

Bibliography of North American Geology, 1959

G E O L O G I C A L S U R V E Y B U L L E T I N 1 1 4 5



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By RUTH REECE KING and others

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This bibliography represents work done jointly by Ruth Reece King, Virginia M. Jussen, Elisabeth S. Loud, Mildred Challman Mead, Eleanor H. de Chadenèdes, and Florence V. Oftedahl



UNITED STATES DEPARTMENT OF THE INTERIOR

STEWART L. UDALL, *Secretary*

GEOLOGICAL SURVEY

Thomas B. Nolan, *Director*

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BIBLIOGRAPHY OF NORTH AMERICAN GEOLOGY

1959

By RUTH REECE KING and others¹

INTRODUCTION

The current volume lists publications that appeared during 1959 on the geology of the United States (including Alaska and Hawaii), the rest of the North American continent including Greenland, the West Indies, and adjacent islands, and also Guam and other Pacific island possessions—but not the trust territories of the United States. A few articles published before 1959 and not included in previous volumes, are cited also. Articles by American authors published in foreign journals are cited if they deal with North American localities or are of a general nature, but not if they deal only with foreign areas. Articles on North America by foreign authors are included regardless of place of publication while those of a general nature are included only if they appeared in North American journals.

The citations are listed alphabetically by author, with full title and publication data. There follows a subject index to the papers cited. Geologic names in the index are those used by the individual authors, and their listing here does not imply approval by the Geological Survey.

Assistance of Margaret E. Barcroft, Virginia Elizabeth Rees, and Lillian B. Dawson in the preparation of this volume is gratefully acknowledged.

The Bibliography of North American Geology comprises the following bulletins: 746-747 (1785-1918), 823 (1919-28), 937 (1929-39), 1049 (1940-49), 985 (1950), 1025 (1951), 1035 (1952-53), 1054 (1954), 1065 (1955), 1075 (1956), 1095 (1957), and 1115 (1958).

¹ This bibliography represents work done jointly by Ruth Reece King, Virginia M. Jussen, Elisabeth S. Loud, Mildred Challman Mead, Eleanor H. de Chadenèdes, and Florence V. Oftedahl.

ORGANIZATION OF THE INDEX

The index to a bibliography can be used most effectively when the reader is familiar with its organization. The following paragraphs describe the system of headings, subheadings, and entries used in the index of this bibliography.

Headings.—The headings comprise the main subdivisions of the index and are recognized by their position, that is, flush with the margin of the column; these headings are in capital and small capital letters. They can be classified into two general types: geographic and subject headings. Typical examples of the headings are ALABAMA, ALBERTA, ALUMINA, ANTICLINES. Although most of the headings remain the same in each issue of the bibliography, new ones are included and others are discontinued as the need arises.

Headings with cross references.—Some headings have a cross reference only, that is, no entries are listed under the heading and the reader is referred to another heading. Examples are:

AQUIFERS. *See* Ground water.

BOTANY, fossil. *See* Paleobotany.

MINERAL MAPS. *See* Maps, *Mineral*.

Some headings have entries listed under them but also have cross references to other headings of a similar or related nature. Examples are:

MINERAL DESCRIPTIONS. *See also* Mineralogy.

MINERAL DEPOSITS. *See also* Economic geology.

ECONOMIC GEOLOGY. For areal, *see* subheading *Economic geology* under the states and countries. *See also* Mineral deposits; the more important economic minerals.

Geographic headings.—The geographic headings are names of countries and colonial possessions in North America, the States, territories, and possessions of the United States, the provinces of Canada, and well-known physiographic areas like the Atlantic Coastal Plain and the Appalachians. Examples of geographic headings are: ALABAMA, ALBERTA, CANADA, JAMAICA, MEXICO, NEVADA, UNITED STATES. CANADA and UNITED STATES are headings used to index papers covering the whole of these areas or more than two or three States or provinces. For example, an article on oil and gas exploration in Manitoba would be indexed under MANITOBA but one on western Canada's oil and gas potentialities would be indexed only under CANADA and not under each province discussed in the paper. Similarly, "Feldspar and mica deposits in the south-eastern United States" would be indexed only under UNITED STATES and not under the individual States described.

Subject headings.—The subject headings deal with the subject of the paper rather than the geographic areas. They include, among others, the general subdivisions of geology, such as ECONOMIC GEOLOGY, MINERALOGY, PALEONTOLOGY, the phyla and larger classes of animals, such as BRACHIPODA, MOLLUSCA, the common economic minerals and metals, such as COPPER, GOLD, MICA, and SILVER, and other geologic entries. A few of the major subject headings and the scope of the entries listed under each are:

<i>Heading</i>	<i>Entries</i>
Bibliography	Subject, area, or individual
Biography	Individual names
Geologic formations	Listed by name of formation; only detailed information indexed
Geologic formations, lists, sections, tables	Area listing of all formation tables and sections
Geologic history	Area
Geologic maps	Area; some sketch maps included
Guidebooks	Areas covered by field trips
History	History of various organizations or geological investigations
Industrial minerals	Subject or area
Mineral deposits	Area; also includes articles discussing origin of minerals or ores
Mineral descriptions	Mineral name listing
Mineral resources	Area; includes more than one mineral; not indexed to individual minerals
Mineralogy	Mineral examinations, origin, etc.; methods of testing and the like
Oil and gas fields	Listed by name of field
Popular and elementary geology	Papers written for the layman
Rock descriptions	Rock names and areas; restricted to new or unusual rocks or detailed descriptions
Surveys	Special activities of U.S. Geological Survey or State and foreign geological surveys
Systems	Chemical rock- or mineral-forming systems; alphabetically by formula or name

Subheadings.—Subheadings, in italics and indented two spaces, are used to group entries under the geographic headings and under four of the subject headings. Subheadings used under geographic headings are: *Areas described* (for general descriptions), *Economic geology*, *Geologic maps*, *Ground water*, *Historical geology*, *Mineralogy*, *Paleontology*, *Petrology*, *Physical geology*, *Physiographic geology*. Subheadings are used under the four subject headings EARTH, MAPS, PALEONTOLOGY, and TECHNIQUE. Subheadings for EARTH include *Crust*, *Interior*, and *Temperature*. Subheadings for MAPS include *Aeromagnetic*, *Geophysical*, and *Mineral*. The PALEONTOLOGY subheadings include *General* and the age groups, *Cambrian*, *Ordovician*, etc. Subheadings under TECHNIQUE include *Apparatus*, *Geophysical*, *Mineralogical*, and *Petrographic*.

Entries.—Entries form the main subdivisions of headings and are indented four spaces. Entries usually follow a subheading, but where they do not fit under any of the subheadings used, they follow the main heading directly. Under both the geographic and subject headings, the entries may be either geographic, subject, or a combination of the two. Each entry is followed by the name of the author of the paper referring to it. A number following the author's name refers to the paper so numbered in the bibliography. Examples of entries under geographic and subject headings are as follows:

ILLINOIS.

Economic geology.

Natural gas, Freeburg pool: Meents, W. F.

Historical geology.

Coal beds, Pennsylvanian, correlation by spores: Kosanke, R. M.

Cook Mills area, Mississippian-Pennsylvanian: Whiting, L. L.

INDEXES.

Geologic names of North America: Wilson, Druid.

IRON.

Alberta, Peace River area: Kidd, D. J.

Itabirite, origin of hard hematite: Park, C. F., Jr.

Mineralizing solutions, ore deposition: Butler, B. S.

Minnesota, Cook County, titaniferous magnetite: Grout, F. F.

Pennsylvania, eastern: Gray, C., 1.

United States, resources: Carr, M. E. S.

Wisconsin, Ironwood iron-formation, origin: Huber, N. K.

Use of index.—In general, if the paper sought deals with a specific mineral resource from a specific State, province, or country, it should be found under the following entries: (a) the heading for the specific geographic area under the subheading *Economic geology*, and (b) the mineral resource heading with an entry under the specific geographic area. For example, a paper on iron deposits in Minnesota might be found under:

MINNESOTA.

Economic geology.

Iron, Cook County, titaniferous magnetite: Grout, F. F.

IRON.

Minnesota, Cook County, titaniferous magnetite: Grout, F. F.

However, if a paper discusses iron in a particular State but also covers deposits in several other States, there will be no entry under the specific States discussed but only under the United States. Thus the index would read in such a case:

UNITED STATES.

Economic geology.

Iron, resources: Carr, M. E. S.

IRON.

United States, resources: Carr, M. E. S.

In other words, papers covering the larger geographic area, of which the area of interest is a part, should also be examined for possible supplementary information on the particular area under study.

In the case of subjects and other special types of entry, a similar situation holds true. Most mineral names will not be indexed with an individual heading but will be found under the headings MINERAL DESCRIPTIONS or MINERALOGY, or under the *Mineralogy* subheading for the geographic area in which they are found. In general, items will be included under the larger, more general group heading rather than under an individual entry: that is, a special oil field, under OIL AND GAS FIELDS; general papers on aeromagnetic surveys under GEOPHYSICS or TECHNIQUE, *Geophysical*; Ordovician trilobites under TRILOBITA; etc.

SERIALS

The following list gives the abbreviated title of periodicals and serials most commonly cited in this bibliography. Included also are their complete titles, as used in library catalogs and the "Union List of Serials," and the place of publication. Periodicals cited only infrequently have been omitted from this list, but in the case of those published in foreign countries, the place of publication has been included in the citation in the bibliography proper. Guidebooks, proceedings, and related types of literature prepared for special conferences, congresses, and symposiums are not listed here as serials but are cited in the bibliography proper under the name of the editor or of the issuing society.

- A.I.M.E. Trans.—American Institute of Mining, Metallurgical, and Petroleum Engineers Transactions. New York.
Acta Crystallographica. Copenhagen.
Ala. Acad. Sci. Jour.—Alabama Academy of Science Journal. Montevallo, Ala.
Ala. Geol. Survey Inf. Ser.—Alabama Geological Survey Information Series. University, Ala.
Alberta Research Council Bull.; Prelim. Rept.—Alberta Research Council Bulletin; Preliminary Report. Edmonton, Alberta.
Alberta Soc. Petroleum Geologists Jour.—Alberta Society of Petroleum Geologists Journal. Calgary, Alberta.
Am. Antiquity—American Antiquity. Washington, D.C.
Am. Assoc. Petroleum Geologists Bull.—American Association of Petroleum Geologists Bulletin. Tulsa, Okla.
Am. Ceramic Soc. Bull.; Jour.—American Ceramic Society Bulletin; Journal. Columbus, Ohio.
Am. Geol. Inst. Rept.—American Geological Institute Report. Washington, D.C.
Am. Geophys. Union Trans.—American Geophysical Union Transactions. Washington, D.C.
Am. Jour. Botany—American Journal of Botany. Baltimore, Md.
Am. Jour. Sci.; Radiocarbon Supp.—American Journal of Science; Radiocarbon Supplement. New Haven, Conn.
Am. Malacolog. Union Ann. Rept.—American Malacological Union Annual Report. Buffalo, N.Y.
Am. Mineralogist—American Mineralogist. Washington, D.C.
Am. Mus. Nat. History Bull.—American Museum of Natural History Bulletin. New York.
Am. Mus. Novitates—American Museum Novitates. New York.
Am. Philos. Soc. Proc.—American Philosophical Society Proceedings. Philadelphia, Pa.
Am. Scientist—American Scientist. New Haven, Conn.
Am. Soc. Civil Engineers Proc., Jour. Hydraulics Div.; Jour. Irrigation and Drainage Div.; Jour. Soil Mechanics and Found. Div.; Jour. Waterways and Harbors Div.—American Society of Civil Engineers Proceedings, Journal of the Hydraulics Division; Journal of the Irrigation and Drainage Division; Journal of the Soil Mechanics and Foundations Division; Journal of the Waterways and Harbors Division. New York.
Am. Soc. Testing Materials Special Tech. Pub.—American Society for Testing Materials Special Technical Publications. Philadelphia, Pa.
Am. Water Works Assoc. Jour.—American Water Works Association Journal. New York.
Anal. Chemistry—Analytical Chemistry. Washington, D.C.
Arctic. Montreal, Quebec.

- Ariz. Bur. Mines Bull., Mineral Technology Ser.—Arizona Bureau of Mines Bulletin, Mineral Technology Series. Tucson, Ariz.
- Ariz. Geol. Soc. Digest—Arizona Geological Society Digest. Tucson, Ariz.
- Asoc. Mexicana Geólogos Petroleros Bol.—Asociación Mexicana de Geólogos Petroleros Boletín. México, D.F.
- Assoc. Am. Geographers Annals—Association of American Geographers Annals. Washington, D.C.
- Assoc. Canadienne-Française Av. Sci. Annales—Association Canadienne-Française pour l'Avancement des Sciences Annales. Montreal, Quebec.
- Brigham Young Univ. Research Studies Geology Ser.—Brigham Young University Research Studies Geology Series. Provo, Utah.
- British Columbia Dept. Mines Ann. Rept.; Bull.—British Columbia Department of Mines Annual Report; Bulletin. Victoria, British Columbia.
- Bull. Am. Paleontology—Bulletins of American Paleontology. Ithaca, N.Y.
- Cahiers Géographie Québec—Cahiers de Géographie de Québec. Quebec, Quebec.
- Calif. Dept. Nat. Res., Div. Mines Bull.; Mineral Inf. Service; Special Rept.—California Department of Natural Resources, Division of Mines Bulletin; Mineral Information Service; Special Report. San Francisco, Calif.
- Calif. Dept. Water Res., Div. Res. Plan. Bull.—California Department of Water Resources, Division of Resources Planning Bulletin. Sacramento, Calif.
- Calif. Oil Fields—California Oil Fields. San Francisco, Calif.
- Calif. Univ. Pubs. Geol. Sci.—California University Publications in Geological Sciences. Berkeley, Calif.
- Canada Geol. Survey Bull.; Geophysics Paper; Map; Mem.; Paper; Prelim. Ser. Map—Canada Geological Survey Bulletin; Geophysics Paper; Map; Memoir; Paper; Preliminary Series Map. Ottawa.
- Canada Natl. Mus. Nat. History Paper—Canada National Museum Natural History Papers. Ottawa.
- Canadian Alpine Jour.—Canadian Alpine Journal. Banff, Alberta.
- Canadian Geographer. Manotick, Ontario.
- Canadian Inst. Mining and Metallurgy Trans.—Canadian Institute of Mining and Metallurgy Transactions. Montreal, Quebec.
- Canadian Jour. Botany—Canadian Journal of Botany. Ottawa.
- Canadian Jour. Soil Sci.—Canadian Journal of Soil Science. Ottawa.
- Canadian Min. Jour.—Canadian Mining Journal. Gardenvale, Quebec.
- Canadian Min. Metall. Bull.—Canadian Mining and Metallurgical Bulletin. Montreal, Quebec.
- Canadian Mineralogist. Ottawa.
- Canadian Oil and Gas Industries. Gardenvale, Quebec.
- Ciencia. México, D.F.
- Colo. School Mines Mineral Industries Bull.; Quart.—Colorado School of Mines Mineral Industries Bulletin; Quarterly. Golden, Colo.
- Columbia Univ. Dept. Geology Tech. Rept.—Columbia University Department of Geology Technical Report. New York.
- Compass—The Compass. Provo, Utah.
- Conn. Geol. Nat. History Survey Quadrangle Rept.—Connecticut Geological and Natural History Survey Quadrangle Report. Hartford, Conn.
- Copeia. Ann Arbor, Mich.
- Copenhagen Univ., Mus. Minéralogie et Géologie Commun. Géol.—Copenhagen Université, Muséum de Minéralogie et de Géologie Communications Géologiques. Copenhagen.
- Cushman Found. Forum. Research Contr.—Cushman Foundation for Foraminiferal Research Contributions. Ithaca, N.Y.
- Dansk Geol. Foren. Meddel.—Dansk Geologisk Forening Meddelelser. Copenhagen.
- Desert Mag.—Desert Magazine. Palm Desert, Calif.
- Dissert. Abs.—Dissertation Abstracts. Ann Arbor, Mich.
- Earth Science. Chicago, Ill.
- Ecology. Durham, N.C.
- Econ. Geology—Economic Geology. Urbana, Ill.
- Edmonton Geol. Soc. Quart.—Edmonton Geological Society Quarterly. Edmonton, Alberta.
- Elisha Mitchell Sci. Soc. Jour.—Elisha Mitchell Scientific Society Journal. Chapel Hill, N.C.
- Eng. Min. Jour.—Engineering and Mining Journal. New York.

- Evolution.** Lancaster, Pa.
Field & Lab.—Field & Laboratory. Dallas, Texas.
Fla. Acad. Sci. Quart. Jour.—Florida Academy of Sciences Quarterly Journal. Gainesville, Fla.
Fla. Geol. Survey Rept. Inv.; Special Pub.—Florida Geological Survey Report of Investigations; Special Publication. Tallahassee, Fla.
Fla. State Mus., Biol. Sci. Bull.—Florida State Museum, Biological Sciences Bulletin. Gainesville, Fla.
Ga. Acad. Sci. Bull.—Georgia Academy of Science Bulletin. Emory University, Ga.
Ga. Geol. Survey Bull.—Georgia Geological Survey Bulletin. Atlanta, Ga.
Ga. Mineral Newsletter—Georgia Mineral Newsletter. Atlanta, Ga.
Gems and Gemology. Los Angeles, Calif.
Gems & Minerals. Mentone, Calif.
Geochimica et Cosmochimica Acta. New York.
Geog. Rev.—Geographical Review. New York.
Geol. Assoc. Canada Proc.—Geological Association of Canada Proceedings. Toronto, Ontario.
Geol. Soc. America Bull.; Eng. Geology Case Histories; Proc.—Geological Society of America Bulletin; Engineering Geology Case Histories; Proceedings. New York.
Geologram. Bismarck, N. Dak.
Geonotes. Kingston.
Geophys. Soc. Tulsa Proc.—Geophysical Society of Tulsa Proceedings. Tulsa, Okla.
Geophysics. Tulsa, Okla.
GeoTimes. Washington, D.C.
Grønland. Charlottenlund, Denmark.
Grønlands Geol. Undersøgelse Bull.; Misc. Papers—Grønlands Geologiske Undersøgelse Bulletin; Miscellaneous Papers. Copenhagen.
Gulf Coast Assoc. Geol. Soc. Trans.—Gulf Coast Association of Geological Societies Transactions. Houston, Texas.
Harvard Coll. Mus. Comp. Zoology Bull.—Harvard College Museum of Comparative Zoology Bulletin. Cambridge, Mass.
Herpetologica. San Diego, Calif.
Houston Geol. Soc. Bull.—Houston Geological Society Bulletin. Houston, Texas.
Idaho Bur. Mines and Geology Pamph.—Idaho Bureau of Mines and Geology Pamphlet. Moscow, Idaho.
Ill. State Geol. Survey Circ.; Educ. Ser.; Rept. Inv.—Illinois State Geological Survey Circular; Educational Series; Report of Investigations. Urbana, Ill.
Ill. State Water Survey Cooperative Ground-Water Rept.—Illinois State Water Survey Cooperative Ground-Water Report. Urbana, Ill.
Ind. Acad. Sci. Proc.—Indiana Academy of Science Proceedings. Indianapolis, Ind.
Ind. Geol. Survey Circ.; Rept. Progress—Indiana Geological Survey Circular; Report of Progress. Bloomington, Ind.
Ing. Civil—Ingeniería Civil. Havana.
Inst. Marine Sci. Pub.—Institute of Marine Science Publications. Port Aransas, Texas.
Internat. Geod. Geophys. Union Assoc. Seismology, Sér. A, Travaux Sci.—International Geodetic and Geophysical Union, Association of Seismology, Série A, Travaux Scientifiques. Toulouse, France.
Internat. Ser. Mons. Earth Sci.—International Series of Monographs on Earth Sciences. London.
Iowa Acad. Sci. Proc.—Iowa Academy of Science Proceedings. Des Moines, Iowa.
Iowa State Univ. Sci. and Technology, Eng. Expt. Sta. Bull.—Iowa State University of Science and Technology, Engineering Experiment Station Bulletin. Ames, Iowa.
Jamaica Geol. Survey Pub.—Jamaica Geological Survey Publication. Kingston.
Jour. Chem. Physics—Journal of Chemical Physics. Lancaster, Pa.
Jour. Geol. Education—Journal of Geological Education. Princeton, N.J.
Jour. Geology—Journal of Geology. Chicago, Ill.
Jour. Geophys. Research—Journal of Geophysical Research. Washington, D.C.
Jour. Mammalogy—Journal of Mammalogy. Lawrence, Kans.

- Jour. Paleontology—Journal of Paleontology. Tulsa, Okla.
 Jour. Petroleum Technology—Journal of Petroleum Technology. Dallas, Texas.
 Jour. Sed. Petrology—Journal of Sedimentary Petrology. Menasha, Wis.
 Kans. Acad. Sci. Trans.—Kansas Academy of Science Transactions. Lawrence, Kans.
 Kans. State Geol. Survey Bull.—Kansas State Geological Survey Bulletin. Lawrence, Kans.
 Kans. Univ. Paleont. Contr.—Kansas University Paleontological Contributions. Lawrence, Kans.
 Ky. Geol. Survey, ser. 10, Inf. Circ.; Special Pub.—Kentucky Geological Survey, series 10, Information Circular; Special Publication. Lexington, Ky.
 Limnology and Oceanography. Ann Arbor, Mich.
 Maine Geol. Survey GP. and G. Survey [Maps]; Mineral Res. Reference Map Ser.; Special Geol. Studies Ser.—Maine Geological Survey GP. and G. Survey [Maps]; Mineral Resources Reference Map Series; Special Geologic Studies Series. Augusta, Maine.
 Manitoba Dept. Mines and Nat. Res., Mines Br. Pub.—Manitoba Department of Mines and Natural Resources, Mines Branch Publication. Winnipeg, Manitoba.
 Meddel. om Grønland—Meddelelser om Grønland. Copenhagen.
 México Consejo Rec. Naturales no Renovables Bol.—México Consejo de Recursos Naturales no Renovables Boletín. México, D.F.
 México Univ. Nac., Inst. Geología Bol.; Paleontología Mexicana—México Universidad Nacional, Instituto de Geología Boletín; Paleontología Mexicana. México, D.F.
 Mich. Acad. Sci. Papers—Michigan Academy of Science, Arts, and Letters, Papers. Ann Arbor, Mich.
 Mich. Geol. Survey Progress Rept.—Michigan Geological Survey Progress Reports. Lansing, Mich.
 Mich. Univ. Mus. Paleontology Contr.—Michigan University Museum of Paleontology Contributions. Ann Arbor, Mich.
 Micropaleontology. New York.
 Min. Cong. Jour.—Mining Congress Journal. Washington, D.C.
 Min. Eng.—Mining Engineering. New York.
 Mineral Industries. University Park, Pa.
 Mineral Industries Jour.—Mineral Industries Journal. Blacksburg, Va.
 Mineralogist—The Mineralogist. Portland, Oreg.
 Mines Mag.—Mines Magazine. Denver, Colo.
 Minn. Jour. Sci.—Minnesota Journal of Science. St. Paul, Minn.
 Miss. State Geol. Survey Bull.—Mississippi State Geological Survey Bulletin. University, Miss.
 Mo. Geol. Survey and Water Res. Rept. Inv.—Missouri Geological Survey and Water Resources Report of Investigations. Rolla, Mo.
 Mont. Bur. Mines and Geology Bull.; Mem.; Special Pub.—Montana Bureau of Mines and Geology Bulletin; Memoirs; Special Publication. Butte, Mont.
 N.C. Dept. Conserv. Devel., Div. Mineral Res. Bull.—North Carolina Department of Conservation and Development, Division of Mineral Resources Bulletin. Raleigh, N.C.
 N. Dak. Geol. Survey Circ.; Ground-Water Studies; Rept. Inv.—North Dakota Geological Survey Circular; Ground-Water Studies; Report of Investigation. Grand Forks, N. Dak.
 N.H. State Plan. Devel. Comm. Mineral Res. Survey—New Hampshire State Planning and Development Commission, Mineral Resource Survey. Concord, N.H.
 N.J. Dept. Conserv., Div. Water Policy and Supply Water Res. Circ.—New Jersey Department of Conservation and Economic Development, Division of Water Policy and Supply Water Resources Circular. Trenton, N.J.
 N. Mex. Bur. Mines and Mineral Res. Bull.; Geol. Map; Scenic Trips Geol. Past—New Mexico Bureau of Mines and Mineral Resources Bulletin; Geologic Map; Scenic Trips to the Geologic Past. Socorro, N. Mex.
 N.Y. Acad. Sci. Trans.—New York Academy of Sciences Transactions. New York.
 N.Y. State Mus. and Sci. Service Bull.—New York State Museum and Science Service Bulletin. Albany, N.Y.
 N.Y. Water Power and Control Comm. Bull.—New York Water Power and Control Commission Bulletin. Albany, N.Y.

- Nat. History—Natural History. New York.
 Natl. Acad. Sci. Biog. Mem.—National Academy of Sciences Biographical Memoirs. Washington, D.C.
 Natl. Speleol. Soc. Bull.—National Speleological Society Bulletin. Alexandria, Va.
 Naturaliste Canadien. Quebec, Quebec.
 Nature Mag.—Nature Magazine. Washington, D.C.
 Nebr. State Mus. Bull.—Nebraska State Museum Bulletin. Lincoln, Nebr.
 Nev. Bur. Mines Bull.—Nevada Bureau of Mines Bulletin. Reno, Nev.
 Nicaragua Servicio Geol. Nac. Bol.—Nicaragua Servicio Geológico Nacional Boletín. Managua.
 Nova Scotia Dept. Mines Ann. Rept.—Nova Scotia Department of Mines Annual Report. Halifax, Nova Scotia.
 Ohio Jour. Sci.—Ohio Journal of Science. Columbus, Ohio.
 Oil and Gas Jour.—Oil and Gas Journal. Tulsa, Okla.
 Oil in Canada. Winnipeg, Manitoba.
 Oilweek. Calgary, Alberta.
 Okla. Acad. Sci. Proc.—Oklahoma Academy of Science Proceedings. Norman, Okla.
 Okla. Geol. Survey Bull.; Circ.—Oklahoma Geological Survey Bulletin; Circular. Norman, Okla.
 Okla. Geology Notes—Oklahoma Geology Notes. Norman, Okla.
 Ontario Dept. Mines Ann. Rept.; Geol. Circ.—Ontario Department of Mines Annual Report; Geological Circular. Toronto, Ontario.
 Ontario Fuel Board Ann. Rept.—Ontario Fuel Board Annual Report. Toronto, Ontario.
 Ore.-Bin. Portland, Oreg.
 Oreg. Dept. Geology and Mineral Industries Bull.—Oregon Department of Geology and Mineral Industries Bulletin. Portland, Oreg.
 Pa. Acad. Sci. Proc.—Pennsylvania Academy of Science Proceedings. Grant-ham, Pa.
 Pa. Geol. Survey, 4th ser., Bull.; Inf. Circ.—Pennsylvania Geological Survey, 4th series, Bulletin; Information Circular. Harrisburg, Pa.
 Pacific Discovery. San Francisco, Calif.
 Pacific Science. Honolulu.
 Panhandle Geonews—The Panhandle Geonews. Amarillo, Texas.
 Petroleum Engineer. Dallas, Texas.
 Petroleum Rev.—Petroleum Review. Houston, Texas.
 Photogrammetric Eng.—Photogrammetric Engineering. Washington, D.C.
 Phys. Rev.—Physical Review. Lancaster, Pa.
 Plateau. Flagstaff, Ariz.
 Producers Monthly. Bradford, Pa.
 Quebec Dept. Mines, Geol. Surveys Br. Geol. Rept.—Quebec Department of Mines, Geological Surveys Branch Geological Report. Quebec, Quebec.
 Quebec Dept. Mines, Geol. Surveys Br. Prelim. Rept.; Mineral Deposits Br. Prelim. Rept.—Quebec Department of Mines, Geological Surveys Branch Preliminary Report; Mineral Deposits Branch Preliminary Report. Quebec, Quebec.
 R.I. and Providence Plantations Water Res. Coordinating Board Ground-Water Map—Rhode Island and Providence Plantations Water Resources Coordinating Board Ground-Water Map. Providence, R.I.
 R.I. Water Res. Coordinating Board Geol. Bull.—Rhode Island Water Resources Coordinating Board Geological Bulletin. Providence, R.I.
 Rev. Canadienne Géographie—Revue Canadienne de Géographie. Montreal, Quebec.
 Rocks and Minerals. Peekskill, N.Y.
 Rocky Mtn. Oil Reporter—Rocky Mountain Oil Reporter. Denver, Colo.
 Royal Soc. Canada Minutes Proc.; Trans.—Royal Society of Canada Minutes of Proceedings; Transactions. Ottawa.
 S.C. State Devel. Board Div. Geology Bull.; Geol. Notes—South Carolina State Development Board Division of Geology Bulletin; Geologic Notes. Columbia, S.C.
 S. Dak. Acad. Sci. Proc.—South Dakota Academy of Science Proceedings. Vermillion, S. Dak.

- Saskatchewan Dept. Mineral Res. (Prelim.) Rept.; Rept.—Saskatchewan Department of Mineral Resources (Preliminary) Report; Report. Regina, Saskatchewan.
- Sci. Am.—Scientific American. New York.
- Science. Washington, D.C.
- Seismol. Soc. America Bull.—Seismological Society of America Bulletin. Berkeley, Calif.
- Shale Shaker. Oklahoma City, Okla.
- Smithsonian Inst. Ann. Rept.—Smithsonian Institution Annual Report. Washington, D.C.
- Smithsonian Misc. Coll.—Smithsonian Miscellaneous Collections. Washington, D.C.
- Soc. Econ. Paleontologists and Mineralogists Special Pub.—Society of Economic Paleontologists and Mineralogists Special Publication. Tulsa, Okla.
- Soc. Geol. Mexicana Bol.—Sociedad Geológica Mexicana Boletín. México, D.F.
- Soil Sci. Soc. America Proc.—Soil Science Society of America Proceedings. Danville, Ill.
- Soil Science. Baltimore, Md.
- Southeastern Geology. Durham, N.C.
- Southern Calif. Acad. Sci. Bull.—Southern California Academy of Sciences Bulletin. Los Angeles, Calif.
- Spectrochimica Acta. New York.
- Tenn. Acad. Sci. Jour.—Tennessee Academy of Science Journal. Knoxville, Tenn.
- Tenn. Dept. Conserv. and Commerce, Div. Geology Bull.; Rept. Inv.—Tennessee Department of Conservation and Commerce, Division of Geology Bulletin; Report of Investigations. Nashville, Tenn.
- Texas Board of Water Engineers Bull.—Texas Board of Water Engineers Bulletin. Austin, Texas.
- Texas Jour. Sci.—Texas Journal of Science. San Marcos, Texas.
- Texas Univ., Bur. Econ. Geology Rept. Inv.—Texas University, Bureau of Economic Geology Report of Investigations. Austin, Texas.
- Texas Univ. Pub.—Texas University Publication. Austin, Texas.
- Tulsa Geol. Soc. Digest—Tulsa Geological Society Digest. Tulsa, Okla.
- U.S. Air Force Cambridge Research Center, Geophysics Research Directorate Geophys. Research Paper—United States Air Force Cambridge Research Center, Geophysics Research Directorate Geophysical Research Papers. Bedford, Mass.
- U.S. Army, Corps of Engineers, Snow, Ice and Permafrost Research Establishment Rept.; Research Rept.; Special Rept.; Tech. Rept.—United States Army, Corps of Engineers, Snow, Ice and Permafrost Research Establishment Report; Research Report; Special Report; Technical Report. Wilmette, Ill.
- U.S. Bur. Mines Bull.; Inf. Circ.; Rept. Inv.—United States Bureau of Mines Bulletin; Information Circular; Report of Investigations. Washington, D.C.
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| U.S. Geol. Survey | United States Geological Survey |
| Bull. | Bulletin |
| Circ. | Circular |
| Geol. Quadrangle Map | Geologic Quadrangle Map |
| Geophys. Inv. Map | Geophysical Investigations Map |
| Index Geol. Mapping U.S. | Index to Geologic Mapping in the United States |
| Mineral Inv. Field Studies Map | Mineral Investigations Field Studies Map |
| Misc. Geol. Inv. Map | Miscellaneous Geologic Investigations Map |
| Oil and Gas Inv. Chart | Oil and Gas Investigations Chart |
| Oil and Gas Inv. Map | Oil and Gas Investigations Map |
| Prof. Paper | Professional Paper |
| Water-Supply Paper | Water-Supply Paper |
| | Washington, D.C. |
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- Sediments and sedimentary rocks, symposium: Ireland, H. A., 2.
- Soluble, removal from fresh water entering the sea: Bien, G. S.-N.
- Stable-isotope research, economic applications: James, H. L., 2.
- Strontium, coprecipitation with calcite and aragonite: Oxburgh, U. M.
- Sulfur, isotopic fractionation: Ault, W. U., 1, 2.
- Table of elements: Green, J., 1.
- Telluric currents, possible effects: Norton, M. F., 3.
- Thorium: Adams, J. A. S., 1.
- Uranium: Adams, J. A. S., 1.
- Deposition in marine environments: Sheldon, R. P.
- Distribution in marine calcareous material: Tatsumoto, M.
- Sandstone-type deposits: Garrels, R. M., 1.
- Uranium minerals: Fischer, R. P.
- Uranium-carbonaceous materials, associations: Breger, I. A., 1.
- Vanadium minerals: Fischer, R. P.
- Water, analysis: Hem, J. D.
- Zirconium: Frondel, C.

GEOCHRONOLOGY. *See* Geologic time.

GEODES.

- Illinois, Niota area, oil-filled: Borschel, K.
- Iowa, collecting: Borschel, K.
- Warsaw formation, minerals: Tripp, R. B.

Popular account: Smith, I.

GEOLOGIC FORMATIONS. *See also* Geologic names, lexicons, catalogs, glossaries.

- Abo formation, Permian, New Mexico: Otte, C., Jr., 1.
- Active formation, Cambrian, British Columbia: Fyles, J. T.
- Allegheny group, Pennsylvanian, Pennsylvania: Dutcher, R. R.
- Allen Bay formation, Ordovician-Silurian, Northwest Territories: Thorsteinsson, R., 1.
- Alum phyllite, Precambrian, Virginia, new: Dietrich, R. V.
- Angao formation, Jurassic, Mexico, new: Pantoja Alor, J.
- Annaville limestone, Ordovician, Pennsylvania: Prouty, C. E., 1.
- Aquia formation, Paleocene(?), Maryland-Virginia: Page, R. A., 1.
- Arapien shale, Jurassic, Utah: Johnson, K. D.
- Arcturus formation, Permian, Utah: Hose, R. K.
- Arikaree formation, Miocene, Montana-North Dakota-South Dakota: Denson, N. M., 1.
- Ash Creek series, Precambrian, New Mexico: Hewitt, C. H.
- Atankerdluk formation, Tertiary, Greenland, upper part, type members: Koch, B. E.
- Athabasca formation, Cambrian(?) or Devonian(?), Saskatchewan, redefined: Gussow, W. C., 1.
- Atoka formation, Pennsylvanian, Oklahoma, members: Blythe, J. G.
- Avawatz formation, Pliocene, California: Grose, L. T.
- Aziscohos formation, lower Paleozoic, New Hampshire: Green, J. C.
- Bakken formation, Mississippian, Saskatchewan: Kents, P.
- Baldy Hill formation, Triassic, New Mexico: Baldwin, B.
- Barre group, Ordovician-Devonian, Vermont: Murthy, V. R., 1.
- Basco formation, Ordovician, Nevada, new: Lovejoy, D. W.
- Bear River formation, Cretaceous, Idaho: Vine, J. D., 1.
- Beattie limestone, Permian, United States, midcontinent: Imbrie, J., 1.
- Beauharnois formation, Ordovician, Quebec, new members: Byrne, A. W.

GEOLOGIC FORMATIONS—Continued

- Beaverhill Lake formation, Devonian, Alberta, members: Carrigy, M. A., 1.
- Beck Pond limestone, Devonian, Maine: Boucot, A. J., 3.
- Bell Hill dolomite, Silurian, Utah: Staatz, M. H.
- Bellevue member of McMillan formation, Ordovician, Ohio-Indiana-Kentucky: Hyde, D. E.
- Belloy formation, Permian, Alberta-British Columbia, new: Halbertsma, H. L.
- Big Snowy group, Carboniferous, Montana: Gardner, L. S., 2.
- Bird Spring formation, Mississippian-Permian, Nevada: Rich, M.
- Bishops Lodge member of Tesuque formation, Miocene, New Mexico: Boyer, W. W.
- Blackleaf formation, Cretaceous, Montana, members: Cobban, W. A., 2.
- Blairmore group, Cretaceous, Alberta: Glaister, R. P.; Mellon, G. B., 1.
- Bluebird dolomite, Cambrian, Utah: Rigby, J. K., 2.
- Bluefield formation, Mississippian, Kentucky-Virginia-West Virginia: Wilpolt, R. H.
- Bluesky formation, Cretaceous, Alberta, redefined: Workman, L. E.
- Bone Valley formation, Pliocene, Florida: Cathcart, J. B.
- Bonner quartzite, Precambrian, Montana, new: Nelson, W. H., 3.
- Bonta formation, Miocene, California, new: Durrell, C., 2.
- Bootlegger Cove clay, Pleistocene, Alaska: Miller, R. D., 1.
- Boskydell sandstone, Pennsylvanian, Illinois: Desborough, G. A., 2.
- Brazer dolomite, Mississippian, Utah: Sando, W. J.
- Brazil formation, Pennsylvanian, Indiana: Kottlowski, F. E., 1.
- Bullard Peak series, Precambrian, New Mexico: Hewitt, C. H.
- Cameron Creek formation, Carboniferous, Montana: Gardner, L. S., 2.
- Caney shale, Mississippian, Oklahoma: Braun, J. C.; Elias, M. K., 2.
- Mississippian-Pennsylvanian, Oklahoma: Tomlinson, C. W., 1.
- Cape Phillips formation, Ordovician-Silurian, Northwest Territories: Thorsteinsson, R., 1.
- Cedar Fort member of Oquirrh formation, Pennsylvanian, Utah: Bissell, H. J., 3.
- Cedar Mtn. formation, Cretaceous, Colorado: Young, R. G.
- Central Valley sandstone, Devonian, New York, new: Boucot, A. J., 5.
- Chaffee formation, Devonian, Colorado, members: Hallgarth, W. E.

GEOLOGIC FORMATIONS—Continued

- Challis volcanics, Oligocene(?), Idaho: Anderson, A. L.
- Chapperon group, Precambrian, British Columbia: Jones, A. G.
- Characharando volcanic series, Tertiary, Mexico, new: Pantoja Alor, J.
- Chattanooga shale, Devonian, Alabama-Georgia-Tennessee: Glover, L., 3d.
- Chinle formation, Triassic, Arizona-New Mexico: Cooley, M. E., 1.
- Colorado Plateau: Finch, W. I., 2; Stewart, J. H., 1.
- Chukotat group, Precambrian, Quebec: Beall, G. H.
- Coal Creek sequence, Devonian, Nevada, new: Lovejoy, D. W.
- Cole Canyon dolomite, Cambrian, Utah: Rigby, J. K., 2.
- Collina limestone, Permian, Arizona: Bryant, D. L.
- Condor formation, Cambrian, Utah: Cohenour, R. E.
- Conococheague formation, Cambrian, Pennsylvania, members: Gray, C., 1.
- Cooper marl, Oligocene, South Carolina: Malde, H. E., 1.
- Cornwallis formation, Ordovician, Northwest Territories: Thorsteinsson, R., 1.
- Cottage Grove sandstone, Pennsylvanian, Kansas: Schulte, G. S.
- Cove Fort quartzite, Devonian, Utah: Crosby, G. W., 2.
- Croatan formation, Pleistocene, North Carolina-South Carolina: DuBar, J. R.
- Cumberland group, Pennsylvanian, Nova Scotia: Copeland, M. J.
- Dakota formation, Cretaceous, Colorado-New Mexico: Tyrrell, W. W., Jr. South Dakota: Gries, J. P.
- Dakota group, Cretaceous, Colorado: Rocky Mtn. Assoc. Geologists.
- Dakota sandstone, Cretaceous, Colorado: Konishi, K., 2.
- Dawson Bay formation, Devonian, Saskatchewan: Edie, R. W., 1; Lane, D. M.
- Day Point formation, Ordovician, New York-Vermont, members: Oxley, P.
- Days Creek formation, Cretaceous, Oregon: Imlay, R. W., 5.
- Decorah formation, Ordovician, upper Mississippi Valley: Heyl, A. V., Jr., 1.
- Deer Creek formation, Pennsylvanian, Colorado: Bolyard, D. W.
- Deese group, Pennsylvanian, Oklahoma, subsurface zones: Gunter, C. E.
- Delleker formation, Miocene, California, new: Durrell, C., 2.

GEOLOGIC FORMATIONS—Continued

- Devils Pocket formation, Pennsylvanian, Montana: Gardner, L. S., 2.
- Difunta group, Cretaceous-Tertiary (?), Mexico: Murray, G. E., 2.
- Disappointment Bay formation, Silurian or Devonian, Northwest Territories: Thorsteinsson, R., 1.
- Double Point dacite, Quaternary, Alaska: Snyder, G. L.
- Dripping Spring quartzite, Precambrian, Arizona: Granger, H. C.
- Dutch Peak tillite, Precambrian, Utah, new: Cohenour, R. E.
- Duzel formation, Ordovician, California, new: Wells, F. G.
- Earp formation, Pennsylvanian-Permian, Arizona: McClymonds, N. E., 1.
- East Berlin formation, Triassic, Connecticut, new: Lehmann, E. P.
- East Point formation, Quaternary, Alaska: Snyder, G. L.
- Echo Canyon conglomerate, Cretaceous, Utah: Williams, N. C.
- Edwards limestone, Cretaceous, Texas: Nelson, H. F.
- Eleanor River formation, Ordovician (?), Northwest Territories: Thorsteinsson, R., 1.
- Elk Point group, Devonian, Alberta: Belyea, H. R.; Storey, T. P., 2.
- Elliot group, Precambrian, Ontario: Pienaar, P. J.
- Ely limestone, Mississippian-Permian, Utah: Hose, R. K.
- Epitaph dolomite, Permian, Arizona: Bryant, D. L.
- Erath member of Anahuac formation, Oligocene or Miocene, Louisiana: Goheen, H. C.
- Esopus formation, Devonian, New York, new members: Boucot, A. J., 5.
- Fall River formation, Cretaceous, South Dakota - Wyoming, redefined: Waagé, K. M., 1.
- Farewell group, Ordovician (?), Newfoundland: Baird, D. M., 1.
- Fernando group, Pliocene, California: Durham, D. L.
- Fernie group, Jurassic, Oxfordian, western Canada: Frebold, H. W. L., 2.
- Floride dolomite, Ordovician or Silurian, Utah: Staatz, M. H.
- Fogo group, Ordovician (?), Newfoundland: Baird, D. M., 1.
- Fontenelle tongue of Green River formation, Eocene, Wyoming: Bradley, W. H., 2.
- Fort Union formation, Paleocene, Montana-North Dakota-South Dakota: Denson, N. M., 1.
- Franciscan formation, Jurassic-Cretaceous, California: Durham, J. W., 4.

GEOLOGIC FORMATIONS—Continued

- Franklin Mtn. formation, Ordovician, Northwest Territories: Bell, W. A.
- Fredericksburg division, Cretaceous, Texas: Lozo, F. E., 2.
- Frio formation, Oligocene, Texas: Walters, J. E.
- Oligocene-Miocene, Texas, sand facies: Houston Geol. Soc.
- Galena formation, Ordovician, upper Mississippi Valley: Heyl, A. V., Jr., 1.
- Game Refuge formation, Mississippian, Oklahoma, new: Harlton, B. H.
- Gardner dolomite, Mississippian, Utah: Utah Geol. Soc.
- Gaspé group, Silurian-Devonian, Quebec: Duquette, G.
- Gazelle formation, Silurian, California, new: Wells, F. G.
- Genesee formation, Devonian, New York: de Witt, W., Jr.
- Gila conglomerate, Miocene-Pliocene, Arizona: Heindl, L. A., 3.
- Golata formation, Mississippian, Alberta-British Columbia, new: Halbertsma, H. L.
- Goshute Canyon formation, Cambrian, Utah: Blick, K. F.
- Grantsville formation, Triassic, Nevada: Silberling, N. J.
- Green River formation, Eocene, Utah: Cashion, W. B., Jr.
- Wyoming: Bradley, W. H., 2.
- Greenbrier limestone, Mississippian, Kentucky-Virginia-West Virginia: Wilpolt, R. H.
- Greene series, Permian, Appalachian basin: Arkle, T., Jr., 1.
- Hall Canyon member of Oquirrh formation, Pennsylvanian, Utah: Bissell, H. J., 3.
- Harrisite dolomite, Silurian, Utah: Staatz, M. H.
- Hartland formation, Paleozoic, Connecticut: Gates, R. M.
- Hartmann group, Cambrian, Utah: Rigby, J. K., 2.
- Hatch Hill formation, Cambrian, New York, new: Theokritoff, G., 1.
- Hawthorn formation, Miocene, Florida: Carr, W. J.
- Hayes River group, Precambrian, Manitoba: Quinn, H. A.
- Hazelton group, Jurassic-Cretaceous, British Columbia, revision: Tipper, H. W.
- Heath formation, Mississippian, Montana-North Dakota: Willis, R. P.
- Hell Creek formation, Cretaceous, Montana-North Dakota-South Dakota: Denson, N. M., 1.
- Herkimer limestone, Cambrian, Utah: Rigby, J. K., 2.

GEOLOGIC FORMATIONS—Continued

- Hershey limestone, Ordovician, Pennsylvania, new: Prouty, C. E., 1.
- Hornbrook formation, Cretaceous, California, units: Jones, D. L.
- Hortonville formation, age unknown, Vermont: Zen, E-an, 5.
- Hoskinnini member of Moenkopi formation, Triassic(?), Colorado Plateau: Stewart, J. H., 2.
- Hubbard evaporite member of Dawson Bay formation, Devonian, Saskatchewan, new: Lane, D. M.
- Hygiene group, Cretaceous, Colorado: Scott, G. R., 2.
- Iles formation, Cretaceous, Colorado: Konishi, K., 3.
- Indian Islands group, Silurian, Newfoundland: Baird, D. M., 1.
- Ingalls formation, Oligocene, California, new: Durrell, C., 2.
- Interlake group, Silurian, Manitoba: Andrichuk, J. M., 1.
- Intrepid Bay formation, Pennsylvanian, Northwest Territories: Thorsteinsson, R., 1.
- Inyan Kara group, Cretaceous, South Dakota-Wyoming: Waagé, K. M., 1.
- Ironwood iron-formation, Precambrian, Michigan-Wisconsin: Huber, N. K.
- Island Lake series, Precambrian, Manitoba: Quinn, H. A.
- Jackfork group, Mississippian, Oklahoma: Cline, L. M., 2; Tomlinson, C. W., 1.
- Jackson group, Eocene, Texas: Eargle, D. H., 1, 2.
- Johns Valley shale, Mississippian, Oklahoma, zones: Harlton, B. H.
- Mississippian-Pennsylvanian, Oklahoma: Cline, L. M., 2.
- Kaguyak formation, Cretaceous, Alaska, new: Keller, A. S.
- Kansas City group, Pennsylvanian, Kansas: Parkhurst, R. W.
- Kara bentonitic member of Pierre shale, Cretaceous, Wyoming, new: Robinson, C. S.
- Karla Kay conglomerate member of Burro Canyon formation, Cretaceous, Colorado, new: Ekren, E. B., 4.
- Kearny formation, Pennsylvanian, Kansas: McManus, D. A.
- Keechelus andesitic series, Eocene-Miocene, Washington: Crandell, D. R.
- Kiamichi formation, Cretaceous, Texas: Shelburne, O. B., Jr., 1.
- Kiskatinaw formation, Mississippian, Alberta-British Columbia, new: Halbertsma, H. L.
- Kittanning formation, Pennsylvanian, Pennsylvania: Dutcher, R. R.

GEOLOGIC FORMATIONS—Continued

- Kootenay formation, Jurassic, Alberta, members: Norris, D. K.
- Kriley formation, Eocene(?), Idaho, new: Anderson, A. L.
- La Boca formation, Triassic(?), Mexico, new: Mixon, R. B.
- Laboreita formation, Pennsylvanian-Permian, New Mexico, new: Otte, C., Jr., 1.
- Permian, New Mexico: Otte, C., Jr., 2.
- Ladson formation, Pleistocene, South Carolina: Malde, H. E., 1.
- La Habra formation, Pleistocene, California: Durham, D. L.
- Laib formation, Cambrian, British Columbia, new members: Fyles, J. T.
- La Joya formation, Jurassic, Mexico, new: Mixon, R. B.
- Lake Ardmore formation, Pennsylvanian, Oklahoma, new: Tomlinson, C. W., 2.
- Laketown dolomite, Silurian, Utah: Bissell, H. J., 4.
- Lakota formation, Cretaceous, South Dakota-Wyoming, redefined: Waagé, K. M., 1.
- Laney shale member of Green River formation, Eocene, Wyoming: Bradley, W. H., 2.
- Lansing group, Pennsylvanian, Kansas: Parkhurst, R. W.
- Leadville limestone, Mississippian, Colorado: Lovering, T. G., 1.
- Lenoxhills formation, Permian, Texas: Ross, C. A.
- Lewiston Peak member of Oquirrh formation, Pennsylvanian, Utah: Bissell, H. J., 3.
- Lirio limestone, Pliocene(?), Puerto Rico: Kaye, C. A., 3.
- Little River gneiss, Precambrian, Virginia, new: Dietrich, R. V.
- Little Sitkin dacite, Quaternary, Alaska, members: Snyder, G. L.
- Lodgepole formation, Mississippian, Manitoba, members: McCabe, H. R.
- Lombard facies of Big Snowy group, Mississippian, Montana: Blake, O. D.
- Lost Sheep dolomite, Silurian, Utah: Staats, M. H.
- Lovejoy formation, Eocene, California, new: Durrell, C., 1, 2.
- Loveland formation, Pleistocene, Iowa, new type section: Daniels, R. B.
- Lower quartzite, Precambrian or Cambrian(?), New York: Norton, M. F., 2.
- Luning formation, Triassic, Nevada: Silberling, N. J.

GEOLOGIC FORMATIONS—Continued

- Lynchburg(?) formation, Precambrian, Virginia: Dietrich, R. V.
- McClellan Creek sequence, Devonian(?), Nevada, new: Lovejoy, D. W.
- McMurray formation, Cretaceous(?), Alberta: Carrigy, M. A., 2.
- McNamara argillite, Precambrian, Montana, restricted: Nelson, W. H., 3.
- Madera formation, Pennsylvanian, Colorado: Bolyard, D. W.
- Madison group, Mississippian, North Dakota: Anderson, S. B.
- Williston basin: N. Dak. Geol. Soc., 2.
- Mal Paso formation, Cretaceous, Mexico, new: Pantoja Alor, J.
- Mancos shale, Cretaceous, Colorado: Rocky Mtn. Assoc. Geologists.
- Maniobra formation, Eocene, California, new: Crowell, J. C., 1.
- Manning Canyon shale, Mississippian-Pennsylvanian, Utah: Moyle, R. W.
- Mannville group, Cretaceous, Alberta: Glaister, R. P.
- Maquoketa formation, Ordovician, Iowa: Parker, Mary C.
- Marias River shale, Cretaceous, Montana, members: Cobban, W. A., 2.
- Martin Lake series, Precambrian, Saskatchewan, new: Gussow, W. C., 1.
- Matinenda formation, Precambrian, Ontario: Pienaar, P. J.
- Max Meadows fault breccia, Paleozoic(?), Virginia: Cooper, B. N., 2.
- Meadow Canyon member of Oquirrh formation, Pennsylvanian, Utah: Bissell, H. J., 3.
- Meguma group, Ordovician(?), Nova Scotia: Stevenson, I. M.
- Menefee formation, Cretaceous, Colorado: Wanek, A. A.
- Merced formation, Pliocene-Pleistocene, California: Glen, W.
- Mesaverde formation, Cretaceous, Wyoming: Barwin, J. R.
- Mesaverde group, Cretaceous, Colorado: Rocky Mtn. Assoc. Geologists; Wanek, A. A.
- Midway group, Paleocene, Texas: Kellogg, G. R.
- Millard formation, Cambrian, Utah: Cohenour, R. E.
- Miller Peak argillite, Precambrian, Montana, redefined: Nelson, W. H., 3.
- Mine Hill granite gneiss, Paleozoic, Connecticut: Gates, R. M.
- Minnelusa formation, Pennsylvanian-Permian, Wyoming: Foster, D. I.
- Minturn formation, Pennsylvanian, Colorado: Walker, T. R.

GEOLOGIC FORMATIONS—Continued

- Modesto formation, Pleistocene, California, new: Davis, S. N.
- Moenkopi formation, Triassic, Colorado-Utah, members: Shoemaker, E. M., 2.
- Monashee group, Precambrian, British Columbia: Jones, A. G.
- Monongahela series, Pennsylvanian, Appalachian basin: Arkle, T., Jr., 1.
- Montoya group, Ordovician, Texas-New Mexico: Howe, H. J.
- Morapos sandstone member of Mancos shale, Cretaceous, Colorado: Ritzma, H. R., 1.
- Mt. Ida group, Precambrian, British Columbia: Jones, A. G.
- Mt. Kindle formation, Ordovician, Northwest Territories: Bell, W. A.
- Mt. Tom hornblende gneiss, Paleozoic, Connecticut: Gates, R. M.
- Munising sandstone, Cambrian, Wisconsin-Michigan: Driscoll, E. G.
- Múzquiz formation, Cretaceous, Mexico, new: Robeck, R. C.
- Myerstown limestone, Ordovician, Pennsylvania, new: Prouty, C. E., 1.
- Naturita formation, Cretaceous, Colorado: Young, R. G.
- Nealranch formation, Permian, Texas: Ross, C. A.
- Necoxtila formation, Cretaceous, Mexico: Thalmann, H. E., 2.
- New Fork tongue of Green River formation, Eocene, Wyoming: Bradley, W. H., 2.
- New York City group, Paleozoic(?), New York: Prucha, J. J.
- Newark group, Triassic, Pennsylvania, lithofacies: McLaughlin, D. B.
- Newberry formation, post-Miocene, California, new: Danehy, E. A.
- Nicholville conglomerate member of Potsdam sandstone, Cambrian, New York: Postel, A. W.
- Niobrara formation, Cretaceous, Colorado: Rocky Mtn. Assoc. Geologists.
- Nisku formation, Devonian, Alberta: Hargreaves, G. E.
- Nonesuch shale, Precambrian, Michigan: White, W. S.
- North Park(?) formation, Tertiary, Wyoming: Vine, J. D., 2.
- Noxie sandstone, Pennsylvanian, Kansas: Schulte, G. S.
- Ocozocuautla (Tuxtila) formation, Cretaceous, Mexico: Chubb, L. J., 2.
- Ogallala formation, Miocene-Pliocene, Oklahoma: Kitts, D. B., 2.
- Texas: Frye, J. C., 3.
- Pliocene, South Dakota: Taft, W. H.
- Opex dolomite, Cambrian, Utah: Rigby, J. K., 2.

GEOLOGIC FORMATIONS—Continued

- Oquirrh formation, Pennsylvanian, Utah: Bissell, H. J., 3.
- Oriskany sandstone, Devonian, central Appalachians: Appalachian Geol. Soc.
- Otero member of Yeso formation, Permian, New Mexico, new: Bachman, G. O., 1.
- Pablo formation, Permian(?), Nevada: Silberling, N. J.
- Park City formation, Permian, United States, western: McKelvey, V. E., 1.
- Utah, members: Johnson, K. D.
- Utah-Wyoming: Cheney, T. M.
- Park City group, Permian, Utah: Hose, R. K.
- Pass Creek sandstone, Pennsylvanian, Colorado: Bolyard, D. W.
- Patterson Point formation, Quaternary, Alaska: Snyder, G. L.
- Payette(?) formation, Miocene or Pliocene, Idaho-Nevada-Utah: Mapel, W. J., 1.
- Penman formation, Pliocene, California, new: Durrell, C., 2.
- Pennington group, Mississippian, Kentucky-Virginia-West Virginia: Wilpolt, R. H.
- Peguop formation, Permian, Nevada: Steele, G.
- Phosphoria formation, Permian, United States, western, members: McKelvey, V. E., 1.
- Pierre shale, Cretaceous, Colorado-Wyoming, sandstone members: Scott, G. R., 2.
- Wyoming-Montana: Robinson, C. S.
- Pigeon Point formation, Cretaceous, California: Hall, C. A., Jr., 2.
- Pilcher quartzite, Precambrian, Montana, new: Nelson, W. H., 3.
- Pine Canyon limestone, Mississippian, Utah: Bissell, H. J., 3; Utah Geol. Soc.
- Pinyon Peak formation, Devonian-Mississippian, Utah: Brooks, J. E.
- Platteville formation, Ordovician, upper Mississippi Valley: Heyl, A. V., Jr., 1.
- Plattsburg limestone, Pennsylvanian, Kansas: Davis, J. C.; Harbaugh, J. W., 2.
- Plumb shale member of Wood Siding formation, Pennsylvanian, Kansas, new: Mudge, M. R., 2.
- Plympton formation, Permian, Utah: Hose, R. K.
- Pole Canyon member of Oquirrh formation, Pennsylvanian, Utah: Bissell, H. J., 3.
- Pottsville group, Pennsylvanian, Pennsylvania: Dutcher, R. R.
- Presumpscot formation, Pleistocene, Maine: Bloom, A. L., 1.

GEOLOGIC FORMATIONS—Continued

- Price River formation, Cretaceous, Colorado-Utah: Hale, L. A.
- Purisima formation, Pliocene, California: Glen, W.
- Quebec group, Cambrian-Ordovician, Quebec: Duquette, G.
- Raton formation, Paleocene(?), Colorado: Harbour, R. L.
- Read Bay formation, Silurian, Northwest Territories: Thorsteinsson, R., 1.
- Red River formation, Ordovician, Manitoba: Andrichuk, J. M., 1; Sinclair, G. W., 1.
- Repetto formation, Pliocene, California: Durham, D. L.
- Riddle formation, Jurassic, Oregon: Im-lay, R. W., 5.
- Riverbank formation, Pleistocene, California, new: Davis, S. N.
- Salem limestone, Mississippian, Illinois, new members: Baxter, J. W.
- Saline River formation, Cambrian, Northwest Territories: Bell, W. A.
- Salt Lake formation, Pliocene, Idaho-Nevada-Utah: Mapel, W. J., 1.
- San Andres limestone, Permian, New Mexico: Hayes, P. T.
- San Lucas formation, Cretaceous, Mexico, new: Pantoja Alor, J.
- Sappa formation, Pleistocene, Nebraska: Keech, C. F., 1.
- Sappington formation, Devonian-Mississippian, Montana: Achauer, C. W.
- Schoharie formation, Devonian, New York-New Jersey-Pennsylvania, redefined: Johnsen, J. H.
- Sept-Iles group, Precambrian, Quebec, new: Emo, W. B.
- Sharon Springs member of Pierre shale, Cretaceous, Kansas-Colorado: Landis, E. R., 1.
- South Dakota-Nebraska: Kepferle, R. C.
- Shedhorn sandstone, Permian, United States, western: McKelvey, V. E., 1.
- Sheeprock series, Precambrian, Utah, new: Cohenour, R. E.
- Shinarump member of Chinle formation, Triassic, Utah: Lewis, R. Q., Sr., 1.
- Shunda formation, Mississippian, Alberta: Nelson, S. J., 6.
- Shuswap terrane, Precambrian, British Columbia: Jones, A. G.
- Shuttle Meadow formation, Triassic, Connecticut, new: Lehmann, E. P.
- Sitkin Point formation, Quaternary, Alaska: Snyder, G. L.
- Snowblind Bay formation, Silurian or Devonian, Northwest Territories: Thorsteinsson, R., 1.

GEOLOGIC FORMATIONS—Continued

- Soda Mtn. formation, Triassic-Jurassic, California, new: Grose, L. T.
- South Platte formation, Cretaceous, Colorado: Waagé, K. M., 2, 3.
- Spring Hill limestone member of Plattsburg limestone, Pennsylvanian, Kansas: Harbaugh, J. W., 2.
- Springer sandstone, Mississippian-Pennsylvanian, Oklahoma: Jacobsen, C. L., 2.
- Stanley group, Mississippian, Oklahoma: Cline, L. M., 2.
- Stanton limestone, Pennsylvanian, Kansas, members: Ball, S. M.
- Stony Mtn. formation, Ordovician, Manitoba: Andrichuk, J. M., 1.
- Swan Hills member of Beaverhill Lake formation, Devonian, Alberta, new: Fong, G.
- Swasey limestone, Cambrian, Utah: Cohenour, R. E.
- Sycamore formation, Mississippian, Oklahoma: Braun, J. C.; Chenoweth, P. A., 1; Prestridge, J. D.
- Takla group, Triassic-Jurassic, British Columbia, revision: Tipper, H. W.
- Tampa limestone, Miocene, Florida: Carr, W. J.
- Tapeats sandstone, Cambrian, Arizona: Krieger, M. H.
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Oklahoma, Arbuckle and Ouachita Mts., Cambrian-Silurian, correlation chart: Decker, C. E.

Arbuckle and Ouachita Mts., Precambrian-Mississippian, correlation chart: Ham, W. E.

Ardmore basin, Pennsylvanian: Jacobsen, C. L., 1.

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Atoka formation, Pennsylvanian, McAlester basin, cross sections: Scull, B. J., 2.

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Creek County, measured and cross sections: Oakes, M. C.

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Garvin County, Ordovician-Pennsylvanian, composite log: Gunter, C. E.

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Correlation chart: Bercutt, H.

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- Seminole-Hughes Counties, Ordovician-Pennsylvanian: Duck, J. H., Jr.
- South Palacine oil field, Cambrian-Pennsylvanian: Atkinson, Walter E.
- Southern, oil fields: Ardmore Geol. Soc.
- Ordovician-Mississippian, sections: Maxwell, R. W.
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- Washita group, Cretaceous, table: Curtis, N. M., Jr., 3.
- Wesley-Johns Valley sequence, Mississippian-Pennsylvanian, Ouachita Mts., correlation: Cline, L. M., 2.
- Wichita Mts., north flank, Pennsylvanian facies: Edwards, A. R.
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- Quebec, Causapsical area, east half, Silurian-Devonian: Stearn, C. W.
- Cross Lake area, Precambrian, table: Beall, G. H.
- Gaspé Peninsula, eastern, Silurian-Lower Devonian, measured sections: Cumming, L. M.
- Grondines area, Precambrian and Pleistocene, cross section: Canada G. S., 62.
- Richard-Gravier area, cross sections: Carboneau, C.
- Squateck area, west half: Lespérance, P.-J.
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- Cleveland area, Cambrian-Mississippian: Swingle, G. D.
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Rio Grande valley, Hudspeth County, basin fill, lower Pleistocene: Strain, W. S.

Southwestern, Cretaceous-Oligocene cross sections: McClain, O. G.

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- Cottonwood-American Fork area, generalized section: Wilson, Clark L.
- Daggett County: Ritzma, H. R., 2.
- Deep Creek Mts., Precambrian-Tertiary, list: Nelson, R. B.
- Diamond Fork anticline, cross section: Neighbor, F.
- Elk Ridge 4 quadrangles, Pennsylvanian-Jurassic: Lewis, R. Q., Sr., 3, 4.
- Flvemile Pass-northern Boulter Mtn. area: Bissell, H. J., 4.
- Goose Creek district: Mapel, W. J., 1.
- Green River and lower Uinta formations, Eocene: Picard, M. D., 1.
- Hermosa formation, Pennsylvanian, Paradox basin, well-log correlations: Millard, F. S.
- House Range, Cambrian-Ordovician: Powell, D. K.
- Manning Canyon shale, Mississippian-Pennsylvanian: Moyle, R. W.
- Uinta Mts., measured sections: Sadlick, W., 1.
- Moenkopi formation, Triassic, salt-anticline region, measured sections: Shoemaker, E. M., 2.
- Needle Range, Paleozoic, measured sections: Gould, W. J.
- North Strawberry Valley, Pennsylvanian-Miocene, table: Bissell, H. J., 2.
- North-central, Phosphoria interval, Permian, intertonguing, diagrams: Cheney, T. M.
- Northeastern, Upper Cretaceous, cross sections: Hale, L. A.
- Pavant Range, southern: Crosby, G. W., 2.
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- Randolph quadrangle, Mississippian-Permian(?): Sando, W. J.
- Sheeprock Mts., Cambrian-Mississippian, cross sections: Cohenour, R. E.
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- Tintic Mts. to Wasatch Mts., Paleozoic: Johnson, K. D.
- Tooele arch, Ordovician, cross sections: Hintze, L. F., 2.
- Uinta Mtn. area basins, Paleocene-Eocene, chart: Gazin, C. L., 1.

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- Wasatch Mtn. area, Jurassic, chart: Stokes, W. L.
- Wasatch Mts., structure sections: Baker, A. A.
- Wasatch and Uinta Mts., Mississippian, correlation charts: Crittenden, M. D., Jr.
- Triassic: Scott, W. F.
- Vermont, Chazy series, Ordovician, Champlain Valley, measured: Oxley, P.
- Clarendon-Dorset area, Precambrian-Ordovician, table: Thompson, J. B., Jr., 2.
- Coxe Mtn. area, Precambrian-Ordovician: Osberg, P. H.
- Ordovician-Devonian, correlation chart: Murthy, V. R., 1.
- Rutland area, marble belt, Cambrian-Ordovician: Bain, G. W.
- St. Johnsbury quadrangle: Hall, L. M.
- Taconic area, graptolite-bearing units, Cambrian-Ordovician: Berry, W. B. N., 1.
- Virginia, southwestern, Upper Mississippian, sections and correlation chart: Wilpolt, R. H.
- West Virginia, Doddridge-Harrison Counties, Silurian-Permian: Haught, C. L., 2.
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- Williston basin, Mississippian-Pennsylvanian: Willis, R. P.
- Northern, Cambrian-Silurian, cross sections: Porter, J. W.
- Mississippian, chart: Fish, A. R.
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- Wisconsin, Ironwood iron-formation, Precambrian: Huber, N. K.
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- Crooks Creek SE quadrangle, cross section: Marshall, C. H., 4.
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- Inyan Kara group, Cretaceous, Black Hills, measured: Waagé, K. M., 1.
- Meridian anticline area, cross section: Cochran, K. L.
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Red Desert area: Masursky, H.

Southeastern, Mesaverde group, Cretaceous, composite section: Bergstrom, J. R.

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Trinity Islands, Cretaceous-Recent: Kirschner, C. E.

Alberta, Panther dome area: Hunt, C. W., 1.

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New Mexico, southern: Flower, R. H., 1.

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Northwest Butner oil field area: Duck, J. H., Jr.

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Southwestern: McDaniel, G. A.

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Alaska: Miller, D. J.

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 Daly City, Westlake area: Bonilla, M. G.
 Death Valley, Black Mts., turtleback fault areas: Drewes, H. D.
 Eureka area: Evenson, R. E.
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 Long Canyon area, Boulder County: Broscoe, A. J., 1.
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 Moqui quadrangles: Ekren, E. B., 2; Houser, F. N., 2.
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- Illinois, Buda quadrangle, surficial: MacClintock, P., 1.
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 Nemaha County: Mudge, M. R., 1.
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 Louisiana, Sabine Lake area: Gulf Coast Assoc. Geol. Soc.; Kane, H. E.
 Maine, Augusta-Sidney area: Wing, L. A., 2.
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 Cuernavaca area, Morelos, sketch: Bauman, C. F., Jr.
 Galeana-Iturbide area, Nuevo León: South Texas Geol. Soc.
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 Central-western, Canadian River valley, bedrock and Pleistocene: Fay, R. O., 3.
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 Garvin County, Pennsylvanian, paleo-geologic: Gunter, C. E.
 Harper County: Myers, A. J.
 Johns Valley area: Harlton, B. H.
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 Lynn Mtn. syncline, western: Cline, L. M., 2.
 Medicine Springs area: Johnson, R. H., Jr.
 Northwestern, Devonian(?) and Pennsylvanian, paleogeologic: Boler, M. E.
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- Southwestern, Cambrian, subsurface: Sanford, B. V.
- Sudbury district: Falconbridge Nickel Mines Ltd.
- Wapese Lake-Tully Lake area: Williamson, W. R. M.
- Westport area: Canada G. S., 54.
- Oregon, Coos Bay area: Baldwin, E. M., 1, 2.
- Corvallis to Prineville, highway strip maps: Wilkinson, W. D., 2.
- Corvallis-Depoe Bay area: Bostwick, D. A.
- Eugene area: Baldwin, E. M., 1, 2.
- John Day area: Baldwin, E. M., 1.
- John Day River region, upper, Miocene volcanic and basin deposits: Thayer, T. P.
- John Day to upper Bear Valley, highway strip maps: Wilkinson, W. D., 4.
- Lakeview uranium area: Peterson, N. V., 1.
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- Picture Gorge to Portland, highway strip maps: Wilkinson, W. D., 5.
- Portland area: Baldwin, E. M., 1.
- Prineville-John Day area: Wilkinson, W. D., 3.
- Pennsylvania, Allensville quadrangle, reconnaissance: Dort, W., Jr., 1.
- Boyetown quadrangle, Precambrian and Hardyston formation, Cambrian: Buckwalter, T. V., Jr.
- Buckingham Mtn., formational boundaries problem: Wherry, E. T.
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- Northwestern, glacial: Pa. Geologists: Shepps, V. C., 1, 2.
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- Deception River area, upper: De Montigny, P.-A.
- Dollier-Charron area: Neale, E. R. W., 1.
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- McLachlin-Booth area: Lyall, H. B., 2.
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- Malartic area: Wilson, M. E.
- Margry-Prévert area: Remick, J. H., 3d.
- Marion Lake area: Canada G. S., 43.
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- Peppler Lake area: Phillips, L. S.
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 Battleford area, surficial: Canada G. S., 41.
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 Milliken Lake area: Canada G. S., 61.
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 Swift Current area, glacial: Christiansen, E. A.
 Uranium City area: Canada G. S., 20.
 Wapus Bay area: Cheesman, R. L.
 South Carolina, Coastal Plain, generalized: Siple, G. E., 1.
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 Lodgepole area, sketch: Denson, N. M., 2.
 McIntosh quadrangle: Stevenson, R. Evans, 1.
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 Galveston Island-Bollivar Peninsula area: Gulf Coast Assoc. Geol. Socs.
 Lancaster quadrangle: Ingels, J. J. C.
 McLennan County, Edwards limestone, Cretaceous, outcrop: Nelson, H. F.
 Marathon uplift: West Texas Geol. Soc.
 Medina County: Holt, C. L. R., Jr.
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 Sabine Lake area: Gulf Coast Assoc. Geol. Socs.; Kane, H. E.
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 Bismark Peak quadrangle: Foster, J. M.
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 Clay Hills quadrangles: Mullens, T. E., 1, 2.
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 - House Range: Hintze, L. F., 1.
 - Southern: Powell, D. K.
 - Lisbon Valley area: Byerly, P. E.
 - Monument Valley, generalized: Lewis, R. Q., Sr., 1.
 - Mt. Nebo-Salt Creek area: Johnson, K. D.
 - Naval Oil-Shale Reserve No. 2: Cashion, W. B., Jr.
 - Needle Range: Gould, W. J.
 - Northeastern: Eardley, A. J., 1.
 - Oquirrh Mts., southern: Utah Geol. Soc.
 - Park City mining district: Wilson, Clark L.
 - Pavant Range, southern: Crosby, G. W., 2.
 - Sheeprock Mts.: Cohenour, R. E.
 - Silver Lake Flat area: Burge, D. L.
 - Spors Mtn.: Staats, M. H.
 - Stansbury Mts., east and west flanks: Davis, B. L.
 - Southern: Telchert, J. A.
 - Thomas Range fluorite district: Staats, M. H.
 - Wasatch-Uinta Mts. transition area: Intermountain Assoc. Petroleum Geologists.
 - Zion National Park: Brigham Young Univ. Dept. Geology.
- Vermont, east-central, generalized: Howard, P. F.
- Mt. Mansfield quadrangle: Christman, R. A., 2.
 - St. Johnsbury quadrangle: Hall, L. M.
- Virgin Islands, Tortola and adjacent cays: Martin-Kaye, P. H. A.
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- Virginia, Cacapon Mtn. area: Appalachian Geol. Soc.
- Calypso-Middle-North Rivers drainage basins, generalized: Carroll, D., 2.
- Floyd County: Dietrich, R. V.
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- Middle River drainage basin: Carroll, D., 2.
- Washington, Buckley quadrangle: Crandell, D. R.
- Cascade Mts., northern, reconnaissance: Crowder, D. F.
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- Grand Coulee area: Bretz, J. H., 1.
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 - St. Kitts: Martin-Kaye, P. H. A.
 - West Virginia, Cacapon Mtn. area: Appalachian Geol. Soc.
 - Williston basin, northern: Porter, J. W.
 - Wisconsin, Baraboo syncline: Hinze, W. J., 1.
 - Southwestern, lead-zinc district: Heyl, A. V., Jr., 1.
 - Wyoming, Beartooth Mts., Gardner Lake area: Harris, R. L., Jr.
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- Amaranth evaporite, Jurassic: Bannatyne, B. B.
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Idaho, Big Wood River-Silver Creek area: Smith, Rex O.

Illinois, Chicago region: Suter, M.

Kansas, Clay County: Walters, K. L.

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Kansas River valley, Wamego to Topeka: Beck, H. V.

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Platte River basin, lower: Keech, C. F., 2.

New Jersey, Cape May County: Gill, H. E.

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 South Dakota, Ponca Creek basin: Newport, T. G.
 Texas, Bexar County: Arnrow, T.
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 Medina County: Holt, C. L. R., Jr.
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 Cooks Mills area, Mississippian formations: Whiting, L. L.
 Kansas, Hutchinson salt member of Wellington formation, Permian: Kulstad, R. O.
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 Louisiana, Erath member of Anahuac formation, Oligocene or Miocene: Goheen, H. C.
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 Mexico, Veracruz basin, Eocene-Miocene formations: Fuente Navarro, J. M. de la.
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 Central and eastern, Mississippian-Pennsylvanian: Willis, R. P.
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 New Mexico, northeastern: Krisle, J. E.
 Sangre de Cristo Mts., southern: Panhandle Geol. Soc., 2.
 Southeastern, pre-Simpson formations, Cambrian-Ordovician: Barnes, V. E., 1.
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 Harper County: Jordan, L., 3.
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 Southern, pre-Pennsylvanian: Maxwell, R. W.
 Southwestern, Cambrian-Middle Pennsylvanian, groups and formations: McDaniel, G. A.

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Three Forks-Bakken sequence, Devonian-Mississippian: Kents, P.

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Texas, Delaware-Val Verde basins, Paleozoic formations: Vertrees, C. D.

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Yoakum area, Wilcox formation submarine canyon, Eocene: Hoyt, W. V.

United States, Anadarko basin, northern, Morrow series: Abels, T. A.

Great Basin, eastern, Cambrian and Ordovician: Cohenour, R. E.

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Midcontinent, Cambrian-Pennsylvanian formations: Huffman, G. G., 3.

Mississippian: Moore, C. A.

South-central, Chattanooga shale: Glover, L., 3d.

Triassic intervals: McKee, E. D.

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Yukon, northern: Martin, L. J., 1.

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Alaska, Juneau quadrangle: Lathram, E. H.

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British Columbia, Salmo area, lead-zinc: Fyles, J. T.

California, Lake Elsinore quadrangle: Engel, R. L. H.

Mojave Desert, western, collecting: Berkholtz, M. F.

Canada: Canada Dept. Mines and Tech. Surveys Mines Br.

Iron: Canada G. S., 4.

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Colorado, clay, by counties: Van Sant, J. N.

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Colorado Plateau, uranium: Finch, W. I., 2.

Greenland, Werner Bjerger massif: Bearth, P.

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Southern limestone areas: Lamar, J. E.

Kansas, Wabaunsee County, construction materials: Mudge, M. R., 2.

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Nonmetallic: Esquivel Morales, J.

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Nova Scotia, Renfrew gold district: Stevenson, I. M.

Oklahoma, Ouachita Mts.: Scull, B. J., 1.

Saskatchewan, Amisk-Hanson Lakes area: Beck, L. S.

Northern, Precambrian: Beck, L. S.

Tennessee: Hardeman, W. D.

Texas, Terlingua mercury district: Yates, R. G.

United States, aluminum silicates: Grammetbauer, A. B.

Iron: Carr, M. E. S.

Southwestern, metallogenic provinces, sulfophile trace elements: Burnham, C. W., 2.

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United States—Continued

- Uranium, epigenetic deposits: Finch, W. I., 1.
- Utah, Beaver-Millard-Juab Counties: Nackowski, M. P., 1.
- Green River-Henry Mtn. districts, uranium: Johnson, H. S., Jr., 2.
- Thomas Range fluorite district: Staatz, M. H.
- Virginia: Gooch, E. O.

Miscellaneous.

- Cross-strata dip bearings, Kansas, Ottawa County, Dakota sandstone: Franks, P. C., 2.
- Facies, Utah-Wyoming, Park City interval: Cheney, T. M.
- Fracture patterns, Montana-Wyoming, Beartooth Mts.: Spencer, E. W.
- Geochemical, Nova Scotia, northern mainland, stream sediments, heavy metals: Canada G. S., 51-53, 57.
- Geologic structure, Alaska, Adak Island, southern, and Kagalaska Island: Fraser, G. D., 2.
- Alberta, Lake Athabasca area, photogeologic: Godfrey, J. D.
- Arizona, Catalina gneiss, Santa Catalina Mts.: Du Bois, R. L., 2.
- Arkansas, Arkansas Valley basin, southwestern, photomosaic: Fort Smith Geol. Soc.
- Boston Mts. and Arkansas Valley areas: Quinn, J. H., 2.
- Washington County, southwestern. Jackson, K. C., 2.
- British Columbia, Salmo lead-zinc area: Fyles, J. T.
- Colorado, southwestern: Byerly, P. E.
- Gulf of Mexico, continental shelf: Atwater, G. I., 1.
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- Mississippi Valley, upper: Heyl, A. V., Jr., 1.
- Montana, Granite County, southeastern: Poulter, G. J.
- New Mexico, Lucero region: Wengerd, S. A., 1.
- Ocate area, photogeologic: Bogart, L. E.
- Oklahoma, Love-Carter Counties, pre-Atokan: Reed, B. K.
- Pennsylvania, southwestern: Dutcher, R. R.
- Utah, Slab Canyon anticline: Lewis, D. W.
- Southeastern: Byerly, P. E.
- Wasatch Mts., faults: Baker, A. A.
- Vermont, Mt. Mansfield quadrangle: Christman, R. A., 2.
- St. Johnsbury quadrangle: Hall, L. M.
- Wisconsin, southwestern, lead-zinc district: Heyl, A. V., Jr., 1.

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- Wyoming, Bighorn Mts., central, Precambrian: Osterwald, F. W., 2.
 - Tongue River area, Bighorn Mts., joints: Osterwald, F. W., 2.
 - Glacial, Alberta, Sturgeon Lake area, Wisconsin ice-front positions: Henderson, Eric P., 2.
 - Illinois, south-central and southwestern: Leighton, M. M.
 - Michigan, Lower Peninsula, northern: Zumberge, J. H., 2.
 - Minnesota, Cook County: Grout, F. F.
 - Ohio, Madison County: Norris, S. E., 1.
 - Lithofacies, Alberta, Nisku formation, Devonian: Hargreaves, G. E.
 - Alberta, southern, Lower Cretaceous: Glaister, R. P.
 - Winterburn-Wabamun groups, Devonian: Sutterlin, P. G.
 - Arkansas, northern, pre-Atoka: Frezon, S. E.
 - Kansas, western, Kearny formation, Pennsylvanian: McManus, D. A.
 - Manitoba, southern, Ordovician-Silurian: Andrichuk, J. M., 1.
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 - Michigan, Michigan basin, Middle Devonian: Briggs, L. I., Jr.
 - Texas, Frio formation, Oligocene-Miocene, upper gulf coast: Houston Geol. Soc.
 - United States, Anadarko basin, northern, Morrow series: Abels, T. A.
 - Triassic intervals: McKee, E. D.
 - Utah, southeastern, Salt Wash member, Jurassic: Johnson, H. S., Jr., 2.
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 - Salinity, Williston basin, Cambrian-Silurian, formation fluids: Porter, J. W.
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- Alberta: Canada G. S., 1.
 - Arizona: Stipp, T. F.
 - British Columbia, northeastern: Canada G. S., 1.
 - Illinois: Ill. Div. Indus. Plan. and Devel.
 - Kansas: Hambleton, W. W., 1.
 - Southwestern, Mississippian: Veroda, V. J.
 - Kentucky, Breathitt County: Nosow, E., 1.
 - Larue County: Crawford, T. J., 1.

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Muhlenberg County: Rose, W. D., Jr.

Taylor County: Crawford, T. J., 2.

Louisiana: Colinet, G. O.

Manitoba, western: Canada G. S., 2.

Mexico: Petróleo Interamericano.

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Kent County: Phifer, R. L., 2.

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Northern, Strawn fields: Dickinson, R.

Scurry County: Phifer, R. L., 4.

Stuart City gas field: Montgomery, P. A., Jr.

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British Honduras, Pliocene-Recent: Wright, A. C. S.

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Arizona, Hurricane Cliffs-2 NW quadrangle: Pomeroy, J. S.

Colorado, Coach Creek quadrangles: Hackman, R. J., 1, 2.

Delta quadrangle: Marshall, C. H., 1.

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Norwood-1 quadrangle: Marshall, C. H., 2.

Yellow Jacket quadrangle: Hackman, R. J., 3.

New Mexico, Ocate area, structure: Bogart, L. E.

Utah, Coach Creek quadrangles: Hackman, R. J., 1, 2.

Desert Lake-4 quadrangle: Marshall, C. H., 3.

Mt. Ellen-4 quadrangle: Hemphill, W. R., 1.

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Flat Top Mtn. NE quadrangle: Olson, A. B.

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Cook Inlet area, upper, diagram: Miller, R. D., 1.

Matanuska Valley: Stump, R. W.

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Southeastern, pediments: Tuan, Y.-F.

Atlantic Ocean, floor: Heezen, B. C., 2.

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Michigan, Red Cedar River basin, glacial features and drainage: Stillwell, H. D.

Montana, Glacier National Park: Ross, C. P., 1.

New Mexico, northeastern: Foster, R. W., 2.

Sacramento Mts., major features: Motts, W. S., 1.

North Dakota, provinces: Powell, J. E.

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- Northwest Territories, Arctic Archipelago: Fortier, Y. O.
 Great Slave and Trout River areas, glacial: Douglas, R. J. W., 1.
 Keewatin District, southern, glacial: Lee, H. A., 1.
 King William Island-Adelaide Peninsula: Fraser, J. K., 1.
 Ohio, glacial features, Wisconsin stage: Goldthwait, R. P., 1.
 Ontario, Lindsay-Peterborough area, glacial features: Canada G. S., 6.
 Oregon: Baldwin, E. M., 1.
 Quebec, central, glacial: Henderson, Eric P., 1.
 Tennessee, Central Basin, regions: Deselm, H. R.
 Dyersburg quadrangle: Schreurs, R. L.
 Texas, Sabine Lake area, entrenched valleys, Pleistocene: Gulf Coast Assoc. Geol. Socs.
 Shorelines, gulf and bay: LeBlanc, R. J.
 United States, east of Rocky Mts., glacial: Flint, R. F.
 Provinces: Shimer, J. A.
 Utah: Brigham Young Univ. Dept. Geology.
 San Juan Canyon area: Cooley, M. E., 2.
 Wasatch-Uinta Mts. junction, geomorphic elements: Threet, R. L., 1.
 Washington, eastern, channeled scabland, glacial: Bretz, J. H., 1.
 Wyoming, Green River basin: Van Couvering, M.
 Wasatch-Uinta Mts. junction, geomorphic elements: Threet, R. L., 1.

Structure contour.

- Alaska, Cape Simpson area: Robinson, F. M., 3.
 Square Lake anticline, Cretaceous: Collins, F. R.
 Wolf Creek anticline, Cretaceous: Collins, F. R.
 Alberta, Bellshill Lake oil field, Lower Cretaceous formations: Rudolph, J. C.
 McMurray area: Carrigy, M. A., 1.
 Watino district, bedrock surface: Henderson, Eric P., 2.
 Arizona, House Rock Spring SE quadrangle, Kaibab limestone, Permian: Wells, J. David.
 Paria Plateau NE quadrangle: Petersen, R. G., 1.
 California, Buena Vista oil and gas field: Borkovich, G. J.
 Canfield Ranch oil and gas field: Matthews, J. F., Jr.

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- Colorado, Cortez SW quadrangle, Mancos shale base, Cretaceous: Ekren, E. B., 1.
 Little Cone quadrangle: Bush, A. L., 2.
 Moqui SE quadrangle: Ekren, E. B., 2.
 Moqui SW quadrangle, Mancos shale base, Cretaceous: Houser, F. N., 2.
 Sentinel Peak NE quadrangle: Ekren, E. B., 3.
 Gulf Coastal Plain, southern, Cretaceous-Quaternary: Williamson, J. D. M.
 Illinois, Chicago region: Suter, M.
 Cooks Mills area, Mississippian formations: Whiting, L. L.
 Cumberland-Coles-Douglas Counties, Pennsylvanian coals and pre-Pennsylvanian erosion surface: Clegg, K. E.
 Indiana, south-central, Devonian and Mississippian: Melhorn, W. N., 2.
 Kansas: Jewett, J. M.
 Abilene anticline area: Shenkel, C. W., Jr.
 Lansing group, Pennsylvanian: Merriam, D. F., 1.
 South-central, Iola limestone, Pennsylvanian: Schulte, G. S.
 Southeastern, Mississippian: Merriam, D. F., 2.
 Kentucky, eastern, Upper Mississippian formations: Wilpolt, R. H.
 Louisiana, Erath member of Anahuac formation, Oligocene or Miocene: Goheen, H. C.
 Southern, post-Oligocene foraminiferal zones: Crouch, R. W.
 Manitoba, southwestern, Mississippian: McCabe, H. R.
 Missouri, Precambrian: Grenla, J. D.
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 Black Hills: Mapel, W. J., 3.
 Central, Amsden dolomite, Pennsylvanian: Todd, D. F.
 Red Creek oil field: Lowe, H. R.
 Sweetgrass arch, southern, Madison formation, Mississippian: Gribb, E. A., Jr.
 Nebraska, Clay County, Cretaceous and base of Pleistocene: Keech, C. F., 1.
 New Jersey, Cape May County, southern, Kirkwood formation, Miocene, and base of Pleistocene: Gill, H. E.
 New York, Dryden-Harford quadrangles: Sutton, R. G., 2.

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- North Dakota, Antelope oil field: Folsom, C. B., Jr.
 Northern, and adjacent areas, Madison group, Mississippian: Fish, A. R.
 Square Buttes coal field, Hagel coal bed, Tertiary: Johnson, W. D., Jr.
 Ohio, bedrock surface: Cummins, J. W.
 Cambrian formations: Shearrow, G. G., 2.
 Madison County, bedrock and Newburg zone, Silurian(?): Norris, S. E., 1.
 Oklahoma, Cambrian-Ordovician: Berrett, H.
 Creek County, Woodford shale: Oakes, M. C.
 Garvin County, Deese group, Pennsylvanian: Gunter, C. E.
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 Northwest Butner oil field area: Duck, J. H., Jr.
 Northwestern, Ordovician-Pennsylvanian: Boler, M. E.
 Southern, oil fields: Ardmore Geol. Soc.
 Woods County, Ordovician-Pennsylvanian: Bowles, J. P. F.
 Ontario, southwestern, Precambrian surface: Sanford, B. V.
 Saskatchewan, Quill Lakes-Qu'Appelle area, Dawson Bay formation, Devonian: Lane, D. M.
 South Carolina, Coastal Plain, pre-Cretaceous surface, generalized: Siple, G. E., 1.
 South Dakota, north-central: Petsch, B. C., 3.
 Tennessee, Dyersburg quadrangle, Eocene bedrock: Schreurs, R. L.
 Texas, Cochran-Hockley Counties: Phifer, R. L., 1.
 Delaware basin, Delaware lime: Kuhn, P. J.
 Devils River uplift: Flawn, P. T., 2.
 Horseshoe atoll, reef limestone top, Pennsylvanian-Permian: Burnside, R. J., 1.
 Karnes County area, Jackson group, Eocene: Eargle, D. H., 1.
 Kelly anticline, Georgetown limestone, Cretaceous: West Texas Geol. Soc.
 Kent County: Phifer, R. L., 2.
 Medina County, base of Grayson shale, Cretaceous: Holt, C. L. R., Jr.
 Mitchell County: Phifer, R. L., 3.
 Pandale anticline: Vinson, M. C.
 Pheasant-Francitas area, Rio formation, Oligocene: Walters, J. E.
 Raspberry oil field: Swanson, R. L.

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 Scurry County: Phifer, R. L., 4.
 Scurry-Kent-Borden-Garza Counties, Pennsylvanian-Permian formations: Stafford, P. T.
 Winkler County: Garza, S.
 United States, Anadarko basin, northern, top of Morrow series: Abels, T. A.
 Midcontinent, Mississippian: Moore, C. A.
 Utah, Aneth area, Upper Pennsylvanian: Picard, M. D., 2.
 West Portal-Soldier Summit area, Flagstaff limestone, Eocene: Walton, P. T.
 Virginia, southwestern, Upper Mississippian formations: Wilpolt, R. H.
 West Virginia, Doddridge-Harrison Counties, Greenbrier limestone, Mississippian: Haught, O. L., 2.
 Southern, Berea sandstone, Mississippian: Haught, O. L., 3.
 Upper Mississippian formations: Wilpolt, R. H.
 Williston basin, northern, Cambrian-Silurian: Porter, J. W.
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 Wisconsin, southwestern, lead-zinc district: Heyl, A. V., Jr., 1.
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 Black Hills: Mapel, W. J., 3.
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 Arizona: Wilson, Eldred D., 4.
 Jerome area: Wilson, Eldred D., 4.
 Mohave County, northwestern: Wilson, Eldred D., 4.
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 Arkansas, Ouachita Mts.: Miser, H. D.
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 Montana, northwestern: McMannis, W. J.
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 New Mexico, northeastern: Panhandle Geol. Soc., 2.
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 Sketch: Thom, W. T., Jr.

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Oklahoma, Ouachita Mts.: Miser, H. D. Texas, northern: Russell, H. A.

Trans-Pecos segment of Ouachita structural belt: Flawn, P. T., 2.

United States, Ouachita structural belt, Alabama-Texas: Flawn, P. T., 1.

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Utah, central: Proctor, P. D., 2.

Daggett County: Ritzma, H. R., 2.

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Uinta Basin: Van Couvering, M.

Vermont, St. Johnsbury quadrangle: Hall, L. M.

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California, Crestmore area, contact metamorphism of magnesian limestones: Burnham, C. W., 1.

Puerto Rico: Cadilla, J. F., 1.

Vermont, Rutland area: Bain, G. W.

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Minnesota, deposits: Schwartz, G. M., 1. Rapid chemical analysis: Goldich, S. S., 2.

Origin and characteristics: Thiel, G. A., 1.

South Carolina, Charleston area, Tertiary: Malde, H. E., 1.

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Economic geology.

Chromite, early mines: Pearre, N. C.

Geologic maps.

Beaverdam Creek basin: Rasmussen, W. C., 1.

Wilmington complex: Ward, R. F.

Ground water.

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Potomac group, Cretaceous: Carroll, D., 6.

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Foraminifera, Aquia formation, Paleocene(?), lists and correlations: Page, R. A., 1.

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Mollusks, Miocene: Oleksyshyn, J.

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Watts Branch, Montgomery County, erosion of cohesive bank: Wolman, M. G., 1.

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Engineering geology, glacial and bedrock: Currier, L. W.

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Sand and gravel, Wilmington quadrangle: Castle, R. O.

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Shelburne Falls quadrangle, surficial: Segerstrom, K.

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Blackstone and Ipswich drainage basins, supply problems: Upson, J. E., 2d.

East Providence quadrangle, map: Allen, W. B., 2.

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Historical geology.

Boston Basin, Recent changes of level: Barghoorn, E. S.

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Martha's Vineyard, late Pleistocene
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Provincetown area, Quaternary, geo-
morphic: Smith, H. T. U.

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nary: Segerstrom, K.

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Castle, R. O.

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Man, Bull Brook site, radiocarbon
dates: Byers, D. S.

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Pleistocene: Ogden, J. G., 3d.

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sylvanian: Towe, K. M.

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crystallization history: Toulmin,
P., 3d.

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Barnstable Marsh: Redfield, A. C., 2.

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Zeigler, J. M., 2.

Provincetown area, dunes: Smith,
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Crossbedding: Wright, M. D.

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Virginia, Shenandoah River, North
Fork, entrenched, structural con-
trol: Hack, J. T., 1.

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California, origin of deposits, relation
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Bailey, E. H., 2.

Cinnabar and metacinnabar, origin,
stability relations: Dickson,
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Resources: Bailey, E. H., 1.

Schuetterite, origin: Bailey, E. H., 3.

Texas, Terlingua district: Yates, R. G.

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Paleontology, *Mesozoic*; Triassic.

British Columbia, Atlin area: Aitken,
J. D., 1.

Central: Tipper, H. W.

Nechako River area, Takla and Haz-
elton groups: Tipper, H. W.

California, Soda Mts., northeastern:
Grose, L. T.

Mexico, Saltillo-Galeana area, Coahuila-
Nuevo León: South Texas Geol.
Soc.

New Mexico, northeastern, nomencla-
ture revision: Griggs, R. L.

Union County: Baldwin, B.

Yukon, south-central, tectonics: Wheel-
er, J. O.

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more important minerals.

British Columbia: British Columbia
Dept. Mines, 1.

Mexico, Guanajuato district, mineraliza-
tion: González Reyna, J., 2.

Northern, metallogenic provinces,
sulfophile trace elements: Burn-
ham, C. W., 2.

Mineragraphy: Cameron, E. N.

Ore and gangue, stability relations,
thermochemical data: Holland,
H. D.

Ore-forming fluid, sulfide solubility in
aqueous solutions: Czamanske,
G. K.

Prospecting techniques, review: Hoy,
R. B.

Translocation by podzolization: Cate,
R. B., Jr.

United States, Basin and Range prov-
ince, porphyry relations: String-
ham, B. F., 1.

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Utah, Beaver-Millard Counties: Nackow-
ski, M. P., 1.

METALS. *See also* Elements.

Exploration, lake-bottom sampling
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Meteorites, chondritic, metal particles,
mineragraphy: Urey, H. C., 1.

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posits: Butler, B. S.

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sediments, heavy, map: Canada
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Provinces and ores, classification, pos-
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Questions answered: Pearl, R. M.

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tions; the more common rocks.

Alaska, Chichagof Island, northwestern:
Rossman, D. L., 2.

California, Crestmore area, magnesian
limestones, progressive metasom-
atism: Burnham, C. W., 1.

Poe Tunnel, petrography: Lydon, P.
A., 1.

Soda Mts., roof pendants: Grose,
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Valley Ford area, glaucophane
schists: Bloxam, T. W.

Colorado, Hall Valley area, Front
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unconformable series: Wahl-
strom, E. E.

Connecticut, Roxbury quadrangle:
Gates, R. M.

Cuba, Sierra de Trinidad: Hill, P. A.

Delaware, Wilmington complex: Ward,
R. F.

Elements, geochemical distribution:
Green, J., 1.

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 Greenland, Nathorst Land: Zweifel, H.
 Guatemala, Antillean Cordillera core,
 regional albitization: Ljunggren,
 P.
 Idaho, Gem monzonite stocks area:
 Crosby, G. M.
 Orofino area, kyanite-garnet gedritite
 and associated rocks: Hietanen,
 A. M.
 Manitoba, Elbow-Heming Lakes area,
 Precambrian: McGlynn, J. C.
 Island Lake series, Precambrian:
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- Glacier Bay, Reid Inlet area, gold: Rossman, D. L., 1.
- Prince of Wales Island, Bokan Mtn. area, uranium-thorium: MacKevett, E. M., Jr., 2.
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- Libby vermiculite deposit, origin: Bassett, W. A., 1.
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- Liberty mine, copper: Fournier, R. O.
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- Phillips mine—Camp Smith area: Klemic, H., 1.
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- Bristol Township, gold possibilities: Ferguson, S. A.
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- Terminology: Stringham, B. F., 1.
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Indiana, Jeffersonville formation, biohermal microfacies: Carozzi, A. V., 2.

Plant, North Vernon area: Beals, H. O.

Iowa, chitinozoans, Cedar Valley formation: Dunn, D. L.

Kentucky, radiolarians, Huron member of Ohio shale: Foreman, H. P.

PALEONTOLOGY—Continued

Devonian—Continued

Manitoba, Manitoba group, zones: McCammon, H. M.

Michigan, brachiopods, Traverse group: Imbrie, J., 2.

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New York, brachiopods, Highland Mills area, Early: Boucot, A. J., 5.

Conodonts: Hass, W. H., 2.

Ostracodes, Centerfield limestone: Kesling, R. V.

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Alberta, ammonoids, Fernie group, Oxfordian: Frebold, H. W. L., 2.

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Cuba, ammonoids, Viñales area: Torre y Capablanca, C. de la.

PALEONTOLOGY—Continued

Jurassic—Continued

Greenland, ammonoid zones, Jameson Land: Callomon, J. H.

Conifers, Cape Stewart formation, Scoresby Sound: Florin, R.

Plants, Scoresby Sound, cf. Sweden: Lundblad, B.

Pelecypods, *Aucella*, speciation, Late: Imlay, R. W., 1.

Saskatchewan, microfossils: Wall, J. H.

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Canada, algae, western: Johnson, J. Harlan, 1.

Corals, fasciculate, Rocky Mts.: Nelson, S. J., 5.

Possible index fossils, western: Nelson, S. J., 4.

Illinois, brachiopod, *Reticularina*, Chester series: Campbell, K. S. W. Golconda formation: Rodriguez, J. Spores, coal beds, Late: Winslow, M. R.

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Golconda formation: Rodriguez, J.

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Conodonts, Ouachita Mts.: Elias, M. K., 1.

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Mississippian—Continued

Spores and pollen, catalog: Kremp, G. O. W., 2.

Correlations: Wilson, L. R., 1.

Tennessee, Maury formation, De Kalb County: Kellberg, J. M., 1.

Spore, *Densosporites*, genotype, Pennington coal: Wilson, L. R., 3. Texas, conodonts, Chappel limestone, zones: Hass, W. H., 1.

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Utah, bryozoan, Manning Canyon shale, Utah County: Burckle, L. H., 1.

Bryozoans, fenestrate, central: Burckle, L. H., 3.

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Canada, index fossils, Red River and Stony Mtn. formation equivalents, western: Nelson, S. J., 3.

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Cystoids, parallel evolution: Sinclair, G. W., 2.

Idaho, brachiopods, Saturday Mtn. formation, Lemhi Range: Ross, R. J., Jr.

Iowa, conodonts, Galena formation members: Ethington, R. L., 1.

Kentucky, conodonts, Eden formation, Cincinnati, Ohio, region: Sweet, W. C., 2.

Manitoba, conodonts, Shamattawa limestone, northern: Ethington, R. L., 2.

Minnesota, graptolite, Stewartville dolomite: Sloan, R. E., 1.

New Mexico, corals, Montoya group, Mud Springs Mts.: Hill, D.

Lea and Eddy Counties, pre-Simpson well cores: Cloud, P. E., Jr., 2.

Trans-Pecos area, Montoya group, lists: Howe, H. J.

New York, Chazy series, Champlain Valley: Oxley, P.

Graptolites, Deepkill shale, zones: Berry, W. B. N., 2.

Taconic area: Berry, W. B. N., 1.

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Oklahoma, trilobite, Bromide formation, Criner Hills: Sutherland, P. K., 1.

Trilobite, Viola limestone, Coal County: Amsden, T. W., 1.

Ontario, trilobite, meraspis, Craigleith formation: Fritz, M. A., 2.

Quebec, ostracodes, St. Lawrence Lowlands: Carter, G. F. E.

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Ordovician—Continued

- Texas, coral, Aleman dolomite, El Paso area: Hill, D.
- Montoya group, trans-Pecos area, lists: Howe, H. J.
- Pre-Simpson, well cores: Cloud, P. E., Jr., 2.
- United States, conodonts, Cincinnati series, midcontinent: Sweet, W. C., 3.
- Sponges, western: Rigby, J. K., 9.
- Vermont, Chazy series, Champlain Valley: Oxley, P.
- Graptolites, Taconic area: Berry, W. B. N., 1.
- Virginia, trilobites, silicified, Middle: Whittington, H. B.
- West Virginia, Wood County deep well, lists: Prouty, C. E., 2.
- Wyoming, conodonts, Bighorn dolomite: Stone, G. L.

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- Foraminifera, nonfusulinid, bibliography: Toomey, D. F.
- Kentucky, Pitman oil pool, lists: Jillson, W. R., 4.
- Nautiloids, muscle-attachment impressions: Sweet, W. C., 1.
- Ostracodes, *Paraparchites*, type-species redescription and new family: Scott, H. W.
- Sponges, North America, early: Rigby, J. K., 10.
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- Sponges, stratigraphic distribution, upper: Finks, R. M., 2.
- Utah, central, lists: Utah Geol. Soc.

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- Colorado, Fountain formation, Perry Park: Ellis, C. H.
- Fluted cones, problematical: Branson, C. C., 6.
- Illinois, cordaitan stem, McLeansboro group, Calhoun area: Cohen, L. M.
- Fern, coenopterid, McLeansboro group, Berryville area: Eggert, D. A., 2.
- Fusulinids, southern, Early: Thompson, M. L.
- Invertebrates, Mazon Creek area: Richardson, E. S., Jr., 1, 2.
- Spores, coal beds: Kosanke, R. M.; Winslow, M. R.

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Pennsylvanian—Continued

- Indiana, ostracode, *Bairdia oklahomaensis*, speculation: Shaver, R. H., 2.
- Paper coal, matted plant cuticle: Guennel, G. K.
- Plants, coal ball, Booneville area: Phillips, T. L.
- Southwestern: Canright, J. E.
- Kansas, bowmanitean cone, Cherokee shale: Mamay, S. H., 2.
- Bryozoans, fenestrate, Virgillian, eastern: Richards, H. G., 4.
- Calamitean stem, Cabaniss group, West Mineral area: Cridland, A. A.
- Cordaitean stem, Cherokee shale, West Mineral area: Baxter, R. W., 2.
- Plants, coal balls, Cherokee County: Phillips, T. L.
- Spores, Fleming coal: Baxter, R. W., 1.
- Kentucky, fusulinids, Illinois basin, Early: Thompson, M. L.
- Ostracodes, Morgantown area, Early: Thompson, M. L.
- Montana, bryozoans, Amsden formation: Perry, T. G., 3.
- Nautiloids, colled: Hansman, R. H.
- New Mexico, invertebrates, Sacramento Mts., Late: Otte, C., Jr., 1.
- Ohio, reptile, Linton area: Peabody, F. E., 2.
- Oklahoma, alga, Boggy shale, McAlester area: Mamay, S. H., 1.
- Atoka formation, McAlester basin, north side: Blythe, J. G.
- Conulariids: Strimple, H. L., 3.
- Crinoids, Missouri series, Bartlesville area: Strimple, H. L., 1.
- Wann formation: Strimple, H. L., 2.
- Gastropod, spine-bearing, Excello shale: Branson, C. C., 5.
- Plant, *Cordaites*, Dawson coal, Beggs area: Tynan, E. J., 1.
- Spore, Morrow series, nomenclature: Felix, C. J.
- South Dakota, conodonts and fusulinids, Minnelusa formation, Black Hills: Jennings, T. V.
- Spores and pollen, catalog: Kremp, G. O. W., 1, 2.
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- Texas, Foraminifera, Big Saline formation: Moore, W. Leroy.
- Fusulinids, Marble Falls limestone: King, W. Edward.
- Strawn series, upper, central: Stewart, W. J.
- United States, ferns, coenopterid, Des Moines series, central: Eggert, D. A., 1.
- Ferns, *Psaronius*, central: Morgan, Eleanor J.
- Ostracodes, checklist and distribution: Echols, D. A. J.

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Pennsylvanian—Continued

Utah, fusulinids, Oquirrh formation and Durst group, correlations: Sadlick, W., 2.

Sponges, Manning Canyon shale: Rigby, J. K., 6.

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British Columbia, fusulinid, Wapiti Lake area, early: Forbes, C. L.

California, coral, McCloud limestone: Langenheim, R. L., Jr., 1.

Kansas, amphibian, trimerorhachoid, Speiser formation: Hotton, N., 3d, 1.

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Bryozoans, fenestrate, Wolfcampian, eastern: Richards, H. G., 4.

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Insects, Wellington formation: Tasch, P., 2.

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Insects, Wellington formation: Tasch, P., 2.

Reptiles, Captorhinidae, classification: Seltin, R. J., 2.

South Dakota, fusulinids, Minnelusa formation, Black Hills: Jennings, T. V.

Texas, fusulinids, Wolfcamp series, Glass Mts.: Ross, C. A.

Sponges, hexactinellid: Finks, R. M., 1.

Vertebrates, Vale formation, Knox County: Seltin, R. J., 1.

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Alaska, ostracodes, Gubik formation: Swain, F. M., Jr., 3.

Arctic Ocean, Foraminifera, continental shelf-central basin: Ericson, D. B., 2; Green, K. E.

Arizona, mammals, Lehner site, Pleistocene: Lance, J. F., 2.

Arkansas, bird, grouse, Willcockson area, Pleistocene: Wetmore, A., 2.

Mastodon, Garland area, Pleistocene(?) : Fay, G. E.

PALEONTOLOGY—Continued

Quaternary—Continued

Atlantic Ocean, corals, deep-sea: Squires, D. F., 1.

Bahamas, birds, New Providence Island: Brodkorb, W. P., 2.

Birds, Pleistocene, North America: Wetmore, A., 1.

British Columbia, invertebrates, southwestern, lists: Wagner, F. J. E.

Pelecypod, Sunnyside formation: Wagner, F. J. E.

Plants, Vancouver Island, Englishman River section, Pleistocene: Terasmae, J., 4.

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Invertebrates, Newport Bay area, late Pleistocene fauna, cf. Recent: Kanakoff, G. P.

Mollusks, Bay Point formation, Pleistocene, list: Valentine, J. W., 1.

Huntington Beach Mesa, Pleistocene, list: Valentine, J. W., 3.

San Diego area, late Pleistocene: Emerson, W. K., 1

Plants, Rancho La Brea, Pleistocene: Templeton, B. C.

Vertebrates, Schulling Cave, Mojave Desert, Pleistocene: Downs, T.

Wolf and coyote, Samwel Cave, Pleistocene: Graham, R.

Cuba, sloths, Pleistocene: Matthew, W. D.

District of Columbia, baldcypress wood, Pleistocene, radiocarbon age: Brown, Roland W., 1.

El Salvador, fish, poeciliid, Zanjón de Tzitzimicú diatomite beds: Álvarez del Villar, J.

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Bat, Reddick area, Pleistocene: Gut, H. J.

Birds, Arredondo area, Pleistocene: Brodkorb, W. P., 1.

Arredondo member of Wicomico formation, Pleistocene, Williston area: Holman, J. A., 2.

Rock Spring Run, Pleistocene: Woolfenden, G. E.

Insects, Vero Beach, Pleistocene: Young, F. N.

Mammals, Arredondo member of Wicomico formation, Pleistocene, Williston area: Holman, J. A., 2.

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Florida—Continued

Reptiles, Orange Lake area, Pleistocene: Holman, J. A., 3.

Williston area, Illinoian: Holman, J. A., 1.

Rodent, Vero Beach, Pleistocene: Bader, R. S., 1.

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Type localities: Puri, H. S., 2.

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Louisiana, chenier plain, Recent, zones: Byrne, J. V.

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Massachusetts, pollen profiles, Martha's Vineyard, late Pleistocene: Ogden, J. G., 3d.

Mexico, coral reefs, Gulf of California: Squires, D. F., 2.

Invertebrates, Islas Tres Marías, Pleistocene: Hertlein, L. G., 2.

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Ostracodes, Bahía Todos Santos, Baja California, ecology: Benson, R. H., 2.

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New Jersey, mammals, Pleistocene, dredged off coast: Richards, H. G., 5.

New York, mastodons and mammoths, western localities: Heubusch, C. A., 2.

Ohio, forests, Pleistocene, western: Burns, G. W.

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Newell Lake deposit, Pleistocene: Zimmerman, J. A.

Pennsylvania, bird, grouse, New Paris area, Pleistocene: Wetmore, A., 2.

Saskatchewan, Herbert area, postglacial: Kupsch, W. O., 2.

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Quaternary—Continued

Texas, amphibians and reptiles, Friesenhahn Cave, Pleistocene: Mecham, J. S.

Armadillo, Denton County, Pleistocene: Slaughter, B. H.

Bison: Dalquest, W. W., 2.

Sabine Lake area, marine-lacustrine biofacies: Kane, H. E.

United States, echinoids, eastern: Cooke, C. W.

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Yukon, mammals, Old Crow River area, Pleistocene: Geist, O. W.

Silurian.

Algae: Johnson, J. Harlan, 3.

Appalachians, ostracodes, paleoecope, central: Wainwright, J. E. N.

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Pennsylvania, fish, Monroe County: Beerbower, J. R., 1.

United States, algae, southwestern: Rezak, R.

Brachiopods, eastern, regional correlation, Middle: Tillman, C. G.

Worms, genera, nomenclature: Howell, B. F.

Yukon, Prong Creek area: Raasch, G. O.

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California, birds, southern, Miocene: Howard, H.

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Foraminifera, Coast Ranges, early: Mallory, V. S.

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Mammals, Avawatz formation, Pliocene, footprints: Alf, R. M., 2.

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PALEONTOLOGY—Continued

Tertiary—Continued

California—Continued

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- Salamander tracks, Mehrten formation, Pliocene: Peabody, F. E., 1.
- Ventura basin, Miocene dwarf fauna: Skolnick, H., 1.
- Carnivores, *Amphicyon*, Miocene, baculum: Olsen, S. J., 2.
- Nimravus*, Oligocene-Miocene: Toohy, L. M.
- Colorado, insect, Florissant shale, Miocene: Carpenter, F. M.
- Vertebrates, Piceance Creek basin: Gazin, C. L., 1.
- Cuba, Foraminifera, larger, Eocene-Oligocene: Hewitt, P. C.
- Florida, carnivore, *Leptarctus*, Miocene, middle ear: Olsen, S. J., 3.
- Fish, beryciform, Marianna limestone, Oligocene: Dunkle, D. H.
- Porpoise, Bartow area, Miocene: Kellogg, R.
- Type localities: Purl, H. S., 2.
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- Foraminifera, larger, Paleocene-Eocene, zones, southern North America: Cole, W. S.
- Lepidocyclinidae, Eocene-Miocene: Grimsdale, T. F.
- Gastropods, *Pterorytis*: Emerson, W. K., 2.
- Georgia, Tivola member of Ocala limestone, Eocene, list: Connell, J. F. L., 2.
- Greenland, floras, Nûgssuaq Peninsula: Koch, B. E.
- Insectivores, pantolestid: Gazin, C. L., 2.
- Jamaica, bryozoans, Bowden formation, Miocene: Lagaaij, R.
- Kansas, bird, condor, Rexroad fauna, Pliocene: Tordoff, H. B.
- Cat, Rexroad formation, Pliocene: Stephens, J. J., 1.
- Kentucky, pollen, exine ultrastructure, Eocene: Ehrlich, H. G.
- Louisiana, Foraminifera, Anahuac formation, list: Goheen, H. C.
- Foraminifera, Oligocene-Miocene, catalog: Butler, E. A. M.
- Maryland, Foraminifera, Brightseat formation, Paleocene: Page, R. A., 2.
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PALEONTOLOGY—Continued

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Mexico—Continued

- Foraminifera, *Coskinoquina*, Yucatán, Eocene index fossil: Bonet, F.
- Veracruz basin, list: Fuente Navarro, J. M. de la.
- Gastropods, Baja California, northwestern, Pliocene: Hertlein, L. G., 1.
- Insects, Chiapas, Miocene amber: Wille, A.; Wygodzinsky, P.
- Invertebrates, Islas Tres Marias, Pliocene: Hertlein, L. G., 2.
- Montana, insect, Alder area, Oligocene: Carpenter, F. M.; Pierce, W. D., 1.
- Plant, Ruby River basin, Oligocene: Becker, H. F.
- Nebraska, rhinoceros, Kimball formation, Pliocene: Tanner, L. G.
- Rodents, Niobrara River fauna, Miocene: Hoffmeister, D. F.
- Nevada, diatoms, Fallon area, Miocene-Pliocene: Okuno, H.
- Mammals, Smith Valley fauna, Pliocene: Macdonald, J. Reid.
- New Mexico, mammals, San Juan Basin, Paleocene type area: Simpson, G. G., 2.
- North Carolina, mollusks, Trent formation, Miocene, paleoecology: Smith, A. B.
- North Dakota, crabs, Cannonball formation, Paleocene: Holland, F. D., Jr., 1.
- Oklahoma, alligator, Laverne formation, Pliocene: Woodburne, M. O.
- Badger, Ogallala formation, Pliocene, Harper County: Kitts, D. B., 1.
- Vertebrates, Ogallala formation, Pliocene, Durham local fauna: Kitts, D. B., 3.
- Oregon, bat, John Day formation, Oligocene: Brown, Roland W., 3.
- Pelecypods, Oligocene-Pliocene(?), Shumard's types: Trumbull, E. J.
- Plants, Columbia Plateau, Miocene: Chaney, R. W.
- John Day formation, Oligocene: Brown, Roland W., 3.
- Salem-Dallas area, Eocene-Oligocene collecting localities: Steere, M. L.
- Turtles, Rome area, Pliocene: Brattstrom, B. H.
- Ostracoda, catalog: Ellis, B. F., 2.
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- Panama, gastropods, Canal Zone: Woodring, W. P., 1.
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- Rodents, Eocene radiation and phylogeny: Wood, A. E., 1.

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Tertiary—Continued

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Texas, Foraminifera, Midway group, Paleocene: Kellough, G. R.

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Seeds, Ogallala formation: Frye, J. C., 3.

Trinidad, fishes: Casler, E. M.

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Plants, problematica, western: Brown, Roland W., 2.

Utah, bird, recurvirostrid, Colton formation, Eocene: Hardy, J. W.

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Virginia, Foraminifera, Yorktown formation, York-James peninsula: McLean, J. D., Jr.

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 Albite, low- and high-temperature: Ferguson, R. B., 1.
 Albite-nepheline-water: Saha, P., 2.
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 Amphiboles, hydrothermal investigations: Boyd, F. R., 1.
 Analcite-jadeite phase boundary: Fyfe, W. S., 2.
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- $\text{CaCO}_3-\text{CO}_2-\text{H}_2\text{O}$, solubility: Ellis, A. J., 3.
 $\text{CaCO}_3-\text{MgCO}_3-\text{FeCO}_3$, join $\text{CaMg}(\text{CO}_3)_2-\text{CaFe}(\text{CO}_3)_2$: Rosenberg, P. E.
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 Calcite-dolomite in sea water: Kramer, J. R.
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 $\text{CaO}-\text{CO}_2-\text{H}_2\text{O}$: Wyllie, P. J., 2, 3.
 Calcite-portlandite join: Wyllie, P. J., 6.
 $\text{CaO}-\text{FeO}-\text{Fe}_2\text{O}_3-\text{SiO}_2$: Phillips, B.
 $\text{CaO}-\text{H}_2\text{O}$, melting of portlandite: Wyllie, P. J., 4.
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 $\text{CaO}-\text{SiO}_2-\text{H}_2\text{O}$: Dent Glasser, L. S.
 $\text{CaO}-\text{V}_2\text{O}_5-\text{H}_2\text{O}$: Marvin, R. F.
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 Mg_2GeO_4 - Mg_3SiO_4 : Dachtile, F., 1, 3; Ringwood, A. E., 3.
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- Airborne gravity meter: Lundberg, H. T. F.
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- Autoclave in spectrometer diffraction unit: Droste, J. B., 2.
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 Calorimeter, portable, measuring heat flow in steaming ground: Benseman, R. F.
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- Seismic cross-section plotter, resolved time in steeply dipping areas: Oil and Gas Jour., 3.
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- Refraction, portable: Stam, J. C.
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- Spindle stage, indexes of refraction, determination: Wilcox, Ray E., 3.
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- Thermoluminescence measurement: Lewis, D. R.
- Till-fabric rack: MacClintock, P., 2.
- Time-lapse camera, slow-acting geologic processes: Miller, R. D., 2.
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- Wolfe goniometer, polarizing adapter: Wolfe, C. W., 1.
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- Crystal-structure models, polyhedral, construction: Zoltai, T., 1.
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- Pyrite, polishing method, minimum deformation: Stanton, R. L., 1.
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- Soils, X-ray methods: Brydon, J. E., 1.
- Specific-gravity determination, minute grains, microscope tilting: Shaub, B. M., 1.
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- Stuart City field: Montgomery, P. A., Jr.
- Yoakum field: Hoyt, W. V.
- Oil and gas, Anadarko basin, northwestern: Beebe, B. W., 1, 2.
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- Delaware basin: Dodge, C. F.; Kuhn, P. J.
- Grayson County: Bradfield, H. H., 1.
- High Island salt dome: Barnes, C. W.
- Horseshoe atoll, Borden-Howard Counties: Burnside, R. J., 1.
- Scurry-Kent Counties: Stafford, P. T.
- Jackpot field: Warren, E. M.

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Petroleum—Continued

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- Ogallala formation, Miocene-Pliocene : Frye, J. C., 3.
- Padre Island-Laguna Madre Flats area, Quaternary : Fisk, H. N., 1.
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- Cretaceous, middle, central : Baylor Geol. Soc.
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- Bastrop County, Eocene sands, sources: Folk, R. L., 1.
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- Van Horn Mts.: Twiss, P. C.
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- Balcones fault zone, central: Boyd, C. E.
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- Devils River uplift and Ouachita structural belt: Flawn, P. T., 2.
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- Galveston-Houston area, subsidence: Small, J. B.
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- Ordovician, north-central: Hintze, L. F., 2.
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- Pavant Range, Cambrian-Quaternary: Crosby, G. W., 2.
- Pennsylvanian-Permian, western: Brill, K. G., Jr.
- Permian, northern: Cheney, T. M.
- Permian-Jurassic, southeastern: Stewart, J. H., 1.
- Randolph quadrangle, Mississippian-Permian(?): Sando, W. J.
- Salt Lake group, Tertiary: Slentz, L. W.
- Silver Island Range, Paleozoic and Tertiary: Schaeffer, F. E., Jr.
- Silver Lake Flat area, Precambrian-Tertiary: Burge, D. L.
- Stansbury Mts., southern, Paleozoic and Quaternary: Telchert, J. A.
- Thomas Range fluorite district, Ordovician-Pleistocene: Staatz, M. H.
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- Upper Devonian unconformity: Rigby, J. K., 1.
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- Clifton district-Gold Hill area, mines: Wilson, S. R.
- Green River formation, mineral assemblages, relations: Milton, C., 1.
- Green River-Henry Mtn. districts: Johnson, H. S., Jr., 2.
- Halloysite, Lake Mts., hot-spring deposit: Ames, L. L., Jr., 1.
- Happy Jack uranium mine: Trites, A. F., Jr.
- Hornblendes, Henry Mts., phenocrysts in porphyries, composition: Engel, C. G.

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- Micaceous minerals, Ophir Hill mine, alteration sequence: Weintraub, J.
- Monument Valley, uranium-vanadium channel deposits: Lewis, R. Q., Sr., 1.
- North Horn formation, Cretaceous-Paleocene, differentiation by heavy minerals, central: Lee, K.-Y., 2.
- Phosphate minerals, Clay Canyon: Hamilton, H. V.
- Pyrophyllite, origin, north-central: Ehlmann, A. J., 2.
- Saline deposits: Kerr, P. F., 3.
- Silver Lake Flat area: Burge, D. L.
- Stansbury Mts., igneous rocks: Davis, B. L.
- Umoholte, Marysville area, X-ray study: Kamhi, S. R.
- Variscite, Clay Canyon: Hamilton, H. V.
- Paleontology.*
- Belemnoids, Chainman shale, Mississippian: Flower, R. H., 2.
- Bird, recurvirostrid, Colton formation, Eocene: Hardy, J. W.
- Bryozoans, fenestrate, Mississippian, central: Burckle, L. H., 3.
- Manning Canyon shale, Mississippian, Utah County: Burckle, L. H., 1.
- Camp Maple Dell area, for Boy Scouts: Rigby, J. K., 8.
- Confusion Range, Mississippian-Triassic: Hose, R. K.
- Conodonts, Triassic, north-central: Clark, D. L., 1.
- Ely limestone, Pennsylvanian, Needle Range: Gould, W. J.
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- Thomas Range fluorite district: Staats, M. H.
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 Georgia, coastal, parallel to shoreline, origin: Zeigler, J. M., 1.
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- Montana, Libby deposit, origin: Bassett, W. A., 1.

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- Copper, Elizabeth mine: Howard, P. F.
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- East-central, generalized: Howard, P. F.
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- Champlain basin, Cambrian-Ordovician: Erwin, R. B.
 Champlain Valley, central, Cambrian-Ordovician: Welby, C. W.
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- Coxe Mtn. area, Precambrian-Ordovician: Osberg, P. H.
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- Mt. Mansfield quadrangle: Christman, R. A., 2.
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- Lynchburg gneiss, conjugate quartz veins in joints, Fancy Gap area: Richard, B. H.
- Pulaski and Max Meadows thrusts, tectonic breccia: Cooper, B. N., 2.
- Saltville fault, drill-hole data: Nelson, W. A., 1.
- Shenandoah River, meander intrenchment in Martinsburg shale, structural control: Hack, J. T., 1.
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- Idaho, Goose Creek district and adjacent states: Mapel, W. J., 1.
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- Pacific Ocean, white ash layer, origin: Ewing, W. M., 2.

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- Beartooth Mts., Gardner Lake area: Harris, R. L., Jr.
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- Lodgepole Creek drainage basin, upper: Bjorklund, L. J.
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ZIRCONIUM, mineralogy and geochemistry: Frondel, C.

the 1990s, the incidence of *S. flexneri* has increased in the United Kingdom [10].

There is a paucity of data on the epidemiology of *S. flexneri* in the United Kingdom. The only published study of *S. flexneri* in the United Kingdom was by Smith *et al.* [11], who reported the isolation of 10 strains of *S. flexneri* from patients with acute colitis in 1981. The strains were isolated from patients with acute colitis, and the authors concluded that *S. flexneri* was the causative agent of the disease.

The aim of this study was to determine the prevalence of *S. flexneri* in the United Kingdom, and to determine the distribution of *S. flexneri* in the United Kingdom. The study was carried out in the United Kingdom, and the results are presented in this paper.

METHODS

Study area

The study was carried out in the United Kingdom, and the results are presented in this paper. The study was carried out in the United Kingdom, and the results are presented in this paper. The study was carried out in the United Kingdom, and the results are presented in this paper.

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