  
 Noble County: Schmidt, James J., 1959a.  
 Ohio Turnpike: Schmidt, James J., 1954a.  
 Paulding County: Ohio Div. Water, 1960; Walker, 1959a, 1959b, 1959f.  
 Perry County: Walker, 1958a, 1958b.  
 Pickaway County: Norris, 1956.  
 Pike County: Pree, 1960d; Smith, R. C., 1953.  
 Portage County: Cross, W. P., 1952; Cummins, 1960; Walker, 1959j; Warrick, 1960; Winslow, J. D., 1957, 1957a.  
 Preble County: Toeppe, 1951.  
 Putnam County: Kaser, 1958; Ohio Div. Water, 1960; Walker, 1959a, 1959b, 1959c, 1959d, 1959f.  
 Recharging aquifers: Klaer, 1952; Norris, 1959a.  
 Ross County: Schmidt, James J., 1954.  
 Scioto County: Walker, 1953.  
 Seismic exploration: Walker, 1957; White, R. M., 1952.  
 Shelby County: Walker, 1959, 1960, 1960a.  
 Southeastern Ohio: Ohio Div. Water, 1959.  
 Stark County: Cross, W. P., 1952; Walker, 1959l.  
 Studies by resistivity methods: Spicer, 1954.  
 Summit County: Smith, R. C., 1953a; Walker, 1959l; Warrick, 1960.  
 Trumbull County: Cross, W. P., 1952; Cummins, 1960a, 1960b, 1960c; Pree, 1960.  
 Union County: Schmidt, James J., 1960, 1960d, 1960e.  
 Van Wert County: Ohio Div. Water, 1960; Walker, 1959, 1959a, 1959b, 1959f.  
 Warren County: Walker, 1960d, 1960f, 1960g, 1960h, 1960j.  
 Washington County: Schmidt, James J., 1959a; Walker, 1958c.  
 Western Ohio: Norris, 1957a.  
 Williams County: Ohio Div. Water, 1960; Walker, 1959g, 1959h, 1959i.  
 Wood County: Ohio Div. Water, 1960; Walker, 1959f, 1959j.
- Guernsey County: See also Coal; Oil and gas; Pennsylvanian.  
 Coal: Brant, 1954a, 1956, 1960; Carmin, 1943; DeBrosse, 1957; DeLong, 1955; Ford, Bacon & Davis, 1951; Smith, W. H., 1952.  
 Cow Run sandstone: Phillips, 1951.  
 Field guide: Smyth, 1955.

## Guernsey County - continued

- General geology: Unklesbay, 1940.  
 Ground water: Schmidt, James J., 1959a.  
 Limestone: Lamborn, 1951.  
 Strip-mine overburden: Limstrom, 1951a.  
 Guidebooks: See Field guide.  
 Gypsum:  
 Bibliography: Withington, 1960.  
 General: Gutchick, 1956; Ohio Chamber of Commerce, 1952; Ohio Dept. Industrial Relations; Ohio Geol. Survey, 1959.
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- Hamilton County: See also Cincinnati area; Ordovician; Paleontology; Southwestern Ohio.  
 Cynthiana limestone: Edwards, 1957.  
 Eden group: Edwards, 1957; Norman, 1959; Sharp, E. R., 1957.  
 Fracture study: Keller, 1957.  
 Geomorphology: Mase, 1952.  
 Glacial geology: Breene, 1956, 1957; Gilson, 1951.  
 Ground water: Norris, 1957; Schmidt, James J., 1959; Walker, 1960e, 1960j, 1960k.  
 Paleontology: Bass, I., 1957; Braun, 1912; Howard, H., 1951; Kesling, 1960a; Pulse, 1959; Schweinfurth, 1958; Shaw, 1960; Sweet, 1950; Turco, 1957; VanFossen, 1951; Warner, 1956; Wilkie, 1957.  
 Soil: Farnham, 1951.  
 Stratigraphy: Braun, 1912; Lattman, 1951, 1954; Weiss, M. P., 1960a.
- Hancock County: See also Glacial geology; Oil and gas; Silurian.  
 Gravity anomaly: Mourad, 1959.  
 Ground water: Ohio Div. Water, 1960; Walker, 1959d, 1959e.
- Hardin County: See also Glacial geology; Oil and gas; Silurian.  
 Gravity anomaly: Mourad, 1959.  
 Ground water: Ohio Div. Water, 1960; Schmidt, James J., 1960; Walker, 1959c, 1959e; Walton, 1953.
- Harrison County: See also Coal; Oil and gas; Pennsylvanian.  
 Coal: Brant, 1954a, 1956, 1960; DeBrosse, 1957; DeLong, 1955; Denton, 1960; Fagerstrom, 1954; Ford, Bacon & Davis, 1951; Smith, W. H., 1952.  
 Desiccation cracks in limestone: Fagerstrom, 1955.  
 General geology: Fagerstrom, 1953.  
 Ground water: Schmidt, James J., 1959c, 1959d.  
 Limestone: Lamborn, 1951.  
 Strip-mine overburden: Limstrom, 1950a, 1951.  
 Heavy minerals: Breene, 1956, 1957; Brown, J. L., 1951.
- Helium: Anderson, C. C., 1951; Boone, 1958.
- Henry County: See also Glacial geology.  
 Glacial geology: Kahle, 1957.  
 Gravity anomaly: Mourad, 1959.  
 Ground water: Ohio Div. Water, 1960; Walker, 1959f, 1959i, 1959j, 1959k.  
 Oak openings: Shearer, 1951.
- Highland County: See also Glacial geology; Ordovician; Silurian.  
 Brassfield limestone: Hopkins, 1954.  
 Elkhorn formation: Lindner, 1951.

## Highland County - continued

- Glacial geology: Forsyth, 1957.  
 Greenfield formation: Miller, P. M., 1956.  
 Ground water: Ohio Div. Water, 1960a; Pree, 1960c, 1960d; Walker, 1960i.  
 Heavy minerals in sandstone: Brown, J. L., 1951.  
 Magnetic survey: Miller, H. D., 1951.  
 Niagaran series: Bowman, 1956.  
 Pebbles formation: Mallin, 1951.  
 Soil: Farnham, 1951.  
 Stratigraphy: Weiss, M. P., 1960a.  
 Structure: Kantrowitz, 1959.  
 Tymochtee formation: Miller, P. M., 1956.  
 Highway engineering: See under Engineering.  
 Historical geology: See the various geologic ages.  
 History of geology: Caster, 1951a; Chamberlin, 1956.  
 Hocking County: See also Mississippian; Oil and gas; Pennsylvania.  
 Acid mine drainage: Cole, 1955.  
 Clay: Schultz, 1958.  
 Coal: Brant, 1954a, 1956, 1960; DeBrosse, 1957; DeLong, 1957; Granchi, 1958.  
 Core tests: Wertman, 1959.  
 Economic geology: Bengston, 1950.  
 General geology: Hall, J. F., 1951, 1952.  
 Geomorphology: Merrill, 1953.  
 Glacial geology: Forsyth, 1957; Kempton, 1956, 1959.  
 Ground water: Walker, 1958a, 1958b.  
 Limestone: Lamborn, 1951.  
 Stratigraphy: Hyde, J. E., 1953.  
 Strip-mine overburden: Limstrom, 1951a.  
 Structure: Erickson, 1959; Kantrowitz, 1959.  
 Hocking State Park: Hall, J. F., 1952.  
 Holmes County: See also Glacial geology; Oil and gas; Pennsylvania.  
 Clay: Schultz, 1958.  
 Coal: Brant, 1954a, 1956, 1960; DeLong, 1957; Ford, Bacon & Davis, 1951; Granchi, 1958.  
 Gravity anomaly: Mourad, 1959.  
 Limestone: Lamborn, 1951.  
 Oil and gas: Pepper, 1953.  
 Strip-mine overburden: Limstrom, 1951.  
 Huron County: See also Devonian; Glacial geology.  
 Glacial geology: Campbell, 1955.  
 Radiocarbon dating: Barendsen, 1957.  
 Hydrology: See Ground water; Stream flow; Water.

## I

- Insoluble residues: Carpenter, 1960; Hills, 1934; Summerson, 1957.  
 Iron industry: Marple, 1954; Morrow, 1956; Stout, 1933.  
 Iron ore: Bengston, 1950; Carr, 1959; Luttrell, 1957; Ohio Geol. Survey, 1959.  
 Irrigating: Evans, 1954.

## J

- Jackson County: See also Mississippian; Oil and gas; Pennsylvania.  
 Coal: Brant, 1954a, 1956, 1960; DeLong, 1957; Ford, Bacon & Davis, 1951; Granchi, 1958.  
 Economic geology: Bengston, 1950; Morrow, 1956.  
 General geology: Weiss, R. M., 1951.  
 Limestone: Lamborn, 1951.

## Jackson County - continued

- Stratigraphy: Hyde, J. E., 1953.  
 Strip-mine overburden: Limstrom, 1951a.  
 Vanport limestone: Teflian, 1952.  
 Water resources: Walker, 1953a.  
 Jefferson County: See also Oil and gas; Pennsylvanian.  
 Coal: Brant, 1954a, 1956, 1960; DeBrosse, 1957; DeLong, 1955; Denton, 1960; Ford, Bacon & Davis, 1951; Smith, W. H., 1952.  
 Ground water: Schmidt, James J., 1959c, 1959d.  
 Limestone: Lamborn, 1951.  
 Strip-mine overburden: Limstrom, 1950a.  
 Water resources: Smith, R. C., 1955.  
 Joints: Magbee, 1951.

## K

- Knox County: See also Glacial geology; Mississippian; Oil and gas.  
 General geology: Root, 1958.  
 Glacial geology: Forsyth, 1960a.  
 Ground water: Schmidt, James J., 1960c.  
 Limestone: Lamborn, 1951.  
 Paleontology: Rodriguez, 1957.

## L

- Lacustrine deposits: Campbell, 1955; Winslow, J. D., 1958.  
 Lake County: See also Devonian; Glacial geology; Lake Erie.  
 Earthquakes: Walter, 1951.  
 Ground water: Pree, 1960a, 1960b.  
 Lake Erie shore: Christopher, 1959; Gordon, 1956; Pincus, 1960a; Tinker, 1959; U. S. Army Corps Engineers, 1950a, 1954.  
 Limestone: Lamborn, 1951.  
 Salt mining: Cochran, 1960.  
 Sand dredging areas: Hartley, 1960; Ohio Div. Shore Erosion, 1956.  
 Sharon conglomerate: Fuller, 1955.  
 Shore erosion: Chierizzi, 1958; Christopher, 1955; U. S. Army Corps Engineers, 1950a, 1952, 1954.  
 Stratigraphy: Bowen, A. S., 1951.  
 Water inventory: Frost, 1959.  
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- Shore line features: Bowman, 1953; Pincus, 1959a; Tinker, 1959.
- Water movement: Verber, 1955.
- Lake Hope State Park: Marple, 1954.
- Landform map: Bier, 1956.
- Landslides: Marshall, 1953; Mase, 1952; Savage, 1951.
- Lawrence County: See also Oil and gas; Pennsylvanian; Southern Ohio.
- Clay: Schultz, 1958.
- Coal: Brant, 1954a, 1956, 1960; DeBrosse, 1957; DeLong, 1955, 1957; Ford, Bacon & Davis, 1951; Granchi, 1958.
- Economic geology: Bengston, 1950.
- Limestone: Lamborn, 1951.
- Strip-mine overburden: Limstrom, 1951a.
- Licking County: See also Mississippian; Oil and gas.
- Berne conglomerate: Swick, 1956.
- Coal: Brant, 1960; Granchi, 1958.
- Core tests: Wertman, 1959.
- Field guide: Smyth, 1955.
- Flint Ridge: Pagnucco, 1959; Riley, M. S., 1947; Schiefer, 1936; Zeitner, 1956; Anonymous, 1942.
- General geology: Crombie, 1952; Franklin, 1953.
- Glacial geology: Jones, R. L., 1959.
- Ground water: Schmidt, James J., 1960c.
- Limestone: Lamborn, 1951.
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- Stratigraphy: Crombie, 1952; Hyde, J. E., 1953.
- Water resources: Dove, 1960a.
- Lightweight aggregates: See Aggregates.
- Lime: See under Limestone.
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- Athens County: Sturgeon, 1958.
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- Crawford County: Hall, J. F., 1956.
- Eastern Ohio: Lamborn, 1951.
- Erie County: Jackson, J. H., 1950.
- Fluxstone: Smith, R. W., 1957.
- General: Baltimore and Ohio Railroad Co.; Lamborn, 1951; Ohio Chamber of Commerce, 1958; Ohio Dept. Industrial Relations; Ohio Geol. Survey, 1959; U. S. Bur. Mines.
- Lime: Johnson, L. E., 1951; Ohio Chamber of Commerce, 1958; Patterson, 1960; U. S. Bur. Mines.
- Marion County: Hall, J. F., 1956.
- Maxville: Bowen, C. H., 1954a.
- Morrow County: Hall, J. F., 1956.
- Ottawa County: Jackson, J. H., 1950.
- Perry County: Flint, N. K., 1951.
- Summit County: Morrison, G. A., 1943.
- Vanport: Teflian, 1952.
- Wyandot County: Hall, J. F., 1956.
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- Sedimentation: Mohler, 1958.
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- Carbonate rocks: Keeler, 1941.
- Elkhorn formation: Lindner, 1951.
- Saluda formation: Garrison, 1954.
- Loess: National Research Council, 1952; White, G. W., 1953.
- Logan County: See also Devonian; Glacial geology; Silurian.
- Columbus limestone: Jackson, R. R., 1952; Summer-son, 1957.
- Core tests: Wertman, 1959.
- Field guide; Carman, 1955a.
- General geology: Baumiller, 1917.
- Glacial geology: Forsyth, 1956.
- Ground water: Schmidt, James J., 1960, 1960e; Walker, 1960, 1960b.
- Ohio shale: Stephens, 1953.
- Paleontology: Mowery, 1958; Zimmerman, 1958, 1960.
- Stratigraphy: Freeman, 1953.
- Lorain County: See also Glacial geology; Lake Erie; Mississippian; Oil and gas.
- Bedford shale: Laswell, 1948.
- Engineering geology; Kauer, 1956.
- Lake Erie shore: Kleinhampl, 1952, 1953; Tinker, 1959; U. S. Army Corps Engineers, 1953a, 1953b.
- Limestone: Lamborn, 1951.
- Sand dredging areas: Hartley, 1960; Ohio Div. Shore Erosion, 1956a.
- Stratigraphy: Rogers, 1953; Treuttner, 1954; Wen-berg, 1938; Woodhams, 1954.
- Lucas County: See also Devonian; Lake Erie; Oil and gas; Silurian.
- Columbus limestone: Summerson, 1957.
- Field guide: Ehlers, 1951, 1952.
- General geology: Farnsworth, D. W., 1958.
- Ground water: Ohio Div. Water, 1960; Walker, 1959j, 1959k.
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- Oak openings: Shearer, 1951.
- Paleontology: Denison, 1960; Hoare, 1960; Kelsey, 1957; Kesling, 1954; Kier, 1952; Stumm, 1953, 1953a; Weiss, M., 1954.
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- Geomorphology: Norris, 1951.
- Glacial geology: Goldthwait, 1952.
- Ground water: Norris, 1956, 1959, 1959b; Schmidt, James J., 1960d, 1960e; Walker, 1960f.
- Paleobotany: Sears, 1952.



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 Cuyahoga formation: Szmuc, 1957.  
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 General geology: Galaida, 1941.  
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 Limestone: Lamborn, 1951.  
 Soil: Smith, T. R., 1958a.  
 Strip-mine overburden: Limstrom, 1950.  
 Water resources: Cross, W. P., 1952.  
 Mapping: Copelan, 1959, 1959b; Williamson, 1957.  
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 Ground water: Schmidt, James J., 1960, 1960a.  
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 Cuyahoga formation: Szmuc, 1957, 1959.  
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 Ground water: Walker, 1959l.  
 Limestone: Lamborn, 1951.  
 Soil: Baker, F. J., 1960a.  
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 Coal: Brant, 1954a, 1956, 1960; Cross, A. T., 1956; DeBrosse, 1957; DeLong, 1955, 1957; Denton, 1960; Ford, Bacon & Davis, 1951.  
 Economic geology: Bengston, 1950.  
 Ground water: Walker, 1958c, 1958d.  
 Hockingport sandstone: Martin, W. D., 1955.  
 Limestone: Lamborn, 1951.  
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 Strip-mine overburden: Limstrom, 1951a.  
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 Ground water: Ohio Div. Water, 1960; Walker, 1959.  
 Meteorite: Dietz, 1960; Henderson, 1958.  
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 Field guide: Smyth, 1955.  
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 Mineral collecting: See also Field guides; names of various minerals.  
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 Ashtabula County: Szmuc, 1953.  
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 Berne conglomerate: Swick, 1956.  
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 Jackson County: Weiss, R. M., 1951.  
 Knox County: Root, 1958.  
 Lake County: Bowen, A. S., 1951.  
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 Limestone: Lamborn, 1951.  
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 Northern Ohio: Nelson, 1955.  
 Oil and gas: Magbee, 1954.  
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 Ross County: Brooks, H. K., 1958; Single, 1956.  
 Shenango sandstone: Szmuc, 1959.

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- Mississippian-Pennsylvanian unconformity: Danner, 1955.
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 Core tests: Wertman, 1959.  
 Field guide: Cross, A. T., 1950.  
 General geology: Arkle, 1953.  
 Ground water: Schmidt, James J., 1959a, 1959e.  
 Limestone: Lamborn, 1951.  
 Soil: Smith, T. R., 1958b.  
 Strip-mine overburden: Limstrom, 1951a.  
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 Brassfield limestone: Pennell, 1952.  
 Elkhorn formation: Lindner, 1951.  
 Field guide: Smyth, 1955.  
 Geomorphology: Norris, 1951.  
 Glacial geology: Flint, R. F., 1951.  
 Ground water: Norris, 1959a; Walker, 1960c, 1960d, 1960f.  
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- Morgan County: See also Oil and gas; Pennsylvanian.  
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 General geology: Norling, 1957, 1958.  
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- Museum: Caster, 1942.
- Muskingum County: See also Oil and gas; Pennsylvanian.  
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 Field guide: Smyth, 1955.  
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 Sharon conglomerate: Fuller, 1955.
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     Everhart, G. M., 1953; Shearrow, 1959a, 1959c.  
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     Mt. Hope member: Magorian, 1953, 1954.  
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     Southgate member: Sharp, 1957.  
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   Catskill delta: Greiner, 1957.  
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   Pennsylvanian: Unklesbay, 1954.  
   Trails and tracks: Flower, 1955.  
 Collections: Caster, 1942.  
 Conodonts: See under Paleontology, vertebrate.  
 Conostichus: Marple, 1956; Stout, 1956.  
 Devonian (general): See also the various classes of animals.  
   Ehlers, G. M., 1951; LaRocque, 1955; Taylor, 1951.

## Paleontology, invertebrate - continued

- Echinodermata (general): See also Blastoidea; Edioasteriodes.  
   Devonian: Kier, 1951, 1952.  
   Ordovician: Caster, 1952a.  
 Edioasteriodes:  
   General: Kesling, 1960.  
   Ordovician: Bassler, 1936; Kesling, 1960a; Pogue, 1954, 1954a.  
 Eurypterida:  
   General: Kjellesvig-Waering, 1958; Stormer, 1955.  
   Ordovician: Caster, 1951.  
   Silurian: Leutze, 1958.  
 Foraminifera:  
   Devonian: Summerson, 1958.  
   Mississippian: Conkin, 1957, 1960.  
   Pennsylvanian: Marple, 1951, 1955a; Smyth, 1951, 1951a, 1957.  
 Fusulinidae: See Foraminifera.  
 Gastropoda: See also Mollusca (general).  
   Devonian: Linsley, 1953.  
   Ordovician: Nosow, 1960.  
   Paleozoic: Knight, 1941.  
 General: Crick, 1953; LaRocque, 1955; Marple, 1955; Verneuil, 1847.  
 Mississippian (general): See also the various classes of animals.  
   Bowen, A. S., 1951; Fagadau, 1952, 1952a; Franklin, 1953; Hyde, J. E., 1907, 1953; LaRocque, 1955; Rodriguez, 1957; Szmuc, 1957.  
 Mollusca (general): See also Gastropoda; Pelecypoda.  
   General: Knight, 1960.  
   Methods for study: LaRocque, 1959a, 1960.  
   Pleistocene: Aukeman, 1960; Clark, 1958; Cornejo, 1959; Forsyth, 1956a; LaRocque, 1952, 1956, 1957, 1958, 1959, 1959a, 1960; Leonard, 1953; Mowery, 1958; Reynolds, M. B., 1958, 1959; Sheatsley, 1960; Zimmerman, 1958, 1960.  
 Ordovician (general): See also the various classes of animals.  
   Bergman, 1959; Butler, 1954; Caster, 1955; Gotautas, 1951; Kanizay, 1950; Kerr, D., 1951; LaRocque, 1955; Raymond, 1960; Schweinfurth, 1958; Slaughter, 1953; Uhri, 1954.  
 Ostracoda:  
   Devonian: Coley, 1954; Kesling, 1954; Weiss, M., 1954.  
   Ordovician: Bergman, 1959; Gotautas, 1951a; Kesling, 1953.  
   Pennsylvanian: DuFeu, 1956; Marple, 1951, 1952, 1957; Smith, W. O., 1949.  
   Permian: Smith, W. O., 1949.  
 Pelecypoda: See also Mollusca (general).  
   Pennsylvanian: Lucas, 1957.  
 Pennsylvanian (general): See also the various classes of animals.  
   Franklin, 1953; LaRocque, 1955; Taber, 1951.  
 Permian (general): See also the various classes of animals.  
   LaRocque, 1955.  
 Pleistocene and Recent (general): See also the various classes of animals.  
   LaRocque, 1955.  
 Protozoa: See also Foraminifera.  
   Devonian: Foreman, 1959.  
 Scolecodonts:  
   Mississippian: Bowen, A. S., 1951, 1951a.  
   Ordovician: Bergman, 1959.

## Paleontology, invertebrate - continued

## Silurian (general):

Bowman, 1956; LaRocque, 1955.

## Stromatoporoidea:

Bibliography: Galloway, 1956.

Classification: Galloway, 1957a.

Devonian: Galloway, 1957; St. Jean, 1955.

## Trilobita:

Devonian: Stumm, 1953, 1953a, 1954.

General: Delo, 1940; Harrington, 1959.

Ordovician: Schweinfurth, 1958.

## Paleontology, vertebrate:

Amphibians: Turnbull, 1958.

## Conodonts:

Bibliography: Holmes, G. B., 1928.

Devonian: Hass, 1958; Stewart, 1956.

Mississippian: Bowen, A. S., 1951; Holmes, G. B., 1928.

Ordovician: Bergman, 1959; Hazel, 1955; Pulse, 1959, 1960; Sweet, 1959, 1959a; Turco, 1957; Warner, 1956; Wilkie, 1957.

Ducks: Howard, H., 1951.

## Fish:

Devonian: Denison, 1960; Harris, 1951; Kelsey, 1957; Roberts, 1960; Sinclair, 1956.

Silurian: Leutze, 1960.

Mammalia, Pleistocene: Stewart, 1952; Thomas, E. S., 1951, 1951a, 1952; Wood, 1952.

Paulding County: See also Oil and gas; Western Ohio.

Glacial geology: Baker, F. J., 1960.

Ground water: Ohio Div. Water, 1960; Walker, 1959a, 1959b, 1959f.

Soil: Baker, F. J., 1960, 1960d; Ohio Div. Land and Soils, 1953a, 1955, 1955a.

Peat: Ohio Chamber of Commerce, 1958; Ohio Geol. Survey, 1959; U. S. Bur. Mines.

Pennsylvanian (Stratigraphic geology): See also under Paleobotany; Paleontology. See also Coal.

Allegheny coals: Brant, 1954a, 1956; DeLong, 1957; Denton, 1957, 1957a.

Ames limestone: Bjurstrom, 1960.

Appalachian basin: Arkle, 1960; Cross, A. T., 1952.

Athens County: Aukland, 1952; Laubach, 1953; Schuh, 1953; Sturgeon, 1954, 1958.

Belmont County: Berryhill, H. L., 1955; Cross, A. T., 1950; DuFeu, 1956.

Conemaugh coals: DeBrosse, 1957.

Conemaugh group (formation, series): Condit, 1910; Philbrick, 1953.

Coshocton County: Lamborn, 1953.

Cow Run sandstone: Laubach, 1953; Phillips, 1951.

Cuyahoga County: Frank, 1958; Pedry, 1951.

Gallia County: Blake, 1952.

Geauga County: Bowen, C. H., 1952, 1953; Pedry, 1951.

General: LaRocque, 1955; Stevenson, J. J., 1876.

Gilboy sandstone: Turrill, 1960.

Guernsey County: Carmin, 1943; Phillips, 1951.

Harrison County: Fagerstrom, 1953; Lehman, 1954.

Hocking County: Hall, J. F., 1951.

Jackson County: Teflian, 1952; Weiss, R. M., 1951.

Knox County: Root, 1958.

Licking County: Crombie, 1952; Franklin, 1953.

Limestone: Lamborn, 1951.

Lower Freeport sandstone: Laubach, 1953.

Lower Kittanning (No. 5) coal bed: Brant, 1954.

Massillon sandstone: Gray, 1956.

Meigs Creek (No. 9) coal bed: Smith, W. H., 1953.

Mississippian-Pennsylvanian unconformity: Danner, 1955.

## Pennsylvanian (Stratigraphic geology) - continued

Monongahela coals: Denton, 1960.

Monongahela group (formation, series): Arkle, 1960; Berryhill, H. L., 1955; DuFeu, 1956.

Monroe County: Arkle, 1953; Cross, A. T., 1950.

Morgan County: Norling, 1957, 1958.

Perry County: Flint, N. K., 1951.

Pike County: Jessup, 1951.

Pittsburgh (No. 8) coal bed: Cross, 1954; DeLong, 1955; Smith, G. E., 1952.

Portage County: Bowen, C. H., 1952, 1953.

Pottsville coals: Granchi, 1958.

Pottsville group (formation, series): Fuller, 1955; Gray, 1954; Potter, 1956.

Redstone (No. 8A) coal bed: DeLong, 1955.

Redstone limestone: DuFeu, 1956.

Sharon sandstone and conglomerate: Bowen, C. H., 1952, 1953; Cochran, 1959; Farnsworth, C., 1957; Fuller, 1955.

Stark County: Baroffio, 1958; Gray, 1954.

Subsurface: Shearrow, 1957a.

Summit County: Frank, 1958; Savage, 1951a.

Trumbull County: Szmuc, 1953.

Tuscarawas County: Gray, 1952; Lamborn, 1956.

Uniontown sandstone: Turrill, 1960.

Vanport limestone: Baltimore and Ohio Railroad Co.; Teflian, 1952.

Washington County: Cross, A. T., 1950; Kellenberger, 1960; Smith, B. E., 1960; Stearns, 1957.

Wayne County: Multer, 1955, 1957.

Pennsylvanian-Mississippian contact: Multer, 1957.

Permian (Stratigraphic geology): See also under Paleobotany; Paleontology. See also Coal.

Antiquity sandstone: Martin, W. D., 1957; Mushake, 1956.

Appalachian area: Cross, A. T., 1952.

Athens County: Schuh, 1953; Sturgeon, 1958.

Belmont County: Cross, A. T., 1950.

Coal: Denton, 1960.

Correlation: Dunbar, 1960.

General: Cross, A. T., 1950, 1952c; LaRocque, 1955; Stevenson, 1876.

Harrison County: Fagerstrom, 1953.

Hockingport sandstone: Martin, W. D., 1955, 1957.

Hundred sandstone: Martin, W. D., 1949.

Limestones: Lamborn, 1951.

Meigs County: Mushake, 1956.

Monroe County: Arkle, 1953; Cross, A. T., 1950.

Morgan County: Norling, 1957, 1958.

Sandstones: Martin, W. D., 1957.

Sherman sandstone: Healy, 1956.

Upper Marietta sandstone: Martin, W. D., 1949; Thomas, J. A., 1956.

Washington County: Cross, A. T., 1950; Kellenberger, 1960; Smith, B. E., 1960; Stearns, 1957; Thomas, J. A., 1956.

Waynesburg sandstone: Martin, W. D., 1957; Miller, D. J., 1942.

Perry County: See also Mississippian; Oil and gas; Pennsylvanian.

Ames limestone: Bjurstrom, 1960.

Clay: Schultz, 1958.

Coal: Brant, 1954a, 1956, 1960; DeBrosse, 1957; Ford, Bacon & Davis, 1951; Granchi, 1958.

Core tests: Wertman, 1959.

General: Flint, N. K., 1951.

Ground water: Walker, 1958a, 1958b.

Limestones: Lamborn, 1951.

Maxville limestone: Friedman, 1952, 1956.



## Perry County - continued

- Mississippian: Hyde, J. E., 1953.  
 Oil and gas: Alkire, 1952.  
 Stratigraphy: Hyde, J. E., 1953.  
 Strip-mine overburden: Limstrom, 1951a.  
 Structure: Erickson, 1959.  
 Petrography: See Petrology.  
 Petroleum: See Oil and gas.  
 Petrology:  
 Ames limestone: Bjurstrom, 1960.  
 Antiquity sandstone: Mushake, 1956.  
 Bedford shale: Laswell, 1948.  
 Berea sandstone: Thomsen, 1934.  
 Brassfield limestone: Hopkins, 1954; Pennell, 1952.  
 Cincinnati limestones: Weiss, M. P., 1960, 1960b.  
 Clay: Schultz, 1958.  
 Coal: Cady, 1955, 1955a, 1958; Parks, 1956.  
 Columbus limestone: Jackson, R. R., 1952; Moore, 1951; Struble, 1952.  
 Cynthiana limestone: Edwards, 1957.  
 Dayton formation: Gerrard, 1959.  
 Delaware limestone: Jackson, R. R., 1952; Moore, 1951; Struble, 1952.  
 Eden group: Edwards, 1957; Norman, 1959; Sharp, 1957.  
 Evaporite facies: Briggs, 1958.  
 Gilboy sandstone: Turrill, 1960.  
 Greenfield formation: Miller, P. M., 1956.  
 Hillsboro sandstone: Brown, 1951.  
 Hundred sandstone: Martin, W. D., 1949.  
 Massillon sandstone: Gray, 1956.  
 Maxville limestone: Friedman, 1952, 1956.  
 Meigs Creek coal: Cady, 1955.  
 Ohio shale: Brown, 1951.  
 Oriskany sandstone: Brown, 1951.  
 Peebles formation: Mallin, 1951.  
 Precambrian rocks: McCormick, 1960.  
 Sharon conglomerate: Bowen, C. H., 1952, 1953.  
 Sherman sandstone: Healy, 1956.  
 Sylvania sandstone: Brown, 1951.  
 Teays-Mahomet valley deposits: Manos, 1960.  
 Till: Droste, 1958; Sitler, 1955, 1955a, 1957.  
 Tymochtee formation: Miller, P. M., 1956.  
 Underclays: Schultz, 1958.  
 Uniontown sandstone: Turrill, 1960.  
 Upper Marietta sandstone: Martin, W. D., 1949.  
 Vanport limestone: Teflian, 1952.  
 Waynesburg sandstone: Miller, D. J., 1942.  
 Photogrammetric map: Williamson, 1957.  
 Physiographic map: Bier, 1956.  
 Physiography: See Geomorphology; Glacial geology.  
 Pickaway County: See also Central Ohio; Devonian; Glacial geology; Mississippian.  
 Field guide: Goldthwait, 1952a.  
 Glacial geology: Schuster, 1952.  
 Ground water: Norris, 1956.  
 Radiocarbon dating: Rubin, 1955.  
 Structure: Kantrowitz, 1959.  
 Pike County: See also Devonian; Mississippian.  
 Coal: Brant, 1960; Granchi, 1958.  
 Contorted beds: Brooks, H. K., 1958; Single, 1956.  
 Economic geology: Bengstom, 1950.  
 Flow markings: Wilson, W. J., 1950.  
 General geology: Jessup, 1951.  
 Greenfield formation: Miller, P. M., 1956.  
 Ground water: Pree, 1960d; Smith, R. C., 1953.  
 Peebles formation: Mallin, 1951.  
 Radiocarbon dating: Rubin, 1955.  
 Stratigraphy: Hyde, J. E., 1953.

## Pike County - continued

- Strip-mine overburden: Limstrom, 1951a.  
 Structure: Brooks, 1958; Single, 1956; Wilson, W. J., 1950.  
 Teays-Mahomet valley deposits: Manos, 1960.  
 Tymochtee formation: Miller, P. M., 1956.  
 Water resources: Smith, R. C., 1953.  
 Pipe lines map: Alkire, 1955a.  
 Pleistocene and Recent deposits: See also Glacial geology; Sedimentation.  
 Allen County: Kahle, 1957.  
 Artifacts: Smith, A. G., 1953.  
 Auglaize County: Kahle, 1957.  
 Beach ridges: Forsyth, 1959.  
 Belmont County: Lessig, 1959a.  
 Butler County: Breene, 1957; Smith, J. M., 1949.  
 Carroll County: White, G. W., 1951.  
 Central Ohio: Forsyth, 1957a.  
 Champaign County: Norris, 1958.  
 Cincinnati area: Hays, 1951.  
 Clark County: Norris, 1958.  
 Columbiana County: Lessig, 1959, 1959b; White, 1951.  
 Correlation: Forsyth, 1960a; Lieftinck, 1957.  
 Crawford County: Gregory, 1956.  
 Cuyahoga County: Bagley, 1953; White, G. W., 1953; Winslow, J. D., 1958.  
 Darke County: Smith, J. M., 1949; Thorp, 1957.  
 Defiance County: Kahle, 1957.  
 Drainage changes: Coffey, 1958.  
 Eastern Ohio: Stout, 1953.  
 Eolian deposits: National Research Council, 1952; White, G. W., 1953.  
 Erie County: Campbell, 1955.  
 Fairfield County: Conley, 1956.  
 Field trip: Goldthwait, 1952a, 1952b, 1955.  
 Forests of Wisconsin age: Burns, 1958; Goldthwait, 1958.  
 Franklin County: Norris, 1959c.  
 Geauga County: Baker, J., 1957.  
 General: Dreimanis, 1960; Flint, R. F., 1955a, 1956, 1957, 1957a; Goldthwait, 1953, 1955, 1959; Horberg, 1956; Hough, 1958; LaRocque, 1955; White, G. W., 1952a.  
 Gravels: MacClintock, 1954.  
 Hamilton County: Breene, 1957; Gilson, 1951.  
 Henry County: Kahle, 1957.  
 Highland County: Forsyth, 1957.  
 Hocking County: Forsyth, 1957; Kempton, 1956; Merrill, 1953.  
 Hocking River valley: Merrill, 1953.  
 Huron County: Campbell, 1955.  
 Illinoian deposits: Breene, 1956, 1957; White, G. W., 1951.  
 Knox County: Forsyth, 1960a.  
 Licking County: Jones, R. L., 1959.  
 Logan County: Forsyth, 1956.  
 Madison County: Norris, 1958; Sears, 1952.  
 Mahoning County: White, G. W., 1951.  
 Microclimate: Wolfe, 1951.  
 Minford silt: Norris, 1959.  
 Muskingum County: Jones, R. L., 1959.  
 Northeastern Ohio: Shepps, 1953; Sitler, 1957; White, G. W., 1951a, 1952b, 1957, 1960.  
 Northern Ohio: Forsyth, 1959.  
 Ohio River valley: Carlston, 1957; Wayne, 1952.  
 Pickaway County: Schuster, 1952.  
 Pike County: Manos, 1960.  
 Preble County: Smith, J. M., 1949; Thorp, 1957.  
 Putnam County: Kahle, 1957.

## Pleistocene and Recent deposits - continued

- Radiocarbon dating: Arnold, 1951; Barendsen, 1957; Crane, 1956; Flint, R. F., 1951, 1955, 1955a, 1956, 1957; Horberg, 1955; Libby, 1951, 1954; Rubin, 1955, 1956, 1958, 1960; Suess, 1954.
- Scioto County: Manos, 1960.
- Shelby County: Forsyth, 1956, 1956a, 1958.
- Southwestern Ohio: Durrell, 1956; Goldthwait, 1955; Hays, 1951; Rich, 1956.
- Stark County: White, G. W., 1951.
- Teays-Mahomet valley deposits: Manos, 1960.
- Western Ohio: Forsyth, 1957a, 1960a; Goldthwait, 1958.
- Wisconsin deposits: Breene, 1956, 1957; Dreimanis, 1960; Flint, R. F., 1955a; Goldthwait, 1958; Forsyth, 1957, 1960a; MacClintock, 1954; Sitler, 1955, 1957; Smith, J. M., 1949; Thorp, 1957; White, G. W., 1951, 1952b, 1953, 1957, 1960; Zumberge, 1960.
- Portage County: See also Glacial geology; Northeastern Ohio: Oil and gas; Pennsylvanian.
- Buried valleys: Pakiser, 1956; Warrick, 1960; Winslow, J. D., 1957.
- Clay minerals: Droste, 1956a.
- Coal: Brant, 1960; Granchi, 1958.
- Engineering geology: Kauer, 1956.
- Field guide: Pettit, 1954; White, G. W., 1952.
- Geophysics: Pakiser, 1956; Warrick, 1960.
- Glacial geology: White, G. W., 1952.
- Ground water: Cross, W. P., 1952; Cummins, 1960; Walker, 1959; Warrick, 1960; Winslow, J. D., 1957, 1957a.
- Limestone: Lamborn, 1951.
- Mineral collecting: Birkheimer, 1938.
- Nelson Ledges: Cochran, 1959; Farnsworth, C., 1957; Pettit, 1954, 1958.
- Radiocarbon dating: Rubin, 1955.
- Seismology: Pakiser, 1956.
- Sharon conglomerate: Bowen, C. H., 1952, 1953; Cochran, 1959; Fuller, 1955; Anonymous, 1953.
- Soil: Kauer, 1956; Smith, T. R., 1956b.
- Stratigraphy: deWitt, 1951; Winslow, J. D., 1957.
- Strip-mine overburden: Limstrom, 1950.
- Subsurface geology: Duggan, 1952.
- Water: Cross, W. P., 1952; Frost, 1959.
- Preble County: See also Glacial geology; Ordovician; Silurian; Western Ohio.
- Brassfield limestone: Pennell, 1952.
- Dayton formation: Gerrard, 1959.
- Elkhorn formation: Lindner, 1951.
- Field guide: Smyth, 1955.
- General geology: Lind, 1957.
- Glacial geology: Smith, J. M., 1949; Thorp, 1957.
- Ground water: Toeppe, 1951.
- Paleontology: Shaw, 1960.
- Soil: Thorp, 1957.
- Stratigraphy: Vorhis, 1941; Weiss, M. P., 1960a.
- Structure: Kantrowitz, 1959.
- Precambrian: Bass, M. N., 1960; McCormick, 1960; Tilton, 1960.
- Putnam County: See also Glacial geology; Silurian.
- Glacial geology: Kahle, 1957.
- Gravity anomaly: Mourad, 1959.
- Ground water: Kaser, 1958; Ohio Div. Water, 1960; Walker, 1959a, 1959b, 1959c, 1959d, 1959f.
- Soil: Boyce, 1959.
- Pyrite: McAlister, 1941; Ohio Chamber of Commerce, 1951; Ohio Geol. Survey, 1959; Anonymous, 1945.

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- Quartz, bubble inclusions: Bowen, C. H., 1955a.
- Quaternary: See Glacial geology; Pleistocene and Recent deposits.

## R

- Radioactivity used in correlation: Lieftinck, 1957.
- Radiocarbon dating: Barendsen, 1957; Crane, 1956; Flint, R. F., 1951, 1955a, 1956, 1957; Horberg, 1955; Libby, 1951, 1954; Rubin, 1955, 1956, 1958, 1960; Suess, 1954.
- Radio transmission and geology: Spieker, 1936.
- Refractory material: Bole, 1951.
- Research, geologic: Farnsworth, C., 1957a.
- Reservoirs: Hahn, 1955; Thomas, N. O., 1956.
- Richland County: See also Glacial geology; Mississippian; Oil and gas.
- Cuyahoga formation: Szmuc, 1957.
- Limestone: Lamborn, 1951.
- Roadbuilding materials: Marshall, 1952.
- Rock Mill: Stout, 1958.
- Ross County: See also Devonian; Glacial geology; Mississippian.
- Chillicothe test core: Carman, 1955.
- Concretions: Seyfried, 1953.
- Contorted beds: Brooks, H. K., 1958; Single, 1956.
- Flow markings: Wilson, W. J., 1950.
- Greenfield formation: Miller, P. M., 1956.
- Ground water: Schmidt, James J., 1954.
- Mineral collecting: Knille, 1942; McAlister, 1941.
- Ohio shale: Stephens, 1953.
- Paleontology: Reynolds, M. B., 1958, 1959.
- Peebles formation: Mallin, 1951.
- Radiocarbon dating: Rubin, 1958, 1960; Suess, 1954.
- Soil: Ohio Div. Land and Soils, 1954, 1957b.
- Stratigraphy: Hyde, J. E., 1953.
- Structure: Kantrowitz, 1959.
- Subsurface geology: Carman, 1955.
- Tymochtee formation: Miller, P. M., 1956.

## S

- Salt: See also Brines.
- Bibliography: Lang, 1957.
- Industry: Cochran, 1960; Kefauver, 1960a; Morrow, 1956.
- Production: Ohio Dept. Industrial Relations; Ohio Geol. Survey, 1959; Shearrow, 1957c; U. S. Bur. Mines.
- Sand: See also Sand and gravel.
- Beach: Lundahl, 1942; Ridge, 1932.
- Dredging and pumping: Gilfillan, 1959; Hartley, 1960; Ohio Div. Shore Erosion, 1955, 1956, 1956a, 1957.
- Foundry: Ohio Chamber of Commerce, 1949, 1950; Williams, D. C., 1950.
- Grains: Bowen, C. H., 1955a.
- Sand and gravel: See also Glacial geology; Sand.
- Cincinnati area: Schaleman, 1953.
- Production: Ohio Dept. Industrial Relations; Ohio Geol. Survey, 1959; U. S. Bur. Mines.

- Sand and gravel - continued  
 Roadbuilding: Goldthwait, 1954.  
 Southeastern Ohio: Bengston, 1950.
- Sandstone: See also under the various geologic ages.  
 Production: Ohio Chamber of Commerce, 1953; Ohio Dept. Industrial Relations; Ohio Geol. Survey, 1959.
- Refractory material: Bole, 1951.
- Sandusky County: See also Devonian; Glacial geology; Lake Erie; Silurian.  
 Columbus limestone: Summerson, 1957.  
 Delaware limestone: Summerson, 1957.  
 Field guide: Coash, 1957.  
 Lake Erie sedimentation: Pincus, 1951; U. S. Army Corps Engineers, 1953.  
 Lake Erie shore: Pincus, 1960a.  
 Radiocarbon dating: Libby, 1951.  
 Shore erosion: Shaffer, 1951.
- Scioto County: See also Mississippian; Oil and gas; Pennsylvanian.  
 Coal: Brant, 1954a, 1956, 1960; DeLong, 1957; Granchi, 1958.  
 Field guide: Thomas, R. N., 1955.  
 Flow markings: Wilson, W. J., 1950.  
 Limestone: Lamborn, 1951.  
 Stratigraphy: Hyde, J. E., 1953.  
 Strip-mine overburden: Limstrom, 1951a.  
 Teays-Mahomet valley deposits: Manos, 1960.  
 Water: Walker, 1953.
- Sedimentary structures:  
 Cross bedding: Potter, 1956.  
 Deformation: Brooks, H. K., 1958; Province, 1952.  
 Desiccation cracks: Fagerstrom, 1955.  
 Flow markings: Wilson, W. J., 1950.
- Sedimentation: See also Sedimentary structures.  
 Appalachian area: Cross, A. T., 1952; Potter, 1956.  
 Lake Erie: Bowman, 1953; Gacek, 1951; Humphris, 1952, 1953; Kleinhampl, 1952, 1953; Metter, 1952, 1953; Ohio Div. Shore Erosion, 1957a, 1958, 1958a, 1959; Pincus, 1951, 1951a, 1958; Richards, 1956; Savoy, 1956.  
 Ohio shale: Rich, 1951, 1953; Stephens, 1953.  
 Reservoirs: Hahn, 1955; Mohler, 1958.  
 Streams: Archer, 1950; Crawford, 1951a.
- Seismology: Pakiser, 1956; Walker, 1957; Warrick, 1960; White, R. M., 1952.
- Selenite: Birkheimer, 1938.
- Seneca County: See also Devonian; Glacial geology; Silurian.  
 Columbus limestone: Struble, 1952.  
 Delaware limestone: Struble, 1952.  
 Field guide: Coash, 1957.  
 Insoluble residue in limestone: Summerson, 1957.
- Shale: See also under the various geologic ages; See also Black shale; Oil shale.  
 Analyses: Austin, 1934.  
 General: Ohio Dept. Industrial Relations.  
 Lightweight aggregates: Bowen, C. H., 1955; Ehlers, E. G., 1958; Johnson, J. E., 1957.  
 Mineralogy: Nelson, 1956.  
 Oil: Bowen, C. H., 1951; Jillson, 1926; Karrick, 1947; Kerr, T. H., 1948; Krumin, 1951; Swanson, 1960.
- Shatter cones: Dietz, 1960.
- Shelby County: See also Glacial geology; Silurian.  
 Glacial geology: Forsyth, 1956, 1956a, 1958.  
 Ground water: Walker, 1959, 1960, 1960a.  
 Paleontology: LaRocque, 1957.  
 Radiocarbon dating: Rubin, 1955, 1958.
- Shore erosion: See under Lake Erie; names of various counties.
- Silica: Jaster, 1957; Murphy, 1930; Anonymous, 1953.
- Silurian (Stratigraphic geology): See also under Paleobotany; Paleontology.  
 Adams County: Thomas, R. N., 1955.  
 Brassfield limestone: Baltimore and Ohio Railroad Co.; Hopkins, 1954; Manning, 1932; Pennell, 1952.  
 Butler County: Kanizay, 1950.  
 Cayuga: Alling, 1959.  
 Champaign County: Nave, 1956.  
 Clark County: Bernhagen, 1960; Nave, 1956.  
 Clinton sand: Calvert, 1960; Pepper, 1953.  
 Contact with Devonian: Summerson, 1959.  
 Dayton formation: Gerrand, 1959.  
 Evaporites: Briggs, 1958.  
 General: LaRocque, 1955; Manning, 1932.  
 Greene County: Bernhagen, 1960; Nave, 1956.  
 Greenfield formation: Miller, P. M., 1956.  
 Highland County: Bowman, 1956.  
 Lithofacies map: Amsden, 1955.  
 Lorain County: Treuttner, 1954; Rogers, 1953.  
 Madison County: Summerson, 1959.  
 Newberg zone: Floto, 1955; Morrison, R. B., 1934; Norris, 1956.  
 Niagara series: Bowman, 1956; Jones, E. V., 1956; Meyerhoff, 1922; Norris, 1956.  
 Oil and gas: Magbee, 1954.  
 Ordovician-Silurian problem: Kanizay, 1950.  
 Peebles formation: Mallin, 1951.  
 Preble County: Gerrand, 1959; Vorhis, 1941.  
 Reefs: Cumings, 1928; Floto, 1955; Mallin, 1951; Anonymous, 1956.  
 Ross County: Carman, 1955.  
 Scioto County: Thomas, R. N., 1955.  
 Silurian-Devonian contact: Summerson, 1959.  
 Southwestern Ohio: Manning, 1932.  
 Subsurface: Duggan, 1952; Freeman, 1951; Rogers, 1953; Shearrow, 1957a.  
 Tymochtee formation: Miller, P. M., 1956.
- Soils:  
 Adams County: Farnham, 1951.  
 Allen County: Ohio Div. Lands and Soil, 1959.  
 Analysis: Pratt, 1955.  
 Ashtabula County: Meyer, 1957.  
 Auglaize County: Baker, F. J., 1959.  
 Belmont County: Lessig, 1959a.  
 Brown County: Farnham, 1951.  
 Buried: Forsyth, 1956a, 1958; Lessig, 1959.  
 Butler: Farnham, 1951; Smith, J. M., 1949.  
 Clark County: Baker, F. J., 1960c.  
 Classification: Dotson, 1958; Smith, T. R., 1960.  
 Clermont County: Farnham, 1951.  
 Clinton County: Farnham, 1951; Ohio Div. Lands and Soil, 1953, 1956, 1957a, 1959a.  
 Columbiana County: Lessig, 1959, 1959b.  
 Correlation: Forsyth, 1960a.  
 Cuyahoga County: Smith, T. R., 1960a; White, G. W., 1953.  
 Darke County: Smith, J. M., 1949; Thorp, 1957.  
 Delaware County: Smith, T. R., 1960b; Ohio Div. Lands and Soil, 1960a.  
 Engineering: Kauer, 1956; Supp, 1954.  
 Forest: Carmean, 1957.  
 Floods, relation to soils: Cross, W. P., 1959a.  
 Franklin County: Baker, F. J., 1960b.  
 Fulton County: Boyer, 1960.  
 Geauga County: Smith, T. R., 1956.

## Soils - continued

- General: Dotson, 1958; Goldthwait, 1954; U. S. Dept. Agriculture, 1960.
- Greene County: Ohio Div. Lands and Soil, 1957; Roseler, 1960.
- Hamilton County: Farnham, 1951.
- Highland County: Farnham, 1951.
- Irrigating: Evans, 1954.
- Knox County: Forsyth, 1960a.
- Madison County: Smith, T. R., 1958; Summerson, 1959a.
- Mahoning County: Smith, T. R., 1958a.
- Map: Ohio Div. Lands and Soil, 1954.
- Medina County: Baker, F. J., 1960a.
- Monroe County: Smith, T. R., 1958b.
- Names: Smith, T. R., 1960.
- Paulding County: Baker, F. J., 1960, 1960d; Ohio Div. Lands and Soil, 1953a, 1955, 1955a.
- Phosphorous in soil: Pratt, 1955.
- Portage County: Smith, T. R., 1956b.
- Preble County: Smith, J. M., 1949; Thorp, 1957.
- Putnam County: Boyce, 1959.
- Ross County: Ohio Div. Lands and Soil, 1954, 1957b.
- Sangamon: White, G. W., 1953.
- Slope, relation to soils: Garrigus, 1958, 1959.
- Southwestern Ohio: Gooding, 1959, 1960.
- Structure of forest soils: Carmean, 1957.
- Summit County: Smith, T. R., 1956a.
- Trumbull County: Smith, T. R., 1957.
- Van Wert County: Ohio Div. Lands and Soil, 1960.
- Warren County: Farnham, 1951.
- Western Ohio: Forsyth, 1960a.
- Wood County: Ohio Div. Lands and Soil, 1956a, 1958.
- Southeastern Ohio: See also the names of the counties in southeastern Ohio.
- Economic geology: Bengston, 1950.
- Hundred sandstone: Martin, W. D., 1949.
- Niagaran series: Jones, E. V., 1956.
- Refractory material: Bole, 1951.
- Silurian: Jones, E. V., 1956.
- Terraces: Hubbard, 1954.
- Upper Marietta sandstone: Martin, W. D., 1949.
- Water: Ohio Div. Water, 1959.
- Waynesburg sandstone: Miller, D. J., 1942.
- Southern Ohio: See also the names of the counties in southern Ohio.
- Logan formation: Fagadau, 1952, 1952a.
- Mississippian formations: Hyde, J. E., 1953.
- Southwestern Ohio: See also Cincinnati area; Ordovician; Paleontology; names of various counties in southwestern Ohio.
- Cynthiana formation: Butler, 1954; Edwards, 1957.
- Eden group: Edwards, 1957; Sharp, E. R., 1957.
- Field guide: Goldthwait, 1955; Slaughter, 1953.
- Glacial geology: Durrell, 1956; Goldthwait, 1955; Gooding, 1959, 1960; Hays, 1951; Rich, 1956.
- Mineral collecting: Wuestner, 1938.
- Pleistocene: Hays, 1951.
- Silurian: Manning, 1932.
- Stratigraphy: Gutstadt, 1958.
- Spectrographic analysis: Uhri, 1954.
- Standing Stone: Stout, 1952.
- Stark County: See also Glacial geology; Oil and gas; Pennsylvanian.
- Coal: Brant, 1954a, 1956, 1960; DeLong, 1957; Ford, Bacon & Davis, 1951; Granchi, 1958.
- Glacial geology: White, G. W., 1951.
- Gravity anomaly: Mourad, 1959.
- Ground water: Cross, W. P., 1952; Walker, 1959l.

## Stark County - continued

- Limestone: Lamborn, 1951.
- Massillon sandstone: Gray, 1956.
- Oil and gas: Belden, 1952; Pepper, 1953.
- Paleontology: Sheatsley, 1960.
- Stratigraphy: Baroffio, 1958; Gray, 1954; Seik, 1959.
- Strip-mine overburden: Limstrom, 1951.
- Water: Cross, W. P., 1952; Winslow, J. D., 1960.
- Stone: See also Limestone; Sandstone.
- U. S. Bur. Mines; Ohio Chamber of Commerce, 1958; Ohio Dept. Industrial Relations.
- Stratigraphic sections: Brant, 1956a.
- Stratigraphic studies: Hills, 1934; Smith, W. H., 1956.
- Stratigraphy (general): See also under the names of the various counties; names of the various geologic periods; Cincinnati area; Northeastern Ohio; Southeastern Ohio; Southwestern Ohio.
- Hills, 1934; LaRocque, 1955; Verneuil, 1847.
- Stream flow: See under Water.
- Streams: See under Water.
- Streams, suspended sediment in: Lamar, 1956.
- Strip-mine land: Knudsen, 1954; Riley, C. V., 1960.
- Strip-mine land reclamation: Copelan, 1959a; Dickman, 1960; Flaler, 1952; Miller, D. P., 1954, 1957, 1958.
- Strip-mine overburden: Limstrom, 1950, 1950a, 1951, 1951a.
- Strontium in natural water: Feulner, 1960; Skougstadt, 1960.
- Structure:
- Appalachian basin: Linn, 1956.
- Contemporaneous deformation: Province, 1952.
- Cone-in-cone: Horstman, 1954.
- Contorted beds: Single, 1956.
- Cryptovolcanic: Bucher, 1933; Dietz, 1960; Sappenfield, 1951.
- Devonian: Freeman, 1951.
- Flow markings: Wilson, W. J., 1950.
- General: Shearrow, 1959a, 1959c.
- Joints: Keller, 1957; Magbee, 1951.
- Lucas County: Ehlers, G. M., 1952.
- Morgan County: Norling, 1958.
- Northern Ohio: Pepper, 1953a.
- Ordovician: Freeman, 1951.
- Serpent Mound: Bucher, 1933.
- Silurian: Freeman, 1951.
- Stark County: Baroffio, 1958; Seik, 1959.
- Trenton: Green, 1957.
- Tuscarawas County: Gray, 1952.
- Wayne County: Multer, 1955.
- Western Ohio: Erickson, 1959; Kantrowitz, 1959.
- Subsurface geology: See also Oil and gas.
- Ashtabula County: Crick, 1953; Pi-Synyer, 1955.
- Buried valleys: Spieker, 1936; Youngquist, 1958.
- Cambrian: Freeman, 1953; Wasson, 1934.
- Cuyahoga County: Bagley, 1953.
- Detroit River series: Tharp, 1945.
- Devonian: Freeman, 1951.
- Electrical resistivity methods: Mayhew, 1960.
- General: Bailey, 1958; Shearrow, 1957a.
- Highway engineering: Mason, 1954.
- Lorain County: Rogers, 1953; Treuttner, 1954; Woodhams, 1954.
- Muskingum County: Bowen, C. H., 1954a.
- Niagaran: Norris, 1956.
- Ordovician: Freeman, 1951, 1953; Wasson, 1934.
- Portage County: Duggan, 1952.
- Precambrian: McCormick, 1960.
- Ross County: Carman, 1955.

## Subsurface geology - continued

- St. Peter sandstone: Dapples, 1955.  
 Tioga bentonite: Fettke, 1952a.  
 Summit County: See also Glacial geology; Mississippian;  
 Oil and gas; Pennsylvanian.  
 Buried valleys: Warrick, 1960.  
 Clay minerals: Droste, 1956a.  
 Coal: Brant, 1960; Granchi, 1958.  
 Cuyahoga formation: Szmuc, 1957.  
 Engineering geology: Kauer, 1956.  
 General geology: Savage, 1951a.  
 Gravity anomaly: Mourad, 1959.  
 Groundwater: Smith, R. C., 1953c; Walker, 1959i;  
 Warrick, 1960.  
 Limestone: Lamborn, 1951; Morrison, G. A., 1943.  
 Oil and gas: Pepper, 1953.  
 Sharon conglomerate: Fuller, 1955.  
 Soil: Smith, T. R., 1956a.  
 Strip-mine overburden: Limstrom, 1951.  
 Water: Frost, 1959.  
 Surveying: Ryan, 1960.  
 Synthetic liquid fuels: Ford, Bacon & Davis, 1951;  
 Fraser, 1950.

## T

- Tax laws: Bowers, 1951.  
 Teays River: See also Buried valleys; Drainage changes;  
 Glacial geology.  
 Janssen, 1953; Norris, 1958; Manos, 1960.  
 Tellurometer: Copelan, 1959, 1959b.  
 Theses: Chronic, 1957.  
 Till: See under Glacial geology.  
 Trace elements: Strahl, 1959.  
 Trenton quadrangle: Shafor, 1959.  
 Trumbull County: See also Glacial geology; Mississippian;  
 Oil and gas; Pennsylvanian.  
 Berea sandstone: deWitt, 1951.  
 Coal: Brant, 1960; Granchi, 1958.  
 Cuyahoga formation: Szmuc, 1957, 1959.  
 Engineering geology: Kauer, 1956.  
 Ground water: Cross, W. P., 1952; Cummins, 1960a,  
 1960b, 1960c; Pree, 1960.  
 Limestone: Lamborn, 1951.  
 Mississippian: deWitt, 1951; King, E. L., 1952;  
 Szmuc, 1953, 1957, 1959.  
 Pennsylvanian: Szmuc, 1953.  
 Soil: Smith, T. R., 1957.  
 Stratigraphy: deWitt, 1951; King, E. L., 1952; Szmuc,  
 1953.  
 Water: Cross, W. P., 1952.  
 Tuscarawas County: See also Oil and gas; Pennsylvanian.  
 Clay: Schultz, 1958.  
 Coal: Brant, 1954a, 1956, 1960; DeBrosse, 1957;  
 DeLong, 1957; Granchi, 1958; Ford, Bacon &  
 Davis, 1951.  
 General geology: Lamborn, 1956.  
 Gravity anomaly: Mourad, 1959.  
 Limestone: Lamborn, 1951.  
 Oil and gas: Pepper, 1953.  
 Slump structure: Gray, 1952.  
 Strip-mine overburden: Limstrom, 1951.

## U

- Underclays: Schultz, 1958.  
 Underground water: See Ground water.  
 Union County: See also Devonian; Glacial geology;  
 Silurian.  
 Columbus limestone: Summerson, 1957.  
 General geology: Baumiller, 1917.  
 Ground water: Schmidt, James J., 1960, 1960d,  
 1960e.  
 Uranium:  
 Bibliography: Fix, 1958.  
 Occurrences: Bregner, 1955; Hoover, 1956; Lamey,  
 1956; Ohio Chamber of Commerce, 1956;  
 Swanson, 1960.

## V

- Van Wert County: See also Glacial geology; Silurian.  
 Ground water: Ohio Div. Water, 1960; Walker, 1959,  
 1959a, 1959b, 1959f.  
 Soil: Ohio Div. Lands and Soil, 1960.  
 Water: Ohio Div. Water, 1960.  
 Vinton County: See also Mississippian; Oil and gas;  
 Pennsylvanian.  
 Acid mine drainage: Cole, 1955; Moulton, 1957.  
 Clay: Schultz, 1958.  
 Coal: Brant, 1954a, 1956, 1960; DeLong, 1957;  
 Ford, Bacon & Davis, 1951; Granchi, 1958.  
 Economic geology: Bengston, 1950.  
 General: Marple, 1954.  
 Limestone: Lamborn, 1951.  
 Mineralogy: Brant, 1959.  
 Strip-mine overburden: Limstrom, 1951a.

## W

- Warren County: See also Cincinnati area; Glacial geology;  
 Ordovician; Paleontology; Southwestern Ohio.  
 Drainage pattern: Tritschler, 1956.  
 Elkhorn formation: Lindner, 1951.  
 Ground water: Walker, 1960d, 1960f, 1960g, 1960h,  
 1960j.  
 Paleontology: Hazel, 1955; Pulse, 1959; Shaw, 1960.  
 Soil: Farnham, 1951.  
 Stratigraphy: Freeman, 1953; Weiss, M. P., 1960a.  
 Washington County: See also Oil and gas; Pennsylvanian;  
 Permian.  
 Coal: Brant, 1960; DeBrosse, 1957; DeLong, 1955;  
 Denton, 1960; Ford, Bacon & Davis, 1951;  
 Smith, W. H., 1952.  
 Core tests: Wertman, 1959.  
 Field guide: Cross, A. T., 1950.  
 General geology: Kellenberger, 1960; Smith, B. E.,  
 1960; Stearns, 1957.  
 Gilboy sandstone: Turrill, 1960.  
 Ground water: Schmidt, James J., 1959a; Walker,  
 1958c.  
 Hockingport sandstone: Martin, W. D., 1955.  
 Limestone: Lamborn, 1951.  
 Strip-mine overburden: Limstrom, 1951a.  
 Uniontown sandstone: Turrill, 1960.  
 Upper Marietta sandstone: Thomas, J. A., 1956.



Water (supply and surface water): See also Ground water; Floods.

- Adams County: Ohio Div. Water, 1960a.
- Allen County: Ohio Div. Water, 1960.
- Analyses: Cross, W. P., 1952; Dove, 1960a; Hubble, 1960; Lohr, 1954; Smith, R. C., 1955; U. S. Geol. Survey, 1953, 1954a.
- Auglaize County: Ohio Div. Water, 1960.
- Belmont County: Smith, R. C., 1955.
- Brown County: Ohio Div. Water, 1960a.
- Chemical character: Lamar, W. L., 1951.
- Clark County: Norris, 1952.
- Columbiana County: Cross, W. P., 1952.
- Conservation: Crawford, 1951; Ohio Div. Water, 1955; Youngquist, 1951.
- Cuyahoga County: Frost, 1959; Winslow, J. D., 1953.
- Defiance County: Ohio Div. Water, 1960.
- Fulton County: Ohio Div. Water, 1960.
- Geauga County: Frost, 1959.
- General: Ohio Development and Publicity Commission, 1950; Ohio Div. Water, 1955; Paulsen, 1952; Youngquist, 1951.
- Greene County: Schneider, 1957.
- Hancock County: Ohio Div. Water, 1960.
- Hardin County: Ohio Div. Water, 1960.
- Henry County: Ohio Div. Water, 1960.
- Highland County: Ohio Div. Water, 1960a.
- Jackson County: Walker, 1953a.
- Jefferson County: Smith, R. C., 1955.
- Lake County: Frost, 1959.
- Licking County: Dove, 1960a.
- Lucas County: Ohio Div. Water, 1960.
- Madison County: Norris, 1959b.
- Mahoning County: Cross, W. P., 1952.
- Measurement: Crawford, 1951.
- Mercer County: Ohio Div. Water, 1960.
- Ohio River basin: U. S. Geol. Survey, 1951a, 1952, 1953a, 1954b, 1954c, 1955, 1956, 1957, 1957b, 1958a, 1959a, 1960, 1960b.
- Ohio Turnpike: Schmidt, James J., 1954a.
- Paulding County: Ohio Div. Water, 1960.
- Pike County: Smith, R. C., 1953.
- Pollution: Ohio Div. Water, 1955.
- Portage County: Cross, W. P., 1952; Frost, 1959.
- Putnam County: Ohio Div. Water, 1960.
- Records: Knox, 1956; Speer, 1956; U. S. Geol. Survey, 1951.
- Reservoirs: Thomas, N. O., 1956.
- Ross County: Schmidt, James J., 1954.

Water (supply and surface water) - continued

- St. Lawrence River basin: Knox, 1956; U. S. Geol. Survey, 1951b, 1952a, 1953b, 1954d, 1955a, 1957a, 1957c, 1958, 1958b, 1959b, 1960a, 1960c.
- Scioto County: Walker, 1953.
- Sediments in streams: Archer, 1950; Crawford, 1951a.
- Southeastern Ohio: Bengston, 1950; Ohio Div. Water, 1959.
- Stark County: Cross, W. P., 1952.
- Stream flow: Bernhagen, 1951; Cross, W. P., 1959; Ohio Div. Water, 1955; Schneider, 1957.
- Streams: Brown, E. H., 1960; Krolczyk, 1954.
- Summit County: Frost, 1959.
- Trumbull County: Cross, W. P., 1952.
- Van Wert County: Ohio Div. Water, 1960.
- Williams County: Ohio Div. Water, 1960.
- Wood County: Ohio Div. Water, 1960.
- Wayne County: See also Glacial geology; Mississippian; Oil and gas; Pennsylvanian.
- Coal: Brant, 1954a, 1956; DeLong, 1957; Granchi, 1958.
- Cuyahoga formation: Szmuc, 1957, 1959.
- Gravity anomaly: Mourad, 1959.
- Limestone: Lamborn, 1951.
- Oil and gas: Pepper, 1953.
- Pennsylvanian: Multer, 1955, 1957.
- Stratigraphy: Multer, 1955, 1957.
- Strip-mine overburden: Limstrom, 1951.
- Western Ohio: See also the names of the various counties in western Ohio.
- Glacial geology: Forsyth, 1957a, 1960a; Goldthwait, 1958.
- Ground water: Norris, 1957a.
- Williams County: See also Glacial geology; Western Ohio.
- Engineering geology: Kauer, 1956.
- Ground water: Ohio Div. Water, 1960; Walker, 1959g, 1959h, 1959i.
- Radiocarbon dating: Rubin, 1955.
- Wood County: See also Devonian; Glacial geology; Silurian.
- General geology: Farnsworth, D. W., 1958.
- Ground water: Ohio Div. Water, 1960; Walker, 1959f, 1959j.
- Soil: Ohio Div. Lands and Soil, 1956a, 1958.
- Wyandot County: See also Devonian; Glacial geology; Oil and gas; Silurian.
- Columbus limestone: Struble, 1952.
- Delaware limestone: Struble, 1952.
- Economic geology: Hall, J. F., 1956.

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