BIBLIOGRAPHY
OF
NORTH AMERICAN GEOLOGY
FOR
1921-1922

BY
JOHN M. NICKLES
### CONTENTS

<table>
<thead>
<tr>
<th>Section</th>
<th>Page</th>
</tr>
</thead>
<tbody>
<tr>
<td>Introduction</td>
<td>1</td>
</tr>
<tr>
<td>Serials examined</td>
<td>3</td>
</tr>
<tr>
<td>Bibliography</td>
<td>9</td>
</tr>
<tr>
<td>Index</td>
<td>153</td>
</tr>
<tr>
<td>Lists</td>
<td>243</td>
</tr>
<tr>
<td>Chemical analyses</td>
<td>243</td>
</tr>
<tr>
<td>Mineral analyses</td>
<td>244</td>
</tr>
<tr>
<td>Minerals described</td>
<td>245</td>
</tr>
<tr>
<td>Rocks described</td>
<td>246</td>
</tr>
<tr>
<td>Geologic formations described</td>
<td>247</td>
</tr>
</tbody>
</table>
BIBLIOGRAPHY OF NORTH AMERICAN GEOLOGY
FOR 1921-1922.

By John M. Nickles.

INTRODUCTION.

The bibliography of North American geology, including paleontology, petrology, and mineralogy, for the years 1921 and 1922 contains publications on the geology of the Continent of North America and adjacent islands and on Panama and the Hawaiian Islands. It includes textbooks and papers of general character by American authors, but not those by foreign authors, except papers that appear in American publications.

The papers, with full title and medium of publication and explanatory note if the title is not fully self-explanatory, are listed under the names of their authors, which are arranged in alphabetic order. The author list is followed by an index to the literature listed.

The bibliography of North American geology is comprised in the following bulletins of the United States Geological Survey: No. 127 (1732–1892); Nos. 188 and 189 (1892–1900); No. 301 (1901–1905); No. 372 (1906–7); No. 409 (1908); No. 444 (1909); No. 495 (1910); No. 524 (1911); No. 545 (1912); No. 584 (1913); No. 617 (1914); No. 645 (1915); No. 665 (1916); No. 684 (1917); No. 698 (1918); and No. 731 (1919–1920).

A cumulation of these bulletins down to 1918, inclusive, consisting of an author list giving titles of papers and brief citations and an index, has been recently issued under the general title "Geologic literature on North America, 1785–1918," in two parts—Part I, Bibliography (Bulletin 746), and Part II, Index (Bulletin 747).
SERIALS EXAMINED.

American Mineralogist, vols. 6, 7. Menasha, Wis.
American Mining Congress: Reports of 23d and 24th Annual Conventions. Washington, D. C.
Association of American Geographers: Annals, vols. 9, 10. New York, N. Y.
California State Mining Bureau: Bulletin, nos. 89, 90. San Francisco, Calif.
Canadian Institute of Mining and Metallurgy: Transactions, vols. 23, 24. Montreal, Quebec.
Canadian Mining Journal, vols. 42, 43. Toronto and Montreal, Canada.
Centralblatt für Mineralogie, etc., 1921, 1922. Stuttgart, Germany.
Deutsche Geologische Gesellschaft: Zeitschrift, Bd. 73, 74. Berlin, Germany.
Indiana Academy of Science: Proceedings for 1920, 1921. Indianapolis, Ind.
Indiana, Department of Conservation, Division of Geology: Second Annual Report. Indianapolis, Ind.
SERIALS EXAMINED.


Mazama, vol. 6, no. 2. Portland, Oreg.
Meddelelser om Grönland, H. 37; Bd. 60, 61. Copenhagen, Denmark.


Mining Congress Journal, vols. 7, 8. Washington, D. C.


Natural History; the Journal of the American Museum, vols. 21, 22. New York.


Neues Jahrbuch für Mineralogie, etc., 1921, 1922. Stuttgart, Germany.


Ohio Academy of Science: Proceedings, vol. 7, pts. 5, 6. Columbus, Ohio.


Ohio Journal of Science, vols. 21, 22. Columbus, Ohio.


Palaeontologische Zeitschrift, Bd. 4. Berlin, Germany.


Rochester Academy of Science: Proceedings, vol. 6, nos. 2–4. Rochester, N. Y.


Texas, University of, Bulletin, nos. 1859, 1860, 2129, 2132, 2230, 2232, 2239. Austin, Tex.

Toronto, University of, Studies; Geological Series, nos. 12–14. Toronto, Ont.


Tschermaks Mineralogische und Petrographische Mitteilungen, Bd. 33, 34, 35, H. 1–2. Wien, Austria.


West Virginia Geological Survey: County Reports, Nicholas County, Tucker County. Morgantown, W. Va.
Zeitschrift für Gletscherkunde, Bd. 11, H. 3–5, Bd. 12, H. 1–2. Berlin, Germany.
Zeitschrift für Praktische Geologie, Jg. 29, 30. Berlin, Germany.
Zeitschrift für Vulkanologie, Bd. 6, H. 3, 4. Berlin, Germany.
BIBLIOGRAPHY.

Adams, F. D. See Wolff, no. 2182.

Adams, Leason H.
1. Note on the measurement of the density of minerals: Am. Mineralogist, vol. 6, no. 1, pp. 11-12, January, 1921.

Agar, W. M.

Albertson, M.

Alcock, Frederick J.

Alden, W. C. See Osborn, no. 1428.

Alderson, Victor C.
13. The oil shale of Kentucky: Colorado School of Mines, Quart., vol. 17, no. 4, pp. 3-15, 10 figs., October, 1922.
Aldrich, H. R.


Aldrich, Truman Heminway.


Allan, John A.

20. Geology of the Drumheller coal field, Alberta, Canada; Third annual report on the mineral resources of Alberta, 1921: Alberta, Scient. and Industrial Research Council, Rept. no. 4, 72, 5 pp., 17 pls., Edmonton, 1922.

Allen, E. T.


Allen, Glover M.


Allen, M. A.

BIBLIOGRAPHY.

Ailing, Harold L.

Ailing, Mark N.

Ambrose, A. W.

Anderson, John Carter.

Anrep, Aleph.

Antevs, Ernst.

Armstrong, P.
42. A field method of reducing maps to scale: Econ. Geology, vol. 17, no. 3, pp. 219-221, 1 fig., May, 1922.

Arnold, Ralph.

Ashley, George H.
Ashley, George H.—Continued.


See also Knopf, no. 1066; Pa. Geol. Survey, no. 1478.

Atwood, Wallace W.


Augur, Irving V.


Augus, F. L.


Aurousseau, M.


Austin, M. M.


Baitsell, George Alfred.

58. (editor). The evolution of man; a series of lectures delivered before the Yale chapter of the Sigma Xi during the academic year 1921-1922. 202 pp., 27 figs., New Haven, Yale University Press, 1922.

Baker, Charles Laurence.


BIBLIOGRAPHY.

Baker, Frank Collins.

Balch, Edwin Swift.

Ball, Max W.
See also Moore, no. 1362.

Ball, Sydney H.
68. The mineral resources of Greenland: Saertryk af Meddelelser om Groenland, Bd. 63, 60 pp., 23 figs., 1922.

Ballard, S. M.

Bancroft, M. F.

Barrell, Joseph.

Barrett, N. O.
14  BIBLIOGRAPHY OF NORTH AMERICAN GEOLOGY, 1921–1922.

Barton, Donald C.

Bartram, John G.

Bascom, Florence.
See also Knopf, no. 1066.

Bassler, Harvey.

Bassler, Ray S.
See also Galloway, no. 622.

Bastin, Edson S.
Bateman, Alan M.
88. Notes on the Kennecott Glacier, Alaska (abstract with discussion by R. T.
Chamberlin and A. O. Hayes): Geol. Soc. America, Bull., vol. 32,
no. 1, pp. 52–53, March 31, 1921.
527–539, 7 figs., September 1, 1922.
91. Croppings of ore deposits: Econ. Geology, vol. 17, no. 8, pp. 703–708,
December, 1922.

Bates, Mowry. See Lupton, no. 1177.

Bather, F. A.
93. Growth stages of the blastoid, Orophocrinus stelliformis: Jour. Geology,
vol. 30, no. 1, pp. 73–76, January–February, 1922.

Bauer, Clyde Max.
94. (and Reeside, J. B., jr.). Coal in the middle and eastern parts of San Juan
County, New Mexico: U. S. Geol. Survey, Bull. 716, pp. 155–237,
19 pls. (including maps), February 11, 1921. Abstract, Washing­
ton Acad. Sci., Jour., vol. 11, no. 17, p. 419, October 19, 1921.
95. (and Herald, F. A.). Lignite in the western part of the Fort Berthold
Indian Reservation south of Missouri River, North Dakota: U. S.
Geol. Survey, Bull. 726, pp. 109–172, 17 pls., 4 figs., December 3,
1921.
282–292, 1 fig. (map), March–April, 1921.

Bauer, Lawson H.
(with Lewis, J. V.). Cyprine and associated minerals from the zinc mine
at Franklin, New Jersey: Am. Jour. Sci., 5th ser., vol. 4, pp. 249–251,
September, 1922.

Bayley, William Shirley.
96. The magnetitic ores of North Carolina—their origin: Econ. Geology,
vol. 16, no. 2, pp. 142–152, 1 pl., March, 1921.
97. Magnetites of North Carolina; their origin (abstract with discussion by
March 31, 1921.
99. General features of the brown hematite ores of western North Carolina:
U. S. Geol. Survey, Bull. 735, pp. 157–208, 10 figs., 3 pls. (incl.
map), October 17, 1922.
100. General features of the magnetite ores of western North Carolina and
eastern Tennesse: U. S. Geol. Survey, Bull. 735, pp. 209–270,
6 figs., December 8, 1922.
(with Ries, Heinrich, and others). High-grade clays of the eastern United
708, 314 pp., 38 figs., 30 pls., 1922.
Beach, L. M.

Bean, Ernest F.

Beaumont, A. B.

Beede, J. W.
118. (and Bentley, W. P.). The geology of Coke County: Texas, Univ., Bull. no. 1850, 82 pp., 3 figs., 17 pls. (incl. map), March, 1921.

Begeman, F.
Behre, Charles H., Jr.

Bell, H. W.

Bell, J. Mackintosh.

Bell, Robert N.
124. Twenty-second annual report of the mining industry of Idaho for the year 1920. 24 pp. [1921].

Bell, Walter A.

Benjamin, Marcus.

Bentley, W. P.
(with Beede, J. W.). The geology of Coke County: Texas, Univ., Bull. no. 1850, 82 pp., 3 figs., 17 pls. (incl. map), March, 1921.

Berger, Walter R.

Berkey, Charles P.
Berry, Edward Wilber.


Berry, S. Stillman.

Bevan, Arthur.

Billingsley, Paul.

Bishop, Sherman C.

Bissell, Malcolm H.

Black, George F.

Blackwelder, Eliot.

Blanchard, Roland.

Bloesch, Edward.

Bøggild, O. B.
167. Grønland, almindelig Oversigt; Geologi [a general account of the geology of Greenland]: Meddelelser om Grønland, Bd. 60, pp. 29–36, atlas, pl. 2 (geol. map), 1921.

Böse, Emil.
Bond, Lewis A.
169. The registration of earthquakes at the Berkeley Station and at the Lick Observatory Station from April 1, 1920, to September 30, 1920: California, Univ., Seismographic Stations, Bull., no. 20, pp. 405-422, April 29, 1921.

Bonine, Chesleigh A.

Bosworth, T. O.

Bowen, N. L.
179. The behavior of inclusions in igneous magmas: Jour. Geology, vol. 30, supplement to no. 6, pp. 513-570, August–September, 1922.

Bowen, W. C.

Bowie, William.
BIBLIOGRAPHY.

Bowie, William—Continued.


185. The earth's crust and isostasy: Geog. Rev., vol. 12, no. 4, pp. 613-627, 5 figs., October, 1922.

Bowles, Oliver.


Bownocker, J. A.


Boydell, H. C.

190. Some etching tests on pyrrhotite: Econ. Geology, vol. 17, no. 6, pp. 491-497, September, 1922.

Bradley, John H., jr.


Bradley, Walter W.

192. California mineral production for 1920, with county maps: California State Min. Bur., Bull. no. 90, 218 pp., illus., 1921.

Branson, E. B.


Braun, J. G.


Bretz, J. Harlen.


See also Johnston, no. 919.

Brewer, W. M.


Bridenstine, I. J.

Bridge, Josiah.

Brigham, Albert Perry.

Brinsmade, Robert B.

Brock, R. W.

Brooks, Alfred H.

Brooks, W. K.

Brouwer, H. A.
214. The horizontal movement of geanticlines and the fractures near their surface: Jour. Geology, vol. 29, no. 6, pp. 560-577, 8 figs., September-October, 1921.
Brown, Barnum.  

Brown, Ernest W.  

Brown, G. H. See Ries, no. 1593.

Brown, John S.  


Brown, Thomas C.  

Bruce, E. L.  


Brückner, Ed.  

Brunton, Stopford.  


Bryan, Kirk.  


Bryant, William L.  
Bibliography of North American Geology, 1921-1922.

Bucher, Walter H.

Buddington, A. F.

Buehler, H. A.

Burchard, Ernest F.

Burling, Lancaster D.

Burr, Freeman F.

Burrard, Sidney.

Burroughs, E. H.
Burrows, Alfred Granville.

Burton, E. F.

Burton, George E.

Burwash, Edward M.
See also Johnston, no. 919.

Bustamante, Miguel.
258. Yacimientos petrolíferos en el distrito sur de la Baja California: México, Secretaría de Industria, Comercio, y Trabajo, Departamento de Petróleo, 72 pp., 6 pis., 2 maps, 1921.
259. Informe sobre la geología y la existencia de los yacimientos petrolíferos en el distrito sur de la Baja California (costa del Pacífico): Bol Petróleo, vol. 11, no. 6, pp. 469–543, 8 pis. (incl. maps), June, 1921.

Butler, G. M.

Butts, Charles.
262. The Mississippian series of eastern Kentucky; a regional interpretation of the stratigraphic relations of the Subcarboniferous group based on new and detailed field examinations: Kentucky Geol. Survey, ser. 6, vol. 7, 188 pp., 7 figs., 81 pls., sections sheet, 1922.
Buwalda, John P.
See also Redwood, no. 1563.

Bybee, H. P.

Cable, Emmett J.
266. Some phases of the Pleistocene of Iowa; with special reference to the Peorian interglacial epoch. Diss., University of Iowa, 65 pp., 27 figs. [Cedar Falls, Iowa, Wolverton Bros. Printing Co., 1921.]

Cady, Gilbert H.

Cairnes, C. E.

Calkins, F. C.

Cameron, A. E.
Campbell, E. E.

Campbell, J. Morrow.
278. The profession of ore hunting: Econ. Geology, vol. 17, no. 2, pp. 139–141, March–April, 1922.

Campbell, Marius R.

Campbell, Stewart.
282. Twenty-third annual report of the mining industry of Idaho for the year 1921, 152 pp. [1922].

Campbell, W. W.

Camsell, Charles.

Canada, Department of Mines, Mines Branch.
285. Summary report of investigations made by the Mines Branch during the calendar year ending December 31, 1920, 87 pp., 7 figs., 1922.

Canada, Geological Survey.

Canu, Ferdinand.

Cape, Emily Palmer.
288. Lester F. Ward; a personal sketch. xi, 208 pp., 5 pls. (incl. port.), New York, G. P. Putnam’s Sons, 1922.

Capps, Stephen R.

Carman, J. Ernest.

Carmody, P.
Carnegie Institution of Washington.


Carpenter, Ford A.


Case, E. C.


298. New reptiles and stegocephalians from the Upper Triassic of western Texas. 84 pp., 33 figs., 14 pls., Carnegie Institution of Washington (Pub. no. 321), October, 1922.

Catheart, S. H.


Cattell, R. A.


Cave, H. S.

301. Historical sketch of the Geological Survey of Georgia; bibliography and other data: Georgia, Geol. Survey, Bull. no. 39, 154 pp., 7 pls., 2 figs. (incl. map), 1922.

Cervantes, Enrique A.


Chadwick, George H.


See also Galloway, no. 622.
Chamberlin, Rollin T.


See also Bateman, no. 88.

Chamberlin, T. C.


Chaney, Ralph W.


Chapin, Theodore.


30 BIBLIOGRAPHY OF NORTH AMERICAN GEOLOGY, 1921–1922.

Charles, B. E.

Chase, Charles A.

Cheney, Charles A.

Cheney, M. G.

Christensen, H. P.

Churchill, Frederick C.

Clapp, Charles H.


Clapp, Frederick G.


Clark, Bruce L.


Clark, Bruce L.—Continued.


Clark, Clifton W.


Clark, F. B. See Redwood, no. 1563.

Clark, G. C.

Clark, George Huntington.


Clark, K. A.


Clark, R. W.


Clark, Thomas H.


Clark, W. O.


Clarke, F. B.

32 BIBLIOGRAPHY OF NORTH AMERICAN GEOLOGY, 1921–1922.

Clarke, Frank Wigglesworth.

Clarke, John M.
358. Organic dependence and disease; their origin and significance: New York State Mus. Bull., nos. 221, 222, 113 pp., 105 figs., 1921 (also New Haven, Yale University Press, 1921).
359. Sixteenth report of the director of the State Museum and science department, including the seventy-third report of the State Museum, the thirty-ninth report of the State geologist, and the report of the State paleontologist for 1919: New York State Mus. Bull. nos. 227, 228, 146 pp., 1921.
360. Seventeenth report of the director of the State Museum and Science department, including the seventy-fourth report of the State Museum, the fortieth report of the State geologist, and the report of the State paleontologist for 1920–21: New York State Mus. Bull. nos. 239–240, 209 pp., 12 figs., 17 pls., 1922.

Cleland, Herdman F.

Cobb, Collier.

Cockrell, T. D. A.
BIBLIOGRAPHY.


Cockfield, W. E.

Coffin, R. C.

Colby, Charles C.

Cole, L. H.

Coleman, A. P.
385. Physiography and glacial geology of Gaspe Peninsula, Quebec: Canada, Geol. Survey, Bull. no. 34, 52 pp., 5 figs., 7 pls., map, 1922.
386. Glacial and postglacial lakes in Ontario: Toronto, Univ., Studies, Biological series, no. 21, 76 pp., 9 figs., 6 pls., 1922.
34 BIBLIOGRAPHY OF NORTH AMERICAN GEOLOGY, 1921–1922.

Collier, A. J.
See also Redwood, no. 1563.

Collingwood, D. M.

Collins, W. D.

Collins, W. H.
400. The geology of Ontario’s iron ores: Canadian Min. Jour., vol. 43, no. 37, pp. 625–626, September 15, 1922.

Colony, R. J.

Conard, H. S.

Conrey, Guy Woolard.

Condit, D. D.
See also Redwood, no. 1563.
Conine, W. H.

Connor, M. F.

Cook, Charles W.

Cook, Harold J.

Cook, John H.

Cooke, C. Wythe.
410. New names for West Indian Tertiary pectens: Nautilus, vol. 34, no. 4, p. 137, April, 1921.
See also Cushman, no. 442.

Cooke, Harold Caswell.
Cooke, M. K.


Coons, A. T.


Cooper, Herschel, H.


Cornwall, Ira E.


Coryell, Horace Noble.


Coste, Eugene. See Matteson, no. 1241.

Cottingham, Kenneth.

Cotton, Leo A.

Cottrell, Kate W.

Cox, G. H.

Crampton, T. H. M.

Cressey, George B.

Crider, A. F.

Crosby, Irving B.

Cross, J. G.

Crosby, Whitman.
38 BIBLIOGRAPHY OF NORTH AMERICAN GEOLOGY, 1921–1922.

Culbertson, Glenn.

Culver, Harold E.

Cumings, E. R.

Currier, Louis W.

Cushman, Joseph Augustine.

Dachnowski, Alfred P.

Dake, Charles Lawrence.
Dake, Charles Lawrence—Continued.


Dale, Nelson C.


Dale, T. Nelson.


Dall, William Healey.


Daly, Reginald A.


Dana, Edward Salisbury.


Darton, N. H.


See also Redwood, no. 1563.
40 BIBLIOGRAPHY OF NORTH AMERICAN GEOLOGY, 1921–1922.

Davis, Hubert W.

Davis, N. B.

Davis, William Morris.
473. Lower California and its natural resources; a review: Geog. Rev., vol. 11, no. 4, pp. 551–562, October, 1921.
See also Cleland, no. 382; Foye, no. 604; Meinzer, no. 1264; Osborn, no. 1428; Schuchert, no. 1682.

Davison, Charles.

Dawson, C. B.

Day, Arthur L.

Day, David T.
De Geer, Gerard.

485. Correlation of late glacial clay varves in North America with the Swedish time scale: Geol. Fören. i Stockholm, Förhandl., Bd. 43, H. 1-2, pp. 70-73, 1 fig., January-February, 1921.

DeGolyer, E.


DeLongh, W. H. D.

490. Enkele geologische en mineralogische mededeelingen over Mexico in het algemeen en over de mijndistricten Zacatecas, Pachuca, en Real del Monte in het bijzonder [general geology of Mexico and ore deposits of Zacatecas and other districts, particularly the silver ores]: De Ingenieur, Den Haag, Jaarg. 35, no. 1, pp. 4-9, 2 figs., January 3, 1920.

DeLury, J. S.

491. Mineral prospects in southeastern Manitoba: Rice Lake, Maskwa River, and Boundary districts: Manitoba Bulletins, Commissioner of Northern Manitoba, 55 pp., illus., map [1921].

Denis, Théo. C.

492. Report on mining operations in the Province of Quebec during the year 1920: Quebec (Province), Department of Colonization, Mines, and Fisheries, 140 pp., illus., Quebec, 1921.

493. Report on mining operations in the Province of Quebec during the year 1921: Quebec (Province), Department of Colonization, Mines, and Fisheries, 156 pp., illus., Quebec, 1922.

Deussen, Alexander.

494. Salt domes of Texas and Louisiana: Oil Weekly, vol. 24, no. 4, pp. 11, 16, 18, January 21, 1922.

DeWolf, F. W.


Dickerson, Roy E.


42 BIBLIOGRAPHY OF NORTH AMERICAN GEOLOGY, 1921–1922.

Diener, Carl.

Diller, J. S.

Doak, Samuel E.

Dobbin, Carroll E.

Dodd, Harold V.

Dodge, W. E.

Dolmage, Victor.

Douglass, Earl.
BIBLIOGRAPHY.

Dove, Leonard P.


Dowling, D. B.


Dresser, John A.


Duane, William.


Dunbar, Carl O.


Dufresne, O. A.

BIBLIOGRAPHY OF NORTH AMERICAN GEOLOGY, 1921–1922.

Dunlop, J. P.


Dunn, Robert.

Dyer, W. S.

Eakle, Arthur S.


Eardley-Wilmot, V. L.

Easton, H. D.
543. Is Mississippi to be an oil State?: Oil Weekly, vol. 23, no. 5, pp. 12, 26, 28, 2 figs., October, 1922.

Eaton, Arthur. See Lee, no. 1102.

Eaton, George F.

Eaton, Harry N.


Ebert, F. C.

Eby, George.
Eckel, Edwin C.


Edwards, E. C.


Ehlers, G. M.


Eichler, A.


Elledge, Emmett R.

552. The economic geology of the Arkansas City district: Kansas, State Geol. Survey, Bull. 8, pp. 5-37, 2 figs., 11 pls. (incl. map), 1921.

Ellis, Arthur J.


Ellis, Robert W.

555. Geology of the Sandia Mountains: New Mexico, State Univ., Bull. no. 4, (Geol. ser. 3), 45 pp., 2 figs., 4 pls., map, September, 1922.

Ellison, Robert S.


Ellsworth, H. V.


Emery, W. B. See Redwood, no. 1563.

Emmons, William Harvey.

Emmons, William Harvey—Continued.

English, Walter A.

Erickson, E. Theodore.

Eskola, Pentti.

Estlin, E. S.

Evans, George Watkin.

Evans, Isabel P.

Fairchild, H. L.

Faribault, E. R.

Fath, A. E.
572. Geology of the Eldorado oil and gas field, Butler County, Kansas; Kansas, State Geol. Survey, Bull. 7, 187 pp., 9 figs., 19 pls. (incl. maps) [1921].
Fath, A. E.—Continued.

573. The age of the domes and anticlines in the Lost Soldier-Ferris district, Wyoming: Jour. Geology, vol. 30, no. 4, pp. 303-310, 1 pl. (map), May-June, 1922.

See also Redwood, no. 1563.

Fenneman, Nevin M.


Fenner, Clarence N.


Fenton, Carroll Lane.


Ferguson, Henry G.


Ferguson, R. N.


Fettke, Charles R.

(with Ashley, G. H.). Pennsylvania coals and shales greatly vary in their content of oil: Coal Age, vol. 19, no. 9, pp. 401-403, March 3, 1921.
See also Pa. Geol. Survey, no. 1478.
Field, Richard M.


Field, V. W.

586. A Utah feldspar locality: Am. Mineralogist, vol. 6, no. 6, pp. 103–104, June, 1921.

Finlay, J. R.


Flores, Teodoro.


Foerste, Aug. F.


See also Ulrich, no. 1965.

Ford, William E.


Foshag, William F.


598. New minerals: Am. Mineralogist, vol. 6, no. 8, p. 132, August, 1921; no. 9, pp. 140–141, September, 1921.


(with Larsen, E. S.). Merwinite, a new calcium magnesium orthosilicate from Crestmore, California: Am. Mineralogist, vol. 6, no. 10, pp. 143–148, 1 fig., October, 1921.
BIBLIOGRAPHY.

Foye, Wilbur G.


Foyles, Edward J.


Frame, James.


Franks, Arthur J.


Freeman, O. W.


Freudenberg, Wilhelm.


Frick, Childs.


Friedlander, Immanuel.

614. Vulkanische Ereignisse in Mexiko; Erdbeben und Ausbruch (?) am Orizaba: Zeitschr. Vulkanologie, Bd. 6, H. 2, pp. 80-85, 1 fig., June, 1921.


Furlong, Chester.

Gaby, W. E.

Gale, Hoyt Stoddard.

Galloway, J. J.

Gardescu, Ionel I.

Gardner, James H.

Gardner, Julia. See Cooke, no. 411.

Gavin, Martin J.

George, H. C.

George, R. D.
BIBLIOGRAPHY.

Gerry, C. N.

Gibson, T. W.

Gidley, James Williams.

Giles, Albert W.
638. The geology and coal resources of Dickenson County, Virginia: Virginia Geol. Survey, Bull. no. 21, 224 pp., 21 figs., 18 pls. (incl. maps), 1921.

Gill, A. C.

Gilmore, Charles W.
BIBLIOGRAPHY OF NORTH AMERICAN GEOLOGY, 1921-1922.

Gilmore, Charles W.—Continued.

Gledhill, T. L.

Glenk, Robert.
649. Louisiana lignite: Louisiana, Dept. Conservation, Bull. no. 8, 65 pp., illus., map, March, 1921.

Glen, Leonidas Chalmers.
653. The geology and coals of Webster County: Kentucky Geol. Survey, Series Six, vol. 5, 249 pp., 31 figs., 1922.

Glock, Waldo S.

Glover, Sheldon L.

Goldman, Marcus I.
See also Darton, no. 464; Fath, no. 571; Hancock, no. 710, 711; Schultz, no. 1684; Shaw, no. 1718; Winchester, no. 2162.
BIBLIOGRAPHY.

Goldring, Winifred.

Goldschmidt, V. M.

Goldston, W. L., jr.
666. Differentiation of the Glenn formation in the U. S. G. S. Ardmore quadrangle. 3 sheets, maps and sections, Oklahoma Geol. Survey [1922].

Goldthwait, James Walter.
See also Antevs, no. 40.

Goodier, B. D.

Goodrich, H. B.

Gordon, Clarence E.
See also Foye, no. 604; Keith, no. 951.

Gordon, J. P.
Gordon, Samuel G.


Grabau, Amadeus W.


Granger, Walter.


Grant, Wilbur H.


Gray, F. W.


Greene, Frank C.


Gregory, Herbert E.


Gress, E. M.


Griggs, Robert Fiske.


Grout, Frank F.

Gruner, John W.

Guild, F. N.
695. The identity of flagstaffite and terpin hydrate: Am. Mineralogist, vol. 6, no. 9, pp. 133–135, September, 1921.

Gunter, Herman.

Guppy, H. B.

Hackford, J. E.

Hafer, C.

Hager, Dorsey.

Haley, Charles S.
Hall, George M.

Hamilton, Fletcher.

Hamilton, W. R.

Hammill, Chester A.

Hannibal, Harold.

Hanson, George.
Harder, E. C.

Harper, Roland M.

Harrington, George L.

Harris, G. D.

Hartley, Burton.

Hartnagel, C. A.

Harvie, Robert.

Haseman, J. D.

Hastings, John B.

Hawkins, Alfred C.
732. Two new forms on quartz from Pikes Peak [Colorado]: Am. Mineralogist, vol. 6, no. 12, p. 169, December, 1921.
Hawxhurst, Robert, jr.

Hay, Oliver P.
740. Observations on some extinct elephants. 19 pp., 10 figs., 4 pls., June 12, 1922 [private print].

Hayes, A. O. See Bateman, no. 88.

Hayes, C. W.

Hayes, Ellen.

Hayford, John F.

Headden, William P.

Headstrom, Birger R.

Heald, K. C.


See also Ferguson, no. 583.

Heikes, Victor C.


Heim, Arnold.

761. Vulkane in der Umgebung Oase La Purisima auf der Halbinsel Nieder-Kalifornien: Zeitschr. Vulkanologie, Bd. 6, H. 1, pp. 15-21, 7 figs., 4 pls. (incl. map), April, 1921.


Heist, H. D.


Henderson, Charles W.


Henderson, Charles W. —Continued.

Henry, Earl C.

Herald, Frank A.

Hess, Frank L.

Hewett, D. F.
BIBLIOGRAPHY.

Hewett, D. F.—Continued.

Hicks, W. B.

Hill, Edward Allison.

Hill, James M.

Hill, Robert T.

Hinds, Norman E. A.

Hitchcock, C. H.

Hixon, Hiram W.
798. Is coal a mineralized peat bog or has it been formed from woody deposits of great river deltas?: Coal Age, vol. 21, no. 1, pp. 8–9, January 5, 1922.
See also Matteson, no. 1241.

Hobbs, William Herbert.
Hobbs, William Herbert—Continued.

See also Loomis, no. 1149; Louderback, no. 1154; Taber, no. 1847.

Hodgson, Ernest A.

Hodson, Floyd.

Holden, Edw. F.
812. Specific gravity and composition in iron-rutile: Am. Mineralogist, vol. 6, no. 6, pp. 100-103, 1 fig., June, 1921.

Hollick, Arthur.

Honess, Arthur P.
815. The etching figures of topaz: Am. Mineralogist, vol. 6, no. 4, pp. 71-77, 1 fig., 1 pl., April, 1921.

Honess, Charles W.

Honigmann, Ernesto.
BIBLIOGRAPHY.

Hopkins, Oliver B.

See also Redwood, no. 1563.

Hopkins, Percy E.


Hosted, Joseph O.


Hovey, Edmund Otis.


Howard, W. V.


Howe, Henry V.

Howe, Marshall A.


Howell, B. F.


Howell, J. V.


Hubbard, George D.


Hubbard, Wyant D.


Hudson, F. S.


Huene, F. von.


Hughes, Richard.


Hull, J. P. D.


BIBLIOGRAPHY.

Hull, J. P. D.—Continued.

Hume, George S.

Hunt, Walter F.

Huntington, Ellsworth.

Huntley, L. G.
855. (and Huntley, Stirling). Mexican oil fields: Mining and Metallurgy, no. 177, pp. 27–32, 3 figs., September, 1921.

Huntley, Stirling.
(with Huntley, L. G.). Mexican oil fields: Mining and Metallurgy, no. 177, pp. 27–32, 3 figs., September, 1921.

Hurst, Macleod E.

Hyde, J. E.

Iddings, Joseph P.

Insley, Herbert.
Jackson, Robert Tracy.

Jacobs, Elbridge C.

Jaggar, T. A., Jr.

Jeffrey, Edward C.

Jenison, H. A. C.
Jenkins, Olaf P.


Jennings, O. E.

885. Have the streams of Long Island been deflected by the earth’s rotation?: Science, new ser., vol. 55, p. 291, March 17, 1922.

Jenson, J. B.


Jillson, Willard Rouse.

887. Economic papers on Kentucky geology; an indexed collection of thirteen short papers and reports on the geology and special occurrence of oil and gas, oil shale, asphalt, rock, and fluor spar within the commonwealth: Kentucky Geol. Survey, ser. 6, vol. 2, 304 pp., illus., 1921.


889. Geology and coals of the Middle Fork of the Kentucky River near Buckhorn in Perry and Breathitt counties: Kentucky Geol. Survey, ser. 6, vol. 6, pp. 53-101, 28 figs., 1921.

890. Oil and gas possibilities of the “Jackson Purchase” region: Kentucky Geol. Survey, ser. 6, vol. 6, pp. 191-220, 11 figs., 1921.


892. The region about Frankfort: Kentucky Geol. Survey, ser. 6, vol. 6, pp. 269-282, 8 figs., 1 pl. (map), 1921.

893. A bibliography of the several books, reports, papers, and maps principally relating to geology written and prepared by Willard Rouse Jillson: Kentucky Geol. Survey, ser. 6, Pamphlet no. 2, 11 pp., 1921.

894. The production of eastern Kentucky crude oils . . . 99 pp., 1 fig., prepared for and published by the Cumberland Pipe Line Co., Winchester, Ky., 1921.


898. A bibliography of the several books, reports, papers, and maps, principally relating to geology, written and prepared by Willard Rouse Jillson: Kentucky Geol. Survey, ser. 6, Pamphlet no. 3, 14 pp., Frankfort, Ky., 1922.

899. The coal industry in Kentucky; an historical sketch. 87 pp., Frankfort, The State Journal Company, 1922.

BIBLIOGRAPHY OF NORTH AMERICAN GEOLOGY, 1921-1922.

Johannsen, Albert.


Johnson, Bertrand Leroy.


Johnson, Charles W.


Johnson, Columban A.

907. Coal, oil, gas, and electricity; our natural resources. 107 pp., illus., Pittsburgh, Charles W. Swope, 1921.

Johnson, Douglas W.


See also Johnson no. 914.


Johnson, Roswell H.


Johnston, R. A. A.


Johnston, W. A.

917. Winnipegosis and upper Whitemouth River areas, Manitoba; Pleistocene and Recent deposits: Canada, Geol. Survey, Mem. 128, 42 pp., 2 figs., 2 maps, 1921.


922. Sedimentation of the Fraser River delta: Canada, Geol. Survey, Mem. 125, 46 pp., 9 pls. (incl. maps), 1921.


Jonas, Anna I.

Jones, Arthur Taber.

Jones, Edward L.

Jones, O. C.

Jones, William F.

Jordan, David Starr.

Katz, Frank J.

Kay, George F.
BIBLIOGRAPHY.

Keele, Joseph.

Keeley, F. J.

Keith, Arthur.

Kellogg, A. E.

Kellogg, Remington.
957. Description of the skull of Megaptera miocaena, a fossil humpback whale from the Miocene diatomaceous earth of Lompoc, California: U. S. Nat. Mus., Proc., vol. 61, art. 14, pp. 1–18, 4 pls., 10 figs., 1922.

Kemnitzer, William.

Kemp, James F.
72 BIBLIOGRAPHY OF NORTH AMERICAN GEOLOGY, 1921–1922.

Kemp, James F.—Continued.


See also Mitchell, no. 1331.

Keyes, Charles Rollin.

967. When Hopkins geology was in flower: Johns Hopkins Alumni Mag., vol. 9, no. 3, pp. 204–212, March, 1921.


**BIBLIOGRAPHY.**

**Keyes, Charles Rollin—Continued.**


992. Giant bay bar of ancient Bonneville Lake; Thrust at Crow's Nest; Biplanation of earth's straticulate crust; Flexures in Canadian front ranges of Rockies; Some prairie tectonics; Tectonic setting of Utah's high plateaus: Pan-Am. Geologist, vol. 37, no. 2, pp. 167–176, 2 figs., 2 pis., March, 1922.


Keyes, Charles Rollin—Continued.


BIBLIOGRAPHY.

Keyes, Charles Rollin—Continued.

Kindle, Edward M.
1047. An example of gravity deformation in a limestone slab: Canadian Field-Naturalist, vol. 35, no. 6, pp. 115-116, 1 fig., September, 1921.

Kirk, Charles T.
Kirk, Edwin.

Kirkham, Virgil R. D.

Kite, W. C. See Aurin, no 55.

Kitto, F. H.
1054. New oil fields of northern Canada: Canada, Dept. of the Interior, Natural Resources Intelligence Branch, 8 pp., map, 1921.

Klotz, Otto.

Knapp, Arthur.

Knight, Cyril W.

Knopf, Adolph.

Knopf, Eleanor Bliss.
Knowlton, Frank Hall.


See also Manson, no. 1225.

Knox, Henry H.

Koch, Lauge.

Kratzert, J.

Kraus, Edward H.

Krey, Frank.

Kümmerl, Henry B.

See also Foye, no. 604.

Labbe, Charles.
BIBLIOGRAPHY OF NORTH AMERICAN GEOLOGY, 1921-1922.

Ladoo, Raymond B.

Lagler, Carl.

Lahee, Frederic H.
See also Collingwood, no. 392; Lupton, no. 1177.

Lambert, G. S.

Lambert, Jules.

Landell-Mills, Thomas.

Lane, Alfred C.
See also Rogers, no. 1607.

Large, Thomas.

Larsen, Esper S.
BIBLIOGRAPHY.

Larsen, Esper S.—Continued.


Larsen, J. A.

Lawson, Andrew C.


Lee, Charles H.

Lee, Wallace.


Lee, Willis T.

04204—24—6
Lee, Willis T.—Continued.


1104. The face of the earth as seen from the air; a study in the application of airplane photography to geography: Am. Geog. Soc., Special Pub. no. 4, 110 pp., 82 figs., 1922.


Lees, James H.


See also Kay, no. 943; Miller, no. 1316.


Leighton, Morris M.


Leith, Charles Kenneth.


Leonard, Arthur Gray.


Levensaler, Lewis A.


Leverett, Frank.


Leverett, Frank—Continued.
See also Osborn, no. 1428.

Lewis, J. Volney.
See also Wilder, no. 2128.

Liddle, R. A.
1128. The geology and mineral resources of Medina County: Texas, Univ., Bull. no. 1860 (October 25, 1918), 177 pp., 9 figs., 9 pls. (incl. map), March, 1921.

Lindgren, Waldemar.

Little, Homer P.

Livingston, D. C.

Lobbeck, Armin Kohl.
BIBLIOGRAPHY OF NORTH AMERICAN GEOLOGY, 1921–1922.

Lobeck, Armin Kohl—Continued.

Locke, Augustus.
1137. Experiment in ore-hunting geology: Mining and Metallurgy, no. 184, pp. 27–29, 1 fig., April, 1922.

Loel, Wayne.

Logan, W. N.
See also Ries, no. 1593.

Long, E. Tatum.

Longwell, Chester R.
See also Foye, no. 604.

Lonsdale, John T.
Loomis, F. B.


Loomis, Harve.


Louderback, George D.


Loughlin, G. F.


Lowe, E. N.

1165. Seventh biennial report, 1918-1919 of the director of the State geological survey to the Mississippi legislature. 12 pp., Jackson, Miss. [1920?].

1166. Eighth biennial report, 1920-1921, of the director of the State geological survey to the Mississippi legislature. 45 pp. [1921?].

Lucas, Frederic A.


Lull, Richard Swann.


Lupton, Charles T.


Lyman, Frank.

1180. Benjamin Smith Lyman: Mining and Metallurgy, no. 170, pp. 23–24, February, 1921.

McArthur, D. C.


McCabe, Joseph.

1182. Ice ages; the story of the earth’s revolutions. 134 pp., 4 pls., New York., G. P. Putnam’s Sons, 1922.

McCallie, S. W.


1184. Notes on the geology of Georgia: Georgia, Geol. Survey, Bull. no. 39, pp. 72–85, 1 fig. (map), 1922.
McCann, William Sidney.
1187. Geology and mineral deposits of the Bridge River map area, British Columbia: Canada, Geol. Survey, Mem. 130, 115 pp., 11 figs., 11 pls., 2 maps, 1922.
1188. The gold quartz veins of Bridge River district, British Columbia, and their relationship to similar ore deposits in the western Cordilleras: Econ. Geology, vol. 17, no. 5, pp. 350-369, 4 figs., August, 1922.

MacCarthy, Gerald R.

MacClintock, Paul.

McComb, H. E.

McCoy, Alex. W.

McDermid, A. J.

Macelwane, James B.
1195. Some seismological evidence that is not evident: Science, new ser., vol. 56, pp. 478-480, October 27, 1922.

McInnes, William.

MacKay, B. R.

MacKenzie, J. D.
MacKenzie, J. D.—Continued.

McKinstry, Hugh E.
1205. The Unionville, Pennsylvania, corundum mines: Am. Mineralogist, vol. 6, no. 9, pp. 135–137, September, 1921.

McLaughlin, R. P.

MacLean, A.

McLearn, F. H.

McLeish, John.
1211. Summary report of investigations made by the Mines Branch during the calendar year ending December 31, 1920: Canada, Department of Mines, Mines Branch, 87 pp., 7 figs., 1922.

McNutt, V. H.

Macready, George A.

Malott, Clyde A.
Malott, Clyde A.—Continued.


Mann, Albert.


Mansfield, George Rogers.


Manson, Marsden.


Marshall, J. R.


Martin, George C.


Martin, H. T.

Marvin, C. F.

Mather, Kirtley F.
See also Schuchert, no. 1682.

Mathews, Edward B.

Matsumoto, H.
1240. Revision of *Palaeomastodon* and *Moeritherium*; *Palaeomastodon intermedius* and *Phiomia osborni* new species (with note by H. F. Osborn): Am. Mus. Novitates, no. 51, 6 pp., 3 figs., November 21, 1922.

Matteson, W. G.

Matthes, F. E.

Matthew, G. F.
Matthew, William Diller.
See also Sinclair, no. 1748.

Maury, Carlotta Joaquina,
1256. The recent Arcas of the Panamic province; Palaeontographica Americana, vol. 1, no. 4, pp. 163–208, 3 pls., December 25, 1922.

Mead, Warren J.

Mehl, Maurice G.

Meinzer, Oscar E.
1261. Hidrologfa subterránnea: Ingenierfa Internacional, New York, t. 5, no. 4, pp. 195–202, 10 figs., April, 1921; Bol. Minero, t. 11, no. 6, pp. 837–849, 3 figs., June, 1921.
Melcher, A. F.

Mendenhall, T. C.

Merriam, John C.

Merrill, George Perkins.
Merrill, George Perkins—Continued.


Merritt, John Wesley.


Mertie, J. B., jr.


Merwin, H. E.


Middleton, Jefferson.


Millard, M. J. See Aurin, no. 55.
Miller, Arthur M.
1300. Fossils—are they merely "prehistoric," or must they also be "geologic"?
32, no. 1, pp. 35–36, March 31, 1921.
March, 1922.
1303. Licks and caves of the lower Ohio Valley as repositories of mammalian
remains, including those of man: Geol. Soc. America, Bull., vol. 33,
no. 1, pp. 156–159, March 31, 1922.
1304. Meteorite hunting: Science, new ser., vol. 56, pp. 249–251, September 1,
1922.

Miller, Benjamin L.
1305. Graphite industry of the United States and Canada: Eng. and Min.
Jour., vol. 112, no. 6, pp. 207–213, 3 figs., August 6, 1921.
See also Pa. Geol. Survey, no. 1478.

Miller, Eric R.
(with Winchell, A. N.). The great dust fall of March 19, 1920: Am.

Miller, Gerrit S., jr.
1306. (and Gidley, J. W.). A new fossil rodent [Ischromys] from the Oligo-
cene of South Dakota: Jour. Mammalogy, vol. 1, no. 2, pp. 73–74,
February, 1920.

Miller, L. H.
1307. Asphalt beds of Rancho La Brea [California] (abstract): Washington

Miller, Willet G.

Miller, William John.
1309. The geological history of the Connecticut Valley of Massachusetts;
a popular account of its rocks and origin. 74 pp., 27 figs., map,
[Northampton, Mass., The Hampshire Bookshop, 1921].
1311. Some crystal localities in St. Lawrence County, New York: Am. Min-
eralogist, vol. 6, no. 4, pp. 77–79, April, 1921.
3, pp. 227–233, April–May, 1921. Abstract, Geol. Soc. America,
1313. Wilmington Notch [Adirondacks, New York]: The Conservationist
3, 384 pp., 80 figs., 20 pls., New York, P. F. Collier & Son Company,
1922.
1315. Sillimanite-schist inclusions in granite (abstract): Geol. Soc. America,
Bull., vol. 33, no. 1, pp. 130–133, 1 fig., March 31, 1922.
587–610, 10 figs., October–November, 1922; Abstract with discussion
by James H. Lees: Geol. Soc. America, Bull., vol. 33, no. 1, p. 98,
March 31, 1922.
Miller, William John—Continued.

See also Foye, no. 604.

Miller, W. Z.


Millis, John.


Mills, R. Van A.

1320. Experimental studies of subsurface relationships in oil and gas fields (discussion): Econ. Geology, vol. 16, no. 1 pp. 52-60, January, 1921.
See also Matteson, no. 1241.

Milner, Henry B.

1322. Trinidad; a review of its geology and oil resources: Min. Mag., vol. 25, nos. 3 and 4, pp. 139-148, 205-213, 7 figs., September and October, 1921.
1323. Petroleum in Central America and the West Indies: Min. Mag., vol. 27, no. 1, pp. 9-18, 5 figs., July, 1922.

Miser, Hugh D.

See also Redwood, no. 1563.

Mitchell, Graham John.

Mitchell, Graham John—Continued.

Moffatt, John.

Moffit, Fred H.

Monett, V. E.

Moody, Margaret W.

Moodie, Roy L.

Mook, Charles Craig.
BIBLIOGRAPHY.

Mook, Charles Craig—Continued.


Moore, Elwood S.


1353. Coal; its properties, analysis, classification, geology, extraction, uses, and distribution. 462 pp., 20 pls., 142 figs., New York, John Wiley & Sons, 1922.

See also Pa. Geol. Survey, no. 1478; Ries, no. 1593.

Moore, Raymond C.


(with Plummer, F. B.). Stratigraphy of the Pennsylvanian formations of north central Texas: Texas, Univ., Bull., no. 2132, 237 pp., 19 figs., 27 pls. (incl. map) [1922].

See also Glenn, no. 651; Lee, no. 1102.

Morey, George W.


64264—24—7
Morgan, G. B.
1367. Eleventh biennial report of the State geologist [of Wyoming] for the period October 1, 1920, to and including September 30, 1922. 34 pp., map [Sheridan, Wyo., 1922].

Morgan, George D.

Morize, H.

Morningstar, Helen.

Mosier, J. G.

Moulton, Gail F.

Moyer, W. Irwin.

Muilenburg, G. A.

Muir, John.

Múñoz Lumbier, Manuel.

Mylius, L. A.
Naething, Foster S.

Nason, Frank Lewis.

Nebel, M. L.
(with Savage, T. E.). Geology and mineral resources of the La Harpe and Good Hope quadrangles: Illinois, State Geol. Survey, Extract A from Bull. no. 43, 89 pp., 11 figs., map, 1921.

Nelson, Edward W.

Nelson, Wilbur A.

Nelson, Richard N.

Ness, John.

Neumann, Emm. Ma. S.-Navarro.

Newland, David H.
1391. The mineral resources of the State of New York: New York State Mus. Bull. nos. 223, 224, 315 pp., figs., pls. (maps), 1921.
Newland, David H.—Continued.


Nickles, John M.


Nicolas, Frank J.


Niemi, Signa.

1398. Mesabi iron range of Minnesota; a bibliography. 18 pp., Library School, University of Wisconsin, June, 1920.

Noble, L. F.


Noé, Adolf C.


Nopcsa, Francis.


Nordenskjöld, Otto.

1404. Die nordeuropäischen Polarinseln: Handbuch d. regionalen Geologie (Steinman u. Wilckens), Bd. 4, Abt. 2b, H. 24, 31 pp., 10 figs., 1 pl. (map), Heidelberg, 1921.

North, Lloyd.


Norton, William Harmon.

1406. The elements of geology. 464 pp., 376 figs., Boston, Ginn and Company [copyright 1905, 1921].

Nourse, M. R.


O'Connell, Marjorie.

Oklahoma Geological Survey.
1410. Map showing distribution of mineral resources. 1921. [Scale: 30 miles to 1 inch, about.]

Oldroyd, T. S.

Olmstead, Seymour G.

Olsson, A. A.

Omori, Fusakichi.

Orcutt, Charles R.

Osborn, Clarence C.

Osborn, Henry Fairfield.
Osborn, Henry Fairfield—Continued.


1427. Hesperopithecus, the first anthropoid primate found in America: Am. Mus. Novitates, no. 37, 5 pp., 3 figs., April 25, 1922.


1434. Dibelodon edensis (Frick) of southern California; Miomastodon of the middle Miocene, new genus: Am. Mus. Novitates, no. 49, 4 pp., 3 figs., October 23, 1922.


See also Matsumoto, no. 1240.

Overstreet, J. B. See Barton, no. 75.

Owen, W. T.


Pace, Lula.


Pack, Frederick J.


Pack, R. W.

Packard, Earl L.

Paige, Sidney.
1447. Copper deposits of the Tyrone district, New Mexico: U. S. Geol. Survey, Prof. Paper 122, 53 pp., 29 figs., 10 pls. (incl. maps), 1922. See also Hayes, no. 741.

Palmer, Andrew H.

Palmer, Chase.

Palmer, Harold S.

Palmer, Leroy A.

Pan-American Geologist. See Keyes, no. 975.

Panyity, L. S.

Pardee, J. T.
Pardee, J. T.—Continued.


Paredes, Trinidad.


Parker, E. W.


Parks, W. A.


Parmelee, C. W.


Parr, S. W.


Parsons, A. L.


1471. A third type of proustite from Cobalt, Ontario: Toronto, Univ., Studies, Geol. ser., no. 14, pp. 89-90, 1 fig., 1922.

Parsons, A. L.—Continued.


Patton, Leroy.


Patty, Ernest N.


Peck, Charles Harvey.


Peck, Frederick B. See Pa. Geol. Survey, no. 1478; Rids, no. 1593.

Pennsylvania, Bureau of Topographic and Geological Survey.

1478. Bulletin, nos. 1–59 [mimeographed]:

BIBLIOGRAPHY OF NORTH AMERICAN GEOLOGY, 1921–1922.


18. Oil from Pennsylvania shales and coals; preliminary report of work of Chas. R. Fettke. January 1, 1921.
20. Pennsylvania iron ores, by J. Ross Corbin. April, 1921.
22. The coal deposits of southern Somerset County, by J. D. Sisler. [No date.]
34. Coal beds in Westmoreland County, by J. D. Sisler. March 25, 1922.
44. Coal reserves in Cambria County, Pennsylvania, by John F. Reese. June 20, 1922.
50. Coal beds in Center, Cameron, Clinton, and Lycoming counties, Pennsylvania, by J. D. Sisler. September 10, 1922.
56. Oil fields rejuvenated, by Robert B. Bossier. September 1, 1922.

Penrose, R. A. F., jr.

Perkins, George H.

Peterson, P. P.

Petrascheck, W.
1485. Kristalliner Magnesit in Amerika: Montanistische Rundschau, Jg, 14, no. 12, pp. 262-263, June 16, 1922.

Petrunkevitch, Alexander.

Pilsbry, Henry A.

Pirsson, Louis V.

Plummer, Frederick B.
1492. (and Moore, R. C.). Stratigraphy of the Pennsylvanian formations of north central Texas: Texas, Univ., Bull. no. 2132, 237 pp., 19 figs., 27 pls. (incl. map) [1922].

Pogue, Joseph E.
1493. The economics of petroleum. 375 pp., 150 figs., New York, John Wiley & Sons, 1921.
See also Matteson, no. 1241.

Poitevin, Eugene.

Porter, Charles A.

Ports, P. L.
Powers, Sidney.

(with Hopkins, O. B., and Robinson, H. M.). The structure of the Madill-Denison area, Oklahoma and Texas, with notes on oil and gas development: U. S. Geol. Survey, Bull. 736, pp. 1–33, 6 pls. (incl. maps), June 6, 1922.

Pratt, Joseph Hyde.


Pratt, Wallace E.

See also Barton, no. 75; Hull, no. 845; Lee, no. 1102.

Prescott, Basil. See Shaw, no. 1721.

Prest, Walter H.

Price, George McCready.

Price, W. Armstrong.
1517. Notes on the paleontology of Nicholas County; Invertebrate fossils from the Pottsville series: West Virginia Geol. Survey, Nicholas County, pp. 751–788, 2 pls., 1 fig., 1921.

Prouty, William F.

Putnam, George R.

Pycraft, W. P.

Quirke, Terence T.

Rae, Colin C.

Ragotsky, Federico.
BIBLIOGRAPHY OF NORTH AMERICAN GEOLOGY, 1921–1922.

Rangel, Manuel.


Ransome, F. L.


Rastall, R. H.


Raymond, Percy E.

1540. A contribution to the description of the fauna of the Trenton group: Canada, Geol. Survey, Museum Bull. no. 31, 64 pp., 11 pls., February 17, 1921.

Read, L. C.


Reagan, Albert B.

Reagan, Albert B.—Continued.

Reber, Louis E., jr.

Redfield, Arthur H.

Redwood, Boverton.
1563. Petroleum; a treatise on the geographical distribution and geological occurrence of petroleum and natural gas . . . 4th edition, 3 vols., London, Charles Griffin & Company, 1922. [The part dealing with the United States was contributed by various members of the United States Geological Survey.]

Reeds, Chester A.
Reeside, John B., jr.
1567. Note on the stratigraphy of San Juan County, New Mexico, with special reference to the occurrence of dinosaurs: Smithsonian Misc. Coll., vol. 72, no. 14, pp. 4-6, January 31, 1922.


Reeves, Frank.

Reeves, John R.

Reger, David B.
1573. Nicholas County: West Virginia Geol. Survey [County Reports], 847 pp., 2 maps, 34 pls., 22 figs.; 1921.

Reid, Harry Fielding.
BIBLIOGRAPHY.


Rice, W. N. See Foye, no. 604.


See also Lee, no. 1102; Moore, no. 1362.


See also Redwood, no. 1563.


64284—24—8
BIBLIOGRAPHY OF NORTH AMERICAN GEOLOGY, 1921–1922.

Riddell, C. W.

Ries, Heinrich.
1594. The clay deposits of Kentucky: Kentucky Geol. Survey, Ser. 6, vol. 8, 241 pp., 62 figs., 1922.

Roark, Louis.

Roberts, Joseph K.

Roberts, Milnor.

Robertson, William Fleet.
1601. Annual report of the minister of mines [of British Columbia] for the year ending 31st December, 1921 . . . 365 pp., figs., pls., maps, Victoria, B. C., 1922.

Robinson, A. H. A.

Robinson, Heath M.
(with Hopkins, O. B., and Powers, Sidney). The structure of the Madill-Denison area, Oklahoma and Texas, with notes on oil and gas development: U. S. Geol. Survey, Bull. 736, pp. 1–33, 6 pls. (incl. maps), June 6, 1922.

Robinson, J. French.
See also Pa. Geol. Survey, no. 1478.
BIBLIOGRAPHY. 113

Roesler, Max.

Rogers, Austin Flint.

1606. Cristobalite in the spherulitic obsidian from Yellowstone National Park: Am. Mineralogist, vol. 6, no. 1, pp. 4-6, January, 1921; Supplementary note on cristobalite, no. 3, p. 60, March, 1921.


Rogers, G. Sherburne.

Rogers, W. R.

Ropes, L. S.

Ross, Clarence S.


Ross, Clyde P.
Round, Eda M.


Roundy, P. V.


Rowley, A. B.


Rowley, R. R.


Rubey, W. W.


Ruedemann, Paul.


Ruedemann, Rudolf.

1624. Paleontologic contributions from the New York State Museum: New York State Mus., Bull. nos. 227, 228, pp. 63-130, 61 figs., 1921.


RuKeyser, Walter A.

Runner, J. J.

Russell, William L.

St. Clair, Stuart.
1638. The oil pools of Warren County, Kentucky: Kentucky Geol. Survey, ser. 6, vol. 6, pp. 103–148, 15 figs., 1921.

Salazar Salinas, L.

Sampson, Edward.

Sanborn, James F.

Sandhouse, Grace.

Sardeson, Frederick W.
Sarle, C. J.

Savage, Thomas E.

Sayles, Robert W.

Schaller, Waldemar T.

Schlossmacher, K.
1659. Mikroskopische Untersuchungsbeiträge zur Kenntniss der kanadischen Kobalt-Nickel-Silberformation [Temiskaming, Ontario]: Zeitschr. prakt. Geologie, Jg. 29, H. 9, pp. 131-134, 8 figs., September, 1921.

Schmidt, M. M.

Schoewe, Walter H.

Schofield, Stuart J.
Schofield, Stuart J.—Continued.

1666. (and Hanson, G.). Geology and ore deposits of Salmon River district, British Columbia: Canada, Geol. Survey, Mem. 132, 81 pp., 6 figs., 4 pls., map, 1922.

1667. Relationship of the pre-Cambrian (Beltian) terrain to the Lower Cambrian strata of southeastern British Columbia: Canada, Geol. Survey, Bull. no 35 (Geol. ser. no. 42), 15 pp., 2 figs., October 30, 1922.

Schrader, Frank C.


Schramm, E. F.


Schroeder, Rolf A.


Schroyer, C. R.


Extract, 149 pp., 14 figs., 1921.

Schuchert, Charles.


BIBLIOGRAPHY OF NORTH AMERICAN GEOLOGY, 1921–1922.

Schuchert, Charles—Continued.

See also Brown, no. 216; Nelson, no. 1387.

Schultz, Alfred Reginald.


Schwartz, F. M.

1685. Notes on textures and relationships in the Globe copper ores [Arizona]: Econ. Geology, vol. 16, nos. 4–5, 1 pl., 1 fig., 1921.

Schwarzenbek, F. X.

Schwennesen, A. T.


Scott, Gayle.
(with Winton, W. M.). The geology of Johnson County: Texas, Univ., Bull., no. 2229, 68 pp., 4 figs., map, 1922.

Scott, Irving Day.


Scott, Walter W.


Scott, William Berryman.

1690. Physiography, the science of the abode of man. 384 pp., illus., New York, P. F. Collier & Son Company, 1922.

Sears, J. D. See Jones, nos. 933, 934; Pack, no. 1442; Schwennesen, no. 1686; Westgate, no. 2078.

Sellards, E. H.


Sellards, E. H.—Continued.

1694. Well records in Panola County, including structural contour map: Texas, Univ., Bull., no. 2232, 33 pp., 2 pls., 1922.


Semmes, Douglas R.


Shannon, Earl V.


1704. Owyheeite [Owyhee County, Idaho]: Am. Mineralogist, vol. 6, no. 4, pp. 82–83, April, 1921.


Shannon, Earl V.—Continued.


Shapley, Harlow.


Shaw, Eugene Wesley.


See also Matteson, no. 1241; Redwood, no. 1563.

Shaw, G. R.


Shaw, S. F.


Shea, E. F.


Sheed, Solon.


Sheldon, Pearl.

Shepard, Francis Parker.


See also Schuchert, no. 1682.

Shepherd, E. S.

Sheppard, George.
1729. Recent development work relating to petroleum in western Canada [Alberta and Saskatchewan]: Canadian Inst. Min. and Met., Monthly Bull., no. 113, pp. 802-818, September, 1921; Trans., vol. 24, pp. 60-74, 10 figs. [1922].

Shufeldt, R. W.

Siebenthal, C. E.


Sill, Rush T.
1742. Chemistry of enrichment of silver deposits: Mining and Metallurgy, no. 189, pp. 21-23, September, 1922.
Sinclair, William J.


Singewald, J. T. See Reger, no. 1575.

Sisler, J. D. See Pa. Geol. Survey, no. 1478.

Skirvin, Orren W.


Slawson, Chester B.


Slipper, S. E.


Smith, E. R.


Smith, Edward S. C.


Smith, Eugene Allen.


Smith, George Otis.

1756. Forty-second annual report of the Director of the United States Geological Survey to the Secretary of the Interior, for the fiscal year ended June 30, 1921. 108 pp., 1 pl. (map), Washington, 1921.

BIBLIOGRAPHY.

Smith, George Otis—Continued.
1760. Forty-third annual report of the Director of the United States Geological Survey to the Secretary of the Interior, for the fiscal year ended June 30, 1922. 80 pp., 1 pl. (map), Washington, 1922.

Smith, Isabel F.

Smith, John E.

Smith, Philip S.

Smith, R. A.

Smith, Warren Du Pre.

Smith, W. S. Tangier.

Smithsonian Institution.
1774. Explorations and field work of the Smithsonian Institution in 1920: Smithsonian Misc. Coll., vol. 72, no. 6, 126 pp., 138 figs., 1921.
1775. Explorations and field work of the Smithsonian Institution in 1921: Smithsonian Misc. Coll., vol. 72, no. 15, 128 pp., 132 figs., 1922.

Smythe, D. D.
1777. A contact-metamorphic iron-ore deposit near Fairview, New Mexico: Econ. Geology, vol. 16, no. 6, pp. 410-418, 2 pls., 1 fig., September-October, 1921.

Somers, R. E. See Ries, no. 1593.

Soper, E. K.

Spence, Hugh S.
1780. Barium and strontium in Canada: Canada, Mines Branch, 100 pp., 18 figs., 15 pls., 1922.

Spencer, J. W.

Spieker, Edmund M.

Springer, Frank.

Spooner, W. C.

Spurr, J. E.

Stabler, Herman.
1791. (and others). Water power of the world; Part II, of World atlas of commercial geology: U. S. Geol. Survey, 39 pp., 10 pls. (maps), 1921.
BIBLIOGRAPHY. 125

Stainbrook, M. A.  

Stalder, Walter.  

Stanton, Timothy W.  


See also Galloway, no. 622.

Staub, Walther.  

Staufer, Clinton R.  


Steidtmann, Edward.  


Steiger, George.  

Stephenson, L. W.  


Stevens, Neil E.


Stevenson, John J.


Stock, Chester.


Stockdale, Paris Buell.

1819. Stylolikes; their nature and origin: Indiana Univ. Studies, vol. 9, Study no. 55, 97 pp., 36 figs., December, 1922.

Stoddard, B. H.

Stoddard, B. H.—Continued.


Stoll, A.


Stoller, James H.


Stone, Ralph W.


See also Cathcart, no. 300; Chapin, no. 321; Clapp, no. 329; Cushman, no. 441; Ferguson, no. 581; Harrington, no. 721; Hess, no. 777; Hicks, no. 786; Knopf, no. 1065; Lewis, no. 1125; Pa. Geol. Survey, no. 1478; Stanton, no. 1793.
Stopes, Marie Carmichael.

Storm, Willis.

Stose, George W.

Stout, Wilbur. See Ries, no. 1593.

Strachan, Robert.

Stroud, Ben K.

Suárez Murias, Eduardo.

Sur, F. J. S.

Swigart, T. E.
Taber, Stephen.


Taft, H. H.


Tanton, T. L.


Tarr, William Arthur.

1856. Tables for the determination of the common minerals and rocks. Revised and enlarged, 1921. 32 pp., Columbia, Missouri, The Missouri Book Company, 1921.


Taylor, Frank Bursley.


Teas, L. P.

Teas, L. P.—Continued.


Teetor, Paul.

1867. Clay and shale resources in the vicinity of Arkansas City, Kansas: Kansas, State Geol. Survey, Bull. 8, pp. 38–47, 2 figs., 1921.

Terrenes Benitez, Alberto.


Thiessen, Reinhardt.

1869. Under the microscope coal has already lost much of its former mystery, IV: Coal Age, vol. 19, no. 1, pp. 12–15, 5 figs., January 6, 1921.


Thorn, W. T., jr.


1875. Oil and gas prospects in and near the Crow Indian Reservation, Montana: U. S. Geol. Survey, Bull. 736, pp. 35–53, 1 pl. (map), July 6, 1922.


Thomas, A. O.


Thomas, A. O.—Continued.


Thomas, E. T.


Thompson, David G.


Thompson, Wallace C.


Thomson, Ellis.


Thorpe, Malcolm Rutherford.


Thorpe, Malcolm Rutherford—Continued.


Thwaites, F. T.


Tieje, A. J.


Tilton, John L.


Todd, James E.


Toepelmann, W. C.


Tomlinson, C. W. See Collingwood, no. 392; Moore, no. 1362.

Tondorf, Francis A.


Townley, Sidney D.  

Trager, E. A.  

Trask, Parker Davies.  

Trechmann, C. T.  

Trowbridge, Arthur C.  

Troxell, Edward L.  
Troxell, Edward L.—Continued.


Trueman, A. E.


Tucker, W. M.


Turner, H. G.


Turner, Henry W.


Twenhofel, W. H.


Udden, J. A.


BIBLIOGRAPHY.

Udden, J. A.—Continued.

Uglow, W. L.

Uhrlaub, Rudolph.

Ulrich, E. O.


Upham, Warren.


Van Burgh, L. R.


Vander Leek, Lawrence.


Van Horn, F. R. See Thiessen, no. 1871.

Van Winkle, Katherine E. H.


Varley, Thomas.


Vaughan, Francis Edward.


Vaughan, Thomas Wayland.


Vaughan, Thomas Wayland—Continued.


See also Brown, no. 216; Schuchert, no. 1682.

Veatch, A. C.


Vestal, Arthur G.


Vickery, Frederick P.


Villafañca, Andrés.


Visher, Stephen Sargent.


(with Huntington, Ellsworth). Climatic changes, their nature and causes. 329 pp., 13 figs., New Haven, Yale University Press, 1922.

Vogt, J. H. L.

1994. The physical chemistry of the crystallization and magmatic differentiation of igneous rocks: Jour. Geology, vol. 29, no. 4, pp. 318-350, 5 figs., May-June; no. 5, pp. 426-443, 11 figs., July-August; no. 6, pp. 515-539, 10 figs., September-October; no. 7, pp. 627-649, 23 figs., October-November; no. 8, pp. 659-672, 2 figs., November-December, 1921; vol. 30, no. 7, pp. 611-630, 2 figs., October-November; no. 8, pp. 659-672, 2 figs., November-December, 1922.

Von Engeln, O. D.

BIBLIOGRAPHY OF NORTH AMERICAN GEOLOGY, 1921–1922.

Wade, Bruce.

Waitz, Paul.

Walcott, Charles D.

Note.—The entry in the bibliography of North American geology for 1919–1920 (U. S. Geol. Survey Bulletin 731), no. 1930, should not have been entered under Walcott, Charles D., but under Anonymous. Though based on Mr. Walcott's work the paper contains errors for which Mr. Walcott is not responsible.

Waldschmidt, W. A.

Walker, T. L.
2008. Ulexite from the maritime provinces: Toronto, Univ., Studies, Geol. ser., no. 12, pp. 54–57, 1 fig., 1921.
Walker, T. L.—Continued.


Wallace, Robert C.


Walter, O. T.


Wandke, Alfred.


Wanless, Harold R.


Wanner, H. E.


Ward, Freeman.


2033. The geology of a portion of the Badlands: South Dakota Geol. and Natural Hist. Survey, Bull. 11, pp. 1–59, 11 figs., 17 pls. (incl. map), August, 1922.

140 BIBLIOGRAPHY OF NORTH AMERICAN GEOLOGY, 1921-1922.

Warner, C. A.

Warren, Charles Hyde.

Washburne, Chester W.

Washington, Henry S.
2039. The lavas of the Hawaiian volcanoes: Papers from the Geophysical Laboratory, Carnegie Institution of Washington, no. 434, 12 pp. [reprint from], Hawaiian Annual for 1922, 1921.


Water, Everett O.


Watson, Thomas L.


Weitzberg, Fritz.


Weller, Stuart.


2062. Oil and gas possibilities in Caldwell County, Kentucky: Kentucky Geol. Survey, Series 6, vol. 6, pp. 221–231, 2 figs., 1921.

Wells, Roger C.


Wentworth, Chester K.
2070. The geology and coal resources of Russell County, Virginia: Virginia Geol. Survey, Bull. no. 22, 179 pp., 16 figs., 28 pis., 1922.

Westgate, Lewis G.
See also Foye, no. 604.

Wetmore, Alexander.

Wheeler, H. A.

Wheeler, Walter Calhoun.

Wherry, Edgar T.
Wherry, Edgar T.—Continued.


Whitbeck, Ray Hughes.


White, Charles H.


White, David.


2096. Potash reserves in west Texas: Mining and Metallurgy, no. 184, pp. 19–25, 2 figs., April, 1922.


See also Longwell no. 1147.

64264—24—10
White, I. C.
2101. Map of West Virginia showing coal, oil, gas, iron ore, and limestone areas. Scale, 8 miles to 1 inch. West Virginia Geological Survey, 1921.
See also Aurin, no. 55; Barton, no. 75; Galloway, no. 622; Moyer, no. 1373.
White, Luther H.
Whitlock, Herbert P.
Whitman, Alfred R.
2107. The veins of Cobalt, Ontario (discussion) [glacial conditions in Ontario]: Econ. Geology, vol. 16, no. 8, pp. 558–561, December, 1921.
Whitney, Milton.
Whitney, Ray H.
Whitson, A. R.
BIBLIOGRAPHY.

Whitson, A. R.—Continued.


Whittaker, E. J.


2119. Pleistocene and recent fossils of the St. Lawrence Valley from Prescott to Beauharnois: Report on structural materials along the St. Lawrence River (Keele and Cole), pp. 103-108, Canada, Mines Branch, 1922.


Whitwell, George E.


Wieland, G. R.


Wilder, Frank A.


Wilhelm, Victor H.


Willard, Daniel Everett.

Williams, Charles Francis.

Williams, D. W.

Williams, Henry S.

Williams, M. Y.

Willis, Bailey.

Wilson, Alice E.
2145. The range of certain lower Ordovician faunas of the Ottawa Valley, with descriptions of some new species: Canada, Geol. Survey, Bull. no. 33, pp. 19-59, 7 figs., 3 pls., September 14, 1921.
2146. Ordovician fossils from St. Lawrence Canal system localities, Ontario and Quebec: Report on structural materials along the St. Lawrence River (Keele and Cole), pp. 109-111, Canada, Mines Branch, 1922.

Wilson, Eldred D.
BIBLIOGRAPHY.

Wilson, M. E.


Wilson, Philip D.


2155. Deposition of copper carbonate from mine water (abstract): Mining and Metallurgy, no. 188, p. 37, August, 1922.

Wilson, Roy Arthur.


(with Ward, Freeman). The possibilities of oil in western Dewey County: South Dakota Geol. and Nat. Hist. Survey, Circular 9, 10 pp., 4 figs., September, 1922.

Wiman, C.


Winchell, Alexander N.


Winchell, Horace V.


Winchell, N. H.

Winchester, Dean E.

Wingard, J. H.

Winton, W. M.
2166. (and Scott, Gayle). The geology of Johnson County: Texas, Univ., Bull. no. 2229, 68 pp., 4 figs., 4 pls., map, 1922.

Wittich, Ernesto.
2170. La fluorita en la República Mexicana: Bol. Minero, t. 12, no. 4, pp. 430–433, October, 1921.
BIBLIOGRAPHY.

Wolf, Albert G.


Wolf, John E.

Wood, George McLane.

Wood, Harry O.


Woodbridge, Dwight E.

Woodring, Wendell P.
2189. Stratigraphy, structure, and possible oil resources of the Miocene rocks of the central plain: Haiti, Geol. Survey, 19 pp., map, Washington, 1922.


Woodruff, E. G.


See also Moore, no. 1362.

Woodward, A. Smith.
Woodworth, J. B.

See also Foye, no. 604.

Woolsey, W. J.


Wooster, Lyman C.


Worcester, P. G.

2197. The geology of the Ward region, Boulder County, Colorado: Colorado Geol. Survey, Bull. 21, 74 pp., 2 maps [1921].

Wrather, W. E.


Wright, D. G. H.


Wright, G. Frederick.


Wright, J. F.


Wright, Lawrence B.


Wright, W. J.


Wyckoff, Ralph W. G.


2211. The crystal structure of alabandite (MnS) [Puebla, Mexico]: Am. Jour. Sci., 5th ser., vol. 2, pp. 239–249, 4 figs., November, 1921.
BIBLIOGRAPHY.

Yale, Charles G.


Young, G. A.


Young, George J.


Anonymous.


2225. Notes on Canadian minerals: Toronto, Univ., Studies, Geol. ser. no. 12, pp. 69–72, 1921.


Anonymous—Continued.


INDEX.

(The numbers refer to entries in the bibliography.)

 Abrasive materials: Beach, 104, 107, 111.

 Addresses.
 Applied geology, scientific by-products: Smith, 1757.
 Dakota sandstone problems: Stanton, 1796.
 Development of stratigraphic geology and paleontology in Canada: Parks, 1465.
 Earth sciences as the background of history: Merriam, 1268.
 Economic geology, relation to the general principles of geology: Penrose, 1479.
 Fossils and life: Bather, 92.
 Geology in partnership with American industry: Smith, 1758.
 Igneous intrusion, after-effects: Kemp, 965.
 Mineral deposits, present tendencies in the study of: Lindgren, 1129.
 Mineralogy, future in America: Kraus, 1076.
 Petroleum and natural gas, epochs in the history of: White, 2100.
 Plain geology: Smith, 1761.
 Scientific by-products of applied geology: Smith, 1757.
 Scientist in the Federal Service: Brooks, 211.
 Society of Economic Geologists; its sphere and its future: Penrose, 1480.
 South American faunas, origin: Loomis, 1150.
 Structural failure of the lithosphere: Leith, 1113.
 Trend of earth history: Blackwelder, 163.
 Aerial observation, use in geology: Willis, 2142.

 Alabama.

 Economic geology.
 Kaolin: Clark, 341.
 Mica deposits: Clark, 341.
 Oil possibilities, northern Alabama: Semmes, 1696.

 Historical geology.
 Bentonite in Ordovician: Nelson, 1387.
 Muscle Shores area: Prouty, 1523.
 Northern Alabama: Semmes, 1696.
 Ocoee rocks, Clay County, age: Prouty, 1521, 1522.
 Talladega phylite, Clay County, age: Prouty, 1519.
 Talladega slates: Prouty, 1520.

 Paleontology.
 Eocene Mollusca: Aldrich, 15.
 Pleistocene plants: Berry, 149.

 Physical geology.
 Drag-folding in marble: Berry, 149.

 Agricultural geology: Smith, 1765.

 Alaska.
 Surveys and investigations, administrative report, 1919: Brooks, 204.

 Areas described.
 Cold Bay district: Cappe, 289.
 Iliamna Bay district: Moffit, 1336.
 Kuskokwim region: Martin, 1290.
 Salmon River district, Portland Canal region: Westgate, 2075.
 Seward Peninsula: Cathcart, 290.
 Tuxedni Bay vicinity, Cook Inlet: Moffit, 1385.
 Valley of Ten Thousand Smokes: Griggs, 690.
 Wrangell district, southeastern Alaska: Buddington, 235.
 York region: Steidtmann, 1802.

 153
Alaska—Continued.

**Economic geology.**
- Bituminous deposit, Nenana coal field: Martin, 1232.
- Chitina Valley: Moffit, 1334.
- Chromite, Kenai Peninsula: Gill, 639.
- Coal fields: Evans, 567.
- Cold Bay oil field: Palmer, 1453.
- Fairhaven silver-lead district: Lavensaler, 1117.
- Gold, Juneau and Ketchikan districts: Mertie, 1289.
- Willow Creek district: Chapin, 323.
- Gold, silver, copper, and lead: Brooks, 204, 212.
- Gold lodes, Kuskokwim region: Martin, 1230.
- Goodnews Bay region: Harrington, 721.
- Juneau district: Mertie, 1289.
- Kantishna district: Haney, 713.
- Ketchikan district: Mertie, 1289.
- Matanuska coal fields: Chapin, 322.
- Metalliferous deposits, Yukon and Kuskokwim regions: Mertie, 1290.
- Mineral resources: Brooks, 202, 203.
- Nenana coal field: Martin, 1231.
- Oil fields: George, 627.
- Petroleum: Martin, 1229.
- Inlusk Bay district: Moffit, 1336.
- Salmon River district, Portland Canal region: Westgate, 2075.
- Salmon-Unuk River region: Mertie, 1290.
- Tin, York region: Steidtman, 1802.
- Willow Creek district: Chapin, 323.
- Wrangell district, southeastern Alaska: Buddington, 235.

**Historical geology.**
- Goodnews Bay region: Harrington, 721.
- Kenai Peninsula, southwestern part: Gill, 639.
- Salmon-Unuk River region: Mertie, 1290.
- Tertiary: Brooks, 207.
- Tuxedni Bay vicinity, Cook Inlet: Moffit, 1335.

**Mineralogy.**
- Gillespite, Dry Delta: Schaller, 1658.
- Meteorite, Cold Bay: Merrill, 1282, 1283.

**Paleontology.**
- Brooksia: Kirk, 1052.
- Pliocene pectens, Nome: Dall, 455.

**Petroleum.**
- Assimilation during the Katmai eruption of 1912: Fenner, 578

**Physical geology.**
- Glaciers, movement: Reeds, 1564.
- Katmai, eruption: Griggs, 690.
- Valley of Ten Thousand Smokes: Griggs, 689.
- Kennecott Glacier: Bateman, 88, 90.
- Volcanoes, Aleutian region: Griggs, 688.

**Alberta.**
- Geological reconnaissance: Allan, 19.

**Areas described.**
- Drumheller district: Allan, 20.

**Economic geology.**
- Bituminous sand: Clark, 343.
- Coal, Drumheller district: Allan, 20.
- McMurray tar sands: Clark, 342.
- Oil prospecting: Dowling, 519; Ness, 1388.
- Sheep River gas and oil field: Slipper, 1751.
INDEX.

Alberta—Continued.

Historical geology.

Boring, Fort McMurray: Allan, 16.
Central Alberta: Sheppard, 1729.
General: Dowling, 519.
Red Deer River: Sternberg, 1806.
Rocky Mountains: MacKenzie, 1202.
Sheep River gas and oil field: Slipper, 1751.

Paleontology.

Centrosaurus apertus, Belly River beds: Parks, 1464
Cycadeoid, Belly River beds: Wieland, 2125.
Dinosaurs, Red Deer River: Sternberg, 1806.
Palaeeosaurus: Matthew, 1233.
Panoplosaurus mirus, Belly River beds: Sternberg, 1810.
Parasaurolophus, Red Deer River: Parks, 1466.
Red Deer River fossil beds: Sternberg, 1807.

Physical geology.

Crow's Nest, thrusting: Keyes, 992.
Sedimentation in Lake Louise: Johnston, 929.

Physiographic geology.

Glacial section at Calgary: Burwash, 256.
Postglacial lakes, Mackenzie River basin: Cameron, 275.

Algae.

Trinidad, Miocene: Howe, 832.

Algonkian. See Pre-Cambrian.

Algonkian sediments, quantitative study: Trowbridge, 1924.


Altamont moraine: Leverett, 1122.

Alumina. See also Potash.

Alunite.

Texas, south central: Braun, 195.

Ammonites. See Cephalopoda.

Amphibia.

Annelida.

Arachnida.

Arkansas, Sevier County: Mitchell, 1332.

Anthracite, origin: Jeffrey, 873.

Antimony.

Anhydrite, geology: Newland, 1392.

Anthozoza.

Appalachian geology: Latimer, 1231.

Application of geology to mining: Billingsley, 159.

Arkansas, Sevier County: Mitchell, 1332.

General: Schrader, 1669, 1670, 1671.

Washington, Okanogan Valley: Keyes, 1019.

Antimony.

Anhydrite, geology: Newland, 1392.

Application of geology to mining: Billingsley, 159.

Anthracite, origin: Jeffrey, 873.

Antigu.a.

Paleontology.

Oligocene brachiopods: Thomas, 1880.

Antimony.

Arkansas, Sevier County: Mitchell, 1332.

Application of geology to mining: Billingsley, 159.
Arctic regions.

Areas described.

North Atlantic polar islands: Nordenskjöld, 1404.

Paleontology.

Ordovician and Silurian Cephalopoda: Foerste, 596.

Argillites suggesting seasonal deposition: Sayles, 1566.

Arizona.

Outline of geology: Keyes, 1029.

Areas described.

Papago country: Bryan, 227.

Sierrita Mountains, Pima County: Ransome, 1536.

Economic geology.


Copper ores, Globe district: Schwartz, 1685.

Warren district: Mitchell, 1330.

Deposition of copper carbonate from mine water: Wilson, 2155.

Fluorspar: Allen, 27.

Globe district: Schwartz, 1685.

Gold, silver, copper, lead, and zinc: Heikes, 757, 759.

Gold placers: Allen, 25.

Jerome district, Yavapai County: Reber, 1557.

Oil possibilities: Butler, 260.

Holbrook area, northeastern Arizona: Hager, 704.

Sierrita Mountains, Pima County: Ransome, 1536.

Silver ores, Wickenburg: Bastin, 87.

Uranium and vanadium: Butler, 261.

Vanadium: Allen, 28.

Historical geology.

Dos Cabezas Mountains, southwestern Arizona: Sarle, 1648.

Colorado River basin: Pack, 1441.

Correlation of Fort Apache formations: Reagan, 1551.


Fort Apache region, Eocene glacial deposits: Reagan, 1554.

General: Keyes, 1029.

Globe district: Schwartz, 1685.

Grand Canyon section: Keyes, 1040.

Holbrook area, northeastern Arizona: Hager, 704.

Jerome district, Yavapai County: Reber, 1557.

Lees Ferry region: Bryan, 228.

Lower Gila region: Ross, 1618.

Mazatzal quartzite, central Arizona: Wilson, 2147.

Mohave County: Reeside, 1568.

Nomenclature of formations: Keyes, 1036.

Northeastern Arizona: Moore, 1357.

Paleozoic, Grand Canyon: Noble, 1400.

Mineralogy.

Bisbeeite, Grand Canyon: Rogers, 1612.

Ceruleofibrite, Bisbee: Holden, 814.

Flagstaffite: Guild, 696; identity with terpin hydrate: Guild, 695.

Globe district: Schwartz, 1685.

Meteorite, Navajo: Merrill, 1283.

Paleontology.

Plenstocene Vertebrata, Anita, Coconino County: Hay, 736.

Turtle, Kinosternon arizonense: Gilmore, 645.

Vertebrates, San Pedro Valley: Gidley, 636.

Physical geology.

Erosion and sedimentation, Papago country: Bryan, 227.

Physiographic geology.

Colorado River basin: Pack, 1441.

Coon Butte, origin: Keyes, 884.

Meteor Crater: Campbell, 283; origin: Merrill, 1275.

Papago country: Bryan, 227.

Arkansas.

Areas described.

Batesville district: Miser, 1327.
Arkansas—Continued.

Economic geology.

Antimony, Sevier County: Mitchell, 1332.
Diamond-bearing peridotite, Pike County: Miser, 1329.
El Dorado oil field: Crider, 432; Heald, 750; Hull, 845, 849; Pratt, 1510; Teas, 1866; U. S. Geol. Survey, 1971; age of producing sand: Stephenson, 1804.
Manganese, Batesville district: Miser, 1327.
Wildcat wells, south-central Arkansas: Hull, 848.

Historical geology.

Hot Springs area: Bryan, 229.
Paleozoic: Miser, 1326.
St. Peter sandstone: Dake, 450.
South central Arkansas: Rubey, 1622.

Mineralogy.

Pyrite and wavellite: Shannon, 1711.
Physical geology.

Craterlets, east central Arkansas: Thomas, 1882.
Peridotite dikes, Scott County: Miser, 1328.

Underground water.

Gage, Ellis County: Thompson, 1883.
Hot Springs: Bryan, 229.

Arsenic.

General: Helges, 754, 758.
Nevada, Toquima Range: Ferguson, 580.

Artesian waters and wells. See Underground water.

Arthropoda.

Eurypterida: Ruedemann, 1624.

Arundel fauna, Maryland: Gilmore, 640.

Asbestos.

California: Woolsey, 2195.
General: Diller, 502; Sampson, 1642, 1645.
Quebec: RuKeyser, 1633.
Black Lake: Hubbard, 839.
Bonaventure County, Weir Township: Harvie, 728.

Asphalt.

General: Cottrell, 421, 422, 426.
Humic acid origin: Haseman, 730.
Kentucky: Jillson, 887.
Trinidad: Milner, 1322.

Associations, meetings.

Geological Society of America, 34th meeting, Amherst, 1921: Hovey, 826.
Chicago meeting, 1920: Hovey, 825.
Cordilleran section, March, 1921: Rogers, 1608.
Mineralogical Society of America, first annual meeting, Chicago, 1920: Whitlock, 2104.
second annual meeting, Amherst, 1921: Whitlock, 2105; Anonymous, 2293.
Paleontological Society, thirteenth meeting, Amherst, 1921: Bassler, 53.
twelfth annual meeting, Chicago, 1920: Bassler, 80.
Pacific coast section, tenth annual meeting: Stock, 1815.
first annual meeting, Amherst, 1921: Ball, 67.
first annual meeting, Chicago, 1920: Lewis, 1124.
Chicago meeting, December, 1920: Anonymous, 2226.

Asteridea.

Hudsonasteridae: Raymond, 1841.
Macroporaster nylanderi, Silurian, Maine: Raymond, 1541.
Attitude of concealed bedded formations, determination of: Mead, 1257.
Aux Vases sandstone, diastrophic aspects: Keyes, 1037.

Aves.

Bermuda: Shufeldt, 1730.
Rancho La Brea asphalt beds: Miller, 1307.

Aztec mine, Baldy, New Mexico: Chase, 324.

Bacteria, ancient: Moodie, 1339, 1344.

Balanocrinus, Tamaulipas, Mexico: Springer, 1787.
Barite.
  Mexico: Wittich, 2175.
Barytes. See also Barite.
  Canada: Spence, 1780.
  General: Stowe, 1834, 1836, 1839.
Batholiths.
  Orogenic batholiths: Barrell, 72.
  General: Barrell, 72.
Bauxite.
  General: Hill, 788, 791; Ladoc, 1090.
  Origin: Nelson, 1387.
Beaches. See also Shore lines; Terraces.
  Manitoba, Upper Whitemouth area: Johnston, 917.
  Winnipegosis area: Johnston, 917.
Beauceville area, Quebec: MacKay, 1199.
Bemis moraine: Leverett, 1122.
Bentonite.
  Ordovician, Tennessee, Kentucky, and Alabama: Nelson, 1387.
  Tennessee: Nelson, 1386.
Bermuda.
Paleontology.
  Avian remains: Shufeldt, 1730.
Bibliography.
  Alaska, petroleum: Martin, 1229.
  Ammonite opercula: O'Connell, 1409.
  Central America and West Indies: Vaughan, 1982.
  Clark, W. B., writings: Clarke, 354.
  Cone-in-cone: Tarr, 1860.
  Cushing, H. P., writings: Kemp, 964.
  Dana, J. D., writings: Pirsson, 1488.
  Emerson, B. K., writings: Keyes, 978.
  Emerson, F. V., writings: Brigham, 199.
  Georgia: Cave, 301.
  Glacial period divisions: Osborn, 1428.
  Guppy, R. J. L., writings: Harris, 723.
  Hague, Arnold, writings: Iddings, 860.
  Idaho: Campbell, 282.
  Indiana, stratigraphy and paleontology: Cumings, 439.
  Iowa, Pleistocene: Cable, 296.
  Jillson, W. R., writings: Jillson, 983, 983.
  Magnesite: Whitwell, 2121.
  Manuscript bibliographies, list: Little, 1132.
  Minnesota, Mesabi iron range: Niemi, 1398.
  Oil shales: George, 628; Jillson, 887.
  Packard, A. S., writings: Cockrell, 565.
  Paleontology, Pacific coast: Merriam, 1270.
  Petroleum: Burroughs, 248.
  Pre-Cambrian literature: Steidtmann, 1801.
  Quicksilver: Evans, 568.
  Saint John, O. H., writings: Keyes, 973.
  Stylolites, nature and origin: Stockdale, 1819.
Biography.
  Call, R. E.: Keyes, 991.
  Clark, W. B.: Clarke, 354.
  Cox, G. H.: McNutt, 1212.
  Cushing, H. P.: Clarke, 357; Kemp, 964.
  Dana, J. D.: Pirsson, 1488.
  Emerson, B. K.: Keyes, 978.
  Emerson, F. V.: Brigham, 199.
  Guppy, R. J. L.: Harris, 723.
  Hall, James: Clarke, 355.
## Biography—Continued.

<table>
<thead>
<tr>
<th>Name</th>
<th>Authority</th>
<th>Page</th>
</tr>
</thead>
<tbody>
<tr>
<td>Hess, F. L.</td>
<td>Anonymous</td>
<td>2231</td>
</tr>
<tr>
<td>James, Edwin</td>
<td>Keyes</td>
<td>1034</td>
</tr>
<tr>
<td>Kemp, J. F.</td>
<td>Anonymous</td>
<td>2232</td>
</tr>
<tr>
<td>Lilley, A. T.</td>
<td>Kindle</td>
<td>1049</td>
</tr>
<tr>
<td>Lucas, A. F.</td>
<td>Goodrich</td>
<td>671</td>
</tr>
<tr>
<td>Lyman, B. S.</td>
<td>Lyman</td>
<td>1180</td>
</tr>
<tr>
<td>Miller, B. L.</td>
<td>Anonymous</td>
<td>2241</td>
</tr>
<tr>
<td>Nuttall, Thomas</td>
<td>Keyes</td>
<td>1016</td>
</tr>
<tr>
<td>Packard, A. S.</td>
<td>Cockerell</td>
<td>365</td>
</tr>
<tr>
<td>Ransome, F. L.</td>
<td>Anonymous</td>
<td>2230</td>
</tr>
<tr>
<td>Saint John, O. H.</td>
<td>Keyes</td>
<td>973</td>
</tr>
<tr>
<td>Salisbury, R. D.</td>
<td>Chamberlin</td>
<td>316</td>
</tr>
<tr>
<td>Ward, L. F.</td>
<td>Cape</td>
<td>283</td>
</tr>
<tr>
<td>Winchell, H. V.</td>
<td>Anonymous</td>
<td>2235</td>
</tr>
<tr>
<td>Wright, G. F.</td>
<td>Upham</td>
<td>1974</td>
</tr>
</tbody>
</table>

## Biplanation of earth’s crust: Keyes, 992.

## Bismuth: Heikes, 754, 758.

### Bituminous sand, Alberta: Clark, 342, 343.

### Bituminous shales, Illinois: Barrett, 74.

## Black sands, Idaho: Shannon, 1702.

## Black shales, origin and composition: Thiessen, 1871.

## Blastoida.

### Orophocrinus stelliformis, growth stages: Bather, 93.

## Boraciferotis beds, formation: Keyes, 1013.

### Borax.

#### Colemanite deposits, origin: Foshag, 566.

#### Nevada: Keyes, 1057.

#### Clark County: Noble, 1399; Callville Wash: Gale, 619.

### Borings.

#### Alabama, northern: Semmes, 1696.

#### Alberta: Allen, 17.

#### Fort McMurray: Allan, 16.

#### Arkansas, Batesville district: Miser, 1327.

#### south central: Rubey, 1622.


#### Florida: Sellards, 1691.

#### Fused cores: Ross, 1617.

#### Illinois, District IV: Cadle, 269.

#### Edgington-Milan area: Savage, 1649.

#### New Athens-Okawville area: Shaw, 1719.

#### Kansas, Gove County: Lupton, 1719.

#### Kentucky, Jilson: 887, 897.

#### Caldwell County: Weller, 2062.

#### Jackson Purchase region: Jilson, 890

#### Nicholasville: Miller, 1301.

#### Warren County: St. Clair, 1638.

#### Webster County: Glenn, 653.

#### Louisiana, northwestern: Hamill, 709.


#### Nebraska: Schraimn, 1672.

#### New Mexico: Darton, 467.

#### Ohio: Panity, 1455.

#### Oklahoma, Caddo County, Cement field: Reeves, 1569.

#### central: Hughes, 843.

#### Jefferson County: Robinson, 1603.

#### southern: Hopkins, 821; Morgan, 1368.

#### Ontario: Estlin, 566.

#### Tennessee, Waynesboro quadrangle: Miser, 1325

#### Texas, Caldwell County: Sellards, 1695.

#### McLennan County: Pace, 1437.

#### Medina County: Liddle, 1128.

#### north central: Goldman, 656.

#### northeastern (part): Hopkins, 821.

#### Panola County: Sellards, 1694.

#### Ranger oil field: Reeves, 1570.

#### salt domes: Powers, 1504.

#### Webb and Zapata counties: Sellards, 1692.

64264—24—11
Botany, fossil. See Paleobotany.

Brachiopoda.

Brooksina, Alaska: Kirk, 1052.

Derbya crassa, abnormal sculpture: Price, 1515.

Iowa, Hackberry stage: Fenton, 579.

Maquoketa shale: Bradley, 191.

Lingula, antiquity: Keyes, 1051.

Oligocene, Antigua: Thomas, 1889.

Pugnoides, Devonian, Iowa: Thomas, 1877.

Spirifer: Dutts, 262.

Stringocephalus burtoni, distribution: Kindle, 1044.

Terebratula, Eocene, Maryland: Roberts, 1598.

Branner, J. C., biography: Jordan, 939; Keyes, 1000; Townley, 1916.

Bridge River district, British Columbia: McCann, 1187, 1188.

British Columbia.

Areas described.

Barkerville area: Johnston, 924.

Bridge River area: McCann, 1187.

Coast and islands between Burke and Douglas channels: Dolmage, 512.

Eutsuk Lake district: Brock, 201.

Jervis Inlet region: Blanchard, 165.

Kitsault Valley: Hanson, 718.

Lardeau area: Bancroft, 71.

Lasqueti Island: MacKenzie, 1201.

North Thompson valley, Kamloops district: Uglow, 1957.

Peace River district: Spieker, 1784.

Salmon River district: Schofield, 1666; Young, 2223.

Economic geology.

Cariboo district: Johnston, 927.

Coal, Vancouver Island: MacKenzie, 1203.

Coast Range ore deposits: Brewer, 197.

Copper, Lasqueti Island: MacKenzie, 1201.

Coquihalla area: Cairns, 272.

Crowsnest Pass coal field: Strachan, 1842.

Elk River valley: Marshall, 1227.


General: Robertson, 1600, 1601.

Gold, Barkerville area: Johnston, 924, 925.

Bridge River area: McCann, 1187, 1188.

Coast and islands between Burke and Douglas channels: Dolmage, 512.


Marble Bay mine, Texada Island: Dolmage, 511.

Mineral deposits: Wilson, 2154.

Mining industry, 1920: Robertson, 1600; 1921: Robertson, 1601.

Oil possibilities, Peace River district: Spieker, 1784.

Ore deposits: Schofield, 1664, 1666.

Placers, Cariboo district: Johnston, 927, 928.


Portland Canal district: Wilhelm, 2129.


Salmon River district: Schofield, 1662.

Similkameen district: Campbell, 276.

Stewart district: Campbell, 277.

Vancouver Island, west coast: Dolmage, 509.

Historical geology.


Bridge River district: McCann, 1188.

Cambro-Ordovician section, Beaverfoot Range: Burling, 245; Mount Robson area: Burling, 243.

Coquihalla area: Cairns, 272.

Elk River valley: Marshall, 1227.


Fraser River canyon: Camsell, 264.

Geological mapping: Dolmage, 510.


Pleistocene, Vancouver Island: Berry, 146.

Pre-Cambrian and Cambrian, southeastern British Columbia: Schofield, 1667.

Purcell Range and Rocky Mountains, relations: Burling, 244.
British Columbia—Continued.

Historical geology—Continued.
Rocky Mountain region: Schofield, 1663.
Rocky Mountain trench: Shepard, 1727.
Salmon River district: Schofield, 1662.
Silurian tillite: Shepard, 1725.
Sooke formation, Vancouver Island: Cornwall, 416.
Taseko Lake-French Bar Creek: MacKenzie, 1200.
Taseko Valley: MacKenzie, 1199.
Upper Peace River region: McLearn, 1210.
Vancouver Island, coal measures: MacKenzie, 1203.
west coast: Dolmage, 500.

Mineralogy.
Camellite, Douglas Lake: Ellsworth, 557.
Iridosmine crystals, Ruby Creek, Atlin district: Gledhill, 648.
Marble Bay mine, Texada Island: Dolmage, 511.

Paleontology.
Ceratopyge fauna: Raymond, 1546.
Myadisma, Vancouver Island: Clark, 338.
Pseudocycas, Dunvegan sandstone, Moberly Lake: Berry, 142.
Sooke formation, Vancouver Island: Cornwall, 416.

Physical geology.
Bromley Glacier: Hayes in Bateman, 88.
Fraser River delta, sedimentation: Johnston, 922, 923.
sandstone in delta, formation: Johnston, 920.
stratification: Johnston, 926.
Rocky Mountain trench: Shepard, 1726.

Physiographic geology.
Cordillenan ice sheet: Read, 1550.
Fraser River canyon: Cannell, 294.
Fraser River delta: Johnston, 921, 922.
Glacial deposits, Vancouver region: Johnston, 919.
Llewellyn Glacier: Read, 1560.
Pleistocene oscillations of sea level, Vancouver region: Johnston, 918.
Purcell Range and Rocky Mountains, structural relation: Shepard, 1726.
Rocky Mountain trench, origin: Schofield, 1663.

Brockville-Mallory area, Ontario: Wright, 2207.
Bromine: Cottrell, 428; Inslcy, 861; Stone, 1828.
Bryozoan.
Cyclostomata: Cann, 287.
General: Bassler, 81.
Stones River group: Coryell, 417.
Building stone. See also Granite; Limestone; Sandstone; Stone.
Indians: Logan, 1139, 1141.
Byram mari, Mississippi: Cooke, 413.
Cadmium: Siebenthal, 1733, 1738.
Calcium chloride: Cottrell, 428; Inslcy, 861; Stone, 1828.
California.
Areas described.
Cuyama region: Hudson, 840.
Mohave Desert, eastern part: Palmer, 1454.
Petaluma, Point Reyes, and Santa Rosa quadrangles: Dickerson, 497.
Economic geology.
Ancient river-bed deposits: Ailing, 33.
Asbestos: Woolsey, 2195.
Chromite, Klamath Mountains: Dilley, 503.
Ciervo oil field: Stalder, 1792.
Colemanite deposits, origin: Foshag, 596.
Copper deposits: Engels, Plumas County, origin: Turner, 1942.
California—Continued.

**Economic geology—Continued.**
- Dry placers, southern California: Haley, 765.
- Gold, silver, copper, lead, and zinc: Yule, 2213, 2215, 2218.
- Kern County, northwestern: English, 562.
- Mineral resources: Hamilton, 707.
- Nitrate deposits, Amargosa region, southeastern California: Noble, 1401.
- Oil and gas prospects, Buttonwillow, Kern County: Ferguson, 883.
- Oil fields: McLaughlin, 1208.
- Los Angeles basin: Arnold, 44.
- Oil structures: Hill, 787.
- Kern County: English, 562.
- production decline: McLaughlin, 1207.
- Petroleum geology, development: Hamilton, 708.
- Phosphorus in Californian petroleum: Palmer, 1450.

**Tungsten ores:** Hess, 777.

**Historical geology.**
- Bautista Creek Pleistocene: Frick, 613.
- Briones formation: Trask, 1917, 1918.
- Cambrian Mohave Desert: Clark, 339.
- Imperial Valley: Augur, 34.
- Kern County, northwestern: English, 362.
- Los Angeles basin: Arnold, 44.
- Meganos group: Clark, 334; Dickerson, 486.
- Puente formation: Chaney, 317.
- San Timoteo Pliocene: Frick, 613.
- Tertiary, correlation: Clark, 335.
- marine: Clark, 336.

**Mineralogy.**
- Antimony, native, Kern County: Behre, 120.
- Calico Hills, San Bernardino County: Foshag, 601.
- Cristohalite: Rogers, 1610.
- Hsemannite, Shasta County: Cook, 404.
- Jurupaitite, Crestmore: Eskle, 640.
- Merwinites, Crestmore: Larsen, 1095.
- Meteorite, Owens Valley: Merrill, 1280, 1284.
- Talc, Porterville: Foshag, 600.
- Trolite, Del Norte County: Eakle, 541.
- Vehnertelite, Tulare County: Shannon, 1710.
- Wulfenite, Lavic: Guild, 697.

**Paleontology.**
- Briones fauna: Trask, 1918.
- Chitonus: Berry, 157.
- Cretaceous, Santa Ana Mountains: Packard, 1446.
- Desmostytus, San Jose: Hannibal, 717.
- Dinbelodon densis: Osborn, 1434.
- Meganos group: Clark, 334.
- Megaperta, Lompoc: Kellogg, 957.
- Miocene fishes: Jordan, 698.
- Mollusca, Pleistocene: Oldroyd, 1411; Santa Barbara: Van Winkle, 1977
- Olivella, Oldroyd, 1412.
- Peccary, Rancho La Brea: Merriam, 1271.
- Pinnipeds, Miocene and Pliocene: Kellogg, 956.
- Pleistocene Vertebrata, Bautista Creek: Frick, 613.
- McKittrick asphalt deposit: Merriam, 1272, 1274.
- Pliocene Vertebrata, San Timoteo: Frick, 613.
- Pliocene, Tulare County: Kellogg, 955.
- Puenie flora: Chaney, 317.
- Rancho La Brea asphalt beds: Miller, 1307; flora: Chaney, 320.
- Shanks' teeth, Pliocene: Jordan, 941.
- Trigoniae, Pleistocene: Packard, 1445.
California—Continued.

**Petroleum.**
- Cuyamaca region: Hudson, 840.
- Tridymite-orthoclase rock, Imperial County: Rogers, 1607.

**Physical geology.**
- Crustal movements: Day, 483.
- Differential movements, San Francisco Bay region: Lounders, 1154.
- Earthquakes, Chittenden: Kemnitzer, 958.
- Eagle Lake, Lassen County: Kemnitzer, 959.
- Los Angeles, July, 1920: Taber, 1460.
- registration: Bond, 169, 170; MacElwane, 1196.
- southern California, early records: Carpenter, 293.
- Lassen Peak, volcanic activity, cause: Day, 482.
- Mobility of coast ranges: Lawson, 1100.
- Permian revolution: Finlay, 587.
- San Andreas rift: Willis, 2142.

**Physiographic geology.**
- Pleistocene lakes along Mohave River: Thompson, 1884.
- Sierra Nevada: Muir, 1374.
- Yosemite Valley: Matthes, 1242.

**Underground water.**
- Water levels, southern California: Ebert, 547.
- Call, R. E., biography: Keyes, 991.

**Cambrian.** See also Paleontology, Cambrian.

**Arizona.** Keyes, 1029.
- Grand Canyon: Noble, 1400.
- northeastern, Holbrooke area: Hager, 704.
- Kamloops district, North Thompson valley: Uglow, 1057.
- Mount Robson area: Burling, 243.
- Rocky Mountain region: Schofield, 1663.
- Rocky Mountain trench: Shepard, 1727.
- southeastern: Schofield, 1665, 1667.

**California, Mohave Desert:** Clark, 338.

**Iowa.** Keyes, 1035.
- Mackenzie, Mackenzie River district: Williams, 2140.
- Massachusetts, Essex County: Clapp, 329.
- Nevada, Manhattan district: Ferguson, 580.
- Newfoundland, western: Schuchert, 1678.
- New Jersey, Sussex County: Ries, 1584.
- New York, West Point quadrangle: Berkey, 131.
- Pennsylvania, southeastern: Stose, 1840.
- Quebec, Beaumont area: MacKay, 1198.
- Utah, Ophir district: Olmstead, 1413.
- Vermont, Braintree: Richardson, 1585.
- northwestern: Keith, 951.
- western: Gordon, 673.
- Virginia, western: Stose, 1841.

**Canada (general).** See also names of provinces.
- Elementary geology: Coleman, 384.
- Geological mapping of Cordillera: Dunn, 538.
- report, 1919: Meliones, 1197.
- Mapping pre-Cambrian areas: Bruce, 221.

**Areas described.**
- Belcher Islands, Hudson Bay: Young, 2221.

**Economic geology.**
- Alkali deposits, western Canada: Cole, 379.
- Barytes: Spence, 1780.
Canada—Continued.

Economic geology—Continued.

Coal: Gray, 694.
Coal fields, western, history of discovery: Dowling, 523.
Iron, Belcher Islands: Woodbridge, 2188; Young, 2221.
Oil possibilities, western Canada: Dowling, 515.
Oil reserves: Arnold, 45.
Oil resources: Dowling, 522.
Peat: Anrep, 39.
Strontium: Spence, 1780.
Talc and soapstone: Spence, 1781.
Titanium: Robinson, 1902.

Historical geology.

Pre-Cambrian: Miller, 1308.

Mineralogy.

Sundry minerals: Anonymous, 2223.

Palaeontology.

Sagenopteris: Berry, 156.
Stringocephalus burtoni, distribution: Kindle, 1044.

Physiographic geology.

Cordilleran ice sheet: Read, 1550.
Cordilleras: Dowling, 525.

Canal Zone. See Panama.

Candelaria silver district, Nevada: Knopf, 1063.

Carbonaceous shales, organic material: Rae, 1530.

Carboniferous. See also Palaeontology, Carboniferous.

Alabama, Muscle Shoals area: Prouty, 1523.
Ooee rocks: Prouty, 1521, 1522.
Appalachian coal measures, nomenclature: Ashley, 51.
Arizona: Keyes, 1029.
Grand Canyon: Noble, 1400.
Grand Canyon section: Keyes, 1040.
Lees Ferry region: Bryan, 229.
northeastern: Moore, 1357; Holbrook area: Hager, 704.
northern: Reeside, 1568.
Popago country: Bryan, 237.
Arkansas: Miser, 1326.
Batesville district: Miser, 1327.
Aux Vases sandstone, diastrophic aspects: Keyes, 1037.
Barnett shale, central Texas: Moore, 1361.
British Columbia, Bridge River area: McCann, 1187.
Cochichina area: Cairnes, 272.
Taseko Lake-French Bar Creek: MacKenzie, 1200.
California, Mohave Desert: Clark, 339.
Chester series: Keyes, 1024, 1037.
Colorado, southwestern: Coffin, 376.
Gleelu formation, north central Texas: Goldston, 667.
southern Oklahoma: Goldston, 667.
Grassy black shales: Keyes, 1002.
Idaho, southeastern: Kirkham, 1053.
Illinois, Adams County, northeastern: Currier, 440.
Avon-Canton area: Savage, 1650.
District IV: Cady, 209.
Edgington-Milan area: Savage, 1649.
La Harpe and Good Hope quadrangles: Savage, 1651.
Morris quadrangle: Culver, 438.
New Athens-Okawville area: Shaw, 1719.
Indiana: Cumings, 439.
Mississippian: Stockdale, 1819.
Iowa, Stuart area: Tilton, 1908.
Kansas: Aurin, 55; Moore, 1354; Rogers, 1643.
Cowley County: Elledge, 552.
Eldorado field: Fath, 572.
southeastern: Williams, 2153.
INDEX.

165

Carboniferous—Continued.
Kentucky: Jillson, 897.
  eastern, Buckhorn region: Jillson, 889; Mississippian: Butts, 262.
  Jackson Purchase region: Jillson, 890.
  Monticello quadrangle: Foyle, 607.
  Warren County: St. Clair, 1838.
  Webster County: Glenn, 653.
Maine, Portsmouth Basin: Wandke, 2026.
Mexico, Coahuila, Permian: Bose, 168.
Montana, Cat Creek oil field: Lupton, 1177.
  central and eastern: Clapp, 330.
  Crow Indian Reservation: Thom, 1375.
  Quadrant formation: Freeman, 610.
  Soap Creek oil field: Thom, 1872.
  Sweet Grass Hills: Kemp, 961.
  Muscogee shales, western interior coal field: Kayes, 997.
Missouri: Williams, 1153.
  Oklahoma, Ardmore quadrangle, Glenn formation: Goldston, 666.
  Caddo County: Clapp, 331; Cement field: Reeves, 1569.
  Carter County, Hewitt oil field: Roark, 1597.
  Healdton field, Carter County: Bartram, 77.
  Jefferson County: Robinson, 1603.
  northeastern: Williams, 1153.
  Okmulgee district: Clark, 344; White, 2102.
  Osage Reservation: Roundy, 1620.
  Pontotoc series: Morgan, 1369.
  southern: Burton, 255; Moore, 1355, 1356.
  Stanley shale: Honess, 816.
New Mexico: Carton, 467.
  eastern: Lee, 1102; Rich, 1583.
  Rio Grande region: Kayes, 1015.
  Sandias Mountains: Ellis, 555.
  Nova Scotia, Cape Breton Island, Sydney district: Bell, 125.
  Horton-Windsor district: Bell, 125.
Ohio, Camp Sherman quadrangle: Hyde, 859.
  Wayne County: Conrey, 403.
Oklahoma: Aurin, 55; Rogers, 1613.
  Ardmore quadrangle, Glenn formation: Goldston, 666.
  Caddo County: Clapp, 331; Cement field: Reeves, 1569.
  Carter County, Hewitt oil field: Roark, 1597.
  Healdton field, Carter County: Bartram, 77.
  Jefferson County: Robinson, 1603.
  northeastern: Williams, 1153.
  Okmulgee district: Clark, 344; White, 2102.
  Osage Reservation: Roundy, 1620.
  Pontotoc series: Morgan, 1369.
  southern: Burton, 255; Moore, 1355, 1356.
  Stanley shale: Honess, 816.
Permin: Beede, 119; Kayes, 1023.
  Permian revolution: Finlay, 587.
Pottsville formation, Ohio: Morningstar, 1371.
Red beds and faunas of the Appalachian and Kansas-Texas sections: Beede, 119.
Talladega phyllite, Clay County, Alabama, age: Prouty, 1519.
Talladega slates, Alabama: Prouty, 1220.
  Tennessee, Wayneboro quadrangle: Miser, 1225.
Texas: Rogers, 1613; Udden, 1553.
  Bend series and contiguous formations: Goldman, 669.
  Burk Burnett: Glenn, 651.
  Coke County: Beede, 118.
  Lacasa area, Ranger district: Ross, 1618.
  north central, Pennsylvanian: Moore, 1358; Plummer, 1402.
  Ranger oil field: Reeves, 1370.
  Solitarie uplift: Powers, 1001.
  Willis area, Ranger district: Dobbin, 506.
Utah, Ophir district: Olmstead, 1413.
  southern: Moore, 1362.
  southwestern: Ross, 1568.
  Washington County: Bassler, 79.
Virginia, Dickenson County: Giles, 638.
  Russell County: Wentworth, 2070.
West Virginia, Nicholas County: Price, 1517; Rogers, 1573.
Wyoming: Beale, 747.
Cartography.
Canada, mapping pre-Cambrian areas: Bruce, 221.
Canadian Cordillera, geological mapping: Dunn, 538.
Field mapping for oil geologists: Warner, 2035.
Maps, a field method of reducing to scale: Armstrong, 42.
Caves.
Lehman Cave, White Pine County, Nevada: Hastings, 731.
Virginia, Shenandoah Valley: Anonymous, 2238.
Cement materials.
General: Burchard, 238, 241; Eckel, 549.
Indiana: Logan, 1140, 1141.
Central America.
Economic geology.
Oil reserves: Redfield, 1562.
Petroleum: Milner, 1323.
Historical geology.
Geologic mapping: Vaughan, 1981.
Cephalopoda.
Ammonite evolution: Trueman, 1939.
Ammonites, Opercula, Cuba: O'Connell, 1409.
Ammonites, history: Diener, 499.
Arctic Ordovician and Silurian: Foerste, 590.
Gaustroceras, coal measures, Iowa: Thomas, 1878.
Habits: Raymond, 1547.
Orthoceratidae, color bands: Ruedemann, 1624.
Primitive cephalopods, mode of life: Ruedemann, 1625.
Saltirela, nature: Clark, 346.
Sex distinction: Ruedemann, 1624.
Spirulirostra, Mexico: Berry, 132.
Champlain Sea, decreasing salinity southward: Goldring, 664.
Changes of level. See also Beaches; Shore lines; Terraces.
British Columbia, Vancouver region, Pleistocene: Johnston, 918.
Isostasy, relation of: Bowie, 183.
Mexico, coast regions: Wittich, 2178.
Newfoundland: Daly, 460; postglacial: Daly, 461.
Nova Scotia: Daly, 460.
Quebec, Anticosti Island: Twenhofel, 1945.
Chemical analyses. See list, p. 243.
Chert.
Definition: Glock, 654.
Origin: Price, 1516.
West Virginia: Price, 1516.
Chromite.
Alaska, Kenai Peninsula: Gill, 639.
California, Klamath Mountains: Diller, 503.
General: Diller, 500; Sampson, 1843.
Maryland, northeastern: Knopf, 1065.
Montana, Stillwater and Sweet Grass counties: Westgate, 2077.
North Carolina: Lewis, 1135.
Oregon, eastern: Westgate, 2076.
Klamath Mountains: Diller, 503.
Pennsylvania, southeastern: Knopf, 1065.
Washington: Pardee, 1458.
Chronology in geology: Udden, 1951.
Chitina Valley, Alaska: Moffit, 1334.
Chitons, fossil, of western North America: Berry, 157.
Classification.
Fire clays: Parmelee, 1467.
Gypsum deposits: Wilder, 2128.
Igneous rocks: Pirsson, 1489.
Minerals, sulpho-salt: Wherry, 2082.
Proboscidia: Osborn, 1424.
Clark, W. B., biography: Clarke, 354.
INDEX. 167

Clay.
  General: Middleton, 1298, 1299; Ries, 1593.
  Georgia: Ries, 1593.
  Illinois, refractory clays: Parmelee, 1468.
  Indiana: Logan, 1141; Ries, 1593.
  Kansas, Arkansas City: Testor, 1887.
  Kentucky: Ries, 1593, 1594.
  Michigan: Ries, 1593.
  North Carolina: Ries, 1593.
  Ontario, Missinabi River: Keele, 949.
  Pennsylvania: Pa. G. S., 1478; Ries, 1593.
  Tennessee: Ries, 1593.
  South Carolina: Ries, 1593.
  United States: Ries, 1593.

Climate, geologic. See Paleoclimatology.

Climatic changes, nature and causes: Huntington, 854.

Climatic environment of extinct animals, determination: Case, 294.

Clintertill: Dove, 517.

Clinton iron ore, origin: Galloway, 622.

Coal.
  Age characteristics: Stevenson, 1814.
  Alaska: Evans, 567.
  Matanuska field: Chapin, 322.
  Alberta, Drumheller district: Allan, 20.
  Anthracite, origin: Jeffrey, 873.
  Anthracite basins, Pennsylvania, structural features: Kemp, 965.
  Atmospheric dust in coal: Gock, 655.
  Crownest Pass field: Strachan, 1842.
  Kamloops district, North Thompson valley: Uglow, 1857.
  Vancouver Island: MacKenzie, 1200.
  Canada: Gray, 654.
  Composition: Thiessen, 1899.
  Constitution: Stopes, 1830.
  Formation: Huckford, 702; Hixon, 798.
  General: Moore, 1353; Stevenson, 1813.
  Illinois, Avon and Canton quadrangles: Savage, 1650.
  District IV: Cady, 269.
  Edgington-Miun area: Savage, 1849.
  low-sulphur coal: Cady, 271.
  Miun quadrangle: Savage, 1649.
  Morris quadrangle: Culver, 453.
  New Athens-Oakville area: Shaw, 1719.
  Indiana: Logan, 1141.
  coal seams, distribution: Logan, 1142.
  Iowa: Rice, 1579.
  Isostatic adjustment in formation of coal beds: Kemp, 966.
  Kentucky: Campbell, 281; Jillson, 899.
  eastern, Buckhorn region: Jillson, 899.
  Webster County: Glenn, 653.
  Microscopic study: Thiessen, 1870.
  New Brunswick, Gloucester County: Young, 2220.
  New Mexico, Raton-Brilliant-Koehler area: Lee, 1105.
  San Juan County: Bauer, 94.
  North Carolina, Triassic coal field: Pratt, 1507.
  North Dakota: Dove, 515.
  Ohio, Wayne County: Conrey, 403.
  Origin: Jeffrey, 572.
  anthracite region: Parker, 1462.
  Saskatchewan, Souris field: Dowling, 520.
  Virginia, Dickenson County: Giles, 658.
  Russell County: Wentworth, 2070.
  Washington: Sheld, 1723.
  West Virginia, Harrison, Thomas bed: Campbell, 280.
  Nicholas County: Reger, 1573.
188 BIBLIOGRAPHY OF NORTH AMERICAN GEOLOGY, 1921–1922.

Coal measures. See Carboniferous.

Cobalt.

General: Hess, 770, 780, 783.
Oregon, Jackson County: Kellogg, 933.
Cold Bay district, Alaska: Capps, 289.
Colemanite, Clark County, Nevada: Noble, 1399.
Colemanite deposits, origin: Foshag, 596.

Collections.

Colloids in geologic problems: Hubbard, 838.

Collophane: Rogers, 1609.

Color markings. Orthoceras: Ruedemann, 1624.

Colorado.

Alkanes: Headen, 744.
Guidebook, Denver & Rio Grande Western route: Campbell, 279.

Areas described.
Brilliant quadrangle: Lee, 1105.
Raton quadrangle: Lee, 1105.
Wagon Wheel Gap area: Larsen, 1096.

Economic geology.
Gold, silver, copper, lead, and zinc: Henderson, 770, 773.
Oil shales: George, 628; Jenson, 886; organic matter: Franks, 609.
Radium, uranium, and vanadium deposits: Coffin, 376; Hess, 782.
Silver enrichment, San Juan Mountains: Bastin, 36.
Southwestern Colorado: Coffin, 376.
Telluride area, San Miguel County: Hurst, 858.

Historical geology.
Buried Mountain range of Permian age: Rich, 1689.
Laramie beds, absence in southern Colorado: Keyes, 1025.

Moffat tunnel: George, 629.

San Juan region: Bastin, 36.
Southwestern Colorado: Coffin, 376.
Telluride area, San Miguel County: Hurst, 858.

Mineralogy.
Creedite, Creede quadrangle: Foshag, 595.
Quartz, Pikes Peak: Hawkins, 732.

Paleontology.
Brachyrurus, Florissant: Cockerell, 371.

Fulgoridae, Eocene, Roan Mountain: Cockerell, 367.

Hepatica, Florissant: Howe, 833.

Hymenodont: Troxell, 1929.

Insecta, Eocene: Cockerell, 366.

Laramie flora, Denver Basin: Knowlton, 1070.

Moth, Hydromena, Florissant: Cockerell, 370.

Paleocene mammals, new genera: Matthew, 1247.

Palmoxylon cannoni, Denver: Stevens, 1812.

Pliocene Vertebrata, Denver: Hay, 736.

Pliocene flora, Yuma County: Cook, 406.

Ranunculus florissantensis: Cockerell, 369.

Sauropoda, Canyon City: Osborn, 1419.

Titanotheres, Huerfano formation: Osborn, 1418.

Trilophodon: Cook, 405.

Physical geology.
Southwestern Colorado: Coffin, 376.

Physiographic geology.

Moraines, Estes Park region: Wooster, 2196.

Penepalins, Front Range and Rocky Mountain National Park: Lee, 1108.
Raton mesa: Lee, 1108.
San Juan Mountains: Atwood, 58.

Underground water.

Lincoln and Crowley counties: Tieje, 1906.

INDEX.


Concretions.
Indiana, Monroe County, Knobstone: Tucker, 1940.
Ohio, Elyria, lake deposits: Hubbard, 837.
Origin: Patton, 1474.
Syngenetic origin in shale: Tarr, 1859.
Cone-in-cone structure, origin: Tarr, 1859, 1860.
Conglomerate.
British Columbia, Silurian tillite: Shepard, 1725.

Connecticut.
Guilford quadrangle: Foye, 605.

Historical geology.
Southington-Granby area: Palmer, 1451.
Triassic structure, southern Connecticut: Longwell, 1148.

Mineralogy.
Chatham cobalt mine: Shannon, 1706.
Middletown area: Foye, 603.
Trumbull tungsten mine: Shannon, 1708.

Physical geology.
Triassic trough, origin: Foye, 606.
Underground water.

Southington-Granby area: Palmer, 1451.

Connecticut basin during the Newark epoch: Foye, 604.

Conodonts, Genesee: Bryant, 230.

Copper.
Alaska: Brooks, 205, 212.
Juneau and Ketchikan districts: Mertie, 1289.
Arizona: Helkes, 757, 759.
Globe district: Schwartz, 1683.
Jerome district, Yavapai County: Reber, 1557.
Pima district: Ransome, 1536.
Warren district: Mitchell, 1330.

Texada Island, Marble Bay mine: Dolmage, 511.

California: Yale, 2213, 2215, 2218.
Central States: Dunlop, 532, 534, 537.
Colorado: Henderson, 770, 773.
Eastern States: Dunlop, 535.
General: Jenison, 877, 879, 881.
Idaho: Gerry, 631.
Maskwa River: McCann, 1185.
Montana: Gerry, 630, 633.

Coral reefs.

Coral. See Anthozoa.

Cordilleran belt, Montana and Wyoming, structural features: Thom, 1873.
Cordilleran ice sheet: Read, 1350.

Correlation.
Arizona, Fort Apache region: Reagan, 1551.
northeastern: Moore, 1357.
Correlation—Continued.
Carboniferous: Beede, 119.
Central America and West Indies, Tertiary: Vaughan, 1982.
Colorado River region: Longwell, 1147.
Cretaceous: Stanton, 1785.
Cretaceous-Tertiary boundary, vertebrate evidence as to: Matthew, 1249.
Glacial stages: Osborn, 1428.
Iowa, Cambrian: Keyes, 1035.
Jackson and Vicksburg deposits, Mississippi and Alabama: Cooke, 413.
Lithology, subsurface: Goldman, 656.
Mesozoic and late Paleozoic, Montana and adjacent States: Clapp, 330.
Mioocene: Olsson, 1414.
Mississippi: Butts, 392.
New York, Ordovician: Ruedemann, 1624.
Oklahoma, Okmulgee district: White, 2102.
Ordovician: Raymond, 1548.
Mississippi Valley: Dake, 450.
Pennsylvanian formations: Glenn, 653; McCoy, 1193.
Oklahoma and Texas: Goldston, 667.
Pre-Cambrian and Cambro-Ordovician: Berkey, 131.
Tertiary, West Coast: Clark, 335, 336.
Texas Pennsylvanian: Plummer, 1492.
West Coast Tertiary: Clark, 336.
Wyoming, oil-producing areas: Morgan, 1309.
Corundum, North Carolina, Macon County: Gordon, 681.
Costa Rica.
General: Branson, 194.
Historical geology.
Miocene, northern Costa Rica: Olsson, 1414.
Paleontology.
Plantae, Tertiary: Berry, 138.
Coteau des Prairies, glacial formations: Leverett, 1121.
Cox, G. H., biography: McNutt, 1212.
Crashing of mountain massifs, Lower California: Keyes, 970.
Cretaceous. See also Paleontology, Cretaceous.
Alberta: Allan, 19.
Drumheller district: Allan, 20.
Kanasaskis Lakes-Pulliser River area: Marshall, 1228.
Sheep River area: Slipper, 1751.
Arizona: Keyes, 1029.
Papago country: Bryan, 227.
Arkansas, south central: Rubey, 1622.
British Columbia, Eutsuk Lake district: Brock, 201.
Tassok Lake-French Bar Creek: MacKenzie, 1200.
upper Peace River region: McLaren, 1210.
Vancouver Island: Dolmage, 509; MacKenzie, 1203.
Kern County: English, 562.
Cannonball fauna: Stanton, 1796.
Cavern deposits in Permian, western Texas: Udden, 1952
Cheyenne sandstone, Kansas: Berry, 145.
Colordo, southeastern: Coffin, 377.
southwestern: Coffin, 376.
Comanche succession, taxonomic rank: Stanton, 1797.
Cretaceous-Tertiary boundary: Matthew, 1246, 1249.
Dakota formation: Gress, 657.
Dakota sandstone problems: Stanton, 1796.
Georgia: Teas, 1983.
Idaho, southeastern: Kirkham, 1053.
Illinois, southern: Parmelee, 1467.
Iowa, southwestern: Keyes, 1014.
Jamaica: Trechmann, 1919.
Burretila beds: Trechmann, 1920.
Cretaceous—Continued.

Kansas, western: Lupton, 1178.

Lance and Fort Union formations, age: Cross, 435; Knowlton, 1067; Schuchert, 1077, 1681.

Laramie problem: Knowlton, 1070.

Louisiana, northwestern: Hammill, 709.

MacKenzie, Great Slave Lake region: Cameron, 274.

MacKenzie River region: Dowling, 551; Whitaker, 2112.

Manitoba, Turtle Mountain region: Dowling, 521.

Mexico, Hidalgo, Atotonilco el Grande: Wittich, 2167.

Lower California: Barton, 466.

San Felipe formation: Stanton, 1794.

Missouri, Dakota sandstone: Keyes, 999.

Montana, Cut Creek oil field: Lupton, 1177.

central and eastern: Clapp, 330.

Crow Indian Reservation: Thom, 1875.

Garfield County: Thom, 1874.

Soap Creek oil field: Thom, 1872.

Sweet Grass Hills: Kemp, 961.

Nebraska, Sioux County, Agate anticline: Schramm, 1672.

New Jersey: Mansfield, 1223.

New Mexico: Darton, 467.

Raton-Brilliant-Koeheier area: Lee, 1105.

Sandia Mountains; Ellis, 555.

San Juan County: Bauer, 94; Reeside, 1567.

Oklahoma, southern (part): Hopkins, 821.

Ontario, northern: Keele, 946, 947.

Oregon, eastern: Buwalda, 204.

South Dakota, Badlands: Ward, 2333.

Black Hills: Keyes, 979.

Dewey County: Ward, 2034.

Tennessee, Wayneboro quadrangle: Miser, 1325.

Texas: Hill, 792; Udden, 1953.

Austin formation, San Antonio district: Sellards, 1693.

Caldwell County: Sellards, 1695.

Coke County: Beede, 118.

Johnson County: Winton, 2166.

Lacasa area, Ranger district: Ross, 1616.

McLennan County: Pace, 1457.

Medina County: Liddle, 1128.

northeastern (part): Hopkins, 821.

Panola County: Sellards, 1694.

Ranger oil field: Reeves, 1570.

salt domes: Powers, 1504.

Solitario uplift: Powers, 1501.

western: Baker, 59.

Utah, southern: Moore, 1362.

Windrow formation, upper Mississippi Valley: Thwaites, 1905.

Woodbine sand, Texas: Berry, 144.

Wyoming, northwestern: Dake, 449.

Osage oil field, Weston County: Collier, 390.

Crinoids. See also Echinodermata.

Balanoocrinus: Springer, 1788.

Devonian, Mackenzie: Springer, 1786.

Dolatoocrinus and allies: Springer, 1785.

Crustacea.

Apus, Permian, Oklahoma: Ruedemann, 1629.

Caryocaris: Ruedemann, 1624.

Nova Scotia, coal measures, Merostomata: Bell, 128.

Cryolite: Davis, 465, 469, 470.

Cryovolcanic structure, Adams County, Ohio: Bucher, 232.

Crystallography.

Alabandite, crystal structure: Wyckoff, 2211.

Apatite, epidote, and hematite from Rhode Island: Hawkins, 733.

Boulangerite, Idaho: Shannon, 1785.

Creedite, Colorado: Foshag, 593.

Datolite, Westfield, Massachusetts: Shannon, 1709.

Drawing crystals: Slawson, 1750.
Crystallography—Continued.
  Inyoite, New Brunswick: Poitevin, 1493.
  Optical properties of minerals: Larsen, 1093.
  Orientite, Cuba: Hewett, 784.
  Pucherite, pyrite, trichalcite, and wavellite: Shannon, 1711.
  Structure of crystals: Wyckoff, 2310.
  Vivianite, Idaho: Shannon, 1699.
  Whewellite: Wherry, 2986.

Cuba.
  Economic geology.
  Mineral resources: Suarez Murias, 1843.
  Historical geology.
  Jurassic, western Cuba: Brown, 216.
  Mineralogy.
  Orientite: Hewett, 784.

Paleontology.
  Ammonite opercula: O’Connell, 1409.
  Cushing, H. P., biography: Kemp, 964.
  Cycladects, monocarpy: Wieland, 2123.
  Cystoidea. See also Echinodermata.
  Dakota sandstone problems: Stanton, 1795.
  Daua, J. D., biography: Pirsson, 1488.
  Decomposition of rocks. See Weathering.

Definitions.
  Chert: Glock, 654.
  Flint: Glock, 654.

Deltas.
  Fraser River, British Columbia: Johnston, 922, 923.
  Taseko Lake-French Bar Creek: MacKenzie, 1200.
  Demonstrations in geology: Clevland, 362.
  Denudation. See Erosion.
  Deposition. See Sedimentation.
  Deposition of ores. See Ore deposits. origin.
  Des Moines ice lobe, map: Leverett, 1122.

Devonian. See also Paleontology, Devonian.
  Alaska, Wrangell district: Buddington, 235.
  Arizona: Keyes, 1029.
  Grand Canyon: Keyes, 1040; Noble, 1490.
  Arkansas: Miser, 1326.
  Batesville district: Miser, 1327.
  British Columbia, Rocky Mountain trench: Shepard, 1727.
  Taseko Lake-French Bar Creek: MacKenzie, 1200.
  Greenland, northwestern: Koch, 1074.
  Indiana: Cumings, 439.
  Iowa, Hackberry stage: Fenton, 599a.
  Kentucky: Illson, 897.
  MacKenzie, Great Slave Lake region: Cameron, 274.
  lower Mackenzie Valley: Kindle, 1043.
  Mackenzie River district: Bosworth, 173; Hume, 861; Whittaker, 2118; Williams, 2140.
  Minnesota: Stauffer, 1799, 1800.
  Missouri: Branson, 193.
  Ozark region: Keyes, 1033.
  Ozark uplift, Devonian outlier: Bridge, 193.
  Nevada, Muddy Mountains region: Longwell, 1144, 1146.
  New Brunswick, Mispec group: Matthew, 1244.
  St. John: Matthew, 1246.
  Newfoundland, western: Schuchert, 1678.
  New York, Oriskany sandstone: Eaton, 545.
  Ohio, Camp Sherman quadrangle: Hyde, 859.
  Oklahoma: Schuchert, 1683.
  Ontario, Pagwachuan, Kenogami, and Albany rivers: Williams, 2137.
  Quebec, Beauceville area: MacKay, 1198.
  Gaspe County, Lemieux township: Alcock, 12.
  Saint George: Clark, 349.
INDEX.

Devonian—Continued.
Tennessee, Wayneboro quadrangle: Miser, 1325.
Texas, Solitario uplift: Powers, 1501.
Virginia, western: Stose, 1841.

Diamonds.
Arkansas, Pike County: Miser, 1329.

Diastrophism.
Cause: Chamberlin, 309.
Megadiastrophism: Chamberlin, 311, 314; Jones, 936.
Self-compression of the earth as a problem of energy: Chamberlin, 312.

Diatomaceae.
Collection and preparation: Mann, 1218.

Diffusion in silicate melts: Bowen, 175.

Dikes.
Arkansas, Scott County, peridotite dikes: Miser, 1328.
Maine, Portsmouth Basin: Wandke, 2026.
New York, Ithaca region: Sheldon, 1724.
Vermont, Brantree: Richardson, 1585.

Dinosaurs. See Reptilia.

Dip and strike, determination: Longwell, 1145; Smith, 1773.

Dip chart and protractor: Gaby, 617.

Dislocation. See Faulting.

District of Columbia.
Historical geology.
Pleistocene deposits: Anonymous, 2240.

Petrology.

Physical geology.
Earthquakes, registration: Tondorf, 1914, 1915.
Divide silver district, Nevada: Knopf, 1061.
Dominican Republic.

Palaeontology.
Mollusca, Tertiary: Pilsbry, 1487.
Plantae, Tertiary: Berry, 137.

Drainage changes.
British Columbia, Rocky Mountain region: Schofield, 1663.

Hudson-Champlain Valley: Stoller, 1825.
Indiana: Malott, 1216.
Monroe County: Malott, 1215.
Kentucky, Frankfort area: Jillson, 895.
Mackenzie, River basin, postglacial lakes: Cameron, 275.
Maine, Androscoggin River: Crosby, 433.
Mississippi River: Leverett, 1120.
Missouri River: Greene, 685.
Missouri Valley: Todd, 1910, 1911.
New Hampshire, eastern: Crosby, 433.
Ohio, Wayne County: Conrey, 403.

Ontario: Coleman, 385.

Drift deposits. See Glacial geology; Ice ages (ancient).

Driftless Area, erosional history: Trowbridge, 1921.

Drunilins.
Origin: Millis, 1319.

Dunes.
Indiana, northwestern: Cressey, 431.

Dust fall, March 19, 1920: Winchell, 2159.

Dynamic geology. See Physical geology.

Dynamics of the lithosphere: Jones, 935.

Earth.
Evolution: Hobbs, 800.
Planetesimal hypothesis: Chamberlin, 908.
Self-compression: Chamberlin, 313.

Astronomical viewpoint: Brown, 217.
General: Duane, 530.

Geological viewpoint: Chamberlin, 315.

Paleontological viewpoint: Clarke, 361.

Radioactive point of view: Duane, 529.
Earth—Continued.

Crust.
Antilles, fault troughs: Taber, 1847.
Arcuate and lobate mountain structures: Taylor, 1861.
California, coast ranges, mobility: Lawson, 1100.
Composition: Washington, 2098.
Condition: Putnam, 1524; Reid, 1578.
Deformation in Pacific and Atlantic regions contrasted: Hobbs, 804.
Dynamics of the lithosphere, Jones, 935.
Early conditions: Schuchert, 1075.
Earthquake frequency: Cotton, 420.
General: Coleman, 387.
Isostatic adjustment: Bowie, 185.
Isostatic equilibrium: Wood, 2187.
Lithosphere, tidal stresses: Cotton, 420.
Localization of major geosyclines, cause: Bucher, 233.
Major features of earth's surface: Diener, 498.
Movements of crust: Leith, 1113.
Role of isostatic stress: Willis, 2413.
Tertiary mountain building, cause: Taylor, 1862.

Figure.
Changing sphericity of the earth: Keyes, 983.
Diminishing rate of rotation, effects: Keyes, 985, 1017.
General: Keyes, 986.

History.
Control zones of earth: Chamberlin, 310.

Interior.
Earth's interior: Washington, 2038.
Megadiastrophism: Chamberlin, 314; Jones, 906.
Zone of flow: Hobbs, 803.

Temperature.
Earth, temperature: Sayles, 1657.
Fluids in wells, temperature: Lahee, 1083.
Texas, Brazoria County, West Columbia field: Darton, 75.

Earth sciences as the background of history: Merriam, 1268.

Earthquakes. See also Seismology.
California, Chittenden: Kemnitzer, 958.
Eagle Lake: Kemnitzer, 959.
Los Angeles, July, 1920: Taber, 1846.
registration: Bond, 169, 170; MacElwane, 1196.
southern, early records: Carpenter, 293.
1920: Palmer, 1448.
1921: Palmer, 1449.
Epicenters, location: Hodgson, 808.
General: Mafnor Lumbier, 1376.
Mexico, Orizaba: Friedlaender, 614.
Utah, Elsinore: Pack, 1439.
Washington, Dixie: Eby, 548.
1918: Hodson, 810.

Echinodermata. See Asteroidea; Blastoidae; Crinoidae; Cystoidea; Echinoidea.

West Indies: Jackson, 863.

Economic aspects of geology: Leith, 1112.

Economic geology (general). For regional see particular States. See also Ore deposits, origin and the particular products.
Application of geology to mining: Billingsley, 159.
Applied geology, scientific by-products: Smith, 1757.
Coal, oil, and gas, natural resources: Johnson, 907.
Croppings of ore deposits: Bateman, 91.
Economic aspect: Porter, 1496.
INDEX.

Economic geology—Continued.
 Economic geologists and literature: Bateman, 89.
 Economic geology, relation to general principles of geology: Penrose, 1479.
 Foraminifera, use in determining underground structure: Cushman, 447.
 General: Leith, 1112.
 International mineral problems: Leith, 1114.
 Mineral deposits, present tendencies in the study of: Lindgren, 1129.
 Mining geology methods at Butte, Montana: Billingsley, 159.
 Ore hunting: Campbell, 278.
 Ore-hunting geology: Locke, 1137.
 Profession of ore-hunting: Locke, 1136.
 Scientific by-products of applied geology: Smith, 1757.
 Terminology of mineral deposits: Lindgren, 1130.
 Textbook: Emmons, 561.

Educational.
 Demonstration material in geology: Cleland, 362.
 Dip and strike, laboratory determinations: Turner, 1941.
 Eldorado oil and gas field, Butler County, Kansas: Fath, 572.
 Elephas jeffersonii: Osborn, 1429.
 Emerson, B. K., biography: Keyes, 978.
 Emerson, F. V., biography: Brigham, 199.
 Empiro formation, Coos Bay, Oregon: Howe, 831.
 Engineering geology: Ries, 1592.
 Catskill water supply: Berkey, 134.
 New York, West Point quadrangle: Berkey, 151.
 Eocene. See Tertiary.
 Eolian action. See Wind work.
 Erosion.
 Arid regions: Fenneman, 576.
 Chemical denudation of soils: Whitney, 2109.
 General: Keyes, 987.
 Eruptive rocks. See Igneous and volcanic rocks.
 Eskers.
 Crevasse theory of origin: Prest, 1513.
 Iowa, central: Smith, 768.
 Nova Scotia, Queens County, Middleton: Prest, 1513.
 Etching tests on pyrrhotite: Boydell, 190.
 Evolution.
 Ammonifoe evolution: Trueman, 1939.
 Arrested evolution: Ruedemann, 1627; paleontology of: Ruedemann, 1630.
 General: Headstrom, 746; Keyes, 976; Mather, 1238; Moodie, 1340.
 Geologic evidence: Berry, 153.
 Man: Bailey, 58.
 Orthogenesis: Osborn, 1426.
 Pre-Cambrian life: Brooks, 213.
 Primitive plants: Schuchert, 1675.
 Excursions.
 Experimental investigations.
 Accumulation of oil in sands: Emmons, 559.
 Glacial anticyclone, mechanics: Hobbs, 799.
 Movements of oil and water through sands: Mills, 1321.
 Subsurface relationships in oil and gas fields, experimental studies: Mills, 1320.
 Faulting.
 Alberta, Rocky Mountains: MacKenzie, 1202.
 Anthracite basins, Pennsylvania: Kemp, 965.
 Antilles, fault troughs: Taber, 1547, 1548.
 British Columbia, Rocky Mountain trench: Shepard, 1726.
 San Andreas rift: Willis, 2142.
 Connecticut, southern, Triassic: Russell, 1638.

64264—24——12
Faulting—Continued.

General: Chamberlin, 306.
Idaho, southeastern: Mansfield, 1222.
Isostatic compensation a cause of thrusting: Lawson, 1101.
Kentucky, Golconda quadrangle: Weller, 2061.
Massachusetts, Mount Toby, postglacial: Loomis, 1149.
Nevada, Muddy Mountain overthrust: Longwell, 1146.
New Mexico, Sandia Mountains: Ellis, 555.
New York, Cayuga Lake region: Long, 1143.
West Point quadrangle: Berkey, 131.
Ontario, French River district, postglacial: Hobbs, 805.
South Dakota nickel district: Hitchcock, 786.
Overthrusts and underdrags: Davis, 476.
Thrust faulting: Keyes, 987.
Utah, Wasatch Mountains, Cottonwood district, thrust faulting: Calkins, 273.
Vermont, western: Gordon, 672.
Virginia, Russell Fork fault: Wentworth, 2067.
Wyoming, northwestern: Dake, 449.

Field work.
Canada, mapping pre-Cambrian areas: Bruce, 221.
Compass: Plummer, 1491.
Dip and strike, determination: Smith, 1773.
Dip needle, use: Aldrich, 14.
Field mapping for oil geologist: Warner, 2035.
Field methods in petroleum geology: Lahee, 2058.
Kodak adapted for detail work in field: Wentworth, 2071.
Loose-leaf system for field maps and notes, Rich: 1592.
Recording machines: Dodge, 508.
Smithsonian: Smithsonian Inst., 1774, 1775.
Subsurface contouring: Bloesch, 166.

Feldspar.
General: Beach, 102, 108; Katz, 942.
New York: Newland, 1391.
Ontario, Ottawa district: Davis, 471.
Feldspars, mineralogy: Ailing, 30.
Fire clay.
Illinois: Parmelee, 1467.
Kentucky, eastern coal field: Ries, 1595.

Fishes. See Pisces.

Fissures. See Faulting.

Flint.
Definition: Glock, 554.

Florida.
State geologist, report: Gunter, 698, 699.

Economic geology.
Mineral resources, 1918: Gunter, 693.
Petroleum possibilities: Sellards, 1691.

Historical geology.
General: Gunter, 700; Sellards, 1691.

Paleontology.
Foraminifera: Cushman, 444.
Gavial: Mook, 1348.
Mollusca, St. Lucie Canal: Johnson, 906.
Operculina and Heterostegina: Cushman, 442.
Sea cow, Metaxytherium floridanum: Hay, 738.

Physical geology.
Humic-acid origin of asphalt: Haseman, 730.

Physiographic geology.

Fluorite, optical, southern Illinois: Pogue, 1494.

Fluorspar.
Arizona: Allen, 27.
General: Allen, 27; Davis, 468, 469, 470.
Kentucky: Jillson, 887.
INDEX.

Fluorspar—Continued.

Mexico: Wittich, 2170.
Ontario, Madoc district: Wilson, 2150, 2153.

Folding.

Anthracite basins, Pennsylvania: Kemp, 963.
Canadian Rocky Mountain front ranges: Keyes, 992.
Idaho, southeastern: Mansfield, 1222.
Slouan fold: Keyes, 992.
Wyoming: Ball, 66.
Lost Soldier-Ferris district: Fath, 573.

northwestern: Dake, 449.

Footprints.

Dinosaur tracks, Hamilton County, Texas: Whatley, 2202.
Kansas, coal measures: Martin, 1234, 1236.

Foraminifera.

Byram marl, Mississippi: Cushman, 445.
Dictyococcus, Eocene, Haiti: Woodring, 2190.
Florida: Cushman, 444.
Mississippi, Mint Spring marl: Cushman, 446.
Operculina and Heterostegina: Cushman, 442.
Orthophragmina: Cushman, 443.
Use in determining underground structure: Cushman, 447.

Formations. See Geologic formations.

Fossil, use of term: Field, 584; Miller, 1300.

Fossil forests.

Devonian forest, Catskill Mountains: Clarke, 346.

Fossils. See Paleontology.

Fuller's earth: Middleton, 1297, 1297.

Fused cores: Ross, 1617.

Galena limestone: Keyes, 998.

Garnet.

New York: Newland, 1391.

Gas. See Natural gas.

Gastropoda. See also Mollusca.

Costa Rica, northern, Miocene: Olsson, 1414.
Olivelia, California: Oldroyd, 1412.
Oregon, John Day region, Miocene: Hanna, 714.
Orthaulax: Cooke, 411.
Pleistocene, California: Oldroyd, 1411; Santa Barbara: Van Winkle, 1957.
Trails: Raymond, 1545.

Gems.

General: Stoddard, 1820, 1821, 1824.
United States National Museum collection: Merrill, 1294.

Genesis of ores. See Ore deposits, origin.

Geneva map area, Sudbury district, Ontario: Quirke, 1527.

Geochemistry.

Colloids in geologic problems: Hubbard, 838.
Earth's crust, composition: Washington, 2038.
Humic acid origin of asphalt: Haseman, 730.
Igneous rocks, average chemical composition: Clarke, 353.
Invertebrates, inorganic constituents: Clarke, 352.
Kaolin, Indiana, origin: Bucher, 234.
Metasomatic processes in silicate rocks: Goldschmidt, 665.
Observatories, need for: Jaggar, 838.
Pacific volcanoes, chemistry: Washington, 2042.
Phosphorus in Californian petroleum: Palmer, 1450.
Platinum at high temperatures and pressures: Shaw, 1720.
Volcanism, chemical aspects: Allen, 21.

Geographic distribution.

Bear family: Merriam, 1269.
Proboscidea: Osborn, 1424.

Geographical cycle: Davis, 477.

Geologic climate. See Paleoclimatology.
BIBLIOGRAPHY OF NORTH AMERICAN GEOLOGY, 1921–1922.

Geologic formations, tables. For geologic formations described see list, p. 247.

Alberta, Sheep River area: Slipper, 1751.
Arizona: Keyes, 1029.
southwestern: Reeside, 1686.
Arkansas, Batesville district: Miser, 1327.
British Columbia, Bridge River area: McCann, 1187, 118S.
Kamloops district, North Thompson valley: Uglow, 1937.
Lasqueti Island: MacKenzie, 1201.
Peace River district: Speker, 1754.
Salmon River district: Schofield, 1866.
southeastern: Schofield, 1867.
California: Vander Leck, 1756.
Tertiary: Clark, 336.
Carboniferous: Beede, 119.
Central America and West Indies, Tertiary: Vaughan, 1982.
Cretaceous: Cress, 687.
Georgia: McCallie, 1184.
Gulf Coastal Plain: Sellards, 1691.
Idaho, southeastern: Kirkham, 1053.
Indiana: Cumings, 439.
Jamaica: Trechmann, 1919.
Kansas: Moore, 1354.
Kentucky, Golconda quadrangle: Weller, 2061.
Mackenzie, Great Slave Lake region: Cameron, 274.
lower Mackenzie valley: Kindie, 1043.
Mackenzie River district: Williams, 2140.
Mesozoic and late Paleozoic, Montana and adjacent States: Clapp, 300.
Montana, Little Rocky Mountain region: Collier, 391.
New Mexico: Darton, 467.
San Juan County: Bauer, 94.
 Nova Scotia, Kings and Annapolis counties: Faribault, 570.
Ohio, Camp Sherman quadrangle: Hyde, 859.
Wayne County: Conrey, 403.
Ontario, Brockville-Mallorytown area: Wright, 2207.
Pagwachuan, Kenogami, and Albany rivers: Williams, 2137.
Sudbury district, Geneva area: Quirke, 1337; Wanapitei Lake area: Quirke, 1328.
Ordovician, Mississippi Valley: Dake, 450.
Pre-Cambrian and Cambro-Ordovician: Berkey, 131.
Quebec, Beauceville area: MacKay, 119.
South Dakota: Wilson, 2156.
Tertiary, West Coast: Clarke, 335.
Texas, north central, Pennsylvaniaian: Moore, 1336.
Ranger oil field: Reeves, 1570.
Utah, southwestern: Reeside, 1686.
Virginia, western: Stose, 1841.
Wyoming, Osage oil field, Weston County: Collier, 390.
Yukon, Sixtymile and Ladoe rivers area: Cockfield, 372.

Geologic history.

Alaska, Goodnews Bay region: Harrington, 721.
York region: Steidtmann, 1802.
Alberta, Rocky Mountains: MacKenzie, 1202.
Arizona, Jerome district, Yavapai County: Reber, 1557.
lower Gila region: Ross, 1618.
northeastern, Holbrook area: Hager, 704.
Papago country: Bryan, 227.
British Columbia, Bridge River area: McCann, 1187.
Fraser River canyon: Camsell, 284.
Kamloops district, North Thompson valley: Uglow, 1937.
Rocky Mountain region: Schofield, 1663.
Salmon River district: Schofield, 1666.
California, Petaluma, Point Reyes, and Santa Rosa quadrangles: Dickerson, 497.
Tertiary: Clark, 336.
Canadian Cordilleras: Dowling, 328.
Geologic history—Continued.

Central America and West Indies: Vaughan, 1982.
Colorado Plateau region: Willis, 2144.
General: Merriam, 1268.
Georgia, Macon area: Cooke, 412.
Idaho, southeastern: Mansfield, 1222.
La Harpe and Good Hope quadrangles: Savage, 1651.
Morris quadrangle: Culver, 438.
New Athens-Okawville area: Shaw, 1719.
Mackenzie River basin: Dowling, 524, 526.
Manitoba, pre-Cambrian: Alcock, 11.
Rice Lake and Ossau River areas: Cooke, 415.
Massachusetts, Connecticut Valley: Miller, 1309.
Essex County: Clapp, 329.
Mexico, El Oro and Tialpujahua districts: Flores, 589.
Mid-Continent oil field: McCoy, 1193.
Mississippi Valley, Pleistocene: Leverett, 1120.
Missouri River: Greene, 685.
Montana, Sweet Grass Hills: Hemp, 961.
Nevada, Muddy Mountains region: Longwell, 1144.
New Brunswick, Moncton area: Wright, 2209.
New Mexico, Mogollon district: Ferguson, 583.
Raton-Brilliant-Kochler area: Lee, 1105.
Sandia Mountains: Ellis, 555.
Texar district: Paige, 1447.
New York, Catskill region: Berkey, 134.
West Point quadrangle: Berkey, 131.
Ohio, Camp Sherman quadrangle: Hyde, 859.
Oklahoma, southern: Moore, 1355.
Ontario, northeastern, physiographic history: Collins, 397.
Ordovician, Mississippi Valley: Dake, 452.
Pebbles: Wentworth, 2068.
Quebec, Gaspé Peninsula: Coleman, 382.
Texas, Llaca area, Ranger district: Ross, 1618.
New Brunswick, Moncton area: Wright, 2209.
New Mexico, Mogollon district: Ferguson, 583.
Raton-Brilliant-Kochler area: Lee, 1105.
Sandia Mountains: Ellis, 555.
Tyrone district: Paige, 1447.
Wyoming, Catskill quadrangle: Berkey, 134.
West Point quadrangle: Berkey, 131.
Ohio, Camp Sherman quadrangle: Hyde, 859.
Oklahoma, southern: Moore, 1355.
Ontario, northeastern, physiographic history: Collins, 397.
Ordovician, Mississippi Valley: Dake, 452.
Pebbles: Wentworth, 2068.
Quebec, Gaspé Peninsula: Coleman, 382.
Texas, Llaca area, Ranger district: Ross, 1618.
North central: Plummer, 1492; Pennsylvanian: Moore, 1398.
Tarrant County: Hill, 787.
Tyrone district: Paige, 1447.
New York, Catskill region: Berkey, 134.
West Point quadrangle: Berkey, 131.
Ohio, Camp Sherman quadrangle: Hyde, 859.
Oklahoma, southern: Moore, 1355.
Ontario, northeastern, physiographic history: Collins, 397.
Ordovician, Mississippi Valley: Dake, 452.
Pebbles: Wentworth, 2068.
Quebec, Gaspé Peninsula: Coleman, 382.
Texas, Llaca area, Ranger district: Ross, 1618.
North central: Plummer, 1492; Pennsylvanian: Moore, 1398.
Tarrant County: Hill, 787.
Tyrone district: Paige, 1447.
New York, Catskill region: Berkey, 134.
West Point quadrangle: Berkey, 131.
Ohio, Camp Sherman quadrangle: Hyde, 859.
Oklahoma, southern: Moore, 1355.
Ontario, northeastern, physiographic history: Collins, 397.
Ordovician, Mississippi Valley: Dake, 452.
Pebbles: Wentworth, 2068.
Quebec, Gaspé Peninsula: Coleman, 382.
Texas, Llaca area, Ranger district: Ross, 1618.
North central: Plummer, 1492; Pennsylvanian: Moore, 1398.
Tarrant County: Hill, 787.
Tyrone district: Paige, 1447.
New York, Catskill region: Berkey, 134.
West Point quadrangle: Berkey, 131.
Ohio, Camp Sherman quadrangle: Hyde, 859.
Oklahoma, southern: Moore, 1355.
Ontario, northeastern, physiographic history: Collins, 397.
Ordovician, Mississippi Valley: Dake, 452.
Pebbles: Wentworth, 2068.
Quebec, Gaspé Peninsula: Coleman, 382.
Texas, Llaca area, Ranger district: Ross, 1618.
North central: Plummer, 1492; Pennsylvanian: Moore, 1398.
Tarrant County: Hill, 787.
Tyrone district: Paige, 1447.
Geologic maps—Continued.
Arkansas, Batesville district: Miser, 1327.
Arkansas, peridotite area: Miser, 1329.
Pike County, peridotite area: Dolmage, 512.
British Columbia, Bridge River, Lillooet district: McCann, 1187.
Pike County, peridotite area: Miser, 1329.
coast and islands: Dolmage, 512.
Kitzautil Valley: Hanson, 718.
Lasqueti Island: MacKenzie, 1201.
Peace River district: Spieker, 1794.
Taseko Lake-French Bar Creek: MacKenzie, 1200.
Taseko Valley: MacKenzie, 1199.
California, Cuyamaca region: Hudson, 840.
Kern County: English, 562.
Point Reyes triangle: Dickerson, 497.
Santa Rosa and Petaluma quadrangles: Dickerson, 497.
Central States: Cummings, 439.
Colorado (part): Campbell, 279.
Canyon City area: Osborn, 1419.
Southington-Granby area: Palmer, 1451.
Florida: Gunter, 700; Sellards, 1691.
Georgia: McCollie, 1184.
sand and gravel deposits: Teas, 1893.
Greenland: Bøggild, 167.
Guatemala: Redfield, 1506.
Gulf Coastal Plain: Miser, 1326.
Haiti, central plain: Woodring, 2189.
Idaho, Cranes Flat, Henry, and Lakes Creek quadrangles: Mansfield, 1221.
southeastern: Kirkham, 1053.
Illinois, Adams County, northeastern: Currier, 440.
Avon-Canton area: Savage, 1650.
Edgington-Milan area: Savage, 1649.
La Harpe and Good Hope quadrangles: Savage, 1651.
Morris quadrangle: Culver, 438.
New Athens-Okawville area: Shaw, 1719.
Indiana: Logan, 1141.
Knobstone cuesta region: Malott, 1214.
Iowa, Blackberry stage: Fenton, 670.
Stuart area: Tilton, 1908.
Kansas, Butler County, Eldorado oil and gas field: Fath, 572.
Cowley County: Elliott, 552.
Kentucky, Jackson Purchase region: Jillson, 890.
Labrador, Komatorkov Fiord: Coleman, 381.
Nachvak Fiord: Coleman, 381.
northeastern, and New Quebec: Coleman, 381.
Louisiana: Glenn, 449.
oil and gas fields: Richardson, 1587.
Mackenzie, Mackenzie basin: Cameron, 274.
Mackenzie River district: Whittaker, 2118; Williams, 2140.
Manitoba, Maskwa River nickel-copper deposits: McCann, 1185.
Osbeau River area: Cooke, 415.
Oswagan Lake-Burntwood River area: Alcock, 7.
Bat River: Alcock, 8.
Rice Lake area: Cooke, 415.
Upper Whitemouth area: Johnston, 917.
Winnipegosis area: Johnston, 917.
Massachusetts, central western: Miller, 1309.
Essex County: Clapp, 329.
INDEX.

Geologic maps—Continued.
Mexico, El Oro and Tiahuana districts: Flores, 589.
Lower California, Distrito Sur: Bustamante, 269; La Purisima region: Holm, 761.
Mid-Continent and north Texas oil regions: Rogers, 1613.
Montana, Cat Creek oil field: Lupton, 1177.
central and eastern: Clapp, 330.
Phillipsburg district: Pardee, 1459.
Phillipsburg phosphate field: Pardee, 1457.
Sweet Grass Hills: Kemp, 961.
Nevada, Divide district: Knopf, 1061.
Manhattan district: Ferguson, 530.
Mills City tungsten district: Hess, 777.
Muddy Mountain overthrust: Longwell, 1146.
Muddy Mountains region: Longwell, 1144.
Santa Fe district, Mineral County: Clark, 340.
Toquima Range: Ferguson, 580, 582.
New Brunswick, Moncton area: Wright, 2209.
Newfoundland, west coast: Brunton, 225.
New Hampshire, Hanover district: Merritt, 1288.
New Jersey, greensand beds: Mansfield, 1223.
New Mexico, Iron Mountain: Smythe, 1777.
Jornada del Muerto: Darton, 467.
Mogollon district: Ferguson, 581.
Raton-Brilliant-Koehler area: Lee, 1105.
Sandia and Manzano mountains and Sierra de los Pinos: Darton, 467.
Sandia Mountains: Ellis, 555.
San Juan County: Bauer, 94.
Tularosa Basin: Darton, 467.
Tyrone district: Paige, 1447.
Valencia and Socorro counties (parts): Darton, 467.
New York, Adirondacks: Newland, 1391.
Mount Marcy quadrangle: Kemp, 960.
New York City: Reeds, 1565.
West Point quadrangle: Berkey, 131.
North Carolina, Cherokee County, Nottely and Valley River belt: Bayley, 99.
North Dakota, New Salem lignite field: Hancock, 711.
Nova Scotia, Horton-Windsor district: Bell, 126.
Ohio, Camp Sherman quadrangle: Hyde, 850.
Wayne County: Conrey, 403.
Oklahoma: Reeves, 1599; Robinson, 1603.
Ardmore Basin: Goldston, 667.
Ardmore quadrangle: Goldston, 666.
Jefferson County: Robinson, 1603.
mineral resources: Oklahoma G. S., 1410.
Ontario, Timiskaming district, Kenogami Lake area: Cooke, 414.
Ottawa, Black River area: Wright, 2294.
Ottawa: Burrows, 253.
Ontario, Sudbury district, Moncrieff and Hess townships: Quirke, 1237.
Thunder Bay district: Tanton, 1854.
Timiskaming district, Kenogami Lake area: Cooke, 414.
Larder Lake area: Cooke, 414.
Round Lake area: Cooke, 414.
Pennsylvania, oil and gas fields: Richardson, 1888.
wester, oil and gas fields: Ashley, 50.
Quebec, Beauceville area: MacKay, 1198.
Gaspe Peninsula: LeMieux township: Alcock, 12.
Gaspe Peninsula / (locally: Coleman, 385.
Geologic maps—Continued.

Recession of the last ice sheet in New England: Antevs, 40.

South Dakota, Badlands: Ward, 2033.

Dewey County: Ward, 2034.

Tennessee, Waynesboro quadrangle: Miser, 1325.

Texas: Moore, 1358.

Coke County: Beede, 118.

Johnston County: Winton, 2066.

Lacasa area, Ranger district: Ross, 1816.

McLennan County: Face, 1437.

Medina County: Liddle, 1128.

north central, Pennsylvanian: Moore, 1358; Plummer, 1492.

northeastern: Thompson, 1885.

northeastern (part): Hopkins, 821.

Solitario uplift: Powers, 1501.

Wiles area, Stephens County: Dobbin, 506.

Trinidad: Milner, 1322.

United States, physiographic: Lobeck, 1133.

Utah: Moore, 1362.

(part): Campbell, 279.

Vermont, Braintree: Richardson, 1585.

Virginia, Dickenson County: Giles, 638.

Russell County: Wentworth, 2070.

western: Stose, 1841.

Washington, mining districts: Patty, 1476.

West Virginia, economic deposits: White, 2101.

Nicholas County: Reger, 1573.

Wyoming, oil and gas fields: Morgan, 1957; Richardson, 1589.

Osage oil field, Weston County: Collier, 390.

Rawlings and Sweetwater uplifts: Fath, 573.

Yukon, Keno-Hill district: Cockfield, 373.

Mayo district: Cockfield, 375.

Sixtymile and Ladue rivers area: Cockfield, 372.

Geologic time.

Chronology in geology: Udden, 1951.


Postglacial time, duration: Brückner, 223.

Recession of the last ice sheet in New England: Antevs, 40.

Taonurus, use in estimating geologic time: Galloway, 623.

Time divisions of glacial periods: Osborn, 1428.

Geological surveys. See Surveys.

Geomorphology. See Physiographic geology.

Geomorphology. See Physiographic geology.

Geomorphology. See Earth, figure.

Geology, general: Peck, 1477.

Geology and geography in the United States: Mathews, 1239.

Geology as a profession: Little, 1151.

Geology in partnership with American industry: Smith, 1758.

Geophysical.

Diffusion in silicate melts: Bowen, 175.

Geophysical investigations: Day, 481.

Observatories, need for: Jaggar, 868.

Pressure in magmas: Morey, 1364.

Georgia.

Geological Survey, historical sketch: Cave, 301.

Macon area: Cooke, 412.

Economic geology.

Clay: Ries, 1593.

Manganese, Cartersville district: Anonymous, 2224.

Mineral resources: Cave, 301.

Sand and gravel deposits: Teas, 1953.

Historical geology.

General: McCallie, 1184.

Mineralogy.

Leucite, Graves Mountain, Lincoln County: Watson, 2056.

Meteorite, Pitts, Wilcox County: McCallie, 1183.

Gilsonite.

Utah: Douglass, 513.
INDEX.

183

Glacial anticyclones: Hobbs, 799, 801; and in Visher, 1891.

Glacial deposits.


Correlation with Swedish time scale: De Geer, 485, 486.

Iowa, northwestern: Lees, 1197.

Glacial erosion.

Gouging of valleys by glaciers: Roberts, 1599.

Glacial geology. See also Quaternary.

Alberta, Calgary: Burwash, 256.

Altamont moraine: Leverett, 1122.

Bemis moraine: Leverett, 1122.

British Columbia, Entnuk Lake district: Brock, 201.

Vancouver Island: Berry, 145.

Vancouver region: Johnston, 919.


Cause of glaciation: McCabe, 1182; Manson, 1225.

Colorado, Estes Park region: Wooster, 2186.


Connecticut Valley: Antevs, 40.

Coteau des Prairies, glacial formations: Leverett, 1121.


Idaho: Davis, 472.

Illinois, Alton: Leighton, 1110.

Edgington-Milan area: Savage, 1649.

La Harpe and Good Hope quadrangles: Savage, 1651.

Morris quadrangle: Culver, 438.

New Athens-Okawville area: Shaw, 1719.

northern: Leighton, 1109; differentiation of drift sheets: Leighton, 1111.

Indiana: Malott, 1216.

Iowa: Cable, 266.

Ames, glacial tills: Smith, 1784.

Clarke County: Kay, 943.

Des Moines: Keyes, 1041.

Iowan-Wisconsin borders: Cable, 268.

Kansas, Kansas tills: Schoewe, 1601.

Labrador, northeastern: Coleman, 381.

Lake Erie, preglacial outlet: Wright, 2205.


Manitoba, Seal-Churchill divide, terminal moraine: Alcock, 9.

Upper Whitemouth area: Johnston, 917.

Winnipegosis area: Johnston, 917.

Michigan, northern peninsula: Leverett, 1119.

Minnesota, drift sheets: Sardeson, 1647.

Montana: Davis, 472.

Nebraska and Kansas tills, Iowa: Kay, 943.


New Hampshire: Goldthwait, 699.

New York, Mohawk-Hudson region: Stoller, 1825.

Mount Marcy quadrangle: Alling, 29.


Ohio, Camp Sherman quadrangle: Hyde, 859.

Wayne County: Conrey, 403.

Quebec, Anticosti Island: Twenhofel, 1945.

Beauceville area: MacKay, 1198.

Gaspe Peninsula: Coleman, 385.

Recession of the last ice sheet in New England: Antevs, 40.

Time divisions of glacial period: Osborn, 1428.


Vermont, Braintree: Richardson, 1855.

Lake Willoughby region: Jacobs, 865.

Washington, northern: Runner, 1635.

Spokane region: Large, 1092; Leverett, 1123; Spokane region: Pardee, 1466.

Wisconsin, Driftless Area: MacClintock, 1198.

Ripon, gravel seam in limestone: Thwaites, 1904.

Wisconsin ice sheet, ablation of eastern lobe: Cook, 499.
Glacial lakes. See also Beaches; Shore lines: Terraces.
Lake Missoula: Davis, 472.
Ontario: Coleman, 388.
Vermont, Lake Willoughby: Jacobs, 865.
Glacial period. See Glacial geology.
Glaciation, cycle of: Hobbs, 806.
Glaciers.
Alaska, Kennecott Glacier: Bateman, 88, 90.
British Columbia, Bromley Glacier: Hayes in Bateman, 88.
Cycle of glaciation: Hobbs, 806.
General: Hobbs, 807.
Mexico, Popocatépetl: Weitzberg, 2060.
Glaucocite, association with unconformities: Goldman, 658.
Goosenuda quadrangle, Kentucky: Weller, 2061.
Gold.
Alaska: Brooks, 205, 212.
Goodnews Bay region: Harrington, 721.
Juneau and Ketchikan districts: Mertie, 1289.
Kuskokwim region: Martin, 1230.
Willow Creek district: Chapin, 323.
Appalachians, southern: Frame, 608.
Arizona: Heikes, 757, 759.
gold placers: Alcan, 25.
British Columbia, Barkerville area: Johnston, 925.
Bridge River area: McCann, 1187, 1188.
Cariboo district, Barkerville quartz veins: Uglow, 1960; Cedar Creek area; Johnston, 928.
coast and islands: Dolmage, 512.
Colquihalla area: Cairnes, 272.
California: Yale, 2213, 2215, 2218.
ancient river-bed deposits: Alling, 33.
southern: Haley, 705.
Colorado: Henderson, 770, 773.
Eastern States: Dunlop, 535.
General: Dunlop, 533, 536.
Idaho: Gerry, 631.
Indiana, placer gold: Hafer, 703.
Herk Lake region: Alcock, 10.
northern: Gordon, 675.
Rice Lake area: Cooke, 415.
southeastern: DeLury, 491.
Mexico, El Oro and Tlalpujahua districts: Flores, 589.
El Oro district, Mexico: Winchell, 2160.
Montana: Gerry, 630, 633.
Nevada: Heikes, 755.
Divide district: Knopf, 1061.
Johnnie district: Labbee, 1079.
Mineral County, Cedar Mountain: Knopf, 1062.
Round Mountain district: Ferguson, 582.
Santa Fe district, Mineral County: Clark, 340.
Toquima Range: Ferguson, 580.
New Mexico: Henderson, 766, 771.
Colfax County, Aztec mine: Chase, 324.
Mogollon district: Ferguson, 381.
Sierra del Oro: Keyes, 1005.
Nicaragua, Piz Piz district: Hawxhurst, 734.
INDEX. 185

Gold—Continued.
Ontario: Hopkins, 822, 823.
Blanche River area: Burrows, 253.
Boston-Skead area: Burrows, 232.
Goudreau area: Burrows, 249, 251.
Lightning River area: Knight, 1060.
Michipicoten district: Thomson, 1889.
Schreiber-Duck Lake area: Hopkins, 824.
Timiskaming district, Larder Lake area: Cooke, 414.
Oregon: Yale, 2213, 2216, 2219.
Quebec, Beauceville area: MacKay, 1198.
South Dakota: Henderson, 764, 766, 774.
Texas: Henderson, 769.
Utah: Heikes, 753, 756, 760.
Ophir district: Olmstead, 1413.
Washington: Gerry, 632.
Yukon, Sixtymile and Ladue rivers area: Cockfleld, 372.
Goodnews Bay region, Alaska: Harrington, 721.
Grand Canyon. See Arizona.
Granite.
Segregation granites: Lane, 1088.
Graphite study of igneous rock series: Grout, 692.
Graphite.
General: Beach, 101, 105, 110; Miller, 1305.
Origin: Alling, 31; Clark, 345; Spence, 1778; Winchell, 2158.
Quebec: Spence, 1782.
Buckingham district: Eardley-Wilmot, 542.
Graptolitoida.
Glossograptus: Ruedemann, 1624.
Western North America: Burling, 242.
Grassy black shales: Keyes, 1002.
Gravel.
General: Beach, 109, 113; Stone, 1826; Teas, 1863.
Georgia: Teas, 1863.
Great Basin ranges, origin: Davis, 474; Keyes, 1030.
Great Basin region, physiographic history: Keyes, 1021.
Greater earth: Chamberlin, 310.
Greenland.
Geology: Bøggild, 167.
Economic geology.
Mineral resources: Ball, 68.
Historical geology.
Northwestern Greenland: Koch, 1074.
Ground water. See Underground water.
Groundwork of diastrophism: Chamberlin, 309.
Guatemala.
Economic geology.
Petroleum possibilities: Redfield, 1560.
Historical geology.
General: Redfield, 1560.
Gulf Coastal Plain salt domes, secondary intrusive origin: Matteson, 1241.
Guambo.
Iowa: Keyes, 1039.
Guppy, R. J. L., biography: Harris, 723.
Gypsum.
General: Cottrell, 427.
Geology: Newland, 1392.
In Gulf coast salt domes: Barton, 76.
New York: Newland, 1391.
Occurrence and supply: Newland, 1393.
Origin and classification: Wilder, 2128.
Hague, Arnold, biography: Iddings, 860.
Haiti.
Economic geology.
Oil possibilities, central plain: Woodring, 2189.
Haiti—Continued.

**Historical geology.**
- Miocene, central plain: Woodring, 2189.

**Paleontology.**
- Dicthyocoeus, Eocene foraminifer: Woodring, 2190.
- Tertiary plants: Berry, 145.

**Hall, James, biography:** Clarke, 355.

**Hassemanite:** Hasseman, 730.

**Hawaiian Islands.**
- Kauai: Hinds, 795.

**Mineralogy.**

**Physical geology.**
- Intrusive bodies at Kilauea: Powers, 1497.
- Tectonic aspect of volcanic eruption: Wood, 2184.
- Volcanic action: Meinzer, 1263.
- Volcanic investigation: Jaggar, 867.

**Ground-water problems:** Meinzer, 1262.

**Herd Lake region, Manitoba:** Alecock, 10.

**Hess, F. L., biography:** Anonymous, 2231.

**Hess, F. L., biography:** Anonymous, 2231.

**Historical geology (general).** For regional see names of States. See also the different systems; Correlation; Geologic formations, tables.
- Basal glauconite and phosphate beds: Goldman, 661.
- Comanche succession, taxonomic rank: Stanton, 1797.
- Cretaceous-Eocene transition: Cross, 436; Keyes, 980, 981; Knowlton, 1071; Matthew, 1251; Schuchert, 1681; Stanton, 1796.
- Cretaceous-Tertiary boundary: Matthew, 1246; vertebrate evidence as to: Matthew, 1249.
- General: Parks, 1465; Smithsonian Inst., 1774, 1775.
- Initial deposits of a formation: Twenhofel, 1947.
- Lance and Fort Union formations, age: Cross, 435; Knowlton, 1067; Schuchert, 1677.
- Mid-Continental oil field, paleogeography and historical geology: McCoy, 1193.
- Taconic revolution, evidence for examined: Clark, 346.
- Yorkie: Keyes, 955.

**History, philosophy, etc.**
- Canada: Parks, 1465.
- General: Benjamin, 129.
- Geology: Gregory, 686.
- Geology at Johns Hopkins University: Keyes, 967.
- Kentucky geological surveys: Jilson, 896.
- New York, Adirondack region: Clarke, 357.
- Ohio, geological survey: Mendenhall, 1267.
- Paleontological research on Pacific coast: Merriam, 1270.
- Statistical study of geologists: Mathews, 1239.
- Textbooks of geology: Fairchild, 569.

**Honduras.**

**Petrology.**
- Jade, Copan: Washington, 2050.
- Obsidian, Copan: Washington, 2047.

**Huronian.** See Pre-Cambrian.

**Hyracodons, Big Badlands, South Dakota:** Sinclair, 1746.

**Ice age.** See Glacial geology.

**Ice ages (ancient).**
- British Columbia, Silurian tillite: Shepard, 1725.
- Cause: McCabe, 1182; Manson, 1226.
- General: Coleman, 383; McCabe, 1182.
- New Brunswick, St. John, Devonian: Matthew, 1243.
- Oklahoma, Arbuckle and Wichita mountain regions, Pennsylvanian: Weidman, 2059.
- Ontario, pre-Cambrian glaciation: Coleman, 388.
- Quebec, Levis, tillite: Sayles, 1655.
INDEX.

187

Idaho.

Areas described.
Alturas quadrangle, Blaine County: Ballard, 70.

Economic geology.
General: Bell, 124.
Gold, silver, copper, lead, and zinc: Gerry, 631.
Mining industry, 1921: Campbell, 282.
Oil possibilities: Heald, 722.
southeastern Idaho: Kirkman, 1053.
Quartzburg, Gold Hill mine: McDermid, 1194.

Historical geology.
Igneous geology, southeastern Idaho: Mansfield, 1221.
Snake River valley: Buwalda, 263.

Mineralogy.
Black sands: Shannon, 1702.
Boulangerite, Blaine County: Shannon, 1705.
Ferroanthophyllite, Coeur d'Alene district: Shannon, 1698.
Galenobismutite, Boise County: Shannon, 1707.
Garnet: Shannon, 1710.
Gouge clays, mineralogy: Shannon, 1712.
Ludwigite, Lemhi Co.: Shannon, 1701.
Owyheeite, Owyhee County: Shannon, 1704.
Trichalcite, Shoshone County, Shannon, 1711.
Vivianite, Clearwater County: Shannon, 1699.

Paleontology.
Payette flora: Chaney, 318.

Petrology.
Southeastern Idaho: Mansfield, 1221.

Physical geology.
Rate of soil deposition, Palouse area: Peterson, 1444.
Southeastern Idaho: Mansfield, 1222.

Physiographic geology.
Features of glacial origin: Davis, 472.

Igneous and volcanic rocks.
Alaska, Cold Bay district: Capps, 289.
Goodnews Bay region: Harrington, 721.
Salmon-Unuk River region: Moffit, 1335.
Tuxedni Bay area: Moffit, 1335.
Arizona, Jerome district, Yavapai County: Reber, 1557.
lower Gila region: Ross, 1618.
Papago country: Bryan, 227.

Average chemical composition: Clarke, 333.
British Columbia, Bridge River area: McCann, 1187.
coast and islands: Dolmage, 512.
Eutsuk Lake district: Brock, 201.
Lasqueti Island: MacKenzie, 1201.
Salmon River district: Schofield, 1666.
Classification: Pirsson, 1459.
southwestern: Coffin, 376.
Density, average: Washington, 2049.
General: Washington, 2038.
Graphic study of igneous rock series: Grout, 692.
Greenland, northeastern: Koch, 1074.
Idaho, southeastern: Mansfield, 1221.
Igneous intrusion, after-effects: Kemp, 965.
Massachusetts, Essex County: Clapp, 329.
Igneous and volcanic rocks—Continued.

Mexico, El Oro and Tlalpujahua districts: Flores, 589.
Hidalgo, Atotonilco el Grande: Wittich, 2167.
Lower California, La Purisima region: Helm, 761.
northeastern: Staub, 1798.
Puebla, San Juan de los Llanos: Wittich, 2169.
Montana, Sweet Grass Hills: Kemp, 961.
Nevada, Candelaria district: Knopf, 1063.
Divide district: Knopf, 1061.
Manhattan district: Ferguson, 580.
Mineral County, Cedar Mountain: Knopf, 1662.
Round Mountain district: Ferguson, 582.
Santa Fe district, Mineral County: Clark, 340.
Newfoundland, west coast: Brunton, 225.
New Hampshire, Hanover district: Merritt, 1288.
Portsmouth Basin: Wanda, 2026.
New Jersey, Beennerville: Auroosseau, 56.
New Mexico, Mogollon district: Ferguson, 581.
Raton-Brilliant-Kocher area: Mertie, 1293.
Sandia Mountains: Ellis, 555.
Taylor Creek district: Hill, 790.
Tyrone district: Paige, 1447.
New York, Mount Marcy quadrangle: Kemp, 966.
West Point quadrangle: Berkey, 131.
Ontario, Timiskaming district, Lakwene Lake area: Cooke, 41.
Pennsylvania, Lebanon County, Ordovician: Gordon, 676.
Quebec, Beauceville area: MacKay, 1188.
Gaspé County, Leman Township: Alcock, 12.
Montreal Hills outliers: Howard, 829.
Saskatchewan, Lake Athabasca region, norite rocks: Alcock.
Texas, Medina County: Liddle, 1128.
Solitario uplift: Powers, 1501.
Triangular representation: Johannsen, 902.
Utah, Ophir district: Olmstead, 1413.
Vermont, Braintree: Richardson, 1585.
Virginia, Louisa County, lamprophyre dike: Watson, 2055.
Yukon, Sixtymile and Ladue rivers area: Cockfield, 372.

Illinois.
Soils, DeKalb County: Mosier, 1372.
Areas described.
Adams County, northeastern: Currier, 440.
Avon quadrangle: Savage, 1650.
Canton quadrangle: Savage, 1650.
Edginton quadrangle: Savage, 1649.
Good Hope quadrangle: Savage, 1651.
La Harpe quadrangle: Savage, 1651.
Milan quadrangle: Savage, 1649.
Morris quadrangle: Culver, 458.
New Athens quadrangle: Shaw, 1719.
Okawville quadrangle: Shaw, 1719.
Economic geology.
Bituminous shales: Barrett, 74.
Coal, District IV: Cady, 269.
Low-sulphur: Cady, 271.
Milan quadrangle: Savage, 1649.
Fire clays: Parmelee, 1467.
Fluorite, optical, southern Illinois: Pogue, 1494.
Mineral resources: Barrett, 73.
Oil and gas, Monroe County: Mylius, 1377.
Oil and gas fields, map: Richardson, 1386.
Oil fields, influence of faulting: Wheeler, 2060.
Petroleum: Collingwood, 393.
Potash resources: Schroyer, 1674.
Potash shales: Austin, 57; Union County: Krey, 1077.
Pyrite: Cady, 270.
Wamac oil pool, Marion County: Wheeler, 2581.
INDEX

Illinois—Continued.

Historical geology.


Pleistocene: Baker, 64.

Pleistocene succession near Alton: Leighton, 1110.

St. Peter sandstone: Dake, 450.

Windrow formation: Thwaites, 1905.

Mineralogy.

Fluorite: Pogue, 1494.

Paleontology.

Alton mammalian fauna, age: Leighton, 1110.

Mazon Creek: Moodie, 1340.

Pleistocene Mollusca: Baker, 64.

Grundy County: Baker, 62.

Physical geology.

Pleistocene succession near Alton: Leighton, 1110.

Impressions on rocks: Twenhofel, 1949.

Inclusions in igneous magmas: Bowen, 179.

Indiana.


Economic geology.

Building stones: Logan, 1139.

Cement materials: Logan, 1140.

Coal seams, distribution: Logan, 1142.

General: Logan, 1141.

Indianaite: Ries, 1593.

Kaolin, origin: Bucher, 234.

New Albany oil shale: Reeves, 1572.

Oil in middle Ordovician: Heald, 751.

Petroleum: Bownocker, 188.

Historical geology.

General: Cumings, 439.

Physical geology.

Concretions in Knobstone, Monroe County: Tucker, 1940.

Planation stream piracy: Malott, 1215.

Sphalerite in coal pyrite, Bicknell: Dove, 514.


Stylolites, nature and origin: Stockdale, 1819.

Widening of valleys by frost action: Culbertson, 437.

Physiographic geology.

General: Malott, 1216.

Indiana Creek, Lawrence County, subterranean phenomena: Malott, 1217.

Knobstone cuesta region, southern Indiana: Malott, 1214.

Sand dunes, northwestern Indiana: Cressey, 431.

Indianaite, Indiana: Ries, 1593.

Inskin Bay district, Alaska: Moffit, 1336.

Insecta.

Colorado, Eocene: Cockerell, 366.

Fulgoridae, Eocene: Cockerell, 367.

Hymenoptera, earliest: Cockerell, 368.

Moth, Hydriomena, Florissant: Cockerell, 370.

Paleozoic insects, revision: Handlirsch, 712.

Wyoming, Eocene: Cockerell, 366.

Intraformational corrugated rocks: Miller, 1316.

Intrusions. See also Dikes.

Hawaii, Kilauea: Powers, 1497.

Igneous intrusion, after-effects: Kemp, 965.

Virginia, Louisa County, lamprophyre dike: Watson, 2055.
Invertebrates (general). See also the classes of invertebrates.

Inorganic constituents: Clarke, 332.
Ordovician, Ottawa region, Ontario: Wilson, 2146.
Pottsville fauna, Ohio: Morningstar, 1371.
Trenton fauna, Ontario and Quebec: Raymond, 1540.
Triassic, York County, Pennsylvania: Wanner, 2030.
West Virginia, Nicholas County: Price, 1517.

Areas described.
Pleistocene: Cable, 266.

Economic geology.
Coal: Rice, 1579.

Historical geology.
Cambrian: Keyes, 1035.
Cretaceous, southwestern Iowa: Keyes, 1014.
Drift sections, Des Moines: Keyes, 1041.
Glacial period: Kay, 944.
Hackberry stage of Iowa Devonian: Fenton, 579a.
Maquoketa shale: Bradley, 191.
St. Peter sandstone: Dake, 450.
Stuart area: Tilton, 1908.
Volcanic ash in glacial till: Keyes, 1041.
Windrow formation: Thwaites, 1905.

Paleontology.
Beaver tooth, Des Moines: Thomas, 1879.
Brachiopoda, Maquoketa shale: Bradley, 191.
Gastriceras, Mystic: Thomas, 1878.
Hackberry fauna: Fenton, 579a.
Lime Creek shales, micropaleontology: Thomas, 1881.
Proboscidian remains, Clarke County: Kay, 943.
Pugnoides, Devonian: Thomas, 1877.
Trilobites, St. Lawrence limestone: Walter, 2025.

Physical geology.
Gumbo: Keyes, 1039.
Nebraskan and Kansas tills: Kay, 945.
Sink hole, Pocahontas County: Cable, 267.
Sloven fold: Keyes, 992.

Physiographic geology.
Ames, glacial tills: Smith, 1764.
Drift sheets, relation, Clarke County: Kay, 943.
Driftless Area, erosional history: Trowbridge, 1921.
Eskers, central Iowa: Smith, 1766.
Glacial deposits, Des Moines: Keyes, 1038.
Interglacial volcanic ash, Des Moines: Keyes, 972.
Iowan-Wisconsin borders: Cable, 268.
Pleistocene: Cable, 266.
Valley gravels of northwestern Iowa: Lees, 1107.
Webster County, eolian deposits: Smith, 1763.

Underground water.
Conservation of underground water: Lees, 1108.

Iron.
Alberta: Allan, 19.
Belcher Islands, Hudson Bay: Woodbridge, 2188; Young, 2221.
Biwaik formation, origin: Gruner, 694.
Clinton iron ore, origin: Galloway, 622.
General: Burchard, 239, 240.
Indiana: Logan, 1141.
Iron-depositing bacteria: North, 1405.
Magnetites, North Carolina, origin: Bayley, 97.
Mesabi magnetic ores, origin: Grout, 691.
Minnesota, Mesabi range: Gruner, 693.
Montana, Sweet Grass Hills: Kemp, 961.
New Mexico, Chupadera Mesa: Keyes, 1018.
Iron Mountain: Smythe, 1777.
Iron—Continued.

New York: Newland, 1391.
Adirondack Mountains, magnetite deposits: Miller, 1312, 1317; magnetic ores, sedimentary phases: Nason, 1380.
Essex County, magnetic ores: Henry, 776.
North Carolina, Landing, magnetite-marble ore: Bayley, 98.
magnetite ores: Bayley, 96, 100; Pratt, 1505.
Ontario: Collins, 400; Knight, 1069.
Leeds County, hematite: Wright, 2207.
Michipicoten area: Collins, 396.
Paragenesis of martite and magnetite: Newland, 1395.
Tennessee, Waynesboro quadrangle: Miser, 1325.
Virginia, Oriskany ores: Doak, 505.
Washington: Jenkins, 884.

Isostasy.
Applications in geology: Kemp, 969.
Cause of thrusting: Lawson, 1101.
Comagmatic regions, distribution: Washington, 2049.
Composition of crust, data from: Washington, 2058.
Earth movements: Reid, 1573.
General: Bowie, 183; Hayford, 743; Keyes, 988; Wood, 2187.
Geodetic data, results: Bowie, 181.
Geological directrix: Keyes, 987.
Gravity observations: Putnam, 1524.
Minimum span of isostatic effect: Keyes, 982.
Mountain formation: Burrard, 247.
Ocean currents and isostasy: Bowie, 182.
Relation to uplift and subsidence: Bowie, 183.
Rock density: Washington, 2049.
Rôle of isostatic stress: Willis, 2143.
Theory: Bowie, 184; Putnam, 1524.
Weight of sedimentary rocks: Lane, 1090.
Isostatic theory and applied geology: Keyes, 988.
Jointing.
Mechanical interpretation of joints: Bucher, 231.

Jamaica.

Historical geology.
Cretaceous and Tertiary: Trechmann, 1919.

Paleontology.
Barrettia: Trechmann, 1920.
James, Edwin, biography: Keyes, 1034.
Jasperoid of Joplin district: Smith, 1772.
Jurassic. See also Paleontology, Jurassic.
Alaska, Cold Bay district: Cappe, 289.
Insink Bay district: Moffit, 1336.
Tuxedni Bay area: Moffit, 1335.
Arizona: Keyes, 1029.
Los Angeles region: Bryan, 228.
northern: Reeside, 1568.
British Columbia, Bridge River area: McCann, 1187.
Kitzaul Valley: Hanson, 718.
Salmon River district: Schofield, 1662, 1666.
Taseko Lake-French Bar Creek: MacKenzie, 1200.
Taseko Valley: MacKenzie, 1199.
Vancouver Island: Dolmage, 509.
California, Kern County: English, 682.
Colorado, southwestern: Coffin, 376.
Idaho, southeastern: Kirkham, 1053.
Montana, Cat Creek oil field: Lupton, 1177.
central and eastern: Clapp, 330.
Crow Indian Reservation: Thom, 1875.
Soap Creek oil field: Thom, 1872.
Sweet Grass Hills: Kemp, 901.
Jurassic—Continued.
Nevada, Mineral County, Cedar Mountain: Knopf, 1062.
Muddy Mountains region: Longwell, 1144.
New Mexico: Darton, 467.
Utah, southern: Moore, 1362.
southwestern: Reeside, 1568.

Kansas.
Areas described.
Kansas City district: Elledge, 552.
Eldorado oil and gas field, Butler County: Fath, 572.

Economic geology.
Arkansas City district: Elledge, 552.
Clay and shale, Arkansas City: Teetor, 1867.
Eldorado oil field, Butler County, Stapleton oil horizon, age: Fath, 574.
Helium-bearing natural gas: Rogers, 1613.
Mid-Continent oil-field structures: Monnett, 1338; reflected buried hills: Powers, 1503.
Natural gas, Eldorado field: Fath, 572.
Oil and gas, central Kansas: Williams, 2134.
Oil possibilities, western Kansas: Lupton, 1178.
Oil sands, southeastern Kansas: Williams, 2133.
Petroleum: Moore, 1354.
Eldorado field: Fath, 572.
Sallyards oil field, structure: Berger, 130.
Salt: Darton, 464.
Urschel oil pool, Marion County: Shea, 1722.

Historical geology.
Boring, Gove County: Lupton, 1179.
Dakota formation: Gress, 657.
Granite ridge, buried: Moore, 1359.
Metamorphic rocks, Woodson County: Twenhofel, 1944.
Mid-Continent oil fields: Aurin, 55.
Oil sands, southeastern Kansas: Williams, 2133.
Red beds and faunas of Appalachian and Kansas-Texas sections: Beede, 119.
Western Kansas: Lupton, 1178.

Paleontology.
Amphibian, upper coal measures: Martin, 1235.
Anguillavus hackberryensis, Niobrara beds: Martin, 1233.
Cheyenne sandstone flora: Berry, 145.
Dakota fauna: Gress, 657.
Footprints in coal measures: Martin, 1234.
Onychopus (amphibian): Martin, 1236.
Plaistocene Mollusca, Wallace County: Hanna, 715.
Reptilia, Niobrara group, Logan County: Wiman, 2157.
Vertebrates, collecting: Sternberg, 1809.

Petrology.
Common rocks: Schmidt, 1660.

Physical geology.
Aqueous loess: Todd, 1909.
Granite ridge: Powers, 1503.
Metamorphic rocks, Woodson County: Twenhofel, 1944.
Sallyards oil field, structure: Berger, 130.
Wamego anticline: Beede, 117.

Physiographic geology.
Kansas tills, southernmost extension: Schoewe, 1661.
Lacustrine beds near Atchison: Todd, 1910.

KaoLin.
Alabama: Clark, 341.
General: Ries, 1593.
Indiana: Logan, 1141.
North Carolina: Ries, 1593.
United States: Ries, 1593.


Kentucky.
Geological surveys, history: Jillson, 896.
Mammalian and human remains in caves: Miller, 1308.
Kentucky—Continued.

Areas described.
- Frankfort area: Jillson, 892.
- Jackson Purchase region: Jillson, 890.
- Warren County: St. Clair, 1638.
- Webster County: Glenn, 653.

Economic geology.
- Asphalt rock: Jillson, 887.
- Clay: Ries, 1593, 1594.
- Coal: Jillson, 899.
  - Buckhorn region, eastern Kentucky: Jillson, 889.
  - Webster County: Glenn, 653.
- Coal formations: Campbell, 281.
- Fire clay, eastern coal field: Ries, 1595.
- Fluorspar: Jillson, 887.
- Irvine oil district: St. Clair, 1637.
- Mineral production: Jillson, 891.
- Natural gas: Jillson, 887.
- Oil and gas conservation: Caldwell County: Weller, 2062.
  - Jack son Purchase region: Jillson, 890.
- Oil fields: Glenn, 650.
- Oil shale: Alderson, 13; Jillson, 887.
- Petroleum: Jillson, 887.
  - eastern Kentucky: Jillson, 894.
- Warren County: St. Clair, 1638, 1639.

Historical geology.
- Bentonite in Ordovician: Nelson, 1387.
- Buckhorn region, eastern Kentucky: Jillson, 889.
- Caldwell County: Weller, 2062.
- Golconda quadrangle: Weller, 2061.
- Irvine district: St. Clair, 1637.
- Mills Springs area, Monticello quadrangle: Foyles, 607.
- Mississippian series, eastern Kentucky: Butts, 262.
- Nicholasville boring: Miller, 1301.
- Oil field stratigraphy: Jillson, 887.
- Trenton: Raymond, 1548.
- Warren County: St. Clair, 1639.

Mineralogy.
- Meteorite, Cumberland Falls, Whitley County; Merrill, 1276.
  - Glasgow meteorite: Miller, 1304.
- Labrador, northeastern: Coleman, 381.
- Laccoliths.
  - Nature and origin: Keyes, 993.
  - New Mexico: Keyes, 999.

Lakes.
- Basin and Range province: Meinzer, 1264.
- Lake Chelan, origin and history: Runner, 1635.
- Michigan, inland lakes: Scott, 1687.

Lakes, extinct.
- Lake Bonneville: Pack, 1438.
  - Bonneville Lake beds, origin: Keyes, 1042.
  - Mackenzie River basin, postglacial lakes: Cameron, 275.
- Lakes, glacial. See Glacial lakes.
- Lamellibranchiata. See Pelecypoda.
- Lances and Union formations, age: Schuchert, 1681.
- Landslides.
  - Great Basin ranges: Davis, 474.
- Laramie problem: Knowlton, 1070.

Lava.
- Plateau basalts: Washington, 2031.
- Surface fusion: Diller, 304.
- Lava flows, New Mexico: Lee, 1163.
LEAD.

Alaska: Brooks, 205, 212.
Fairhaven district: Levensaler, 1117.
Arizona: Heikes, 767, 759.
California: Yale, 2213, 2215, 2218.
Central States: Dunlop, 532, 534, 537.
Colorado: Henderson, 770, 773.
Eastern States: Dunlop, 535.
General: Siebenthal, 1731, 1734, 1736, 1740, 1741.
Idaho: Gerry, 631.
Montana: Gerry, 630, 633.
New Mexico: Henderson, 768, 771.
Oregon: Yale, 2213.
Quebec, Gaspe County, Lemiéux Township: Alcock, 12.
South Dakota: Henderson, 764, 766, 774.
Texas: Henderson, 769.
Utah: Heikes, 753, 756, 760.
Ophir district: Olmstead, 1413.
Washington: Gerry, 632.
Yukon, Keno-Hill district: Cockfield, 373.
Mayo district: Cockfield, 374, 375.

Lignite.

Louisiana: Glenk, 649.
North Dakota, Fort Berthold Indian Reservation: Bauer, 95.
New Salem lignite field: Hancock, 711.
Saskatchewan: MacLean, 1209.
Lilley, A. T., biography: Kindle, 1049.
Lime: Loughlin, 1157, 1160, 1164.
Limestone.

New York: Newland, 1391.
North Carolina: Loughlin, 1155.
Red limestones, origin: Galloway, 622.
Washington: Shedd, 1723.
Lingula, antiquity: Keyes, 1031.
Lithology. See Petrology.
Lithology of the White River sediments: Wanless, 2028.
Lithosphere, dynamics of: Jones, 935.
structural failure: Leith, 1113.
tidal stresses: Cotton, 420.
Llanoria: Miser, 1326.
Louisiana.

Economic geology.

Bellevue oil pool: Hull, 846.
Gulf Coastal Plain salt domes, secondary intrusive origin: Matteson, 1241.
Haynesville oil field, Claiborne Parish: Hull, 844; Scott, 1688, 1689; Teas, 1864, 1865.
Lignite: Glenk, 649.
Monroe gas field: Bell, 122.
Oil and gas pools, northern Louisiana: Hull, 845.
Salt domes: Deussen, 494.
Vinton oil field: Wrather, 2198.
Webster Parish gas fields, Hull, 847.

Historical geology.

Cretaceous, northwestern Louisiana: Hammill, 709.
Llanoria: Miser, 1326.
Salt domes: Powers, 1504.

Paleontology.

Orthophragmina: Cushman, 443.

Physical geology.

Salt domes: Powers, 1504.

Loess.

Aqueous loess: Todd, 1909.
Iowa: Cable, 365.
Origin and distribution: Wright, 2208.
Lower Silurian. See Ordovician.
Lucas, A. F., biography: Goodrich, 671.
Lunar craters, origin: Campbell, 288.
Lyman, B. S., biography: Lyman, 1180.
Mackenzie.

Areas described.
Great Slave Lake region: Cameron, 274; Hume, 850.
Mackenzie River region between Great Slave Lake and Simpson: Whittaker, 2118.
between Simpson and Wrigley: Williams, 2140.
North Nahanni and Root Rivers area and Caribou Island: Hume, 851.

Economic geology.
Lead-zinc deposits near Great Slave Lake: Dawson, 480.
Norman oil fields: Hume, 852.
Oil fields: Bosworth, 172, 173, 174; Kindle, 1043, 1048; Kitto, 1054; Ness, 1389; Redfield, 1559; Anonymous, 2227, 2228.
Oil prospecting, Mackenzie River valley: Kindle, 1046; Ness, 1388.

Historical geology.
Lower Mackenzie Valley: Kindle, 1043.
Mackenzie oil field: Bosworth, 173.
Mackenzie River basin: Dowling, 526; Kindle, 1048; Ness, 1388; geologic structure: Dowling, 524.

Paleontology.
Devonian Crinoidea: Springer, 1786.
Tertiary plant remains: Bell, 127.

Physical geology.
Lower Mackenzie Valley: Kindle, 1043.
Mackenzie River region, geologic structure: Dowling, 524.

Physiographic geology.
Postglacial lakes, Mackenzie River basin: Cameron, 275.

Magmas. See also Intrusions.
Assimilation during the Katmai eruption of 1912: Fenner, 578.
Contact phenomena: Eskola, 564.
Diffusion in silicate melts: Bowen, 175.
Igneous intrusion, after-effects: Kemp, 985.
Inclusions in igneous magmas: Bowen, 179.
Pressure in magmas: Morey, 1394.
Reaction principle in petrogenesis: Bowen, 178.
Regional metamorphism, relation to: Barrell, 72.

Magmatic differentiation.

Magnesite.
General: Yale, 2212, 2214, 2217.
Nevada, southern: Anonymous, 2237.
Washington: Petrascheck, 1485; Whitwell, 2121.

Magnesium: Loughlia, 1162.

Maine.

Areas described.
Portsmouth Basin: Wandke, 2026.

Economic geology.
General: Burr, 246.
Peat, Livermore quadrangle: Burr, 246.

Paleontology.
Macroprosperater nylanderi, Silurian, New Sweden: Raymond, 1541.

Petroleum.
Cape Nedick gabbro, York County: Wandke, 2027.
Portsmouth Basin, intrusive rocks: Wandke, 2026.

Physiographic geology.
Androscoggin River, former courses: Crosby, 433.

Mammalia.
Age of mammals, close: Osborn, 1435.
Agriochoerus, John Day beds: Thorpe, 1594.
Amynodontidae: Troxell, 1928.
Araeocyon: Thorpe, 1897, 1900.
Bear family, distribution: Merriam, 1269.
Bison remains, Cape Cod, Massachusetts: Allen, 22.
Blastemeryx marshi, restoration: Lull, 1173.
Mammalia—Continued.

Bothriodonts: Troxell, 1925.

Caenopus: Troxell, 1925.

California, Siestan, Hippopotamus: Stock, 1817.

Camelidae: Lull, 1170.

Canidae: Matthew, 1252.

Carnivora, Tertiary: Thorpe, 1901.


Cetacean, Archaeodelphis: Allen, 23.

Cioenodonts, Eocene, Montana: Gilley, 635.

Colorado, Yuma County, Pliocene: Cook, 496.

Cyclopidius: Thorpe, 1891.

Desmostyli, Tertiary: Hannibal, 717.

Vancouver Island: Cornwall, 416.

Dielodon edensis, southern California: Osborn, 1434.

Diceratherium: Troxell, 1931.

Entelodonts, Badlands, South Dakota: Sinclair, 1744, 1745.

Elephant, Mexico: Freudentberg, 612.

Elephants: Hay, 740.

Elephas jeffersonii: Osborn, 1429.

Epopoion, John Day beds: Thorpe, 1893, 1895.

General: Osborn, 1422.

Gundatoles: Troxell, 1934.

Hesperopithecus, Snake Creek beds: Osborn, 1427, 1430, 1431; Pycraft, 1325; Woodward, 2193; Anonymous, 2296.

Homogalax: Troxell, 1933.

Hoplophoneus, Titanotherium beds, South Dakota: Sinclair, 1746.

Hysenodontidae: Thorpe, 1899.

Hystrichyus: Troxell, 1898.

Hyracodon: Troxell, 1929.

Hyracodon, Big Badlands, South Dakota: Sinclair, 1746.

Illinois, Alton, Pleistocene: Leighton, 1110.

Ischyromys: Troxell, 1932; Bad Lands, South Dakota: Miller, 1306.


Kentucky, cave remains: Miller, 1303.

Lance vertebrates: Matthew, 1261.

Leptacodontus: Thorpe, 1891.

Mammoths, American Pleistocene: Osborn, 1429.


Mastodon: Osborn, 1423.

Mexico: Freudentberg, 612.

Orange County, New York: Bishop, 160.

Mastodontoidae: Osborn, 1425.

Megaptera, Lompoc, California: Kellogg, 957.

Merycoidodon: Thorpe, 1896.

Merycoidodontidae: Rutherford, 1902.

Micromastodon: Osborn, 1434.

Neohystrichytus: Thorpe, 1899.

Nevada, southeastern: Stock, 1818.


Oligobunis, Sioux County, Nebraska: Thorpe, 1892.

Oregon, Newport: Packard, 1443.

Tertiary Canidae: Thorpe, 1898.

Oreodontidae: Thorpe, 1891.

Palaeanodon: Troxell, 1925.

Paleomastodon and Moeritherium: Matsumoto, 1240.

Paleocene mammals, new genera: Matthew, 1247.

Pecary, Crawford, Nebraska: Cook, 407.

California, Rancho La Brea: Merriam, 1271.

Pecora, primitive: Lull, 1175.

Pinniped, Pilopheda, Pliocene: Kellogg, 955.

Pinnipeds, Miocene and Pliocene, California: Kellogg, 956.

Pliocene, Dallas, Texas: Lull, 1171.

Pliocyon, John Day Valley, Oregon: Thorpe, 1892.

Probosclidea, evolution, phylogeny, and classification: Osborn, 1424.

migrations and affinities: Osborn, 1433.
Mammalia—Continued.
Reithroparamys, Bridger formation: Matthew, 1245.
Research methods, classification, etc.; Osborn, 1422.
Sea cow, Metaxytherium floridanum: Hay, 738.
Stehlinius, Eocene insectivore: Matthew, 1248.
Titanotheres, Huerfano formation, Colorado: Osborn, 1418.
Trilophodon, Colorado: Cook, 465.

Man, fossil.
Antiquity: Lull, 1172.
Evolution: Baitsell, 58.
General: Osborn, 1421, 1432.
Glacial man in America: Miller, 1302.
Origin: Headstrom, 746.
Paleopathology: Moodie, 1346.

Manganese.
General: Jenison, 876, 878, 880.
Georgia, Cartersville district: Anonymous, 2224.
Montana: Pardee, 1459.
Oklahoma, Bromide: Hewett, 785.
Oregon: Pardee, 1459.
Utah: Pardee, 1459.
Virginia, western: Stone, 1841.
Washington: Pardee, 1459.
Wyoming, Laramie Mountains: Jones, 934.

Manitoba.
Areas described.
Osseau River area: Cooke, 415.
Ospwagan Lake-Burntwood River area: Alcock, 7.
Rat River: Alcock, 8.
Rice Lake area: Cooke, 415.
Upper Whitemouth area: Johnston, 917.
Winnipegosis area: Johnston, 917.

Economic geology.
northern Manitoba: Gordon, 675.
Herb Lake region: Alcock, 10.
Maskwa River copper-nickel deposit: McCann, 1185.
Maskwa River norite: Colony, 401.
Mineral resources, nonmetallic: McArthur, 1181.
Secondary processes in pre-Cambrian ore bodies: Wallace, 2024.
Southeastern Manitoba: DeLury, 491.

Historical geology.
Herb Lake region: Alcock, 10.
Maskwa River copper-nickel deposit: McCann, 1185.
Pre-Cambrian: Alcock, 11.
northern Manitoba: Bruce, 222.
Southeastern Manitoba: DeLury, 491.
Turtle Mountain coal measures: Dowling, 521.

Petrology.
Granite, local differentiation, Churchill River: Alcock, 6.
Maskwa River norite: Colony, 401.

Physical geology.
Secondary processes in pre-Cambrian ore bodies: Wallace, 2024.

Physiographic geology.
Seal-Churchill divide, terminal moraine: Alcock, 9.

Manuscript bibliographies, list: Little, 1152.
Map making. See Cartography.
Maps. See Geologic maps; Relief maps.
Marl.
North Carolina: Loughlin, 1155.

Maryland.

Economic geology.
Chrome ore, northeastern Maryland: Knopf, 1065.
Chromite deposits: Gordon, 680.
Maryland—Continued.

**Historical geology.**
- Crystalline schists, eastern Maryland: Knopf, 1066.
- Metamorphic rocks, eastern Maryland: Jonas, 931.

**Paleontology.**
- Arundel fauna: Gilmore, 840.
- Labyrinthodont footprints: Lull, 1174.
- Terebratula, Eocene: Roberts, 1586.

**Petroleum.**
- Granitic pegmatites: Gordon, 677.

**Massachusetts.**

**Historical geology.**
- Connecticut Valley, geological history: Miller, 1309.
- Essex County: Clapp, 329.

**Mineralogy.**
- Datolite, Westfield: Shannon, 1700.
- Rockport, Cape Ann: McKinstry, 1204.
- Talc, Russell: Foshag, 600.

**Paleontology.**
- Bison remains, Cape Cod: Allen, 22.
- Oldhamia, Lower Cambrian: Howell, 834.

**Petrology.**
- Contact phenomena, gneiss and limestone in western Massachusetts: Eskola, 564.
- Essex County, igneous rocks: Clapp, 329.

**Physical geology.**
- Postglacial faulting, Mount Toby: Loomis, 1149.

**Physiographic geology.**
- Mount Toby: Loomis, 1149.

**Mastodontidea.** See Mammalia, 1425.

**Meetings.** See Associations.

**Megadistrophism.** Chamberlin, 306, 311, 314; Jones, 936.

**Mercury.** See Quicksilver.

**Mesosole (undifferentiated).**
- Alaska, Goodnews Bay region: Harrington, 721.

**Metamorphism.**
- Clinkertill: Dove, 517.
- Contact metamorphism: Hess, 777.
- Kansas, Woodson County: Twenhofel, 1944.
- Massachusetts, Essex County: Clapp, 329.
- Metasomatic processes in silicate rocks: Goldschmidt, 665.
- Meteorites: Merrill, 1279.
- New Hampshire, Hanover district: Merritt, 1288.
- Pennsylvania and Maryland, crystalline schists: Knopf, 1066.
- Regional metamorphism: Barrell, 72.
- Secondary processes in pre-Cambrian ore bodies: Wallace, 2024.

**Metasomatic processes in silicate rocks: Goldschmidt, 665.**

**Meteorites.**
- Alpine, Brewster County, Texas: Merrill, 1282.
- Annabheim, Saskatchewan: Johnston, 915.
- Blithfield, Ontario: Johnston, 916.
- Cold Bay, Alaska: Merrill, 1282, 1283.
- Cumberland Falls, Whitley County, Kentucky: Merrill, 1276.
- Deal, New Jersey: Keeley, 950.
- Glasgow, Kentucky: Miller, 1304.
- Metamorphism in meteorites: Merrill, 1279.
- Navaj0, Arizona: Merrill, 1283.
- Nickelsville, Virginia: Merrill, 1286.
- Observation of meteorites: Miller, 1304.
- Observations of falling meteorites: Merrill, 1287.
- Odessa, Texas: Merrill, 1285.
- Owens Valley, California: Merrill, 1280, 1284.
- Pitts, Georgia: McCallie, 1183.
Meteorites—Continued.
Rose City, Michigan: Hovey, 828.
Signal Mountain, Lower California: Merrill, 1282.
Temperatures: Jones, 932.
Troup, Texas: Merrill, 1278; Udden, 1950.

Mexico.
Geology: Freudenberg, 611.
Areas described.
Catorce district, San Luis Potosí: Baker, 60.
El Oro district, Mexico: Flores, 580; Villafañã, 1990; Winchell, 2160.
Guadalcazar, San Luis Potosí: Wittich, 2173.
Lower California: Wilhelm, 2130.
Pachuca district, Hidalgo; Winchell, 2160.
San Juan de los Llanos, Puebla: Wittich, 2169.
Tlalpujahua district, Michoacán: Flores, 589; Villafañã, 1990.

Economic geology.
Barite: Wittich, 2175.
Colorado region, Sonora: Honigmann, 818.
El Oro district, Mexico: Flores, 589.
Fluorite: Wittich, 2170.
Gold and silver, El Oro district, Mexico: Winchell, 2160.
Guanaceví, Durango: Terres Benítes, 1868.
Hermosillo district, Sonora: Honigmann, 819.
Isthmian oil fields: Redfield, 1558.
Mica: Cervantes, 303.
Mineral resources, Durango: Rangel, 1531.
Oil fields: Hartley, 725; Huntley, 855.
Oil possibilities, Lower California: Wilhelm, 2130.
Petroliferous formations of Tampico embayment: Semmes, 1697.
Petroleum: Huntley, 855.
Lower California: Bustamante, 258, 259.
Petroleum geology in Mexico: Hartley, 724.
Quicksilver, Guadalcazar, San Luis Potosí: Wittich, 2168.
San José de Guaymas district, Sonora: Honigmann, 830.
Sierra Madre: Taft, 1850.
Sierra Mojada district, Coahuila: Shaw, 1721.
Silver: De Longh, 490.
Pachuca district, Hidalgo, Mexico: Winchell, 2160.
Sulphur: Cervantes, 302.
Tepetate-Chinampa oil pool, graphic model: Huntley, 856.
Tlalpujahua district, Michoacán: Flores, 589; Villafañã, 1990.
Zacatecas oil pool: De Golyer, 487.
Zimapán district, Hidalgo: Brinsmade, 200.
Zinciferous chalcocite, Sinaloa: Eichler, 551.

Historical geology.
Catorce district, San Luis Potosí: Baker, 60.
General: De Longh, 490.
Geologic maps, list: Salazar Salinas, 1640.
Hidalgo, Atotonilco el Grande: Wittich, 2167.
Lower California: Darton, 466.
Distrito Sur: Bustamante, 259.
La Purísima region: Hejm, 761.
Permian, Coahuila: Böse, 168.
Tajo de Andonegui, Tampico: Wittich, 2176.
Tertiary, Lower California: Hejm, 762.

Mineralogy.
Alabandite, Puebla: Wyckoff, 2211.
Dumortierite, Guadalcazar: Wittich, 2171, 2172.
Meteorite, Signal Mountain, Lower California: Merrill, 1282.
Minerals in granite, Guadalcazar: Kratzert, 1075.
Sundry minerals: Wittich, 2170.

Paleontology.
Balanocrinus, Tamaulipas: Springer, 1787.
Mastodons and elephants: Freudenberg, 612.
Mollusca, San Quintín Bay, Lower California: Dall, 456, 457.
Pliocene, San Quintin Bay, Lower California: Orcutt, 1416.
Rudistid, San Felipe formation: Stanton, 1794.
Mexico—Continued.

Paleontology—Continued.
Rudistid shells, Tamaulipas: Stephenson, 1803.
Spirulirostra, Tehuantepec: Berry, 2177.

Petroleum.
Volcanic ash: Wittich, 2172.
Guadalupe, San Luis Potosi: Wittich, 2177.

Physical geology.
Coast elevation: Wittich, 2178.
Crazing of mountain massifs, Lower California: Keys, 970.
Earthquake, Orizaba: Friedlaender, 614.
Popocatepetl, eruption: Atl, 52; Friedlaender, 615; 616; Waite, 1997.
Volcanic activity, extinct, northeastern Mexico: Staub, 1798.

Physiographic geology.
Glacier, Popocatepetl: Weitzberg, 2600.
Ixtacihuatl: Paredes, 1461.
Lower California: Davis, 473; Nelson, 1381.
La Purisima region: Heim, 761.

Underground water.
Ixtacihuatl: Paredes, 1461.

Mica.
Alabama: Clark, 341.
General: Insley, 862; Stoddard, 1822, 1823.
Geology: Lewis, 1126.
Mexico: Cervantes, 303.

Michigan.

Economic geology.
Mineral resources: Smith, 1770.

Historical geology.

Mineralogy.
Eakleite, Isle Royale: Foshag, 599.
Rose City aerolite: Hovey, 828.

Physiographic geology.
Lakes, inland: Scott, 1687.
Northern Peninsula, glaciation: Leverett, 1119.
Shore lines, Saginaw basin: Leverett, 1118.

Microbarograph: Dodge, 508.
Mid-Continent oil field, paleogeography and historical geology; McCoy, 1183.

Military geology.
Physiography, role in military operations: Bryan, 256.
United States Geological Survey, war work: Smith, 1759.
Miller, B. L., biography: Anonymous, 2241.

Mineral analyses. See list, p. 244.

Mineralogy (general). For regional see names of States. For particular minerals see list, p. 245. See also Crystallography; Meteorites; Technique.

Alabandite, crystal structure: Wyckoff, 2211.
Anthophyllite: Shannon, 1698.
Creedite, Colorado: Foshag, 595.
Density of minerals, measurement: Adams, 1.
Determination of common minerals and rocks, tables for: Tarr, 1836.
Drawing crystals: Slawson, 1750.
Florence Pilkington Manchester collection: Wherry, 2034.
Gems and precious stones in U. S. National Museum: Merrill, 1281.
History and outlook: Kraus, 1075.
Lead and copper sulpho-salts, isomorphic relations: Foshag, 597.
Mellilites, natural and synthetic: Buddington, 236.
Microscopic determination of non-opaque minerals: Larsen, 1063; of minerals in sections: Johansen, 1063.

Mineralogists: Thomson, 1837.
Morgan memorial hall of American Museum of Natural History: Whitlock, 2101.
Morgenthau collection: Whitlock, 2103.
New mineral names: Ford, 593.
New minerals: Foshag, 598; Wherry, 2033, 2085.
Mineralogy—Continued.

Opaque minerals, examination: Thomson, 1887.
Optical mineralogy: Winchell, 2161.
Plagioclase feldspars as a case of atomic isomorphism: Wherry, 2088.
Preservation of mineral specimens: Parsons, 1473.
Fuchsite, pyrite, trichalcite, and wavellite: Shannon, 1711.
Pyrite group: Thomson, 1886.
Radioactive minerals, Ontario: Ellsworth, 558.
Structure of crystals: Wyckoff, 2210.
Sulpho-salt minerals, classification: Wherry, 2082.
Textbook: Dana, 483; Rogers, 1605.
for beginners: Dana, 482.
Thaumasite, constitution: Holden, 813.
Topaz, etching figures: Honess, 815.

Mineral waters: Collins, 394; Ellis, 553.

Minerals, microscopical determination in section: Johanssen, 993.

Mining geology: Locke, 1136.

Minnesota.

Bibliography, Mesabi Iron range: Nieml, 1398.
General: Willard, 2131.

Economic geology.

Mesabi magnetic ores, origin: Grout, 691.
Mesabi range ores: Gruner, 693.
Origin of Biwabik iron formation: Gruner, 694.

Historical geology.

Devonian: Stauffer, 1799, 1800.
Mesabi range: Gruner, 694.
St. Peter sandstone: Dake, 450.
Windrow formation: Thwaites, 1905.

Physiographic geology.

Driftless Area, erosional history: Trowbridge, 1921.
Glacial drift sheets: Sardeson, 1847.

Miocene. See Tertiary.

Miscellaneous. See also Addresses.

American geologists, number: Powers, 1499.
Colloids in geologic problems: Hubbard, 838.
Employment of geologists: Sardeson, 1646.
Geology and geography in the United States: Mathews, 1239.
Geology as a profession: Little, 1131.
Geology at Johns Hopkins University: Keyes, 967.
Geology in rural welfare: Smith, 1767.
National Research Council, functions: Fenneman, 575.
Petroleum geology, contributions to geologic science: DeGolyer, 488.
Plain geology: Smith, 1761.
Profession of ore-hunting: Locke, 1136.
Scientific by-products of applied geology: Smith, 1757.
Training of geologists: Mathews, 1239.

Mispec group, New Brunswick: Matthew, 1244.

Mississippi.


Economic geology.

Clay: Ries, 1593.
Oil and gas prospects, present status: Lowe, 1167.
Oil possibilities: Easton, 543.

Historical geology.

Byram calcareous marl: Cooke, 413.
General: Easton, 543.

Paleontology.

Byram calcareous marl: Cooke, 413.
Foraminifera, Byram marl: Cushman, 445.
Mint Spring marl: Cushman, 446.

Mississippian. See Carboniferous.
Missouri.


**Economic geology.**

Cobalt-nickel-copper-lead deposits, Fredericktown: Tarr, 1858.

Mineral production: Buehler, 237.

**Historical geology.**

Carboniferous: Williams, 2135.


Dakota sandstone: Keyes, 999.

Devonian: Branson, 193.

Ozark region: Keyes, 1033.

Devonian outlier, Ozark uplift: Bridge, 198.

Ozark uplift, age: Keyes, 1032.

St. Peters sandstone: Dake, 450.

Silurian, northeastern Missouri: Keyes, 990.

**Mineralogy.**

Madison County: Tarr, 1857.

**Physical geology.**

Aqueous loess: Todd, 1909.

**Physiographic geology.**

Drainage changes, Missouri Valley: Todd, 1911.

Mogollon district, New Mexico: Ferguson, 581.

Molding sand.

Ohio: Bownocker, 189.

**Mollusca.**

Alabama, Eocene: Aldrich, 15.

Briones fauna, California: Track, 1918.

Cretaceous, Santa Ana Mountains: Packard, 1446.

Dominican Republic, Tertiary: Pillsbury, 1457.


Florida, St. Lucie Canal: Johnson, 906.

Gulf States, Pleistocene and Pliocene: Maury, 1255.

Illinois, Pleistocene: Baker, 64.

Kansas, Walla Walla County, Pleistocene: Hanna, 715.

Maryland, Waiilatpu Bluff, Pleistocene: Smith, 1752.

Mexico, Lower California, San Quintin Bay: Dall, 456.

Ontario, Ottawa district, marl deposits: Whittaker, 2117.

Oregon, Coos Bay, Empire formation: Howe, 531.

fresh-water Mollusca: Hanna, 716.

Pleistocene: Goldring, 664.

Molluscoidea.  See Brachiopoda; Bryozoa.

Molybdenite.

Ontario, Ottawa Valley: Wilson, 2148.

Molybdenum.

General: Hess, 779, 780, 783.

Moncton area, New Brunswick: Wright, 2209.

**Montana.**

Areas described.

Beartooth Mountains: Bevan, 158.

Sweet Grass Hills: Kemp, 961.

**Economic geology.**

Butte mines: Rickard, 1596.

Cat Creek oil field, Fergus and Garfield counties: Lupton, 1177.

Chromite, Stillwater and Sweet Grass counties: Westgate, 2077.

Crow Indian Reservation: Thom, 1875.

Gold, silver, copper, lead, and zinc: Gerry, 630, 633.

Manganese: Pardee, 1459.

Oil and gas, central and eastern Montana: Clapp, 330.

Oil and gas prospects, Crow Indian Reservation: Thom, 1875.

Garfield County: Thom, 1574.

Oil developments: Clarke, 351.

Oil possibilities: Ropes, 1615.

laccolithic domes south of Little Rocky Mountains: Collier, 391.

Petroleum, Quadrant formation: Freeman, 610.

Sweetgrass arch: Clapp, 333.

Phosphate, Maxville, Granite County: Pardee, 1457.

Soap Creek oil field, Crow Indian Reservation: Thom, 1872.

Supergene processes, Neihart: Hurst, 557.
Montana—Continued.

Historical geology.

Cat Creek oil field, Fergus and Garfield counties: Lupton, 1177.
Central and eastern Montana: Clapp, 330.
Crow Indian Reservation: Thom, 1875.
Garfield County: Thom, 1874.
Little Rocky Mountain region: Collier, 391.
Quadrant formation: Freeman, 610.
Soap Creek oil field, Crow Indian Reservation: Thom, 1872.

Mineralogy.

Laumontite: Shannon, 1703.

Paleontology.

Brachyceratops: Gilmore, 644.
Clanodonts, Eocene: Gidley, 635.

Petrology.

Sweet Grass Hills: Kemp, 961.

Physiographic geology.

Features of glacial origin: Davis, 472.

Moraines.

Colorado, Estes Park region: Wooster, 2196.
Ohio, Wayne County: Conrey, 403.
Mt. St. Helens: Jillson, 895.
Mud cracks on steeply inclined surfaces: MacCarthy, 1189.

Museums.

National Research Council, functions: Fenneman, 575.
Natural bridges.
Utah: Foek, 1440.

Natural gas.

Alberta, Saskatchewan River area: Slipper, 1751.
Arkansas, El Dorado: Pratt, 1510.
Eastern United States: Moyer, 1373.
General: Redwood, 1583.
Helium content: Rogers, 1613.
History, epochs in: White, 2100.
Illinois, oil and gas fields; map: Richardson, 1586.
Indiana: Logan, 1141.
Kansas, Eldorado field: Fath, 572.
Kentucky: Jillson, 887, 900.
Monroe field: Bell, 122.
northern: Hull, 845.
Webster Parish: Hull, 847.

Migration and accumulation by moving underground water: Rich, 1551.
Montana, central and eastern: Clapp, 330.
New York: Newland, 1391.
Ohio, Wayne County: Conrey, 403.
Oklahoma, Fox field, Carter County: Storm, 1833.
Osage Reservation: Roundy, 1620.
southern (part): Hopkins, 821.
Ontario: Estlin, 263.
future prospects: Williams, 2136.
Oregon, eastern: Buwakda, 294.
Pennsylvania: Ashley, 49, 50; Pa. G. S., 1473.
 oil and gas fields map: Richardson, 1588.
Pore space of oil and gas sands: Melcher, 1265.
Reserves, estimation: Ruedemann, 1623.
Tennessee: Nelson, 1388.
Texas, San Patricio County, White Point field: Wolf, 2181.
Wobb and Zapata counties: Sellards, 1692.
Underground water in migration and accumulation of oil and gas: Bonine, 171.
West Virginia: Reger, 1574.
Nicholas County: Reger, 1573.
Wyoming, oil and gas fields, map: Richardson, 1589.
Nebraska.

Economic geology.
Potash: Hicks, 786.

Historical geology.
Conglomerate of Black Hills: Cook, 408.
Sioux County, Agate anticline: Schramm, 1672.

Palaeontology.
Agrichoerus: Thorpe, 1894.
Blastomeryx marshi: Lull, 1173.
Caenopus: Troxell, 1930.
Eperooodon, Scott's Bluff: Thorpe, 1886.
Hesperopithecus, Snake Creek beds: Osborn, 1427, 1430, 1433; Pyrcraft, 1525; Woodward, 2143; Anonymous, 2258.
Oligobunis, Sioux County: Thorpe, 1892.
Oreodontidae: Thorpe, 1891.
Peccary, Crawford: Cook, 407.

Physiographic geology.
Badlands: Darton, 465.

Nevada.

Areas described.
Candelaria silver district: Knopf, 1063.
Santa Fe district, Mineral County: Clark, 5340.

Economic geology.
Borax: Keyes, 1007.
Cedar Mountain, Mineral County: Knopf, 1062.
Colemanite, Clark County: Gale, 619; Noble, 1399.
Comstock lode, bonanza ores, Virginia City: Bastin, 85.
Divide silver district: Knopf, 1061.
Gold, silver, copper, lead, and zinc: Halkes, 755.
Gold placers, Johnnie district: Labbe, 1079.
Limestone ores, Manhattan district: Ferguson, 580.
Magnesite, southern Nevada: Anonymous, 2237.
Pioche district: Anderson, 36.
Round Mountain district: Ferguson, 582.
Silver, Candelaria district: Knopf, 1063.
Silver Horn district, near Pioche: Crampton, 430.
Tungsten ores: Hass, 777.
Washoe district, Storey County: Grant, 683.

Historical geology.
Candelaria silver district: Knopf, 1063.
Cedar Mountain, Mineral County: Knopf, 1062.
Divide silver district: Knopf, 1061.
Manhattan district: Ferguson, 580.
Muddy Mountains, Clark County: Noble, 1399.
Muddy Mountains region: Longwell, 1144, 1146.
Round Mountain district: Ferguson, 582.

Mineralogy.
Andorrite in silver ore: Shannon, 1709.
Delafossite, Kimberly: Rogers, 1011.

Paleontology.
Ceratopyge fauna: Raymond, 1546.
Lehman Cave, White Pine County: Hastings, 731.
Mammals, southeastern Nevada: Stock, 1516.

Physical geology.
Muddy Mountain overthrust: Longwell, 1146.

Underground water.
Comstock lode, Virginia City: Bastin, 85.

New Brunswick.

Areas described.
Moncton area: Wright, 2209.

Economic geology.
Coal seams, Gloucester County: Young, 2220.
Oil and gas possibilities, Edmundston: McCann, 1186.
Oil shale, Albert Mines: Wright, 2209.
New Brunswick—Continued,
  Historical geology.
  Devonian glacial deposits, St. John: Matthew, 1243.
  Mispeo group: Matthew, 1244.

Mineralogy.
  Inyoite, Hillsborough, Albert County: Poitevin, 1495.

Newfoundland.
  Areas described.
    West coast: Brunton, 225.
    Historical geology.
      Carboniferous, Deer Lake district: Landell-Mills, 1085.
      Western Newfoundland: Schuchert, 1678.
    Physical geology.
      Changes of level, postglacial: Daly, 461.
      Pleistocene terraces: Kindle, 1050.
      Warping, postglacial: Daly, 460.

New Hampshire.
  Areas described.
    Hanover district: Merritt, 1288.
    Portsmouth Basin: Wandke, 2026.

Petrology.
  Hanover district: Merritt, 1288.
  Pawtuckaway Mountains, Rockingham County: Smith, 1753.
  Portsmouth Basin, intrusive rocks: Wandke, 2026.

Physiographic geology.
  Eastern New Hampshire: Crosby, 433.
  Glaciation: Goldthwait, 669.
  White Mountains: Lane, 1037; accordant levels: Lane, 1086.

New Jersey.
  State geologist’s report: Kümme1, 1078.

Economic geology.
  Belleville copper mine: Black, 162.
  Potash in greensands: Mansfield, 1219, 1223.
  Zinc ores, Sussex County, origin: Ries, 1596.

Historical geology.
  Glaucocite-bearing formations: Mansfield, 1223.
  Sussex County: Ries, 1596.

Mineralogy.
  Bustamite, Franklin Furnace: Larsen, 1097.
  Cyprine, Franklin Furnace: Shannon, 1715.
  Franklin: Lewis, 1127.
  Meteorite, Deal, Monmouth County: Keeley, 950.
  Rhodonite, Franklin Furnace: Larsen, 1098.

Petrology.
  Alkali gneiss, Warren County: Hinds, 794.
  Nephelite rocks, Beemerville: Aurousseau, 56.
  Zinc ores, Sussex County, origin: Ries, 1596.

New Mexico.
  Areas described.
    Brilliant quadrangle: Lee, 1105.
    Koehler quadrangle: Lee, 1105.
    Raton quadrangle: Lee, 1105.
    Sandia Mountains: Ellis, 555.
    Tyrone district: Paige, 1447.

Economic geology.
  Aztec mine, Balfy, Colfax County: Chase, 234.
  Black Range tin district: Naething, 1379.
  Chupadera Mesa iron deposits, age: Keyes, 1018.
  Coal, San Juan County: Bauer, 94.
  Copper deposits, Tyrone district: Paige, 1447.
  Gold, Sierra del Oro: Keyes, 1005.
  Gold, silver, copper, lead, and zinc: Henderson, 768, 771.
  Iron-ore deposit near Fairview: Smythe, 1777.
  Mining properties: Finlay, 688.
  Mogollon district: Ferguson, 561.
New Mexico—Continued.

**Economic geology—Continued.**
Pipe vein, Silver Hill: Keyes, 1010.
Salt: Darton, 464.
San Juan County: Bauer, 94.
Taylor Creek tin deposits, Sierra and Socorro counties:

**Historical geology.**
Buried mountain range of Permian age: Rich, 1580.
Chupadera Mesa: Keyes, 1018.
Eastern New Mexico: Lee, 1102; Rich, 1583.
Geologic structure of parts of New Mexico: Darton, 467.
Mogollon district: Ferguson, 581.
Paleozoic: Keyes, 1022.
Rio Grande region, Carboniferous: Keyes, 1015.
Rio Grande Valley: Keyes, 1027.
San Juan County: Bauer, 94; Reeside, 1567.

**Mineralogy.**
Arsenopyrite, Tres Hermanas Mountains: Smythe, 1776.
Iron-ore deposit near Fairview: Smythe, 1777.

**Paleontology.**
Alamosaurus, Ojo Alamo formation: Gilmore, 647.
Paleocene mammals, new genera: Matthews, 1247.
Phytosaur, Triassic, Guadaloupe County: Mehl, 1260.
Sauropod dinosaur, San Juan Basin: Gilmore, 642.

**Petrology.**
Raton-Brilliant-Koehler area: Mertie, 1293.

**Physical geology.**
Laccolithic structures: Keyes, 989.

**Physiographic geology.**
Raton mesa: Lee, 1103.

**New York.**
State Museum, report: Clarke, 360.

**Areas described.**
Mount Marcy quadrangle, Essex County: Kemp, 960.
New York City: Reeds, 1565.
West Point quadrangle: Berkey, 131.

**Economic geology.**
Adirondack magnetic iron ores: Miller, 1317; sedimentary phases: Nason, 1380.
Iron, Clinton County: Newland, 1395.
Magnetic deposits, Adirondack Mountains; Miller, 1312.
Magnetic iron ores, Essex County: Henry, 776.
Mineral resources: Newland, 1391.
Petroleum: Johnson, 910.

**Historical geology.**
Adirondack region: Clarke, 357.
Catskill region: Berkey, 134.
Dunkirk shale, Erie County: Chadwick, 304.
Graptolite zones: Ruedemann, 1624.
Oriskany sandstone, Oriskany Falls: Eaton, 545.

**Mineralogy.**
Morgan memorial hall of American Museum of Natural History: Whitlock, 2106.
Niagara limestone minerals: Giles, 637.
St. Lawrence, Jefferson, and Lewis counties: Agar, 3.
St. Lawrence County, crystal localities: Miller, 1311.

**Paleontology.**
Devonian forest at Gilboa: Clarke, 356, 359.
Dolgeville fauna: Ruedemann, 1624.
Genesee conodonts: Bryant, 230.
Gilboa tree trunks: Clarke, 360.
Glass sponges: Clarke, 360.
Graptolite zones: Ruedemann, 1624.
Mastodon, Temple Hill, Orange County: Bishop, 160.
Mastodons, mammoths, and other Pleistocene mammals: Hartnagel, 727.
Ordovician: Ruedemann, 1624.
Oriskany fauna, Oriskany Falls: Eaton, 545.
Psaronius, Schoharie County: Hovey, 227.
Silurian: Ruedemann, 1628.
Snake Hill fauna: Ruedemann, 1624.
New York—Continued.

**Petrology.**
- Anorthosite gabbro, St. Lawrence County: Miller, 1310.
- Sediments, characters: Alling, 32.
- Sillimanite-schist inclusions in granite: Miller, 1315.

**Physical geology.**
- Dike near Ithaca: Sheldon, 1724.
- Faulting, Cayuga Lake region: Long, 1143.
- Sulphates in the Salina beds: Newland, 1394.

**Physiographic geology.**
- Hudson-Champlain Valley: Stoller, 1825.
- Mohawk-Hudson region, Pleistocene history: Stoller, 1825.
- Mount Marcy quadrangle, glacial geology: Alling, 29.
- Wilmington Notch, Adirondacks: Miller, 1313.
- Wisconsin ice sheet, ablation of eastern lobe: Cook, 409.

Nicaragua.

**Economic geology.**
- Piz Piz gold district: Hawxhurst, 734.

Nickel.
- Dominican Republic, Sierra Prieta: Vaughan, 1985.
- General: Hess, 779, 780, 783.
- Manitoba, Maskwa River: McCann, 1185.
- Niipogen-Schreiber district, Ontario: Tanton, 1853.
- Nitrate deposits, Amargosa region, southeastern California: Noble, 1401.

**Nomenclature.**
- Appalachian coal measures: Ashley, 51.
- Arizona formations: Keyes, 1098.
- Chester series: Keyes, 1024.
- Clastic sediments, terminology: Wentworth, 2073.
- Denudation, erosion, corrosion, corrasion, use of terms: Bissell, 161; Foye, 602; Lahee, 1081.
- Flint and chert: Glock, 654.
- Fossil, use of term: Field, 584.
- Mineral deposits: Lindgren, 1130.
- Muscogee shales, western interior coal field: Keyes, 997.
- Pennsylvanian: Keyes, 1028.
- Structure, usage of term: McLaughlin, 1206.
- Yorkie: Keyes, 985.

North Carolina.
- Work of State geological survey: Pratt, 1506.

**Economic geology.**
- Chrome ore: Lewis, 1123.
- Clay: Ries, 1593.
- Limestones and marls: Loughlin, 1155.
- Magnetite ores, western North Carolina: Bayley, 96, 100; Pratt, 1508.
- Magnetite-marble ore, Lansing: Bayley, 98.
- Magnetites, origin: Bayley, 87.
- Triassic coal field: Pratt, 1507.

**Mineralogy.**
- Porphyry Hill (Franklin), Macon County: Gordon, 681.

North Dakota.

**Areas described.**
- Fort Berthold Indian Reservation, western part: Bauer, 95.

**Economic geology.**
- Coal, occurrence: Dove, 515.
- Lignite, Fort Berthold Indian Reservation: Bauer, 95.
- New Salem field, Morton County: Hancock, 711.

**Historical geology.**
- Nesson anticline: Dove, 516.
- New Salem lignite field, Morton County: Hancock, 711.
- White River formation: Leonard, 1116.

**Paleontology.**
- White River formation: Leonard, 1116.

**Petrology.**
- Clinkertill: Dove, 517.

4426—24——14
North Dakota—Continued.

Physiographic geology.
Missouri River channel, age: Todd, 1912.

Nova Scotia.

Economic geology.
Barytes: Spence, 1780.
Berwick and Lakeview areas, Kings and Annapolis counties: Faribault, 570.
Malagash salt deposits: Moffatt, 1333.

Historical geology.
Berwick and Lakeview areas, Kings and Annapolis counties: Faribault, 570.
Carboniferous, Sydney district, Cape Breton: Bell, 125.
Mississippian, Horton-Windsor district: Bell, 125.

Mineralogy.

Paleontology.
Merochomata, coal measures: Bell, 128.
Palaeochora, coal measures: Bell, 128.

Petrology.

Physiographic geology.
Esker excavation, Middlefield, Queens County: Prest, 1913.
Marine sandbar, Cornwallis Valley: Churchill, 328.

Warping, postglacial: Daly, 460.

Ohio.

Geological survey: Mendenhall, 1287.

Areas described.
Camp Sherman quadrangle: Hyde, 869.
Wayne County: Conrey, 403.

Economic geology.
Helium-bearing natural gas: Rogers, 1913.
Molding sand: Bownocker, 189.
Oil and gas, Ordovician horizons: Panyity, 1455.
Petroleum: Bownocker, 188.

Historical geology.
Borings: Panyity, 1455.
Pottsville formation: Morningstar, 1271.

Paleontology.
Pottsville fauna: Morningstar, 1271.

Physical geology.
Cavities filled with glacial material, Silica, Lucas County: Carman, 290.
Concretions in lake deposits, Elyria: Hubbard, 837.

Physiographic geology.
Adams County, cryptovolcanic structure: Bucher, 232.

Oil shales.
Colorado: George, 628.
Distribution: Winchester, 2163.
General: Gavin, 628; White, 2092.
Green River oil shales: White, 2092.
Indians: Reeves, 1571, 1572.
Kentucky: Alderson, 13; Jillson, 887.
New Brunswick, Albert Mines: Wright, 2209.
Organic matter: Franks, 609.
Origin and composition: Thiessen, 1871.
 Uinta Basin: Jenson, 888.
Wyoming: Morgan, 1366.


Oklahoma.
Oushita Mountains: Honess, 817.
Sequoyah County, notes on: Kirk, 1061.

Areas described.
Gage, Ellis County: Thompson, 1883.
Jefferson County (part): Robinson, 1603.
Madill-Denison area: Hopkins, 821.
Oklahoma—Continued.

**Economic geology.**

- Burbank oil field, Osage County: Miller, 1318.
- Cement oil field, Caddo County: Clapp, 331; Reeves, 1569.
- Fox oil and gas field, Carter County: Storm, 1833.
- Glenn formation: Goldston, 668.
- Healdton oil field, Carter County: Bartram, 77.
- Helium-bearing natural gas: Rogers, 1613.
- Hewitt oil field, Carter County: Roark, 1597; Swigart, 1845.
- Manganese, Bromide: Hewett, 785.
- Mid-Continent oil-field structures: Monnett, 1338.
- Mid-Continent oil fields, reflected buried hills: Powers, 1503.
- Mineral resources, map showing distribution: Okla. G. S., 1410.
- Okmulgee district: Clark, 344.
- Petroleum, Osage County: Hartley, 726.
- Oklahoma, map showing distribution: Okla. G. S., 1410.
- Oil and gas prospects, Jefferson County: Robinson, 1603.
- Oil pools and red beds, relation: Burton, 255.
- Oil sands, northeastern Oklahoma: Williams, 2133.
- Oil structures, southwestern Oklahoma: Howell, 835.
- Oil and gas prospects, Jefferson County: Robinson, 1603.
- Oil structures, southwestern Oklahoma: Howell, 835.
- Oklahoma, map showing distribution: Okla. G. S., 1410.

**Historical geology.**

- Borings, central Oklahoma: Hughes, 843.
- Bromide area: Hewett, 785.
- Caddo County, Cement oil field: Reeves, 1569.
- Carboniferous, southern Oklahoma: Burton, 255.
- Cement oil field, Caddo County: Clapp, 331.
- Correlation of "Wilcox" sand, Okmulgee district, and Osage: White, 2132.
- Devonian: Schnuchert, 1683.
- Garvin County, limestone occurrence: Loomis, 1153.
- Glaciation, Pennsylvanian, Arbuckle and Wichita mountain regions: Weidman, 2059.
- Glenn formation in Ardmore quadrangle: Goldston, 666.
- Southern Oklahoma: Goldston, 667, 668.
- Hewitt oil field, Carter County: Roark, 1597; Swigart, 1845.
- Jefferson County (part): Robinson, 1603.
- Mid-Continent oil fields: Aurin, 55.
- Oil sands, northeastern Oklahoma: Williams, 2133.
- Okmulgee district: Clark, 344.
- Osage Reservation: Roundy, 1620.
- Paleozoic: Misier, 1326.
- Pennsylvanian, Arbuckle area: Morgan, 1360.
- Pre-Permian, Wichita Mountains: Howell, 836.
- St. Peter sandstone: Dake, 450.
- Siluro-Devonian oil horizon, southern Oklahoma: Morgan, 1368.

**Physical geology.**

- Algonia district, Deroche, Hodgins, Gaudette, and Shields townships: Brunton, 224.
- Black River area, Timiskaming: Wright, 2204.
Ontario—Continued.

Areas described—Continued.

Blanche River area: Burrows, 233.

Boston-Skead area, Timiskaming district: Burrows, 232.

Geneva map area, Sudbury district, Ontario: Quirke, 1527.

Goudreau gold area, Michipicoten district: Thomson, 1889.

Gowganda silver area: Burrows, 250.

Kenogami Lake area, Timiskaming district: Cooke, 414.

Larder Lake area, Timiskaming district: Cooke, 414.

Madoc district: Wilson, 2149.

Nipigon-Schreiber district: Tanton, 1853.

Round Lake area, Timiskaming district: Cooke, 414.

Schreiber-Duck Lake area: Hopkins, 824.

Thunder Bay district: Tanton, 1852, 1855.

Wanapetel Lake area, Sudbury district: Quirke, 1528.

Economic geology.

Anthraxolite, Sudbury: Gibson, 634.

Auld and Cane townships: Burrows, 250.

Brockville-Mallory area: Wright, 2207.

Clays, Missinaibi River: Reeve, 949.

Cobalt: Knight, 1058.

Cobalt district, genesis of ores: Whitman, 2108.

Cretaceous sands and clays, northern Ontario: Keele, 947.

Feldspar, Ottawa district: Davis, 471.

Fluorspar, Madoc district: Wilson, 2150, 2153.

Gold: Hopkins, 822, 823.

Boston-Skead area: Burrows, 252.

Michipicoten district: Thomson, 1889.

Goudreau gold area: Burrows, 249, 251.

Hematite, Leeds County: Wright, 2207.

Iron ore: Collins, 400; Knight, 1059.

Lightning River gold area: Knight, 1060.

Lost placers: Coleman, 380.

Mesozoic clays and sands, northern Ontario: Keele, 946.

Michipicoten iron ranges: Collins, 385.

Mine Centre district: Reagan, 1522.

Mineral resources: Rogers, 1614.

Molybdenite, Ottawa Valley: Wilson, 2148.

Natural gas: Estlin, 555, 556.

Oil and gas prospects: Williams, 2136.

Oil fields: Estlin, 556.

Oil possibilities, Manitoulin Island: Williams, 2138.

Peat bogs: Anrep, 37, 38.

Schreiber-Duck Lake area: Hopkins, 824.

Shebandowan nickel-copper deposits: Cross, 434.

Silver ores, Cobalt, genesis: Bastin, 87.

Gowganda area: Burrows, 250.

South Lorrain: Bell, 123.

Silver veins, Cobalt: Knox, 1073.

Silver Islet, Thunder Bay district: Tanton, 1851.

Structural materials, St. Lawrence Valley: Keele, 945.

Talc, Madoc, Hastings County: Wilson, 2152.

Thunder Bay district: Parsons, 1472.

Timiskaming ores, structure: Schlossmacher, 1659.

Historical geology.

Borings: Estlin, 566.

Cretaceous sands and clays, northern Ontario: Keele, 947.

Geologic map, Algoma and Thunder Bay districts: Canada G. S., 286.

Thunder Bay district: Tanton, 1854.

Lightning River gold area: Knight, 1060.

Manitoulin Island: Williams, 2138.

Moose and Albany rivers, northern Ontario: Williams, 2139.

Ordovician, Ottawa region: Wilson, 2145.

Pagwachuan, Kenogami, and Albany rivers: Williams, 2137.

Palaeozoic and pre-Cambrian relationships, southern border of Laurentian Highlands, Wilson, 2151.
Ontario—Continued.

*Historical geology—Continued.*

Pre-Cambrian: Miller, 1308; Quirke, 1520.
  - northern Ontario: Bruce, 222.
  - western Patricia: Burwash, 257.

Pre-Cambrian glaciation: Coleman, 388.

Red Lake district, Patricia: Dowling, 327.

Sudbury district, Geneva map area: Quirke, 1527.

*Mineralogy.*

Animikite and macfarlanite, Silver Islet: Parsons, 1469.

Blithfield meteorite: Johnston, 916.

Cakite, Shangoinah Island, Lake Superior: Parsons, 1470.

Cesanite: Quirke, 1422.

Diopside: Walker, 2036.


Frostite, Cobalt: Parsons, 1471.

Radioactive minerals: Eusworth, 558.


Tellurides: Thomson, 1888.

*Paleontology.*

Conularia rugosa, Lockport limestone, Hamilton: Dyer, 539.

Mollusca, marl deposits, Ottawa district: Whittaker, 2117.

Ordovician faunas, Ottawa region; Wilson, 2145.
  - St. Lawrence Valley: Wilson, 2145.

Ottawa Trenton echinoderm faunas, distribution: Foerste, 592.

Pleistocene and recent fossils, St. Lawrence Valley: Whittaker, 2119.

Trenton fauna: Raymond, 1540.

Triarthrus canadensis, Triarthrus glaber, and Triarthrus spinosus: Parks, 1463.

*Physical geology.*

Cobalt Lake, doming: Albertson, 4.

Faulting, post glacial, French River district: Hobbs, 805

McKay Lake, bottom deposits: Whittaker, 2120.

Point Pelee, Lake Erie, shore-line changes: Kindle, 1045.

Sudbury nickel district, fault: Hitchcock, 796.

*Physiographic geology.*

Glacial and post glacial lakes: Coleman, 386.

Glaciation: Whitman, 2107.

Lake Erie, preglacial outlet: Wright, 2203.

Niagara escarpment, preglacial slope and crest: Spencer, 1783.

Northeastern Ontario, physiographic history: Collins, 397.

*Ordovician.*

See also Paleoontology, Ordovician.

Arizona: Keyes, 1029.

Arkansas: Miser, 1326.

Batesville district: Miser, 1327.

British Columbia, Beaverfoot Range: Burling, 245.

Mount Robson area: Burling, 245.

Rocky Mountain trench: Shepard, 1727.

Ceratopyge fauna: Raymond, 1546.

Galena limestone: Keyes, 998.

Greenland, northwestern: Koch, 1074.

Illinois, Morris quadrangle: Culver, 438.

Indiana: Cumings, 439.

Iowa, Maquoketa shale: Bradley, 191.

Kentucky: Jillson, 897.

Monticello quadrangle: Foyle, 607.

Nevada, Candelaria district: Knopf, 1063.

Round Mountain district: Ferguson, 582.

Newfoundland, western: Schuchert, 1678.

New York: Ruedemann, 1624.

graptolite zones: Ruedemann, 1624.

West Point quadrangle: Berkey, 131.

Ontario: Wilson, 2151.

Brockville- Mallorytown area: Wright, 2207.

Ottawa region: Wilson, 2145.

Pennsylvania, Lebanon County: Gordon, 676.

southeastern: Stose, 1840.
Orдовик — Продолжение.
Quebec: Wilson, 2151.
Beauceville area: MacKay, 1198.
St. Peter sandstone: Dake, 450, 452; complexity: Keyes, 996; derivation: Dake, 451.
Stones River limestone: Coryell, 417.
Taconic revolution, evidence for examined: Clark, 346.
Tennessee, central: Bassler, 84.
Stones River group: Coryell, 417.
Waynesboro quadrangle: Miser, 1325.
Texas, Solitario uplift: Powers, 1501.
Trenton, Tennessee and Kentucky: Raymond, 1548.
Vermont, Braintree: Richardson, 1555.
Trenton, Grand Isle: Perkins, 1482.
western: Gordon, 673.
Virginia, western: Stose, 1841.
Volcanic ash bed of Tennessee, Kentucky, and Alabama: Nelson, 1387.
Ore deposits, origin. For ore deposits in general see Economic geology (general).
Adirondack magnetic iron ores: Miller, 1317.
Alaska, Salmon River district: Westgate, 2075.
Arizona, Jerome district, Yavapai County: Reber, 1557.
British Columbia: Schofield, 1684.
Bridge River district: McCann, 1188.
Salmon River district: Schofield, 1666.
Carnotite ores, Colorado: Coffin, 376.
Chrome ore, Pennsylvania and Maryland: Knopf, 1065.
Chromite, Klamath Mountains: Diller, 503.
Montana: Westgate, 2077.
North Carolina: Lewis, 1125.
Oregon, eastern: Westgate, 2076.
Climatic effect on superficial alteration: Knox, 1073.
Colorado, Telluride area: Hurst, 586.
Copper deposits, Engels, California: Turner, 1942.
Texada Island, British Columbia: Dolmage, 511.
Tyrone district, New Mexico: Paige, 1447.
Copper sulphate stalactites, rate of formation: Mitchell, 1331.
Deposition of copper carbonate from mine water: Wilson, 2155.
Deposition of ores: Keyes, 1098.
Fluorspar, Ontario, Madoc district: Wilson, 2150.
Gold and silver, El Oro district, Mexico: Winchell, 2160.
Graphite: Winchell, 2158.
Iron, Adirondack magnetite deposits: Miller, 1312; Nason, 1389.
Belcher Islands: Young, 2221.
Biwabik formation: Gruner, 694.
limonite, Taseko Valley, British Columbia: Mackenzie, 1199.
magnetites, North Carolina and Tennessee: Bayley, 100.
Mesabi range ores: Gruner, 693.
paragenesis of martite and magnetite: Newland, 1395.
titaniferous ores, origin: Bayley, 96.
Washington: Jenkins, 884.
Waynesboro quadrangle, Tennessee: Miser, 1325.
Kaolin, Indiana: Bucher, 254.
Magnetites, North Carolina, origin: Bayley, 97.
Manganese, western Virginia: Stose, 1841.
Mesabi magnetic ores, origin: Grout, 601.
Mexico, El Oro and Tlalpujahua districts: Flores, 589.
Sierra Mojada district, Coahuila: Shaw, 1721.
Mineral deposits, present tendencies in the study of: Lindgren, 1129.
Nevada, Divide district: Knopf, 1061.
Manhattan, limestone ores: Ferguson, 580.
Mineral County, Cedar Mountain: Knopf, 1062.
Santa Fe district, Mineral County: Clark, 340.
Nickeliferous pyrrhotite, origin: Hudson, 540.
North Carolina, Cranberry magnetite ores: Bayley, 96.
INDEX.

Ore deposits, origin—Continued.
  Ontario, Cobalt district: Whitman, 2108.
  Ore deposition by circulating water: Keyes, 994.
  Pipe vein, Silver Hill, New Mexico: Keyes, 1010.
  Platinum deposits: Shaw, 1720.
  Secondary processes in some pre-Cambrian ore bodies: Wallace, 2024.
  Silver, Cobalt, Ontario: Bastin, 87.
  Comstock lode, Nevada: Bastin, 85.
  Gowganda area, Ontario: Burrows, 250.
  Pachuca district, Hidalgo, Mexico: Winchell, 2160.
  Ontario, Silver Islet: Tanton, 1851.
  South Lorraine, Ontario: Bell, 123.
  Thunder Bay district, Ontario: Parsons, 1472.
  Silver deposits, enrichment: Sill, 1742.
  Silver enrichment, San Juan Mountains: Bastin, 86.
  Supergene processes, Neihart, Montana: Hurst, 857.
  Terminology of mineral deposits: Lindgren, 1130.
  Theoretical considerations: Bastin, 1538.
  Tin, York region, Alaska: Steidtman, 1902.
  Tungsten ores: Hess, 777.
  Utah, Ophir district: Olmstead, 1413.
  Vadose ore deposition: Keyes, 1001, 1012.
  Zinc, Sussex County, New Jersey: Ries, 1906.
  Zonal distribution of ores: Kemp, 962.
  Zonal theory of ore deposition: Spurr, 1790.

Ore-hunting, profession of: Locke, 1130.

Oregon.
  Economic geography: Smith, 1771.

Economic geology.
  Borax, Curry County: Gale, 620.
  Chromite, eastern Oregon: Westgate, 2076.
  Klamath Mountains: Diller, 503.
  Cobalt, Jackson County: Kellogg, 953.
  Gold, silver, copper, and lead: Yale, 2213, 2216, 2219.
  Manganese: Pardee, 1459.
  Oil and gas possibilities: Buwalda, 264.
  Platinum, southwestern Oregon: Kellogg, 954.
  Rogue River valley: Kellogg, 952.

Historical geology.
  Columbia Valley: Bretz, 196.
  Eastern Oregon: Buwalda, 264.
  Empire formation, Coos Bay: Howe, 830, 831.
  John Day beds: Thorpe, 1890.
  Jurassic, Silvies Canyon, Harney County: Packard, 1444.

Mineralogy.
  Priceite, Curry County: Gale, 620.

Paleontology.
  Agriochoerus, John Day beds: Thorpe, 1894.
  Arseneocyon: Thorpe, 1900.
  Camelidae, John Day beds: Lull, 1170.
  Canidae, Tertiary: Thorpe, 1898.
  Empire formation, Coos Bay: Howe, 831.
  Eoeprodoc, John Day beds: Thorpe, 1890.
  Freshwater Mollusca: Hanna, 716.
  Mammalia, marine, Newport: Packard, 1443.
  Marsupial, John Day beds, Logan Butte: Stock, 1818.
  Miocene Gastropoda, John Day region: Hanna, 714.
  Payette flora: Chaney, 318.
  Pliocyon, John Day Valley: Thorpe, 1892.
  Promerycochoerus, John Day beds: Thorpe, 1890.
  Trigonidae: Packard, 1445.

 Petrology.
Orogeny.
Arcuate mountains, evolution: Hobbs, 802.
Canadian Cordilleras: Dowling, 525.
Desert ranges of Mexico, origin: Spurr, 1789.
Folding of mountain ranges: Burrard, 247.
Great Basin ranges: Keyes, 982, 988; origin: Davis, 474; Keyes, 1050.
Laccolithic mountains, origin: Keyes, 977.
Mountain formation: Bowie, 184; Reid, 1578.
Orogenic consequence of a diminishing rate of rotation: Keyes, 1017.
Orogenic forces: Reid, 1578.
Permian revolution: Finlay, 587.
Sierra Nevada: Muir, 1374.
Tertiary mountain building, cause: Taylor, 1852.
Vulcanism and mountain-making: Chamberlin, 365.
Orthaulax, Tertiary guide fossil: Cockerell, 411.

Oscillation. See Changes of level.

Osteomyelites, Permian: Moodie, 1342.
Packard, A. S., biography: Cockerell, 305.

Paleobotany.
Algae, Miocene, Trinidad: Howe, 832.
Araucarioxylon in the Cretaceous: Jeffrey, 870.
Brachyruscus, Florissant, Colorado: Cockerell, 371.
Calatoloides, Eocene fruit, Texas: Berry, 151.
California, Puente flora: Chaney, 317.
Chuyeena sandstone, Kansas: Berry, 145.
Classification of plants: Conard, 402.
Climate, determination by plants: Knowlton, 1088.
Cornus, Converse County, Wyoming: Knowlton, 1072.
Costa Rica, Tertiary: Berry, 135.
Cupressinoxyla of the Mesozoic: Jeffrey, 871.
Cycadeeddea: Wieland, 2122.
Alberta and Texas: Wieland, 2125.
monocarpy: Wieland, 2123.
Cycad-like leaves, Permian, Texas: No6, 1402.
Cycadophyte investigation: Wieland, 2126.
Dakota flora: Gress, 897.
Devonian: Wieland, 2127.
Devonian forest, Catskill Mountains: Clarke, 356.
Dominican Republic, Tertiary: Berry, 137.
Environmental interpretation of fossil plants: Berry, 155.
Eocene climate: Berry, 147.
General: Guppy, 701.
Gilboa tree trunks: Clarke, 360.
Growth rings in Carboniferous wood: Goldring, 663.
Halt, Tertiary: Berry, 143.
Hepatica, Florissant, Colorado: Howe, 833.
Inga culebrana: Berry, 135.
Lance-Union flora: Knowlton, 1071.
Laramie flora, Denver Basin: Knowlton, 1070.
Mackenzie, Mackenzie River basin, Tertiary: Bell, 127.
New York, Devonian forest at Gilboa: Clarke, 359.
Palaeochara, coal measures, Nova Scotia: Bell, 128.
Palm nut, Miocene, Canal Zone: Berry, 138.
Palmoxylon, Colorado, Denver formation: Stevens, 1812.
South Dakota, Pierre formation: Stevens, 1812.
Parichnos in gymnosperms: Jeffrey, 875.
Payette flora: Chaney, 318.
Pines, Mesozoic: Jeffrey, 874.
Pliocene, Alabama and Tennessee: Berry, 149.
Pleistocene interglacial, British Columbia: Berry, 148.
Potamogoton perryi, Henry County, Tennessee: Berry, 141.
Psaronius, Schoharie County, New York: Hovey, 827.
Pseudocysea, British Columbia: Berry, 142.
Rancho La Brea beds, flora: Chaney, 320.
Ranunculus florissantensis: Cockerell, 369.
Saccoglottis: Berry, 154.
Sagenopteris: Berry, 156.
INDEX.

Paleobotany—Continued.
  Sequoia in the Mesozoic: Jeffrey, 569.
  Tennessee, Cretaceous: Berry, 139.
  Tertiary, Pacific region: Chaney, 319.
  Wilcox flora: Berry, 146.

Paleoclimatology.
  Astronomical considerations: Shapley, 1717.
  Climate, determination by plants: Knowlton, 1068.
  Climatic environment of extinct animals, determination: Case, 296.
  Cretaceous: Wieland, 2126.
  Eocene climate: Berry, 147.
  Evolution of geologic climates: Knowlton, 1069; Manson, 1225.
  General: Coleman, 383; Huntington, 854; Manson, 1226; Sayles, 1657; Schuchert, 1679; Wieland, 2124.
  Peat deposits, their evidence of climatic changes: Dackowski, 448.
  Permian: Hall, 706.
  Pleistocene climate: Meinzer, 1284.
  Recession of the last ice sheet in New England: Antevs, 40.

Paleogeography. See also Geologic history; Paleoclimatology; Paleogeographic maps.
  Appalachian geosyncline: Schuchert, 1682.
  California, Tertiary: Clark, 336.
  Cretaceous: Stanton, 1795.
  Llanoria: Miser, 1326.
  Marine invertebrate faunas, distribution: Schuchert, 1680.
  Mid-Continent oilfield: McCoy, 1193.
  Paleozoic: Schuchert, 1690.
  Pre-Cambrian continents, existence and configuration: Ruedemann, 1632.
  Pre-Cambrian landmasses: Ruedemann, 1631.
  Stones River time: Coryell, 417.

Paleogeographic maps.
  California, Tertiary: Clark, 336.
  Central States: Cumings, 439.
  Devonian, late middle: Stauffer, 1590.
  Eocene, middle: Berry, 147.
  Pennsylvanian: McCoy, 1193.

Paleontology. For regional see names of States. See also the classes of animals and Invertebrates (general).
  Animals of the past: Lucas, 1168.
  Arrested evolution, paleontology of: Ruedemann, 1627, 1630.
  Climate, determination by plants: Knowlton, 1068.
  Climatic environment of extinct animals, determination: Case, 296.
  Contributions to knowledge: Berry, 140.
  Fossil, use of term: Field, 584; Miller, 1300.
  Fossils and life: Bather, 92.
  Invertebrates, inorganic constituents: Clarke, 352.
  Marine invertebrate faunas, distribution: Schuchert, 1680.
  Origin of oldest fossils: Brooks, 213.
  Orthogenesis: Osborn, 1426.
  Parasitism: Clarke, 358.
  Photographing fossils: Mohs, 1259.
  Progress of life: Keyes, 976.
  Progress on Pacific coast: Merriam, 1270.
  Protopods: Troxell, 1927.
  Researches in western States: Merriam, 1273.
  South American faunas, origin: Loomis, 1150.
  Species, nature of: Troxell, 1927.
  Symbolism: Clarke, 358.
  Varations or specific distinctions: Lull, 1176.

Cambrian.
  California, Mohave Desert: Clark, 339.
  Iowa, St. Lawrence limestone, Trilobita: Water, 2025.
Palaeontology—Continued.

Carboniferous.
Kentucky, eastern Mississippian: Butts, 262.
Nova Scotia, Horton-Windsor district: Bell, 126.
Oklahoma, Permian Apus: Ruedemann, 1629.
Stanley shale: Honess, 816.
Permian: Beede, 119.
Pottsville fauna, Ohio: Morningstar, 1371.
Texas, Burk Burnett: Glenn, 661.
Northern: Moore, 1920.
West Virginia, Nicholas County: Price, 1517.

Cretaceous.
California, Santa Ana Mountains: Packard, 1446.
Cannounball fauna: Stanton, 1796.
Cheyenne sandstone flora, Kansas: Berry, 145.
Dakota sandstone problems: Stanton, 1795.
Dinosaurs, Red Deer River: Sternberg, 1808.
Kansas, Niobrara beds, Anguillavus: Martin, 1233.
Mexico, San Felipe formation: Stanton, 1794.
Tamaulipas, rudistid shells: Stephenson, 1803.
South Dakota, Badlands: Toepelmann, 1913.
Palmoxylon, Pierre formation: Stevens, 1812.
Tennessee, Cretaceous flora: Berry, 139.
McNair County, Hamulcus: Wade, 1996.
Trigoni, Pacific coast: Packard, 1445.
Trinidad, rudistids: Harris, 723a.
Woodbine flora, Arthurs Bluff, Texas: Berry, 144.

Devonian.
Dolotorinus and allies: Springer, 1755.
Iowa, Hackberry fauna: Fenton, 579, 579a.
Iowa, Lime Creek shales: Thomas, 1881.
Mackenzie, Crinoidea: Springer, 1788.
Minnesota: Stauffer, 1909.
New York, Oriskany fauna, Oriskany Falls: Eaton, 545.
Stringosephalus burtoni, distribution: Kindbl, 1044.

Jurassic.
Trigoni, Pacific coast: Packard, 1445.

Ordovician.
Arctic Cephalopoda: Forste, 590.
Ceratopyge fauna: Raymond, 1546.
Dolgeville fauna: Ruedemann, 1624.
Maquoketa shale, Iowa: Bradley, 191.
New York, graptolite zones: Ruedemann, 1624.
Ontario, Ottawa region: Wilson, 2145.
St. Lawrence Valley: Wilson, 2146.
Snake Hill fauna: Ruedemann, 1624.
Stones River limestone: Coryell, 417.
Tennessee, Stones River group: Coryell, 417.
Trenton echinoderm faunas, distribution: Forste, 592.
Trenton fauna, Ontario and Quebec: Raymond, 1540.
Vermont, Grand Isle: Ruedeman, 1625.

Pre-Cambrian.
General: Keyes, 1004.

Quaternary.
British Columbia, Vancouver Island: Berry, 148.
California, Pleistocene, McKittrick asphalt deposit: Merriam, 1272.
Pleistocene Mollusca: Oldroyd, 1411.
Rancho La Brea, peccary: Merriam, 1271.
Southern, Vertebrata: Frick, 613.
Colorado, Yuma County, Pleistocene Mammalia: Cook, 406.
Ecology in the interpretation of fossil faunas: Baker, 63.
Gulf States, Pelagypoda: Maury, 1254.
Illinois, Alton: Leighton, 1110.
Grundy County, Pleistocene Mollusca: Baker, 62.
Pleistocene Mollusca: Baker, 64.
Kansas, Wallace County, Pleistocene Mollusca: Hanna, 715.
Tertiary.

Alabama, Eocene Mollusca: Aldrich, 15.
Alaska, Pliocene pectens: Dall, 455.
Arachnida: Petrunkevitch, 1486.
Arizona, San Pedro Valley, vertebrates: Gidley, 636.
Briones fauna, California: Trask, 1813.
British Columbia, Vancouver Island, Sooke formation: Cornwall, 416.
Byram marl, Mississippi: Cooks, 413.
Foraminifera: Cushman, 445.
California, Desmostylus: Hannibal, 717.
Lompoc, humpback whale: Kellogg, 957.
Meganos group: Clark, 334.
Petahuma, Point Royes, and Santa Rosa quadrangles, Dickerson, 497.
Pinnipeds: Kellogg, 956.
Pliocene pinniped: Kellogg, 955.
Puente flora: Chaney, 337.
southern, Vertebrata: Frick, 613.
Chiltons: Berry, 157.
Colorado, Eocene Insecta: Cockerell, 366.
Huerfano formation, titanothereas: Osborn, 1418.
Palmyxylon, Denver formation: Stevens, 1812.
Costa Rica, northern, Miocene: Olson, 1414.
Plantae: Berry, 138.
Mollusca: Pilsbry, 1487.
Plantae: Berry, 137.
Foraminifera, Mint Spring marl: Cushman, 446.
Great Basin and Great Plains faunas: Troxell, 1698.
Gulf States, Pecocyphoda: Maury, 1254.
Eusli, plants: Berry, 143.
Hipperion, Sletian, California: Stock, 1817.
Insecta, Eocene: Cockerell, 367.
Mexico, Tehuantepec, Miocene: Berry, 152.
Miocene fishes, California: Jordan, 938.
Mollusca: Pliocene: Maury, 1255.
Montana, Eocene chelonodonts: Gidley, 635.
Myodesma, Pacific coast: Clark, 338.
Oregon, Coos Bay, Empire formation: Howe, 831.
freshwater Mollusca: Hanna, 716.
John Day region, Miocene Gastropoda: Hanna, 714.
Orthoelex; Cooks, 411.
Panama, Canal Zone, Miocene palm nut: Berry, 136.
Payette flora: Chaney, 318.
South Dakota, Badlands: Toepelmann, 1913.
Ischromys: Miller, 1306.
Utah, Stehinius: Matthew, 1248.
Paleontology—Continued.

Tertiary—Continued.

Washington, Olympic Peninsula: Dall, 458.
White River formation, North Dakota: Leonard, 1116.
Wilcox flora: Berry, 146.
Wyoming, Bridger formation, Reithroparamys: Matthew, 1245.
Eocene Insecta: Cockerell, 366.
Van Tassel, Miocene: Loomis, 1151.

Triassic.

New Mexico, phytosaur: Mehl, 1260.
Pennsylvania, York County: Wanner, 2030.
Reptilia: Huene, 841.
Texas, Reptilia: Case, 297.
western: Case, 298.

Paleopathology.

Bacteria, Permian: Moodie, 1344.
Disease, beginnings: Moodie, 1339.
Historical sketch: Moodie, 1345.
Man: Moodie, 1346.
Mesozoic: Moodie, 1343.
Osteomyelites, Permian: Moodie, 1342.
Phytosauria: Moodie, 1347.
Trepanation: Moodie, 1341.

Paleozoic (undifferentiated).

Nova Scotia, Kings and Annapolis counties: Faribault, 570.

Panama (including Canal Zone).

Paleontology.

Areas, recent: Maury, 1256.
Palm nut, Miocene, Canal Zone: Berry, 136.

Paragenesis of minerals.

British Columbia, Texada Island, Marble Bay mine: Delmage, 511.
New Mexico, Iron Mountain: Smythe, 1777.
Timiskaming ores, structure: Schlessmacher, 1659.

Parasitism: Clarke, 368.

Peat.

Canada: Anrep, 39.
Classification and formation: Osborn, 1417.
General: Cottrell, 422, 424; Daacknowski, 448.
Maine, Livermore quadrangle: Burr, 246.
Ontario: Anrep, 37, 38.
Quebec: Anrep, 37.

United States: Soper, 1778.

Pebbles.

Geologic history: Wentworth, 2068.
Measuring and plotting shapes: Wentworth, 2072.
River pebbles, field study: Wentworth, 2066.
Pebbles, shapes: Wentworth, 2072; of beach pebbles; Wentworth, 2074.
Wedge work: Wentworth, 2069.

Pelecypoda.

Areas, Panama region: Maury, 1256.
Barrettia: Trechmann, 1920.
Costa Rica, northern, Miocene: Olsson, 1414.
Mexico, Lower California, San Quentin Bay: Dall, 456.
Tamaulipas, rudistid shells: Stephenson, 1803.
Myadesma, Pacific coast: Clark, 338.
Peeten, Pliocene, Alaska: Dall, 465.
Pectens, Tertiary, West Indies, new names: Cooke, 410.
Pleistocene and Pliocene, Gulf States: Maury, 1254.
Rudistids, San Felipe formation, Mexico: Stanton, 1794.
Rudistids, Trinidad: Harris, 728a.
Trigoniae, Pacific coast: Packard, 1445.

Penneplains.

Colorado, Front Range and Rocky Mountains National Park: Lee, 1106.
Driftless Area, erosional history: Trowbridge, 1921.
INDEX.

Peneplains—Continued.
  General: Davis, 477.
  Pennsylvanian, Piedmont province: Bascom, 78
  Rocky Mountain region: Keyes, 971.
  Utah: Keyes, 1021.
  Peridotite dikes, Scott County, Arkansas: Miser, 1228.
  Permian revolution: Finlay, 387.
  Petrified forest, Sonoma, California: Dickerson, 497.
  Pennsylvania.
    Survey: Ashley, 46.
    Economic geology.
      Anthracite region: Parker, 1462.
      Chrome ore, southeastern Pennsylvania: Knopf, 1065.
      Chromite deposits: Gordon, 680.
      Clay: Ries, 1593.
      Mineral resources: Ashley, 47; Pa. G. S., 1478.
      Oil and gas, outlook for: Ashley, 49.
      Oil and gas fields: Ashley, 50.
      map: Richardson, 1588.
      Oil in coals and shales: Ashley, 48.
    Petroleum: Johnson, 910.
    Historical geology.
      Crystalline schists, southeastern Pennsylvania: Knopf, 1066.
      Lebanon County: Gordon, 676.
      Lower Paleozoic, southeastern Pennsylvania: Stose, 1840.
      Metamorphic rocks, southeastern Pennsylvania: Jonas, 931.
      Triassic, York County: Wanner, 2030.
    Mineralogy.
      Chlorite, white: Shannon, 1714.
      Crocidolite, eastern Pennsylvania: Wherry, 2087.
      Mineralogy: Gordon, 679.
      Texas, Lancaster County: Gordon, 678.
      Unionville corundum mines, Chester County: McKinstry, 1205.
    Paleontology.
      Triassic, Reptilia: Huene, 841.
      York County: Wanner, 2030.
    Petrology.
      Anorthosites, genesis: Smith, 1762.
      Granitic pegmatites: Gordon, 677.
      Ordovician volcanics, Lebanon County: Gordon, 676.
      Serpentine: Gordon, 680.
    Physical geology.
      Anthracite basins, structural features: Kemp, 963.
      Coudersport ice mine: Balch, 65.
    Physiographic geology.
      Cycles of erosion, Piedmont province: Bascom, 78.

Pennsylvania. See Carboniferous.

Pentremites. See Blastoidae.

Permian. See Carboniferous.

Petroleum.
  Accumulation of oil and gas, time factor: Johnson, 913; by moving underground water: Blackwelder, 164.
  Accumulation of oil in sands: Emmons, 559.
  Alaska: George, 627; Martin, 1229.
    Cold Bay field: Palmer, 1453.
    Iniskin Bay district: Moffit, 1336.
  Alberta, Sheep River area: Slipper, 1751.
  Arizona, northeastern, Holbrook area: Hager, 704.
  Arkansas, El Dorado field: Crider, 432; Heald, 750; Hull, 849; Pratt, 1510; Teas, 1866; age of producing sand: Stephenson, 1804.
  Bibliography: Burroughs, 248.
  Brines of oil fields: Washburne, 2037.
  British Columbia, Peace River district: Spieker, 1784.
Petroleum—Continued.
Ciervo field: Stalder, 1792.
Kern County: English, 562.
Los Angeles basin: Arnold, 44.

petroleum geology, development: Hamilton, 708.
production decline: McLaughlin, 1207.
Canada: Dowling, 522.

oil reserves: Arnold, 45.
western: Dowling, 518.
Central America: Milner, 1323.

oil reserves: Redfield, 1562.
Coal tar mistaken for oil residue: Martin, 1232.
Decline curves of various oil pools: Johnson, 911.
Detecting small quantities: Heald, 749.
Domes, origin by isostatic adjustment: Albertson, 4.
Economics: Pogue, 1485.
Experimental petroleum geology: McCoy, 1192.
Field mapping for oil geologist: Warner, 2035.
Field methods in petroleum geology: Cox, 439; Lahee, 1082.
Folding, effect of stratigraphic variation on: Gardeescu, 624.
Foraminifera, use in determining underground structure: Cushman, 447.
Future oil supply: White, 2095.
General: Butler, 260; Redwood, 1563; Vander Leek, 1976.
Genetic factors of oil occurrence: White, 2094.
Geologic aid in exploration: Ellison, 556.
Geologic distillation: Willis, 2141.
Geology: Emmons, 560.
Handbook of the petroleum industry: Day, 484.
History, epochs in: White, 2100.
Idaho, oil possibilities: Heald, 752.
Illinois: Collingwood, 393.
Marion County, Wamac pool: Wheeler, 2081.
Monroe County: Mylius, 1377.
oil and gas fields, map: Richardson, 1586.
Indiana: Bowmecker, 188; Logan, 1141.
in middle Ordovician: Heald, 751.
Inorganic origin: Hixon, 797.
Invasion of oil into a water-wet sand: Skirvin, 1749.
Kansas: Moore, 1354.
central: Williams, 2135.
Eldorado field: Fath, 572; Stapleton oil horizon, age: Fath, 574.
Sallyards field: Berger, 139.
southeastern: Williams, 2133.
Urschel oil pool, Marion County, water conditions: Shea, 1722.
western, oil possibilities: Lupton, 1178.
Kentucky: Glenn, 650; Jillson, 887, 897.
eastern: Jillson, 894.
Irvine district: St. Clair, 1637.
Warren County: St. Clair, 1638, 1639.
Louisiana, Belleview pool: Hull, 846.
Haynesville pool: Hull, 844; Scott, 1888, 1688; Teas, 1864, 1865.
northern: Hull, 845.
salt domes: Deussen, 494.
Vinton field: Wathen, 2106.
Mackenzie River valley: Bosworth, 172, 173, 174; Kindle, 1048, 1048; Kitto, 1054; Ness, 1389; Redfield-1559.
Norman fields: Hume, 832.
Mexico, Isthmian oil fields: Redfield, 1558.
oil fields: Hartley, 725; Huntley, 855.
Lower California: Bustamante, 265.

petroleum geology: Hartley, 724.
Tepetate-Chinampa pool, graphic model: Huntley, 856.
Petroleum—Continued.

Mexico, Vera Cruz fields: Semmes, 1697.

Zacamilxto pool: DeGolyer, 487.

Mid-Continent oil field, paleogeography and historical geology: McCoy, 1193; reflected buried hills: Powers, 1303.

Mid-Continent oil-field structures: Monnett, 1338.

Migration and accumulation, by moving underground water: Rich, 1581.

Migration of oil: Dodd, 607.

Mississippi, oil possibilities: Easton, 543.

Montana: Clarke, 333.

Cat Creek oil field: Lupton, 1177.

central and eastern: Clapp, 330.

Garfield County, oil and gas prospects: Thom, 1874.

Quadrant formation: Freeman, 610.

Soap Creek oil field: Thom, 1872.

Sweetgrass arch: Clapp, 333.

Movements of oil and water through sands: Mills, 1321.

New York: Clarke, 360; Johnson, 910.

Northwest Territory: Anonymous, 2227.

Occurrence: Clapp, 332.

Ohio: Bownocker, 188.

Ordovician horizons: Paunyty, 1455.

Wayne County: Conrey, 403.

Oil reserves: Keyes, 1009; White, 1301.

United States: White, 2097.

Oil structures: Hill, 787.

Oil supply: White, 2098.


Oklahoma, Caddo County, Cement field: Reeves, 1569.

Carter County, Hewitt oil field: Roark, 1597.

Cement field, Caddo County: Clapp, 331.

Fox field, Carter County: Storm, 1833.

Healdton field, Carter County: Bartram, 77.

Hewitt field: Swigart, 1845.


northeastern: Williams, 2133.

Okmulgee district: Clark, 344.

Osage County: Miller, 1318; structural conditions: Hartley, 726.

Osage Reservation: Rounds, 1620.

southern: Burton, 255; Hopkins, 821; Moore, 1355.

southwestern: Howell, 835.

Stephens County: Storm, 1831, 1832.

Ontario, future prospects: Williams, 2136.

Manitoulin Island: Williams, 2138.

Organic material of carbonaceous shales: Rae, 1530.

Origin: Carmody, 291.

humus-acid: Rae, 1529.

Pennsylvania: Ashley, 49, 50; Johnson, 910; Pa. G. S., 1478.

oil and gas fields map: Richardson, 1588.

Permeability and absorption of “sands”: Melcher, 1266.

Petroleum geology, past and future: Goodrich, 675; Powers, 1500.

as a profession: Woodruff, 2192.

east of the Mississippi: Richards, 1504.

Petroliferous provinces: Schuchert, 1676; Woodruff, 2191.

Phosphorus in Californian petroleum: Palmer, 1450.

Pore space of oil and gas sands: Melcher, 1265.

Problems in oil geology: White, 2099.

Progress in petroleum geology: Plummer, 1490.

Rock classification: Knapp, 1057.

Subsurface contouring: Bloesch, 166.

Subsurface relationships in oil and gas fields, experimental studies: Mills, 1330.

Temperature of fluids in wells: Lahee, 1083.

Tennessee: Glenn, 650, 652; Nelson, 1385.


Brazoria County, West Columbia field: Barton, 2190.

Gulf coastal region oil fields: Wolf, 2190.
Petroleum—Continued.

Texas, McLennan County: Pace, 1437.
Mexia field: Whitney, 2110; Wrather, 2199.
northeastera, salt domes: Cheney, 325.
Pecos County, Fort Stockton: Pratt, 1509.
Ranger field: Reeves, 1570.
salt domes: Deussen, 494.
South Bend field, Young County: Cheney, 326.
southwestern oil fields: Owen, 1436; Stephenson, 1805.
Thrall field, Williamson County, Bybee, 265.
Webb and Zapata counties: Sellards, 1692.
Zapata County: Wrather, 2201.
Topographic criteria of oil field structures: Monett, 1337.
Trinidad: Carmody, 291; Macready, 1213; Milner, 1322.
Underground conditions in oil fields: Ambrose, 34.
Underground water in migration and accumulation of oil and gas: Benine, 171.
Utah, southern, oil possibilities: Moore, 1392, 1363.
Washington County: Bassler, 79.
Water displacement in oil and gas sands: Johnson, 912.
Water in oil fields: Ambrose, 35.
West Indies: Milner, 1323; Redfield, 1561.
West Virginia: Reger, 1571.
carbon ratios of coals in oil fields: Reger, 1575.
Nicholas County: Reger, 1573.
Wyoming: Ball, 66; Heald, 747.
accumulation: Heald, 745.
oil and gas fields, map: Richardson, 1589.
Osage oil field, Weston County: Collier, 390.
Petroleum geology, contributions to geologic science: DeGolyer, 488.
Petroliferous provinces: Schuchert, 1676; Woodruff, 2191.

Petrology (general). For regional, see names of States. For rocks described, see list, p. 246. See also Igneous and volcanic rocks; Sedimentary rocks; Technique.

Clinkerhill: Dove, 517.
Contact phenomena, gneiss and limestone in western Massachusetts: Eskola, 564.
Demesne of petrology: Berkey, 133.
Determination of common minerals and rocks, tables for: Tarr, 1856.
Garnet reaction rims in anorthosite: Roessler, 1604.
Granitic pegmatites: Gordon, 677.
Graphic study of igneous rock series: Grout, 692.
Igneous intrusion, after-effects: Kemp, 965.
Igneous rocks, average chemical composition: Clarke, 353.
Jades of middle America: Washington, 2052.
Jasperoid of Joplin district: Smith, 1772.
Lava, surface fusion: Diller, 504.
Limestones: Howell, 816.
Literature, abstracts and reviews: Behre, 121; Johansson, 901.
Metasomatic processes in silicate rocks; Goldschmidt, 665.
Microscopical determination of rocks in sections: Johansson, 903.
Petrographic unconformity: Berkey, 132.
Plateau basalts: Washington, 2051.
Pressure in magmas: Morey, 1394.
Reaction principle in petrogenesis: Bowen, 178.
Segregation granites: Lane, 1088.
Till and stratified clay, microscopic sections: Sayles, 1653.
Phosphate.
General: Cottrell, 425; Stone, 1827, 1829.
Montana, Granite County: Pardee, 1457.

Physical geology (general). For regional, see names of States.
Arcuate and lobate mountain structures: Taylor, 1881.
Collapse of mountain summits: Young, 2222.
Colloidal solutions: Burton, 254.
Contact metamorphism: Hess, 777.
Control zones of earth: Chamberlin, 310.
Crustal movements, California: Day, 483.
Crystalline schists, origin: Keyes, 968.
Cycle of glaciation: Hobbs, 806.
INDEX.

Physical geology (general)—Continued.
Deflection of streams by earth rotation: Davis, 475.
Deformative processes: Chamberlin, 306.
Diminishing rate of rotation, effects: Keyes, 985.
Domes, origin by isostatic adjustment: Albertson, 4.
Drag folding in marble: Dale, 454.
Dynamics of the lithosphere: Jones, 935.
Earthquake rifts, aerial observation: Willis, 2142.
Folding, effect of stratigraphic variation on: Garde, 524.
Foraminifera, use in determining underground structure: Cushman, 447.
General: Scott, 1690.
Groundwork of diastrophism: Chamberlin, 309.
Gulf Coastal Plain salt domes, secondary intrusive origin: Matteson, 1241.
Imbricated structure in river gravels: Johnston, 930.
Impressions on rocks: Twenhofel, 1949.
Intraformational corrugated rocks: Miller, 1316.
Iron-depositing bacteria: North, 1405.
Limestone slab deformed by gravity: Kindle, 1047.
Lithosphere, structural failure: Leith, 1113.
Mechanical interpretation of joints: Bucher, 231.
Megadiastrophism: Chamberlin, 311.
Mountain summits, collapse: Young, 2222.
Mud cracks on steeply inclined surfaces: MacCarthy, 1189.
Natural waters, effects of common changes: Wells, 2065.
Pebbles, wedge work: Wentworth, 2069.
Planetesimal hypothesis: Chamberlin, 308.
Pole displacement: Cotton, 419.
River deflection due to earth's rotation: Hayes, 742.
Rock mass movement: Leith, 1115.
Self-compression of the earth: Chamberlin, 308.
Subjacent igneous invasion, relations of regional metamorphism: Barrell, 72.
Syngenetic origin of concretions in shale: Tarr, 1859.
Valley widening by frost action: Culbertson, 437.

Physiographic geology (general). For regional, see names of States. See also Drainage changes.
Airplane photography: Lee, 1104.
Arcuate mountains, evolution: Hobbs, 802.
Cryptovolcanic structure, Adams County, Ohio: Bucher, 232.
Cycle of glaciation: Hobbs, 806.
Deflection of streams by earth's rotation: Jennings, 885.
Earthquake rifts, aerial observation: Willis, 2142.
Erosional history: Trowbridge, 1921.
Evolution of earth: Hobbs, 800.
Geanticlines, horizontal movement: Brouwer, 214.
General: Scott, 1690.
Geographical cycle: Davis, 477.
Great Basin ranges, origin: Keyes, 1030.
Harbor development by physiographic processes: Cobb, 364.
Localization of major geosynclines, cause: Bucher, 233.
Major features of earth's surface: Diener, 408.
Peninsulas and the geographical cycle: Davis, 477.
Retrograding of offshore bars: Johnson, 908.
Rocky Mountains, physiographic history: Keyes, 980.
Rôle in military operations: Bryan, 226.
Scenery of American rivers: Johnson, 906.
Summit plane of Colorado Rocky Mountains: Keyes, 1011.
Tomaloos and points, formation: Johnson, 914.
Topographic criteria of oil-field structure: Monett, 1337.
Topographic maps: Davis, 478.
United States: Lobeck, 1133, 1135.

age of present surface: Trowbridge, 1922.
physiographic map: Lobeck, 1134.
Utah peneplains: Keyes, 1021.

64264—24———15
BIBLIOGRAPHY OF NORTH AMERICAN GEOLOGY, 1921-1922.

**Pisces.**
- Anguillavus hackberrvensis, Niobrara beds, Kansas: Martin, 1233.
- Devonian: Kindie, 1049.
- Lampris satima, Lompoc, California: Jordan, 937.
- Miocene fishes, California: Jordan, 938.
- restorations: Anonymous, 2234.
- Quisque bakeri, Miocene herring, Texas: Jordan, 940.
- Shark’s teeth, Pliocene, California: Jordan, 941.

**Placers.**
- Alaska: Mertie, 1291.
- British Columbia, Cariboo district: Johnston, 927.
- Plain geology: Smith, 1761.
- Planetesimal hypothesis: Chamberlin, 308; astronomical tests: Reid, 1577.
- Plants, fossil. See Paleobotany.
- Platinum.
  - General: Hill, 789, 792.
  - In quartz veins: Turner, 1943.
  - Oregon, southwestern: Kellogg, 954.
- Pleistocene. See Glacial geology; Quaternary.
- Pliocene. See Tertiary.
- Polyzoa. See Bryozoa.
- Portland cement. See Cement materials.
- Potash.
  - General: Nourse, 1407, 1408.
  - Illinois, potash shales: Austin, 57; Schroyer, 1674.
  - Union County: Krey, 1077.
  - Nebraska: Hicks, 786.
  - New Jersey greensands: Mansfield, 1219, 1223.
  - reserves: White, 2096.

**Pre-Cambrian.**
- Arizona, Jerome district, Yavapai County: Reber, 1557.
- Mazatzal quartzite: Wilson, 2147.
- Papago country: Brynn, 227.
- Rocky Mountain region: Schofield, 1663.
- Rocky Mountain trench: Shepard, 1727.
- southeastern: Schofield, 1665, 1667.
- Canada: Miller, 1908.
  - southwestern: Coffin, 376.
- Greenland, northwestern: Koch, 1074.
- Labrador, northeastern: Coleman, 381.
- Literature: Stedtman, 1801.
- Manitoba: Alcock, 11.
- Maskwa River: McCann, 1185.
  - northern: Bruce, 222.
- Oiseau River area: Cooke, 415.
- Ospwagan Lake-Burntwood River area: Alcock, 7.
- Rat River: Alcock, 8.
- Rice Lake area: Cooke, 415.
- Mexico, Lower California: Darton, 466.
- New Jersey, Sussex County: Ries, 1596.
- New York, Adirondack region: Clarke, 357.
- Mount Marcy quadrangle: Kemp, 960.
- Ontario: Hopkins, 822; Miller, 1908; Quirke, 1536; Wilson, 2151.
- Algoma district: Brunton, 224.
- Black River area: Wright, 2204.
- Blanche River area: Burrows, 253.
- Boston-Skead area: Burrows, 252.
- Brockville-Mallorytown area: Wright, 2207.
- Gowganda area: Burrows, 250.
- Michipicoten district: Thomson, 1899.
  - northern: Bruce, 222.
INDEX.

Pre-Cambrian—Continued.

Ontario, Schreiber-Duck Lake area: Hopkins, 824.
Sudbury district: Quirke, 1537.
Wanapitei Lake area: Quirke, 1538.
Timiskaming district, Kenogami Lake area: Cooke, 414.
Larder Lake area: Cooke, 414.
Round Lake area: Cooke, 414.
western Patricia: Burwash, 257.
Quebec: Wilson, 2151.
South Dakota, Black Hills: Runner, 1634.
Texas: Udden, 1933.
Yukon, Sixtymile and Ladue rivers area: Cockfield, 372.
Pre-Cambrian continents, existence and configuration: Ruedemann, 1632.
Pre-Cambrian life: Keyes, 974.
Precious stones.

General: Stoddard, 1820, 1821, 1824.
Geologic and geographic occurrence: Ball, 69.
United States National Museum collection: Merrill, 1281.
Proboscidea, evolution, phylogeny, and classification: Osborn, 1420.
Pyrite.

General: Jenison, 882; Smith, 1768, 1769.
Illinois: Cady, 270.
New York: Newland, 1391.
South Carolina, Kershaw, Haile mine: Schrader, 1668.
Pyrrhotite, etching tests on: Boydell, 190.
Quaternary. See also Glacial geology; Paleontology, Quaternary.
Arizona, lower Gila region: Ross, 1618.
Champlain sea, decreasing salinity southward: Goldring, 664.
Georgia: Teas, 1863.
Mexico, Lower California, San Quentin Bay, Pleistocene: Orcutt, 1416.
Newfoundland, western: Schuchert, 1678.
New Mexico, Raton-Brilliant-Koehler area: Lee, 1105.
Pleistocene: Hay, 737.
Pleistocene time: Hay, 739.
Texas, Brazoria County, West Columbia field: Barton, 75.
Quebec.

Areas described.
Beauceville area: MacKay, 1198.
Gaspé Peninsula: Coleman, 382, 385.
Lamarche township, Gaspe County: Alcock, 12.
New Quebec: Coleman, 3881.
Torngat Mountains, Labrador: Coleman, 389.
Economic geology.
Allanite, Lac a Baude, Champlain County: Harvie, 729.
Asbestos: Rukeyser, 1633.
Black Lake area: Hubbard, 539.
Weir township, Bonaventure County: Harvie, 728.
Graphite: Spence, 1782.
Buckingham district: Eardley-Wilmot, 542.
Mining operations, 1920, 1921; Denis, 492, 493.
Peat bogs: Anrep, 47.
Structural materials, St. Lawrence Valley: Kede, 948.
Historical geology.
Anticosti Island: Tewenhofel, 1948.
Devonian limestone, Saint George: Clark, 349.
Levis formation: Clark, 347.
Monteregian Hills: Howard, 829.
Paleozoic and pre-Cambrian relationships, southern border of Laurentian Highlands, Wilson, 2151.
Tillite, Levis: Santos, 1655.
Mineralogy.
Allanite, Lac a Baude, Champlain County: Harvie, 729.
Native gold in calcite, Dorchester County: Dufresne, 531.
Quebec—Continued.

**Paleontology.**

Ordovician, St. Lawrence Valley: Wilson, 2146.
Pleistocene and recent fossils, St. Lawrence Valley: Whittaker, 2119.
Trenton fauna: Raymond, 1540.

**Petrology.**

Alnoite, Isle Cadieux: Bowen, 176, 177.
Granitic segregations in serpentine series: Dresser, 528.
Monteviron Hills, outliers: Howard, 829.

**Physiographic geology.**

Beauceville area: MacKay, 1198.
Gaspe Peninsula: Coleman, 382, 385.
Pleistocene terraces: Kindle, 1050.

**Quicksilver.**

Bibliography: Evans, 568.
General: Ransome, 1534, 1535, 1537.
Mexico, San Luis Potosi, Guadalcazar: Wittich, 2168.

**Radium:**

Butler, 261; Hess, 779, 780, 783.

**Raindrops, impressions on rocks:** Twenhofel, 1949.
Raton mesas, New Mexico and Colorado: Lee, 1103.

**Red limestones, origin:** Galloway, 622.

**Relief maps.**

California, central coast ranges: Dickerson, 497.
San Francisco Bay region: Dickerson, 497.
Colorado, central, and New Mexico, north-central: Lee, 1105.
Nebraska, Sioux County, Agate anticline: Schramm, 1872.
Quebec, Beauceville area: MacKay, 1198.
United States: Lobeck, 1135.
Virginia: Stone, 1841.
Washington: Patty, 1476.

**Reptilia.**

Alamosaurus, Ojo Alamo formation, New Mexico: Gilmore, 647.
Alberta, Red Deer River: Sternberg, 1807.
Amphicoelias: Osborn, 1419.
Brachyceratops: Gilmore, 644.
Camarasaurus: Osborn, 1419.
Centrosaurus apertus, Belly River beds: Parks, 1464.
Ceratopsia: Gilmore, 646.

Crocodilide, Bridge beds: Mood, 1350.
Crocodilus acer, Manti beds, Utah: Mook, 1351.
Desmatosuchus, Dockum beds, Texas: Case, 295.
Dinosaur tracks, Hamilton County, Texas: Wharton, 2202.
Dinosauria: Sternberg, 1811.
Dinosaurs, Red Deer River: Sternberg, 1806.
Gavialisuchus americanus, Florida: Mook, 1348.
Kansas, Niobrara group: Wilman, 2157.
Maryland, Arundel formation: Gilmore, 640.
Nodosaurus textilis: Lull, 1199.
Palaeocincus: Matthew, 1253.

**Palaeopathology, Mesozoic:** Moodie, 1343.

Panoplosaurus mirus, Belly River beds: Sternberg, 1810.
Parasaurolophus, Red Deer River: Parks, 1466.
Phytosaur, Triassic, New Mexico: Mehl, 1260.
Phytosaura: Moodie, 1347.
Sauropod dinosaur, San Juan Basin, New Mexico: Gilmore, 642.
Struthionimus, habits: Nopcsa, 1403.
Texas, western, Upper Triassic: Case, 298.
Thecodontia: Huene, 842.
Turtle, Kinosternon arizonense: Gilmore, 645.
Restorations.

Blastomeryx marshi: Lull, 1173.
Brachyceratops: Gilmore, 644.
Camarasaurus: Osborn, 1419.
Eporeodon: Thorpe, 1895, 1903.
Hyrachyus: Troxell, 1883.
Hyrocodon apurus: Sinclair, 1746.
Mioene fishes, California: Jordan, 938; Anonymous, 2234.
Palaeoscincus: Matthew, 1233.
Parasaurolophus: Parks, 1406.
Struthiomimus: Nopcsa, 1403.
Triceratops: Gilmore, 646.
Vertebrates: Lucas, 1168.

Rhode Island.

Mineralogy.

Apatite, South Foster: Hawkins, 733.
Epidote, Pascoag: Hawkins, 733.
Hematite, Manton: Hawkins, 733.

Paleontology.

Crossotheca, Carboniferous: Round, 1619.
River pebbles: Wentworth, 2072.

Rivers.

Colorado River: Pack, 1441.
Fraser River: Johnston, 922.
Missouri River: Greene, 685.
Scenery, origin: Johnson, 909.

Road materials.

General: Bean, 114.
Wisconsin: Bean, 115.

Rock distortion in Oklahoma oil fields: Gardner, 625.
Rock-forming minerals, microscopical determination in sections: Johannsen, 903.
Rock slides. See Landslides.

Rocks. See Igneous and volcanic rocks; Sedimentary rocks.

Rocks, structural features.

Cone-in-cone: Tarr, 1860.
Crystalline schists, origin: Keyes, 968.
Imbricated structure in river gravels: Johnston, 930.
Intraformational corrugated rocks: Miller, 1316.
Mud cracks on steeply inclined surfaces: MacCarthy, 1189.
Rock distortion in Oklahoma oil fields: Gardner, 625.
Strand markings in Pennsylvanian sandstones, Osage County: Powers, 1408
Zircon as a criterion of origin of metamorphosed rocks: Armstrong, 43.

Rocks described. See list, p. 240.

Saint Croix Island, geology: Vaughan, 1880.
Saint John, O. H., biography: Keyes, 973.
Salisbury, R. D., biography: Chamberlin, 316; Keyes, 1020; Wrather, 2203.
Salmon River district, British Columbia: Schofield, 1666.

Salt.

General: Cottrell, 428; Insley, 801; Stone, 1828.
Gulf Coastal Plain salt domes, secondary intrusive origin: Matteson, 1241.
New York: Newland, 1391.
Nova Scotia, Malagash: Moffatt, 1333.

Salt domes.

Gypsum in Gulf salt domes: Barton, 76.
Origin: Barton, 75; Hixon, 797; Powers, 1504; Pratt, 1511.
by isostatic adjustment: Albertson, 4.
secondary intrusive: Matteson, 1241.
Salt cores, origin: Washburne, 2037.
Texas, Fort Bend County: Pratt, 1512.
northeastern: Cheney, 325.
Salterella, nature: Clark, 348.
Sand.

General: Beach, 109, 113; Stone, 1829; Teas, 1833.

Georgia: Teas, 1863.

Ontario, northern: Keele, 946; Cretaceous: Keele, 947.

Sand grains, study of: Galloway, 621.

Sandstone.

Structure and origin: Galloway, 621.

Santa Fe district, Mineral County, Nevada: Clark, 340.

Santo Domingo. *See* Dominican Republic.

Saskatchewan.

Economic geology.


Lignite: MacLean, 1209.


Oil prospecting: Dowling, 519; Ness, 1388.

Souris coal field: Dowling, 520.

Historical geology.


Southern Saskatchewan: Sheppard, 1729.

Mineralogy.

Annaheim meteorite: Johnston, 915.

Petrology.

Norite rocks, Lake Athabasca region: Alcock, 5.

Sedimentary rocks.

Algonkian sediments, quantitative study: Trowbridge, 1924.

Boring, Palo Pinto County, Texas: Goldman, 659.

Classification: Field, 685.

Description and nomenclature: Tieje, 1907.

Kansas, Woodson County: Twenhofel, 1944.

Limestones: Howell, 836.

Ontario, McKay Lake, bottom deposits: Whittaker, 2120.

Organic material of carbonaceous shales: Rae, 1536.

Petrographic characters: Ailing, 32.

Schedule for field description: Goldman, 657, 660.

Texas, characteristics: Udden, 1953.

Till and stratified clay, microscopic sections: Sayles, 1633.

Variation in sediments: Twenhofel, 1948.

Weight: Lane, 1090.

White River beds: Wantless, 2028.

Wyoming, Cambrian: Tieje, 1907.

Sedimentation.

Alberta, Lake Louise: Johnston, 929.

Basal glauconite and phosphate beds: Goldman, 661.

Chemical and physical researches: Wells, 2064.

Chemistry: Clarke, 362.

Committee on sedimentation, work of: Vaughan, 1984.

Fraser River delta, British Columbia: Johnston, 922, 923, 926.

Glauconite, association with unconformities: Goldman, 658.

Lithologic correlation: Goldman, 656.

Ontario, Cobalt Lake: Albertson, 4.

Sand grains, study of: Galloway, 621.

Stratification and time relations: Udden, 1951.

Studies of sedimentation in universities: Moore, 1352; Twenhofel, 1946.

Terms for clastic sediments: Wentworth, 2073.

Variation in sediments: Twenhofel, 1948.

Seismology. *See also* Earthquakes.

Berchmans seismograph: Neumann, 1390.

Earthquake frequency: Cotton, 420.

Earthquake rifts, aerial observation: Willis, 2142.


Earthquake waves, analysis: Klotz, 1055.

Earthquake zones of the Pacific: Omori, 1415.

Forecasting of earthquakes: Rickard, 1591.

General: Macelwane, 1195.

Greater Antilles seismic belt: Taber, 1849.

Isoseismatic lines, construction and use: Davison, 473.

L waves, variable velocity: Hodgson, 899.
INDEX. 229

Seismology—Continued.

Milne-Shaw seismograph: McComb, 1191.
Piezo-electrical accelerograph: Wood, 2186.
"Regional" and "world" seismology: Wood, 2185.
Scales of seismic intensity: Davison, 479.
Seismograph, on a new principle: Morize, 1370.
Temperature control: Hodgson, 811.
Status of seismological work: Klotz, 1056.
United States Weather Bureau investigation: Marvin, 1237.
Selenium: Heikes, 754, 785.
Self-compression of the earth: Chamberlin, 308.
Shale.
Kansas, Arkansas City: Teetor, 1867.
Shapes of pebbles: Wentworth, 2072.
Shore lines. See also Beaches; Terraces.
Ontario, Lake Erie, Point Pelee: Kindle, 1045.
Shore lines (abandoned).
Indiana, northwestern: Cressy, 431.
Michigan, Saginaw basin: Leverett, 1118.
Silica: Beach, 103, 108, 112.
Silliconite-schist inclusions in granite: Miller, 1315.
Silurian. See also Paleontology, Silurian.
Arizona: Keyes, 1029.
Arkansas: Miser, 1326.
Batesville district: Miser, 1327.
British Columbia, Silurian tillite: Shepard, 1725.
Greenland, northwestern: Koch, 1074.
Indiana: Cuming, 439.
Mackenzie, Great Slave Lake region: Cameron, 274; Hume, 800.
lower Mackenzie valley: Kindle, 1063.
Mackenzie River district: Williams, 2140.
Missouri, northeastern: Keyes, 990.
Ontario, Pagenau, Kanagami, and Albany rivers: Williams, 2137.
Quebec, Gaspe County, Lemieux township: Alcock, 12.
Tennessee, Wayneboro quadrangle: Miser, 1325.
Silver.
Alaska: Brooks, 205, 212.
Fairhaven district: Levensaler, 1117.
Arizona: Heikes, 757, 759.
Wickenburg: Bastin, 87.
British Columbia, Kitzault Valley: Hanson, 718.
Salmon River district: Schofield, 1662, 1666.
California: Yale, 2213, 2215, 2218.
Central States: Dunlop, 532, 534, 537.
Chemistry of enrichment: Sill, 1742.
Colorado: Henderson, 770, 773.
Telluride area: Hurst, 858.
Eastern States: Dunlop, 535.
General: Dunlop, 533, 536.
Idaho: Gerry, 631.
Alturas quadrangle: Ballard, 70.
Mexico: De Iongh, 490.
El Oro district, Mexico: Winchell, 2160.
Pachuca district, Hidalgo: Winchell, 2160.
Montana: Gerry, 630, 633.
Nevada: Heikes, 755.
Candelaria district: Knopf, 1063.
Comstock lode: Bastin, 85.
Divide district: Knopf, 1061.
Mineral County, Cedar Mountain: Knopf, 1062.
Santa Fe district, Mineral County: Clark, 340.
Silver Horn district: Crampton, 430.
New Mexico: Henderson, 765, 771.
Mogollon district: Ferguson, 551.
Silver—Continued.

Ontario, Blanche River area: Burrows, 253.
Cobalt: Bastin, 87; Knight, 1058.
Gowganda area: Burrows, 250.
Silver Islet: Tanton, 1831.
South Lorrain: Bell, 123.
Thunder Bay district: Parsons, 1472.
Oregon: Yale, 2213, 2216, 2219.
South Dakota: Henderson, 764, 766, 774.
Texas: Henderson, 769, 772.
Utah: Heikes, 753, 756, 760.
Ophir district: Omlstead, 1413.
Washington: Gerry, 632.
Yukon, Keno-Hill district: Cockfleld, 373.
Mayo district: Cockfleld, 374, 375.

Sink holes.

Iowa, Pocahontas County: Cable, 287.
Slate: Bowles, 189; Loughlin, 1165, 1166, 1167.
Slide-rule dip chart: Gaby, 618.
Slides. See Landslides.

Soapstone.
Canada: Spence, 1781.
General: Diller, 501; Sampson, 1641, 1644.

Sodium compounds: Wells, 2065.
Soils.
Depletion by chemical denudation: Whitney, 2109.
Wisconsin, Buffalo County: Whilton, 2114.
Dane County: Whilton, 2113.
northern: Whilton, 2116.
Portage County: Whilton, 2112.
Waupaca County: Whilton, 2115.
Wood County: Whilton, 2111.

Solitario uplift, Presidio-Brewster counties, Texas: Powers, 1501.

South Carolina.

Economic geology.
Clay: Ries, 1893.
Pyrite, Haile mine, Kershaw: Schrader, 1668.

South Dakota.
State geologist, report: Ward, 2032.
Areas described.
Badlands: Ward, 2033.

Economic geology.
Gold, silver, copper, and lead: Henderson, 764, 766, 774.
Lead, geological methods: Wright, 2208.
Oil possibilities: Thom, 1876; Wilson, 2156.
Dewey County: Ward, 2034.
eastern Pennington County: Ward, 2031.

Historical geology.
Badlands: Wanless, 2028.
Black Hills: Keyes, 979.
Conglomerate of Black Hills: Cook, 408.
Dewey County: Ward, 2034.
General: Thom, 1876.
Lead district: Wright, 2208.
Northwestern South Dakota: Rowley, 1621.
Oreodon beds, Big Badlands: Sinclair, 1748.
Pennington County: Ward, 2031.
Turtle-Oreodon layer of White River Oligocene: Sinclair, 1747.
Unconformity in pre-Cambrian of Black Hills: Runner, 1634.

Mineralogy.
Custer County, tantalate and columbites: Headen, 745.
Sand calcite: Wanless, 2029.

Paleontology.
Agriochoerus: Thorpe, 1894.
Badlands: Toepelmann, 1913.
INDEX.

South Dakota—Continued.

Paleontology—Continued.

Bothriodonts: Troxell, 1925.
Camelidae, Oligocene: Lull, 1170.
Entelodonts, Badlands: Sinclair, 1744.
White River Oligocene: Sinclair, 1745.
Hoplophoneus, Titanotherium beds: Sinclair, 1743.
Hyracodon: Troxell, 1929.
Hyracodons, Big Badlands: Sinclair, 1746.
Ischromys, Badlands: Miller, 1306.
Oreodontidae: Thorpe, 1891.
Palmoxylyon cheyennense: Stevens, 1812.

Physiographic geology.

Badlands: Darton, 465.

Spongæae.

Glass sponges: Clarke, 360.
Stalactites, copper sulphate, rate of formation: Mitchell, 1331.
Stanley shale, Oklahoma: Eames, 815.
Stone: Loughlin, 1158, 1161.

Stratification.

Determination of thickness and depth of strata: Price, 1518.
Fraser River delta, British Columbia: Johnston, 926.
Strata, thickness, computation: Mertie, 1292.
Structure below an unconformity: Mertie, 1294.

Stratigraphic. See Historical geology.

Stream piracy.

Indiana, Monroe County: Malott, 1215.
Planation stream piracy: Malott, 1215.

Strontium.

Canada: Spence, 1780.
General: Stose, 1835, 1838.
Structural geology. See Physical geology.
Structural materials. See Building stone; Clay, etc.
Study and teaching. See Educational.
Stylolites, nature and origin: Stockdale, 1816.
Subsidence. See Changes of level.
Subterranean water. See Underground water.
Sulphates in the Salina beds: Newland, 1394.
Sulphur.

General: Jenison, 882; Smith, 1768, 1769.
Mexico: Cervantes, 302.

Surveys.

Canada, report of geological survey: Collins, 996, 999; McInnes, 1197.
Indiana: Logan, 1138.
Kentucky: Jillson, 896.
administrative report: Jillson, 888.
Pennsylvania: Ashley, 46.
South Dakota, report of State geologist: Ward, 2032.
war work: Smith, 1759.
work of: Ransome, 1833; White, 2003.
Wyoming, report of State geologist: Morgan, 1367.

Symbiosis: Clarke, 358.

Tables of formations. See Geologic formations, tables.

Taconic revolution, evidence for examined: Clark, 346.

Talc.

Canada: Spence, 1781.
General: Diller, 501; Sampson, 1641, 1644.
New York: Newland, 1391.
Ontario, Hastings County: Wilson, 2152.
Vermont: Jacobs, 864.
BIBLIOGRAPHY OF NORTH AMERICAN GEOLOGY, 1921–1922.

Tampsia, Tamaulipas, Mexico: Stephenson, 1803.
Tantalum: Hess, 779, 780, 783.
Taonurus, nature: Galloway, 623.
Tar sands, Athabasca region: Ness, 1388.

Technique.
Attitude of concealed bedded formations, determination of: Mead, 1257.
Compass: Plummer, 1491.
Determination of thickness and depth of strata: Price, 1518.
Dip and strike, determination: Longwell, 1145; Smith, 1773.
laboratory determinations: Turner, 1941.
Dip-chart and protractor: Gaby, 617.
Dip needle, use: Aldrich, 14.
Graphic determination of projection of asymmetrical anticline: Collingwood, 392.
Graphic study of igneous rock series: Grout, 692.
Kodak adapted for detail work in field: Wentworth, 2071.
Loose-leaf system for field maps and notes: Rich, 1582.
Maps, a field method of reducing to scale: Armstrong, 42.
Mining geology methods at Butte, Montana: Billingsley, 159.
Opaque minerals, examination: Thomson, 1887.
Photographing fossils: Mehl, 1259.
Quantitative methods in applied geology: White, 2090.
Recording machines: Dodge, 508.
Seismograph on a new principle: Morize, 1370.
Slip-rule dip chart: Gaby, 618.
Strata, thickness, computation: Mertie, 1292.
Subsurface contouring: Bloesch, 166.
Till and stratified clay, microscopic sections: Sayles, 1653.

Tennessee.
Volcanic ash, Bedford County: Nelson, 1384.

Areas described.
Waynesboro quadrangle: Miser, 1325.

Economic geology.
Bentonite: Nelson, 1386.
Clay: Riss, 1293.
Iron, Waynesboro quadrangle, Tennessee: Miser, 1325.
Magnetite ores, eastern Tennessee: Bayley, 100.
Oil and gas areas: Nelson, 1385.
Oil fields: Glenn, 650.
Petroleum: Glenn, 652.

Historical geology.
Benton County: Nelson, 1383.
Bentonite in Ordovician: Nelson, 1387.
General: Glenn, 652.
Ordovician, central Tennessee: Bassler, 84.
Stones River group, central Tennessee: Coryell, 417.
Trenton: Raymond, 1548.

Paleontology.
Cretaceous flora: Berry, 139.
Hamulus, Cretaceous, McNairy County: Wade, 1996.
Pleistocene plants: Berry, 149.
Potamogeton perryi, Henry County: Berry, 141.
Stones River group, central Tennessee: Coryell, 417.

Physiographic geology.
General: Nelson, 1385.

Terminology of mineral deposits: Lindgren, 1130.
Terms for elastic sediments: Wentworth, 2073.

Terraces.
Gulf of St. Lawrence, postglacial: Kindle, 1050.
Pennsylvania, Piedmont province: Bascom, 75.
Quebec, Anticosti Island, postglacial: Twenhofel, 1945.
Wisconsin, Driftless Area: MacClintock, 1190.

Tertiary. See also Paleontology, Tertiary.
Alaska: Brooks, 207; Martin, 1229.
Salmon-Unuk River region: Mertie, 1290.
Wrangell district: Buddington, 235.
INDEX.

Tertiary—Continued.

Arizona: Koyes, 1029.
lower Gila region: Ross, 1618.
Papago country: Bryan, 227.
Arkansas, south central: Rubey, 1922.
Briones formation, middle California: Trask, 1918.
British Columbia, Entwistle Lake district: Brock, 201.
Taseko Valley: Mackenzie, 1199.
Vancouver Island, Sooke formation: Cornwall, 416.
California: Clark, 336; Vander Leek, 1976.
Briones formation: Trask, 1917, 1918.
Kern County: English, 562.
Los Angeles basin: Arnold, 44.
Meganos group: Clark, 394.
Petaluma, Point Reyes, and Santa Rosa quadrangles: Dickerson, 497.
Central America and West Indies, correlation: Vaughan, 1982.
Colorado, southeastern: Coffin, 377.
Conglomerate of Black Hills: Cook, 408.
Costa Rica, northern, Miocene: Olsson, 1414.
Cretaceous-Tertiary boundary: Matthew, 1946.
Eocene beds in Mississippi embayment: Berry, 150.
Florida: Sellards, 1691.
Georgia: Teas, 1863.
Great Basin and Great Plains formations: Troxell, 1938.
Haiti, central plain: Woodring, 2189.
Miocene: Woodring, 2189.
Illinois, southern: Parmelee, 1467.
Jamaica: Trechmann, 1910.
Lance and Fort Union formations, age: Cross, 430; Knowlton, 1067.
Louisiana: Glenk, 640.
- northwestern: Hammill, 709.
Mackenzie River region: Dowling, 524.
Meganos group, Eocene, California: Dickerson, 496.
Mexico, Hidalgo, Atotonilco el Grande: Wittich, 2167.
Lower California: Darton, 466.
La Purisima region: Heim, 761.
southern Lower California: Heim, 762.
Tajo de Andonegui, Tampico: Wittich, 2176.
Midway limestone, northeastern Texas: Thompson, 1885.
Mississippi, Byram marl: Cooke, 413.
Miocene: Olsson, 1414.
Montana, Cat Creek oil field: Lupton, 1177.
central and eastern: Clapp, 330.
Crow Indian Reservation: Thom, 1875.
Garfield County: Thom, 1874.
Nebraska, Sioux County, Agate anticline: Schramm, 1672.
Nevada, Candelaria district: Knopf, 1063.
Clark County, Callville Wash: Gale, 619.
Divide district: Knopf, 1061.
Manhattan district: Ferguson, 560.
Mineral County, Cedar Mountain: Knopf, 1062.
Muddy Mountains region: Longwell, 1144; Noble, 1399.
Round Mountain district: Ferguson, 582.
southeastern: Stock, 1816.
New Mexico: Darton, 467.
Mogollon district: Ferguson, 581.
Raton-Brilliant-Keohler area: Lee, 1105.
San Juan County: Bauer, 94.
North Dakota, Fort Berthold, Indian Reservation: Bauer, 95.
New Salem lignite field: Hancock, 711.
Oregon, Coos Bay, Empire formation: Howe, 811.
eastern: Buwalda, 294.
Empire formation: Howe, 830.
Oreonon beds, Big Badlands, South Dakota: Sinclair, 1748.
Tertiary—Continued.

Pacific region: Clark, 337.
South Dakota, Badlands: Ward, 2033.
Block Hills: Keyes, 979.
White River Oligocene, turtle-Oreodon layer: Sinclair, 1747.
Texas: Udden, 1953.
Brazoria County, West Columbia field: Baron, 75.
Medina County: Liddle, 1128.
Panola County: Sellards, 1694.
salt domes: Powers, 1504.
Trinidad: Macready, 1213; Milner, 1322.
Utah, southern: Moore, 1362.
West Coast: Clark, 335, 336.
West Indies: Vaughan, 1996.
White River formation, North Dakota: Leonard, 1116.
Yukon, Sixtymile and Ladue rivers area: Cockfield, 372.

Texas.

Areas described.
Coke County: Beede, 118.
Johnson County: Winton, 2166.
Lacasa area, Ranger district: Ross, 1616.
Madill-Denison area: Hopkins, 821.
Ranger oil field: Reeves, 1570.
Solitario uplift, Presidio-Brewster counties: Powers, 1001.
Wiles area, Ranger district: Dobbin, 506.

Economic geology.
Alumine, south central Texas: Braun, 195.
Austin formation in San Antonio oil fields: Sellards, 1693.
Bethany gas pool: Hull, 845.
Gold, silver, copper, and lead: Henderson, 769, 772.
Gulf Coastal oil fields: Wolf, 2180.
Gulf Coastal Plain salt domes, secondary intrusive origin: Matteson, 1241.
Helium-bearing natural gas: Rogers, 1613.
McLennan County: Pace, 1437.
Medina County: Liddle, 1128.
Mexia oil field: Whitney, 2110; Wrather, 2199.
Oil and gas fields, Webb and Zapata counties: Sellards, 1692.
Oil fields, southwestern Texas: Owen, 1436.
Petroleum, Fort Stockton, Pecos County: Pratt, 1509.
Ranger field: Reeves, 1570.
southwestern Texas: Stephenson, 1805.
Zapata County: Wrather, 2201.
Salt: Darton, 464.
salt domes: Deussen, 494.
Fort Bend County: Pratt, 1512.
northeastern Texas: Cheney, 325.
South Bend oil field, Young County: Cheney, 326.
Spindletop oil field, Beaumont: Sur, 1844.
Thrall oil field, Williamson County: Bybee, 265.
West Columbia oil field, Brazoria County: Barton, 75.
White Point gas field, Patricio County: Wolf, 2181.

Historical geology.
Austin formation in San Antonio oil fields: Sellards, 1693.
Barnett shale, age: Moore, 1361.
Bend series and contiguous formations: Goldman, 659.
Boring, Palo Pinto County: Goldman, 659.
Panola County: Sellards, 1694.
Webb and Zapata counties: Sellards, 1692.
Cretaceous formations: Hill, 793.
western Texas: Baker, 59.
Glenn formation, north central Texas: Goldston, 667.
Lithologic correlation in "Bend" series: Goldman, 656.
Llanoria: Miser, 1326.
McLennan County: Pace, 1437.
Medina County: Liddle, 1128.
INDEX.

Texas—Continued.

Historical geology—Continued.
Midway limestone, northeastern Texas: Thompson, 1885.
Pennsylvanian, Burkburnett: Glenn, 651.
  north central Texas: Moore, 1358; Plummer, 1492.
Rios well, Caldwell County: Sellards, 1905.
Salt domes: Powers, 1504.
Tarrant County, geologic history: Hill, 787.
  Upper Triassic beds: Case, 298.
West Columbia oil field, Brazoria County: Barton, 75.

Mineralogy.
Meteorite, Alpine, Brewster County: Merrill, 1282.
Odessa, Ector County: Merrill, 1285.
Troup meteorite: Merrill, 1278; Udden, 1930.

Paleontology.
Calatoloides, Eocene fruit: Berry, 151.
Cycadeoid, Wise County: Wieland, 2125.
Cycad-like leaves, Permian: Noël, 1402.
Desmatosuchia, Triassic: Case, 297.
Desmatosuchus, Dockum beds: Case, 295.
Dinosaur tracks, Hamilton County: Wrather, 2202.
Diplocaulus primigenius, Baylor County: Mehl, 1285.
Pennsylvanian, Burkburnett: Glenn, 651.
  north-central Texas: Plummer, 1492.
  northern Texas: Moore, 1360.
Pleistocene Mammalia, Dallas: Lull, 1171.
Quisque bakeri, Miocene herring: Jordan, 940.
Triassic reptiles and stegocephalians, western Texas: Case, 298.
Vertebrates, collecting: Sternberg, 1809.
Woodbine flora, Arthurs Bluff: Berry, 144.

Petrology.
Sedimentary rocks, characteristics: Udden, 1933

Physical geology.
Salt domes: Powers, 1504.

Textbooks.
Economic geology: Emmons, 561.
  Elementary geology: Coleman, 384.
Elements of geology: Norton, 1406.
Engineering geology: Ries, 1502.
Geology: Grabau, 682; Miller, 1314.
Mineralogy: Dana, 462, 463; Rogers, 1605.
Mineralogy, determinative: Warren, 2036.
Mineralogy, optical: Winchell, 2161.
Petroleum geology, field methods: Cox, 429.
Physiography: Scott, 1809.

Thermal water.
Arkansas, Hot Springs: Bryan, 229.

Thrust faulting: Lawson, 1101.
Thunder Bay district, Ontario: Tanton, 1852.

Titanium.
Canada: Robinson, 1802.
General: Hess, 779, 780, 783; Robinson, 1602.
Virginia, Amelia County: Watson, 2058.

Trails.
Climactinoids: Raymond, 1545.
Formation: Raymond, 1545.
Triassic. See also Paleontology, Triassic.

Alaska, Cold Bay district: Capps, 289.
Arizona: Keyes, 1029.

Lees Ferry region: Bryan, 228.
northeastern, Holbrook area: Hager, 704.
northwestern: Reeside, 1568.

British Columbia, Bridge River area: McCann, 1187.
Peace River district: Speiker, 1784.
upper Peace River region: McLearn, 1210.

Vancouver Island: Dolmage, 509.

Colorado, southwestern: Coffin, 376.
Connecticut, southern: Longwell, 1145; Russell, 1636.
Soutbington-Granby area: Palmer, 1451.

Triassic trough, origin: Foye, 606.

Connecticut basin during the Newark epoch: Foye, 604.

Massachusetts, Connecticut Valley: Miller, 1309.
Montana, central and eastern: Clapp, 330.

Nevada, Mineral County, Cedar Mountain: Knopf, 1062.
Muddy Mountains region: Longwell, 1144.

New Mexico: Darton, 467.
eastern: Rich, 1583.

Pennsylvania, York County: Wanner, 2030.

Texas: Udden, 1953.
western: Case, 298.

Utah, southern: Moore, 1362.
southwestern: Reeside, 1568.

Washington County: Bassler, 79.

Trilobita.

Appendages: Clark, 347.
Color markings: Raymond, 1549.
Criteria for discrimination: Raymond, 1542.
Habits: Raymond, 1547.

Iowa, St. Lawrence limestone: Walter, 2025.

Reversion: Ruedemann, 1654.

Triarthrus canadensis, Triarthrus glaber, and Triarthrus spinosus: Parks, 1463.

Trinidad.

Geology and oil resources: Milner, 1322.

Economic geology.

Petroleum: Macready, 1213; Milner, 1322.
origin: Carmody, 291.

Historical geology.

General: Macready, 1213.

Paleontology.

Algae, Miocene: Howe, 832.
Rudistids: Harris, 729a.

Tungsten.

General: Hess, 778, 779, 780, 783.

Nevada, Round Mountain district: Ferguson, 582.
United States, contact-metamorphic deposits: Hess, 777.

Turtles. See Reptilia.

Tyrone district, New Mexico, copper deposits: Paige, 1447.

Unconformities.

Arizona, Grand Canyon: Noble, 1400.
Glaucnolite, association with unconformities: Goldman, 658.
Idaho, southeastern: Mansfield, 1222.

Petrographic unconformity: Berkey, 132.

South Dakota, Black Hills, pre-Cambrian: Runner, 1634.
Structure below an unconformity: Mertie, 1294.
Underdrag of Great Basin ranges: Davis, 474.

Underground water (general). For regional see names of States. See also Mineral water: Springs.
General: Meinzer, 1261.
Oil-field waters: Ambrose, 35.
Sea water, relation to ground water along coasts: Brown, 219.
Texas, Brazoria County, West Columbia field: Barton, 75.

Ungulata. See Mammalia.

Upper Silurian. See Silurian.

Uranium.
Colorado, southwestern: Coffin, 376.
General: Butler, 261; Hess, 779, 780, 783.
Utah, Temple Mountain: Hess, 781.

Utah.
Guidebook, Denver & Rio Grande Western route: Campbell, 279.
Areas described.
Weber County: Pack, 1438.

Economic geology.
Gilsonite: Douglass, 513.
Gold, silver, copper, lead, and zinc: Heikes, 753, 756, 760.
Manganese: Pardee, 1459.
Oil possibilities, southern Utah: Moore, 1363.
Oil shales: Jensen, 886.
Ophir district: Olmstead, 1413.
Petroleum indications, Uinta Basin: Douglass, 513.

Historical geology.
Colorado River: Longwell, 1147.
Colorado River basin: Pack, 1441.
Eastern Utah: Heist, 763.
Ophir district: Olmstead, 1413.
Southern Utah: Moore, 1362.
Southwestern Utah: Reeside, 1566.
Uinta Basin: Douglass, 513.
Washington County: Bassler, 79; Reeside, 1568.

Mineralogy.
Feldspar, Salt Lake County: Field, 556.

Paleontology.
Amynodon, White River: Troxell, 1928.
Ceratopyge fauna: Raymond, 1546.
Crocodilus acer, Manti beds: Mook, 1351.
Stehlinius, Eocene insectivore: Matthew, 1248.

Physical geology.
Bonneville Lake beds, origin: Keyes, 1042.
Bonneville Lake delta, faulting: Keyes, 1022.
Thrust faulting, Cottonwood district, Wasatch Mountains: Calkins, 273.

Physiographic geology.
Colorado River basin: Pack, 1441.
Lake Bonneville, physical features: Keyes, 992.
Natural bridges: Pack, 1440.
Plateaus, peneplainal affinities: Keyes, 969.

Valleys.
Widening by frost action: Culbertson, 437.

Vanadium.
Colorado, southwestern: Coffin, 376.
Discovery: Wittich, 2174.
General: Allen, 28; Hess, 779, 780, 783.


Vermont.
Areas described.
Brain tree: Richardson, 1585.
Essex County: Schroeder, 1673.
Vermont—Continued.
Areas described—Continued.
Hanover district: Merritt, 1288.
Middlebury and Burlington quadrangles: Dale, 453.
Western Vermont: Gordon, 673.

Economic geology.
Mineral resources: Perkins, 1483.
Talc: Jacobs, 864.

Historical geology.
Black shales, Lake Champlain region, age: Ruedemann, 1624.
Cambrian succession, northwestern Vermont: Keith, 961.
Trenton, Grand Isle: Perkins, 1482.
Western Vermont: Gordon, 674.

Paleontology.
Ordovician, Grand Isle: Ruedemann, 1626.

Petrology.
Mount Monadnock: Wolff, 2182.

Physical geology.
Deformation, western Vermont: Gordon, 672, 674.

Physiographic geology.
Lake Willoughby: Jacobs, 865.

Vertebrata (general). See also Amphibia; Aves; etc.
Arizona, San Pedro Valley: Gidley, 636.
California, Pleistocene, McKittrick asphalt deposit: Merriam, 1272.
Pliocene and Pleistocene: Frick, 613.
Cretaceous, Kansas: Sternberg, 1808, 1809.
Cretaceous-Tertiary boundary, vertebrate evidence as to: Matthew, 1249.
General: Lucas, 1168.
Pliocene, Texas: Sternberg, 1808.
Pleistocene: Hay, 735, 736, 737.
Texas: Sternberg, 1809.

Virgin Islands of the United States, physiographic features: Vaughan, 1980.

Virginia.
Areas described.
Russell County: Wentworth, 2070.

Economic geology.
Coal, Dickenson County: Giles, 638.
Russell County: Wentworth, 2070.
Manganese, western Virginia: Stose, 1841.
Oriskany iron ores: Doak, 905.
Rutile-ilmenite, Amelia County: Watson, 2058.

Historical geology.
Dickenson County: Giles, 638.
Western Virginia: Stose, 1841.

Mineralogy.
Meteorite, Nickelsville, Scott County: Merrill, 1286.
Rutile-ilmenite, Amelia County: Watson, 2058.
Rutile-ilmenite intergrowths, Franklin County: Watson, 2057.

Paleontology.

Petrology.
Lamprophyre dike, Louisa County: Watson, 2055.

Physical geology.
Big Stone Gap area, Wise County, structure: Stose, 1837.
Russell Fork fault, southwestern Virginia: Wentworth, 2067.
Shenandoah Caverns: Anonymous, 2238.

Volcanic ash.
Iowa: Keyes, 1041.
Des Moines, interglacial: Keyes, 972.
Mexico, San Luis Potosi: Wittich, 2177.
Ordovician, Tennessee, Kentucky, and Alabama: Nelson, 1387.
Tennessee, Bedford County: Nelson, 1384.

Volcanic rocks. See Igneous and volcanic rocks.

Volcanism.
Chemical aspects: Allen, 21.
Experimental volcanology, program: Jaggar, 866.
Volcanism—Continued.
   Observatories, need for: Jaggar, 868.
   Tectonic aspect of volcanic eruption: Wood, 2184.
   United States Weather Bureau investigations: Marvin, 1237.
   Volcanism and mountain-making: Chamberlin, 305.
Volcanoes.
   Alaska, Aleutian region: Griggs, 688.
      Katmai: Griggs, 690.
      Valley of Ten Thousand Smokes: Griggs, 689.
      General: Muñoz Lumbier, 1375; Washington, 2043.
   Greater Antilles seismic belt: Taber, 1849.
   Hawaii: Jaggar, 887; Meinzer, 1203.
   Lassen Peak, volcanic activity, cause: Day, 482.
   Pacific volcanoes, chemistry: Washington, 2042.
   Popocatépetl, Mexico: Atl, 52; Waltz, 1997; eruption: Friedlaender, 615, 616.
Volcanoes (extinct).
   Idaho, southeastern: Mansfield, 1221.
   Mexico, northeastern: Staub, 1708.
   New Mexico: Lee, 1103.
   Ward, L. F., biography: Cape, 288.
Washington.
Economic geology.
   Antimony, Okanogan Valley: Keyes, 1019.
   Chromite ores: Pardee, 1458.
   Coal: Shedd, 1723.
   Gold, silver, copper, lead, and zinc: Gerry, 632.
   Iron ores: Jenkins, 884.
   Limestone: Shedd, 1723.
   Magnesite: Pardee, 1458.
   Metal mines: Patty, 1476.
   Mineral resources: Patty, 1475.
Historical geology.
   Columbia Valley: Bretz, 196.
Mineralogy.
   Bementite and neotocite: Pardee, 1456.
   Cristobalite, Columbia River basalt: Shannon, 1713.
Paleontology.
   Olympic Peninsula: Dall, 458.
   Pleistocene Vertebrata, Wenatchee, Chelan County: Hay, 736.
Physical geology.
   Dixie, earth disturbances: Eby, 548.
   Rate of soil deposition, Palouse area: Peterson, 1484.
Physiographic geology.
   Glaciation, Spokane region: Large, 1091; Leverett, 1123; Pardee, 1460.
   Lake Chelan, origin and history: Runner, 1635.
   Mt. St. Helens: Jillson, 895.
   Spokane region: Large, 1092.
Underground water.
   White Bluffs and Hanford region: Jenkins, 883.
Waynesboro quadrangle, Tennessee: Miser, 1325.
Weathering.
   Alaska: Steldtman, 1802.
   Collapse of mountain summits: Young, 2222.
   Conditions: Cleland, 363.
   Mountain summits, collapse: Young, 2222.
   Weight of sedimentary rocks: Lane, 1090.
Well records. See Borings.
West Indies (general). See also names of islands.
Economic geology.
   Petroleum: Milner, 1323.
   Petroleum reserves: Redfield, 1561:
   64264—24—16
West Indies—Continued.

Historical geology.
Geologic mapping: Vaughan, 1981.

Paleontology.
Echini: Jackson, 863.
Pectens, Tertiary, new names: Cooke, 410.

Physical geology.
Fault troughs of the Antilles: Taber, 1847.
Greater Antilles, seismic belt: Taber, 1849.

Physiographic geology.
Antilles, fault troughs: Taber, 1848.

West Virginia.

Areas described.
Nicholas County: Reger, 1573.

Economic geology.
Carbon ratios of coals in oil fields: Reger, 1575.
Coal, Thomas bed, Harrison: Campbell, 280.
Map, coal, oil, gas, iron ore, and limestone areas: White, 210.
Nicholas County: Reger, 1573.
Oil and gas development, 1920: Reger, 1574.

Historical geology.
Nicholas County: Price, 1517.

Paleontology.
Deriya crassa, abnormal sculpture: Price, 1515.
Nicholas County: Price, 1517.

Petrology.
Chert deposits: Price, 1516.

Physical geology.
Arches Fork anticline, Roane and Calhoun counties, subsurface structural features: Cottingham, 418.

White River sediments, lithology: Wantess, 2028.
Willow Creek district, Alaska: Chapin, 323.
Winchell, H. V., biography: Anonymous, 2235.

Wind work.
Atmospheric dust in coal: Glock, 655.
Dust fall, March 19, 1930: Winchell, 2159.
General: Keyes, 1028.
Rate of soil deposition, Palouse area: Peterson, 1494.
Soil shifting and deposits: Larsen, 1099.

Windrow formation, upper Mississippi Valley: Thwaites, 1905.

Wisconsin.

Soils, Buffalo County: Whitson, 2114.
Dane County: Whitson, 2113.
northern Wisconsin: Whitson, 2116.
Portage County: Whitson, 2112.
Waupaca County: Whitson, 2115.
Wood County: Whitson, 2111.

Economic geology.
Road materials: Bean, 115.

Historical geology.
Glacial gravel seam in limestone, Ripon: Thwaites, 1904.
St. Peter sandstone: Dake, 450.
Windrow formation: Thwaites, 1905.

Physical geology.
Glacial gravel seam in limestone, Ripon: Thwaites, 1904.

Physiographic geology.
Driftless Area: MacClintock, 1190.
erosional history: Trowbridge, 1921.
Southeastern Wisconsin: Whitbeck, 2089.
Wisconsin River, Pleistocene history: MacClintock, 1190.

Wyoming.
  Work of State geological survey: Morgan, 1365.

Areas described.
  Osage oil field, Weston County, Wyoming: Collier, 390.

Economic geology.
  Gold, silver, and copper: Henderson, 765, 767, 775.
  Manganese, Laramie Mountains: Jones, 934.
  Mineral resources: Morgan, 1365, 1367.
  Oil accumulation: Ball, 66; Heald, 748.
  Oil and gas fields, map: Morgan, 1367; Richardson, 1589.
  Oil shales: Jenson, 886; Morgan, 1366.
  Oil-bearing horizons: Heald, 747.
  Petroleum, Osage field, Weston County: Collier, 390.

Historical geology.
  Correlation table, oil areas: Morgan, 1367.
  Lost Soldier-Ferris district: Fath, 573.
  Northwestern Wyoming: Dake, 449.
  Oil-bearing horizons: Heald, 747.

Mineralogy.
  Tschermigite: Erickson, 563.

Paleontology.
  Allognathosuchus, Green River: Mook, 1349.
  Cornus, Converse County: Knowlton, 1072.
  Crocodile, Bridge beds: Mook, 1350.
  Fulgoridae, Eocene, Green River: Cockerell, 367.
  Helaletes: Troxell, 1934.
  Insecta, Eocene: Cockerell, 366.
  Minerva saurodosis, Bridger formation: Wetmore, 2079.
  Miocene, Van Tassel: Loomis, 1151.
  Nodosaurus textilis: Lull, 1189.
  Oreodontidae: Thorpe, 1891.
  Reithroparamys, Bridger formation: Matthew, 1245.
  Saniwa, Bridger beds, Sweetwater County: Gilmore, 643.

Petrology.
  Cambrian sedimentary rocks: Tieje, 1907.

Physical geology.
  Deformation, northwestern Wyoming: Dake, 449.
  Folding, major and minor, relative ages: Ball, 66.
  Lost Soldier-Ferris district, folding, age of: Fath, 573.

Yellowstone National Park.

Mineralogy.
  Cristobalite in obsidian: Rogers, 1606.

Yosemite Valley: Matthes, 1242.

Yucatan.

Petrology.
  Obsidian, Chichen Itza: Washington, 2047.

Yukon.

Geological mapping: Dolmage, 510.

Areas described.
  Mayo district: Cockfield, 375.

Economic geology.
  Mayo district: Williams, 2132.
  Silver-lead deposits, Davidson Mountains, Mayo district: Cockfield, 375.
  Keno-Hill area, Mayo district: Cockfield, 373, 374.
  Sixtymile and Ladue rivers area: Cockfield, 372.

Historical geology.
  Sixtymile and Ladue rivers area: Cockfield, 372.

Zinc.
  Arizona: Heikes, 757, 759.
  California: Yale, 2213, 2215, 2218.
  Central States: Dunlop, 532, 534, 537.
  Colorado: Henderson, 770, 773.
  Discovery in America: Keyes, 1006.
  Eastern States: Dunlop, 535.
  General: Siebenhal, 1732, 1735, 1737, 1739.
  Idaho: Gerry, 631.
Zinc—Continued.
Montana: Gerry, 630, 633.
Nevada: Heikes, 755.
New Jersey, Sussex County: Ries, 1596.
New Mexico: Henderson, 768, 771.
New York: Newland, 1391.
Quebec, Gaspé County, Lemieux township: Alcock, 12.
Utah: Heikes, 753, 756, 760
Ophir district: Olmstead, 1413.
Washington: Gerry, 632.
Zinc pigments and salts: Siebenthal, 1741.
Zircon as a criterion of origin of metamorphosed rocks: Armstrong, 43.
### CHEMICAL ANALYSES

- Akerite, 329.  
- Akermanite, 236.  
- Albite, 677.  
- Aikali gneiss, 794  
- Alnoite, 177, 829.  
- Analcite, 2014.  
- Andesite, 252, 253, 589, 677, 1293.  
- Andorite, 1709.  
- Anorthosite, 960, 1762, 2204.  
- Andradite, 1127.  
- Aphthitalite, 2045.  
- Aplite, 329.  
- Aragonite, 731.  
- Asphalt, 291.  
- Augite, 2048.  
- Barite, 2150.  
- Bementite, 1456.  
- Bentonite, 1384.  
- Black shale, 887.  
- Bornite, 2011.  
- Bostonite, 329.  
- Boulangerville, 1705.  
- Braunite, 1327.  
- Bustamite, 1087, 1127.  
- Camptonite, 329, 960.  
- Camelinite, 557.  
- Caryophillite, 1456.  
- Ceruleoflurite, 814.  
- Chabazite, 2014.  
- Chlorite, white, 714.  
- Chrome ore, 503, 1065.  
- Clay, 17, 403, 946, 947, 948, 1594, 1519.  
- Coal, 17, 94, 95, 250, 291, 360, 403, 536, 638, 653, 711, 889, 1105, 1507, 1573, 1579, 1649, 1650, 1719, 1842, 2070.  
- Colemanite, 619.  
- Colerinite, 714.  
- Colophane, 1600.  
- Colombite, 745.  
- Comendite, 2047.  
- Comptonite, 829.  
- Concretion, 1940.  
- Conglomerates, 2010.  
- Copiapite, 2018.  
- Copper ore, 651.  
- Cousalite, 2022.  
- Crescite, 593.  
- Crotodolite, 2097.  
- Cryolitee, 1715.  
- Dacite, 253, 1293.  
- Danburite, 1075.  

---

1 The chemical analyses given in Gordon, 679, are not included in this list.
Leucitite, 56.
Leverrierite, 1384, 1712.
Lignite, 95, 291, 649.
Limestone, 131, 731, 785, 829, 1155, 1327, 1391, 1504, 1723, 1819.
Ludwigite, 1701.
Magnesite ore, 96, 100.
Manganese ore, 785.
Manjac, 291.
Marine invertebrates, 352.
Marl, 1155, 1391.
Matildite, 2225.
Melilite, 236.
Merwinite, 1095.
Mesolite, 2014.
Meteorite, 829, 915, 916, 1183, 1276, 1280, 1282, 1285.
Mica, 17.
Mica schist, 1288.
Mine water, 85, 86.
Minette, 56, 961.
Monchiquite, 329.
Nickel ore, 1659.
Nitrate deposits, 1401.
Nodmarkite, 329.
Obsidian, 2017.
Oil shale, 13, 887, 2209.
Oligoclase, 677.
Owsyhedite, 1704.
Paisanite, 329.
Pantellerite, 2047.
Petroleum, 17, 291, 390, 1569, 1638.
Phosphate rock, 1325, 1327.
Porphyry, 56.
Potash brines, 786.
Psilomelane, 1327.
Pulaskite, 329.
Pyrite ore, 1688.
Pyroclastite, 1841.
Pyroxene, 1075.
Quartz diorite porphyry, 961.
Quartz keratophyre, 329.
Quartz monzonite, 1762.
Rammelsbergite, 2005.
Rhodochrosite, 1709.
Rhodonite, 1098.
Rhyolite, 329.
Rutile, 812, 2057, 2065.
Rutile-ilmenite, 2058.
Salt, 17, 1504.
Salt brine, 403.
Sand, 946, 948, 2028.
Sandstone, 2033.
Schist, 131.
Scheelite, 2014.
Stilbite, 2014.
Stratopite, 1486.
Sussexite, 36.
Syrinite, 56, 229.
Talc, 17, 600, 1391.
Tantalite, 745.
Thorsonite, 2014.
Tinguite, 56, 329, 961.
Trosilite, 541.
Tschermigite, 563.
Umptekite, 329.
Velardenite, 1710.
Vesuvianite, 1127.
Volcanic ash, 2172, 2177.
Volcanic gas, 21.
Wad, 1841.
Water, saline, 291.
Williamsite, 680.

MINERAL ANALYSES.

Alnolite, 177, 829.
Andesite, 1293.
Anorthosite, 960, 1762.
Anorthosite gabbro, 1310.
Basalt, 1288, 2051.
Cobalt ore, 2005.
Comptonite, 829.
Dacite, 1295.
Diopsidite, 960.
Essxite, 829.
Fourchite, 829.
Gabbro, 840, 2027.
Gabbro-diorite, 329.
Garnet-wollastonite, 960.
Gneiss, 564.
Granite, 329, 840, 1288, 2026, 2046.
Granodiorite, 329, 794.
Hornblende schist, 1288.
Hypersthene diorite, 840.
Jade, 2050.
Lamprophyre dike, 2055.
Limburgite, 829.
Meteorite, Cumberland Falls, Ky., 1276.
Mica schist, 1288.
Monchiquite, 829.
Nickel ore, 1659.
Norite, 840.
Obsidian, 2047.
 Olivine gabbro, 840.
Olivine norite, 840.
Ore, Manhattan district, Nevada, 580.
Peridotite, 840, 1329.
Pyroxene, 1075.
Quartz diorite, 1187.
Quartz diorite porphyry, 961.
Quartz gabbro, 840.
Quartz monzonite, 1762.
Quartz norite, 840.
Rhyolite, 2028.
Syrinite, 56.
Tinguite, 961.
Troctolite, 840.
**LISTS.**

**MINERALS DESCRIBED.\(^1\)**

<table>
<thead>
<tr>
<th>Mineral</th>
<th>Page Numbers</th>
</tr>
</thead>
<tbody>
<tr>
<td>Adamite</td>
<td>1062</td>
</tr>
<tr>
<td>Aegirite-hedenbergite</td>
<td>2085</td>
</tr>
<tr>
<td>Akermanite</td>
<td>236</td>
</tr>
<tr>
<td>Alabandite</td>
<td>2211</td>
</tr>
<tr>
<td>Allanite</td>
<td>1702</td>
</tr>
<tr>
<td>“Allemontite”</td>
<td>2013</td>
</tr>
<tr>
<td>Analcite</td>
<td>2014</td>
</tr>
<tr>
<td>Andorite</td>
<td>1709</td>
</tr>
<tr>
<td>Andradite</td>
<td>1127</td>
</tr>
<tr>
<td>Anhydrite</td>
<td>637</td>
</tr>
<tr>
<td>Anhimitke</td>
<td>1469</td>
</tr>
<tr>
<td>Antimonoy, native</td>
<td>120</td>
</tr>
<tr>
<td>Apatite</td>
<td>733</td>
</tr>
<tr>
<td>Aphthitalite</td>
<td>2045</td>
</tr>
<tr>
<td>Apophyllite</td>
<td>2014</td>
</tr>
<tr>
<td>Aragonite</td>
<td>2014</td>
</tr>
<tr>
<td>Armandite</td>
<td>593, 2085</td>
</tr>
<tr>
<td>Arsenopyrrite</td>
<td>1776</td>
</tr>
<tr>
<td>Asbolite</td>
<td>1857</td>
</tr>
<tr>
<td>Augustc</td>
<td>1702, 2048</td>
</tr>
<tr>
<td>Axinite</td>
<td>2172</td>
</tr>
<tr>
<td>Baryte</td>
<td>637, 2150</td>
</tr>
<tr>
<td>Bementite</td>
<td>1436</td>
</tr>
<tr>
<td>Beryl</td>
<td>2172</td>
</tr>
<tr>
<td>Bisseefite</td>
<td>1612</td>
</tr>
<tr>
<td>Bornite</td>
<td>1858, 2011</td>
</tr>
<tr>
<td>Boulangierite</td>
<td>1705</td>
</tr>
<tr>
<td>Brannerite</td>
<td>593</td>
</tr>
<tr>
<td>Braunite</td>
<td>1327</td>
</tr>
<tr>
<td>Bustamite</td>
<td>1097, 112</td>
</tr>
<tr>
<td>Calcite</td>
<td>637, 1470</td>
</tr>
<tr>
<td>Caledonite</td>
<td>2225</td>
</tr>
<tr>
<td>Camsellite</td>
<td>557</td>
</tr>
<tr>
<td>Celestite</td>
<td>637, 2150</td>
</tr>
<tr>
<td>Ceruleofbrite</td>
<td>814</td>
</tr>
<tr>
<td>Cesarollite</td>
<td>593</td>
</tr>
<tr>
<td>Chabazite</td>
<td>2014</td>
</tr>
<tr>
<td>Chalcopyrite</td>
<td>1702, 1958</td>
</tr>
<tr>
<td>Chlsanthite</td>
<td>1886</td>
</tr>
<tr>
<td>Chlorite, white</td>
<td>714</td>
</tr>
<tr>
<td>Chromohercynite</td>
<td>2085</td>
</tr>
<tr>
<td>Cinnabar</td>
<td>1702</td>
</tr>
<tr>
<td>Cobaltite</td>
<td>1885</td>
</tr>
<tr>
<td>Colemanite</td>
<td>506, 601</td>
</tr>
<tr>
<td>Colophane</td>
<td>1699</td>
</tr>
<tr>
<td>Columbite</td>
<td>745, 1702</td>
</tr>
<tr>
<td>Copiapite</td>
<td>2018</td>
</tr>
<tr>
<td>Corundum</td>
<td>1702</td>
</tr>
<tr>
<td>Corynite</td>
<td>1886</td>
</tr>
<tr>
<td>Cosalite</td>
<td>2002</td>
</tr>
<tr>
<td>Creedite</td>
<td>595</td>
</tr>
<tr>
<td>Cristobalite</td>
<td>1606, 1610, 1713</td>
</tr>
<tr>
<td>Crocidolite</td>
<td>2087</td>
</tr>
<tr>
<td>Cyprino, 1127, 1715</td>
<td></td>
</tr>
<tr>
<td>Danburite</td>
<td>1075, 2179</td>
</tr>
<tr>
<td>Datolite</td>
<td>1700</td>
</tr>
<tr>
<td>Delafossite</td>
<td>1161</td>
</tr>
<tr>
<td>Diabandite</td>
<td>2014</td>
</tr>
<tr>
<td>Diopside</td>
<td>2016, 2172, 2179</td>
</tr>
<tr>
<td>Dixinite</td>
<td>583, 2085</td>
</tr>
<tr>
<td>Dolomite</td>
<td>637</td>
</tr>
<tr>
<td>Duftite</td>
<td>598</td>
</tr>
<tr>
<td>Dumortierite</td>
<td>2017, 2171, 2172, 2225</td>
</tr>
<tr>
<td>Dyscrasite</td>
<td>2004</td>
</tr>
</tbody>
</table>

Eaklet, 599.
Epidote, 733.
Feldspar, 586.
Ferrousanthophyllite, 1698.
Fibroferrite, 2019.
Flagstaffite, 593, 605, 696.
Fluorite, 637.
Fluorspar, 2150.
Franklinite, 1596.
Fuggelite, 236.
Gahnite, 637.
Galenobismutite, 1707, 2039.
Garnet, 1596, 1702, 1716.
Gehlenite, 206.
Gersdorfite, 1886, 2225.
Gilleecite, 1658.
Grossularite, 236.
Gypsum, 637.
Hardystonite, 1596.
Hauerite, 1866.
Hausmannite, 1327.
Hematite, 733.
Heulandite, 2014.
Higginsite, 593.
Hornblende, 1702.
Hewlite, 594.
Humboldtitite, 236.
Hydroclinohuminite, 593.
Ilmenite, 1702, 2057, 2058.
Inyote, 596, 1495.
Iridosmine, 648.
Jade, 2050.
Jurupauite, 540.
Kaililite, 1856.
Kreuzbergite, 593, 2085.
Laumontite, 1702, 2014.
Lazulite, 2056.
Leverrierite, 1712.
Linneite, 1857.
Ludwigite, 1701.
Macfarlanite, 1499.
Magnetite, 1702.
Manganite, 1327, 1841.
Marcasite, 637.
Matildite, 2225.
Mellirite, 236.
Merwinite, 1905.
Mescolite, 2014.
Metatorbernite, 593.
Monazite, 1702.
Monticellite, 176.
Mordenite, 2014.
Muscovite, 1712.
Natrolite, 2014.
Neoclitonite, 1456.
Ohsdian, 1702.
Okinite, 2014.
Olivine, 1702.
Orientalite, 594, 784.
Owyheelite, 1704.
Patagésite, 2085.

\(^1\) The minerals described in J. Gordon, 679, and Merrill, 1281, are not included in this list.
BIBLIOGRAPHY OF NORTH AMERICAN GEOLOGY, 1921-1922.

Paternite, 2085.
Pemine, 2172.
Phosphoferrite, 592, 2085.
Phosphophyllite, 693, 2085.
Picromomite, 2085.
Pianolite, 593.
Poly提供了, 1702.
Polydelphite, 1127.
Pho основе, 2179.
Polycrase, 1702.
Polydelphite, 1127.
Prehnite, 2179.
Priceite, 620.
Proustite, 1471.
Psilomelane, 1327, 1841.
Pucherite, 1711.
Pyrite, 637, 1702, 1711, 1886.
Pyrolusite, 1327, 1841.
Pyroxene, 1075.
Quartz, 732, 1702.
Rammelsbergite, 2005.
Rhodonite, 1098, 1596.
Rutile, 637, 812, 1702, 2057, 2058.
Samarskite, 1702.
Sarcolite, 236.
Scolecite, 2014.
Sericite, 1712.
Smaltite, 1702.
Sphalerite, 514, 637, 1596.
Stephanite, 2225.
Stilbite, 2014.
Strontianite, 637.
Talc, 600.
Tantalite, 745.
Tephrinite, 1996.
Thaumasite, 813.
Thomsonite, 2014.
Titanite, 1702.
Toenrebohinite, 2085.
Topaz, 815.
Trichalcite, 1711.
Trigonite, 593, 2085.
Trollite, 541.
Tschermigite, 563.
Ulexite, 596, 2008.
Ullmannite, 1886.
Ultrabasite, 593, 2085.
Valentinite, 129.
Valerandite, 710.
Vesuvianite, 1127.
Villamaninite, 1886.
Vivianite, 1699.
Wad, 593.
Wavenite, 2086.
Willemite, 1596.
Willyamite, 1886.
Wulfenite, 697.
Xanthoxenite, 593, 2085.
Zincite, 1596.
Zircon, 1702.
ROCKS DESCRIBED.

Akerite, 329.
Albitite, 677.
Alkali gneiss, 794.
Alnoite, 176, 177, 829.
Andesite, 329, 1062, 1221, 2197.
Andesite porphyry, 2197.
Anorhosteite, 990, 1762.
Anorhosteite gabbro, 1310.
Aplitite, 329, 1062.
Basalt, 1063.
Beerbachite, 5.
Biotite granite, 2197.
Bostonite, 329.
Camptonite, 329, 960.
Comptonite, 829.
Conglomerate, 414.
Dacite, 329.
Dacite tuff, 1062.
Diabase, 1585, 2197.
Diorite, 1585.
Diorite porphyry, 414, 1062, 2197.
Epidoite, 1585.
Essexite, 329, 829.
Felsite, 2197.
Fourthite, 829.
Gabbro, 329, 940, 1316.
Gabbro-diorite, 329.
Garnet norite, 5.
Garnet-wollastonite rock, 900.
Gneiss, 960.
Granite, 329, 1202, 1937, 2026, 2046, 2197.
Granite gneiss, 2197.
Greywacke, 414.
Hornblende andesite porphyry, 1227.
Hornblende schist, 1288, 2197.
Hypersthene digite, 840.
Hypersthene 5.
Keratophyre, 329, 1062.
Lamprophyre, 414, 1062.
Latite porphyry, 2197.
Limburgite, 829.
Mies dacite porphyry, 2197.
Mies schist, 1288.
Monette, 961.
Mozzioite, 829.
Monzodacite porphyry, 2197.
Nephelite porphyry, 56.
Nephelite syenite, 56, 329.
Nordmarkite, 329.
Norite, 840.
Obsidian, 2047.
Olivine basalt, 1221, 2197.
Olivine gabbro, 840.
Olivine norite, 840.
Palmosite, 329.
Pegmatite, 2197.
Peridotite, 829, 940, 1328, 1585.
Phlogopite, 677.
Porphyry, 56.
Pulaskite, 329.
Pyrite norite, 5.
Pyroxenite, 1585.
Quartz diorite, 329, 1187.
Quartz diorite gneiss, 2197.
Quartz diorite porphyry, 961, 1187.
Quartz gabbro, 840.
Quartz keratophyre, 329.
GEOLOGIC FORMATIONS DESCRIBED.

Quartz latite, 1062.
Quartz latite porphyry, 2197.
Quartz monzonite, 1762.
Quartz monzonite porphyry, 2137.
Quartz norite, 5, 840.
Quartz porphyry, 414.
Rhyolite, 1063, 1221.
Schist, 1585.
Serpentine, 680.
Sillimanite schist, 2197.
Sövlesbergite, 329.
Spessartite, 1187.
Syenite, 5, 320, 414, 2026.
Syenite porphyry, 414.
Tinguaite, 320, 961.
Trachyte, 329, 414, 2197.
Troctolite, 840.
Umptekite, 329.
Williamsite, 680.

GEOLOGIC FORMATIONS DESCRIBED.

Abo sandstone, Permian, New Mexico: Darton, 467; Ellis, 555.
Abrigo terrane, Cambrian, Arizona: Keyes, 1029.
Adamana terrane, Carboniferous, Arizona: Keyes, 1029.
Adams Branch limestone, Carboniferous, Texas: Dobbin, 506.
Adams Branch limestone, Pennsylvanian, Texas: Plummer and Moore, 1492.
Adams Branch limestone member, Carboniferous, Texas: Reeves, 1570.
Adams Branch member, Pennsylvanian, Texas: Moore and Plummer, 1358.
Adana shales, Arizona: Keyes, 1036.
Admiral formation, Permian, Texas: Plummer and Moore, 1492.
Adolphus formation, Cambrian, British Columbia: Burling, 243.
Aftonian interglacial epoch, Pleistocene, Iowa: Cable, 266.
Aftonian interglacial stage, Quaternary: Upham, 1975.
Agamenticus complex, Carboniferous (?), Maine: Wandes, 2026.
Almsworth formation, Cretaceous, South Dakota: Cook, 406.
Ajax formation, Ordovician or Cambrian, Utah: Omlstead, 1413.
Alachua formation, Pliocene, Florida: Sellards, 1691.
Albion formation, Silurian, New York: Cumings, 439.
Amsden formation, Pennsylvanian, Montana: Thorn, 1857.
Anacacho formation, Cretaceous, Texas: Liddle, 1128.
Aldridge formation, pre-Cambrian, British Columbia: Schofeld, 1667.
Algoma formation, pre-Cambrian, Ontario: Burrows and Hopkins, 253.
Algoma limestone, pre-Cambrian, Canada: Miller, 1308.
Arapahoe formation, Tertiary, Colorado: Knowlton, 1070.
Armstrong limestone, Ordovician, Oklahoma: Burrows and Hopkins, 253.
Arkadelphia clay, Cretaceous, Arkansas: Rubey, 1822.
Arkadelphia clay, Cretaceous, Arkansas: Stose and Jones, 1846.
Arkadelphia clay, Cretaceous, Louisiana: Hammill, 709.
Arkansas novaculite, Devonian (?), Georgia: McCauley, 1184.
Arapahoe formation, Tertiary, Colorado: Knowlton, 1070.
Arkadelphia clay, Cretaceous, Arkansas: Rubey, 1822.
Arkadelphia clay, Cretaceous, Arkansas: Stose and Jones, 1846.
Arkadelphia clay, Cretaceous, Louisiana: Hammill, 709.
Arkansas novaculite, Devonian, Arkansas and Oklahoma: Miser, 1326.
Armedaris limestones, Arizona: Keyes, 1036.
Armedaris terrane, Ordovician, Arizona: Keyes, 1029.
Armstrong member, Mississippian, Ohio: Conrey, 403.
Armuchee chert, Devonian, Georgia: McCullle, 1184.
Arnheim formation, Ordovician, Indiana: Cумings, 439.
Arnheim limestone, Ordovician, Tennessee: Miser, 1325.
Artibonite group, Miocene, Haiti: Woodring, 2189.
Aspen formation, Cretaceous, Idaho: Kirkham, 1053.
Athens shale, Ordovician, Virginia: Stose and Miser, 1841.
Atoka formation, Pennsylvanian, Arkansas and Oklahoma: Miser, 1326.
Atwater Creek shale, Ordovician, New York: Ruedemann, 1824.
Aubreyan series, Carboniferous, Arizona: Keyes, 1029.
Austin chalk, Cretaceous, Texas: Hill, 793.
Austin chalk, Cretaceous, Texas: Powers and Hopkins, 1504; Udden, 1492.
Austin formation, Cretaceous, Texas: Liddle, 1128.
Aux Vases sandstone, Mississippian, Kentucky: Jillson, 897.
Aux Vases sandstone, Mississippian, Missouri, Illinois: Keyes, 1337.
Avis sandstone, Pennsylvanian, Texas: Moore and Plummer, 1338; Plummer and Moore, 1492.
Avon River limestone, Mississippian, Nova Scotia: Bell, 126.
Axeman limestone, Ordovician, Pennsylvania: Gordon, 679.
Aztecan series, Tertiary, Arizona: Keyes, 1029, 1036.
Badger Creek formation, Cambrian or pre-Cambrian, British Columbia: Uglow, 1957.
Baitoa formation, Miocene, Dominican Republic: Vaughan et al., 1985.
Bald Hill shales, Pennsylvanian, Kentucky: Glenn, 633.
Baltimore gneiss, pre-Cambrian, Pennsylvania and Maryland: Jonas and Knox, 931.
Bangor limestone, Carboniferous, Georgia: McCallie, 1184.
Barnett shale, Mississippian (?), Texas: Moore, 1361.
Barnett shale, Mississippian, Texas: Moore and Plummer, 1338; Plummer and Moore, 1492.
Barnwell formation, Eocene, Georgia: Texas, 1803.
Barren series, Devonian, Mackenzie: Bosworth, 175.
Barriere formation, Cambrian or pre-Cambrian, British Columbia: Uglow, 1957.
Bartlesville sand, Oklahoma: White and Greene, 2102.
Bartlesville sand, Pennsylvanian, Oklahoma: Roundy et al., 1620.
Bass terrane, pre-Cambrian, Arizona: Keyes, 1029.
Batesville sandstone, Carboniferous, Arkansas: Miser, 1327.
Bautista beds, Pleistocene, California: Frick, 613.
Beede Mountain limestone, Permian, Texas: Plummer and Moore, 1492.
Bear Branch limestone, Devonian, Tennessee: Miser, 1325.
Bear Mountain formation, Silurian, Mackenzie: Kindle, 1943.
Bearpaw formation, Cretaceous, Alberta: Allan, 20; Slipper, 1751.
Bearpaw formation, Cretaceous, Montana: Lupton and Lee, 1177; Thom and Dobbin, 1874.
Bearpaw shale, Cretaceous, Montana: Collier et al., 330; Collier and Cathcart, 391; Thom, 1875.
Bear River formation, Alaska: Mertie, 1290.
Bear River formation, Cretaceous, Idaho: Kirkham, 1053.
Bear River formation, Cretaceous, Wyoming and Idaho: Knowlton, 1070.
Bear River formation, Jurassic, British Columbia: Schofield, 1666; Schofield and Hanson, 1662.
Beartooth quartzite, Cretaceous, New Mexico: Dakota, 467.
Beaver sand, Mississippian, Kentucky: Jillson, 897.
Beaver Bend limestone, Mississippian, Indiana: Cumpins, 439.
Beaver Creek oil "sand," Mississippian, Kentucky: Butts, 202.
Beaverfoot formation, Ordovician, British Columbia: Burling, 245.
Beavertail limestone, Devonian, Mackenzie: Bowser, 173; Kindle, 1106.
Beauvoir series, Ordovician (?), Quebec: MacKay, 1193.
Beaumont clay, Pleistocene, Texas: Barton, 75.
Becie River formation, Silurian, Anticosti Island: Twenhofel, 1948.
Bedford formation, Mississippian, Ohio: Hyde, 639.
Bedford shale, Mississippian, Kentucky: Butts, 282.
Beech Creek limestone, Mississippian, Indiana: Cumpins, 439.
Beech River member, Silurian, Tennessee: Miser, 1325.
Beechwood member, Devonian, Indiana: Cumpins, 439.
Beekmantown formation, Ordovician, Ontario: Kelce and Cole, 948.
Beekmantown formation, Ordovician, Vermont: Gordon, 673.
Beekmantown limestone, Ordovician, Ontario: Wright, 2207.
Beekmantown limestone, Ordovician, Pennsylvania: Gordon, 679; Stose and Jonas, 1840.
Belknap limestone, Pennsylvanian, Texas: Moore and Plummer, 1338.
Belknap limestone lentil, Pennsylvanian, Texas: Plummer and Moore, 1492.
Bella shales, Arizona: Keyes, 1036.
Bella terrane, Devonian, Arizona: Keyes, 1029.
Bellabella formation, post-Pleistocene (?), British Columbia: Dolmage, 512.
Belle Fourche shale member, Cretaceous, Wyoming: Collier, 390.
GEOLOGIC FORMATIONS DESCRIBED.

Belle Plains formation, Permian, Texas: Plummer and Moore, 1492.

Bellevue formation, Ordovician, Indiana: Cumings, 439.


Belly River formation, Cretaceous, Alberta: Slipper, 1751.

Belt series, pro-Cambrian, British Columbia: Schofield, 1603.

Bend group, Pennsylvanian, Texas: Moore and Plummer, 1358; Plummer and Moore, 1492.

“Bend series,” Carboniferous, Texas: Reeves, 1570.

“Bend” series, Mississippian, Texas: Goldman, 656.

Bend (Lower) shale, Pennsylvanian, Texas: Udden, 1953.

Bendor batholith, Jurassic, British Columbia: Mackenzie, 1199.

Bendor quartz diorite batholith, Cretaceous, British Columbia: McCann, 1187.


Benton formation, Cretaceous, Alberta: Slipper, 1751.

Benton formation, Cretaceous, Nebraska: Schramm and Cook, 1672.


Berea grit, Mississippian, Ohio: Hyde, 859.

Berea sandstone, Mississippian, Kentucky: Butts, 262.

Bernalillo shales, New Mexico: Keyes, 1027.

Berea member, Mississippian, Ohio: Conrey, 403; Hyde, 859.

Berwick gneiss, Maine: Wandke, 2026.

Berwick quartz diorite, Carboniferous (?), Maine: Wandke, 2026.

Bethel sandstone, Mississippian, Kentucky: Butts, 262.

Bigby limestone, Ordovician, Tennessee: Miser, 1325.

Big Horn limestone, Ordovician, Montana: Collier and Cathcart, 391.

Bingen formation, Cretaceous, Louisiana: Hammill, 709.

Birch Lake series, pro-Cambrian, Ontario: Burwash, 257.

Birdsong shale, Devonian, Tennessee: Nelson, 1383.

Bitter Creek formation, Paleozoic or Mesozoic, Alaska: Mertie, 1290.

Biswabik formation, pre-Cambrian, Minnesota: Gruner, 694.

Black Flint member, Pennsylvanian, Ohio: Morningstar, 1371.

Black Hand member, Mississippian, Ohio: Conrey, 403.

Blackhorse shales, North Dakota: Keyes, 979.

Blackleaf phase, Cretaceous, Montana: Kemp and Billingsley, 901.

Black Ranch formation, Permian, Texas: Plummer and Moore, 1492.

Black Ranch limestone member, Pennsylvanian, Texas: Plummer and Moore, 1492.
Brassfield limestone, Silurian, Tennessee: Miser, 1325.
Brasstown schist, Cambrian, Georgia: McCullie, 1184.
Brazil formation, Pennsylvanian, Indiana: Cummings, 439.
Brazos River sandstone, Pennsylvanian, Texas: Moore and Plummer, 1358.
Brazos River sandstone and conglomerate, Pennsylvanian, Texas: Plummer and Moore, 1492.
Breckenridge limestone, Pennsylvanian, Texas: Moore and Plummer, 1358.
Breckenridge limestone member, Pennsylvanian, Texas: Plummer and Moore, 1492.
Brelsford sand, Texas: Reeves, 1570.
Bridge River series, Carboniferous, British Columbia: McCann, 1187.
Bridge River series, Pennsylvanian, British Columbia: McCann, 1188.
Bright Angel shale, Cambrian, Arizona: Noble, 1400.
Bright Angel terrane, Cambrian, Arizona: Keyes, 1029.
Briones formation, Miocene, California: Trask, 1917.
Briones formation, Tertiary, California: Trask, 1918.
Briones group, Miocene, California: Clark, 336.
Brown conglomerate, pre-Cambrian, Ontario: Quirke, 1528.
Brown conglomerate, pre-Cambrian, Ontario: Quirke, 1528.
Bruce series, pre-Cambrian, Ontario: Quirke, 1527.
Bruce Clay member, Oligocene, Nebraska: Schramm and Cook, 1672.
Buchhorn limestone, Ordovician or Cambrian, Utah: Olmstead, 1413.
Buda formation, Cretaceous, Texas: Liddle, 1128.
Buda limestone, Cretaceous, Texas: Baker, 59; Pace, 1457; Udden, 1953.
Buena Vista sandstone, Mississippian, Ohio: Hyde, 859.
Buena Vista sandstone member, Mississippian, Ohio: Hyde, 859.
Buena Vista sandstone, Pennsylvanian, Texas: Moore and Plummer, 1358.
Canajoharie shale, Ordovician, New York and Vermont: Ruedemann, 1624.
Caney shale, Carboniferous, Oklahoma: Goldston, 666; Hewett, 785.
Caney shale, Mississippi, Oklahoma: Miser, 1326.
Caneyshales, Pennsylvanian, Oklahoma: Goldston, 667.
GEOLOGIC FORMATIONS DESCRIBED.

Cannonball member, Cretaceous: Schuchert, 1677.
Cannonball marine member, Tertiary (?), North Dakota: Hancock, 711.
Canton shale, Pennsylvanian, Illinois: Cady, 269; Savage, 1650.
Canyon formation, Pennsylvanian, Texas: Ross, 1618; Udden, 1953.
Canyon group, Carboniferous, Texas: Dobbin, 1950; Reeves, 1570.
Canyon group, Pennsylvanian, Texas: Moore and Plummer, 1358; Plummer and Moore, 1492.
Canyon Largo terrane, Tertiary, Arizona: Keyes, 1029.
Cape Neddick gabbro, Carboniferous (?), Maine: Wandke, 2026.
Capps bed, Pennsylvanian, Texas: Moore and Plummer, 1358.
Capps limestone lentil, Pennsylvanian, Texas: Plummer and Moore, 1492.
Carbondale formation, Pennsylvanian, Illinois: Cady, 269; Culver, 438; Currier, 440; Savage, 1650; Savage and Nebel, 1651; Savage and Udden, 1649; Shaw, 1710.
Carbondale formation, Pennsylvania, Kentuck: Gleen, 653.
Caribbean group, Palaeozoic (?), Trinidad: Milner, 1322.
Carlisle shale, Cretaceous, Montana: Thom, 1875.
Carlsbad group, Carboniferous, New Mexico: Darton, 1807.
Carlsbad group, Cretaceous, Wyoming: Collier, 1890.
Carlinville limestone, Ordovician, Illinois: Gordon, 1870.
Carlinville limestone, Devonian, Illinois: Cady, 269.
Carolina gneiss, Archean, Georgia: MaCallie, 1184.
Caroni series, Tertiary, Trinidad: Milner, 1322.
Carrizo formation, Eocene, Texas: Liddle, 1128.
Carter formation, Mississippian, Kentucky: Gillen, 1184.
Carterville formation, Cambrian, Georgia: McCallie, 1184.
Casseville formation, Pennsylvanian, Kentucky: Glenn, 653; Jallion, 890; Weller, 2061.
Cason shale, Ordovician, Arkansas: Dake, 1650; Miser, 1327.
Casper formation, Permian, Kansas: Foyles, 607.
Chesapeake formation, Carboniferous, Arizona: Keyes, 1859.
Chester group, Mississippian, Illinois: Savage and Udden, 1649.
Cerkard formation, Miocene, Dominican Republic: Vaughan et al., 1985.
Cerro Gordo substage, Devonian, Iowa: Fenton, 1879.
Cerro de Sal formation, Miocene, Dominican Republic: Vaughan et al., 1985.
Cevicos limestone, Oligocene, Dominican Republic: Vaughan et al., 1985.
Chacra sandstones, Arizona: Keyes, 1036.
Chacra terrane, Cretaceous, Arizona: Keyes, 1859.
Chadron member, Oligocene, Nebraska: Schramm and Cook, 1972.
Chambersburg limestone, Ordovician, Pennsylvania: Gordon, 679.
Champlain stage, Quaternary: Upham, 1875.
Chariton formation, Pleocene, Florida: Sellsars, 1891.
Chariton formation, Oligocene, Georgia: McCallie, 1184; Teas, 1863.
Chattahoochee formation, Oligocene, Florida: Sellsars, 1891.
Chattahoochee formation, Oligocene, Georgia: McCallie, 1184; Teas, 1863.
Chattanooga black shale, Devonian, Georgia: McCallie, 1184.
Chattanooga group, Palaeozoic, Arkansas: Miser, 1327.
Chattanooga group, Devoniann or Carboniferous, Tennessee: Miser, 1325.
Chattanooga group, Devonian or Mississippian, Oklahoma: Aurin et al., 155; Schuchert, 1983.
Chazy beds, Ordovician, Ontario: Wilson, 2154.
Chazy formation, Ordovician, Quebec: Keene and Cole, 948.
Chazy formation, Ordovician, Vermont: Gordon, 673.
Cheoherboard lime, Oklahoma: White and Greene, 2102.
Chelly terrane, Carboniferous, Arizona: Keyes, 1859.
Cheshepella (? sandstone, Pennsylvanian, Oklahoma: Roundy et al., 1602.
Chester group, Mississippian, Illinois: Shav, 1719.
Chester group, Mississippian, Kentucky: Butts, 262.
Chester series, Mississippian: Weller, 2061.
Chester series, Missouri: Foyles, 607.
Chesterian, Mississippian, Indiana: Cuming, 438.
Chetang formation, Cambrian, British Columbia: Burling, 243.
Checkerboard formation, Mississippian, Nova Scotia: Bell, 126.
Cheyenne sandstone, Cretaceous, Kansas: Berry, 145.
Chickamauga formation, Ordovician, Georgia: McCallie, 1184.
Chickamauga limestone, Ordovician, Virginia: Stose and Miser, 1841.
Chickies quartzite, Cambrian, Pennsylvania: Stose and Jones, 1840.
BIBLIOGRAPHY OF NORTH AMERICAN GEOLOGY, 1921-1922.

Chico formation, Cretaceous, Lower California: Barton, 466.
Chicotte formation, Silurian, Anticosti Island: Twehobef, 1948.
Chilton (Lower) sandstone, Pennsylvanian, West Virginia: Reger, 1573.
Chilton (Upper) sandstone, Pennsylvanian, West Virginia: Reger, 1573.
Chummyhill limestone, Pennsylvanian, Oklahoma: Moore, 1355.
Chinama shale, Jurassic, Alaska: Martin, 1229; Moffit, 1335, 1336.
Chinlee formation, Triassic, Arizona: Hager, 704.
Chinlee formation, Triassic, Nevada: Longwell, 1144, 1146.
Chinle formation, Triassic, New Mexico: Barton, 467.
Chinle formation, Triassic, Utah and Arizona: Reeside and Bassler, 1568.
Chiquito sandstones, Arizona: Keyes, 1036.
Chiquito terrane, Carboniferous, Arizona: Keyes, 1029.
Chiricahuan series, Cambrian, Arizona: Keyes, 1029, 1036.
Chisik conglomerate, Jurassic, Alaska: Martin, 1229; Moffit, 1335, 1336.
Chloridian series, Cambrian, Arizona: Keyes, 1029, 1036.
Chocotawhatchee formation, Miocene, Florida: Sellards, 1091.
Chouteau group, Mississippian, Missouri: Williams, 2135.
Choza formation, Permian, Texas: Beede and Bentley, 118.
Chugwater formation, Cretaceous, Montana: Lupton and Lee, 961.
Chugwater formation, Triassic, Montana: Kemp and Billingsley, 1177.
Chupadera formation, Permian, New Mexico: Barton, 467; Ellis, 555.
Cibola limestones, Arizona: Keys, 1036.
Cibola terrane, Silurian, Arizona: Keys, 1029.
Cibola group, Miocene, California: Clark, 336.
Cincinnati, Ordovician, Indiana: Cumings, 439.
Cisco formation, Pennsylvanian, Texas: Udden, 1953.
Cisco group, Carboniferous, Texas: Reeves, 1570.
Cisco group, Pennsylvanian, Texas: Moore and Plummer, 1358; Plummer and Moore, 1492.
Claggett formation, Cretaceous, Montana: Clapp et al., 330; Lupton and Lee, 1177; Thom, 1875.
Claggett shale, Cretaceous, Montana: Collier and Cathcart, 391.
Clarksville division, Ordovician, Indiana: Cumings, 439.
Clarno limestone, Eocene, British Columbia: Buwalda, 264.
Cleary Creek limestone, Pennsylvanian, Texas: Reger, 1573; Plummer and Moore, 1492.
Clear Fork stage, Permian, Texas: Beede and Bentley, 118.
Cliff House sandstone, Cretaceous, New Mexico: Bauer and Reeside, 94; Darton, 467.
Cliff Lake granite porphyry, pre-Cambrian, Montana: Alcock and Bruce, 11.
Climax sandstone, Silurian, Virginia: Stose and Miser, 1841.
Clinton formation, Silurian, Pennsylvania: Gordon, 679.
Clinton formation, Silurian, Virginia: Stose and Miser, 1841.
Clare limestone, Mississippian, Kentucky: Jilson, 890; Weller, 2061.
Cloverly formation, Cretaceous, Montana: Thom, 1575.
Clyde formation, Permian, Texas: Plummer and Moore, 1492.
Coachella fanglomerate, Quaternary, California: Vaughan, 1979.
Coalburg shale, Pennsylvanian, West Virginia: Reger, 1573.
Coalburg (Lower) sandstone, Pennsylvanian, West Virginia: Reger, 1573.
Coalburg (Upper) sandstone, Pennsylvanian, West Virginia: Reger, 1573.
Coast Range batholith, Jurassic, British Columbia: Dolmage, 656; Schofield, 1666.
Cobalt series, pre-Cambrian, Ontario: Burrows, 250; Burrows and Hopkins, 253.
Cobalt series, pre-Cambrian, Ontario: Cooke, 414; Quirke, 1527, 1528.
Cobourg (Lower) beds, Ordovician, Canada: Raymond, 1540.
Cobourg (Upper) beds, Ordovician, Canada: Raymond, 1540.
Cocalico shale, Ordovician, Pennsylvania: Stose and Jonas, 1840.
Cochise limestones, Arizona: Keys, 1036.
Cochise terrane, Cretaceous, Arizona: Keys, 1029.
Coconino sandstone, Carboniferous, Arizona: Keys, 1040.
Coconino sandstone, Carboniferous, Utah and Arizona: Reeside and Bassler, 1508.
Coconino sandstone, Permian, Arizona: Hager, 749; Noble, 1400.
Coconino sandstone, Permian, Nevada: Longwell, 1144.
Coconino sandstone, Permian (?), Utah: Bassler and Reeside, 79.
Coconino sandstone, Permian, Utah: Moore, 1362.
Coconino terrane, Carboniferous, Arizona: Keys, 1029.
Cole Canyon formation, Cambrian, Utah: Olmstead, 1413.
Coleman limestone and shale, Permian, Texas: Plummer and Moore, 1492.
Coleman Junction limestone, Pennsylvanian, Texas: Moore and Plummer, 1358; Plummer and Moore, 1492.
Collingwood formation, Ordovician, Canada: Raymond, 1540.
Colorado formation, Cretaceous, Montana: Clapp et al., 330.
Colorado group, Cretaceous, Montana: Kemp and Billingsley, 961.
Colorado shale, Cretaceous, Montana: Lupton and Lee, 1177.
<table>
<thead>
<tr>
<th>Formation</th>
<th>Age</th>
<th>Location</th>
<th>References</th>
</tr>
</thead>
<tbody>
<tr>
<td>Columbia River basalt, Miocene, Oregon: Buwalda, 264.</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Comanchean series, Arizona: Keyes, 1036.</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Comanche series, Cretaceous, Texas and Oklahoma: Hopkins et al., 821.</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Comanche Peak limestone, Cretaceous, Texas: Baker, 39.</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Comondu formation, Tertiary, Lower California: Heim, 762.</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Conasauga formation, Cambrian, Georgia: McCallie, 1184.</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Concord formation, Oligocene, California: Clark, 336.</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Conemaugh series, Pennsylvanian, West Virginia: Reger, 1573.</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Conococheague limestone, Cambrian, Pennsylvania: Gordon, 679; Stose and Jonas, 1840.</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Cooper limestone, Devonian, Missouri: Branson, 193.</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Coos conglomerate, Pliocene, Oregon: Howe, 831.</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Coplay limestone, Ordovician, Pennsylvania: Gordon, 679.</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Cornerford, Devonian, Kentucky: Jillson, 887.</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Corrigan sandstone, Oligocene, Texas: Barton, 75.</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Cranberry formation, Ordovician, Indiana: Cumings, 439.</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Cotter dolomite, Ordovician, Missouri: Dake, 452.</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Cotter formation, Ordovician, Missouri, Arkansas: Dake, 450.</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Couchiching, pre-Cambrian, Manitoba: Alcock and Bruce, 11.</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Coutright series, pre-Cambrian, Ontario: Bruce, 222.</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Cow Head limestone breccia, Ordovician, Newfoundland: Schuchert and Dunbar, 1678.</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Cranbrook formation, Cretaceous, British Columbia: Schofeld, 1667.</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Crystal Falls limestone, Pennsylvanian, Texas: Moore and Plummer, 1358.</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Crystal Falls limestone lentil, Pennsylvanian, Texas: Plummer and Moore, 1492.</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Cuesta formation, Tertiary, Lower California: Heim, 762.</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Cumberland Head shales, Ordovician, New York: Ruedemann, 1624.</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Cup coral member, Pennsylvanian, Oklahoma: Goldston, 667.</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Cuseca sand, Cretaceous, Georgia: McCallie, 1184.</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Cuesta sand member, Cretaceous, Georgia: Teas, 1863.</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Cutler formation, Permian-Triassic, Colorado: Coffin, 377.</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Cuyahoga formation, Mississippian, Kentucky: Butts, 262.</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Cuyahoga formation, Mississippian, Ohio: Conrey, 403; Hyde, 859.</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Cuyamac basic intrusive, pre-Cretaceous (?), California: Hudson, 469.</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Cynthiana, Ordovician, Indiana: Cumings, 439.</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Cypress sandstone, Mississippian, Indiana: Cumings, 439.</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Cypress sandstone, Mississippian, Kentucky: Butts, 262; Jillson, 890; Weller, 2061.</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Cyrane member, Silurian, Missouri: Keyes, 900.</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Cyril gypsum member, Permian, Oklahoma: Reeves, 1569.</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Dagmar formation, Cambrian, Utah: Olmstead, 1413.</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Dakota formation, Cretaceous, Alberta: Sliper, 1731.</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>&quot;Dakota&quot; formation, Cretaceous, Colorado: Coffin, 377.</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Dakota formation, Cretaceous, Kansas: Gress, 657; Lapton et al., 1173.</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Dakota sandstone, Cretaceous: Stanton, 1795.</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Dakota sandstone, Cretaceous, Nebraska: Schramm and Cook, 1672.</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Dakota sandstone, Cretaceous, New Mexico: Darrow, 467.</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Dakota sandstone, Cretaceous, Utah: Moore, 1362.</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Dalles beds, Pleistocene, Oregon: Bretz, 196.</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Dawson arkose, Tertiary, Colorado: Knowlton, 1070.</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Dayton limestone, Silurian, Indiana: Cumings, 439.</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Deadwood formation, Cambrian, Montana: Coller and Cathcart, 391.</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Decatur limestone, Silurian, Tennessee: Miser, 1325.</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>De Cholly sandstone, Triassic, Utah: Longwell et al., 1147.</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>De Cholly (Holbrook) sandstone, Permian, Arizona: Hager, 704.</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Decorah formation, Ordovician, Iowa, Illinois, Minnesota, Wisconsin: Dake, 450.</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Decota sandstone, Pennsylvania, West Virginia: Reger, 1573.</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>DeCourcy formation, Cretaceous, British Columbia: MacKenzie, 1203.</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Dedham granodiorite, Devonian (?), Massachusetts: Clapp, 329.</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Deep Canyon fanglomerate, Quaternary, California: Vaughan, 1979.</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Deep Kill shale, Ordovician, New York: Ruedemann, 1624.</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Deer River shale, Ordovician, New York: Ruedemann, 1624.</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Deese member, Pennsylvanian, Oklahoma: Goldston, 666, 667.</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Degonia sandstone, Mississippian, Kentucky: Jillson, 890; Weller, 2061.</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Delicias beds, Permian, Mexico: Bose, 168.</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Del Rio clay, Cretaceous, Texas: Udden, 1653.</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Del Rio clays, Cretaceous, Texas: Pace, 1487.</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Del Rio formation, Cretaceous, Texas: Baker, 59; Liddle, 1128.</td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>
254 BIBLIOGRAPHY OF NORTH AMERICAN GEOLOGY, 1921-1922.

Denain formation, Jurassic (?), British Columbia: MacKenzie, 1198, 1200.
Deaton formation, Cretaceous, Texas: Winton and Scott, 2106.
Denver formation, Tertiary, Colorado: Knowlton, 1070.
Dewey limestone, Pennsylvanian, Oklahoma: Roundy et al., 1629.
Dimple formation, Pennsylvanian, Texas: Powers, 1501.
Dimple limestone, Pennsylvanian, Texas: Powers, 1501.
Dimple formation, Pennsylvanian, Texas: Powers, 1501.
Dingess limestone, Pennsylvanian, West Virginia: Reger, 1573.
Diversity siltite, Tertiary, Nevada: Knopf, 1061.
Dixon formation, Pennsylvanian, Kentucky: Glenn, 653.
Dixon member, Silurian, Tennessee: Miser, 1325.
Deekum group, Triassic, New Mexico: Darton, 467.
Dolgeville shales, Ordovician, New York: Ruedemann, 1624.
Dolly Varden formation, Jurassic, British Columbia: Hanson, 718.
Doré formation, Pennsylvanian, Kentucky: Glenn, 653.
Doré series, pre-Cambrian, Ontario: Collins, 397.
Dothan limestone, Pennsylvanian, Texas: Moore and Plummer, 1358.
Dotson sandstone, Pennsylvanian, West Virginia: Reger, 1573.
Dotson (Lower) sandstone, Pennsylvanian, West Virginia: Reger, 1573.
Double Mountain stage, Permian, Texas: Beede and Bentley, 118.
Douglas shale, Pennsylvanian, West Virginia: Reger, 1573.
Dorr terrane, pre-Cambrian, Arizona: Keyes, 1029.
Doyie shale, Permian, Kansas: Paff, 572.
Doyie shale member, Permian, Kansas: Elledge, 552.
Dragoon series, Cambrian, Arizona: Keyes, 1029.
Dresbach sandstone, Cambrian, Minnesota: Keyes, 1035.
Duck Creek formation, Cretaceous, Texas: Winton and Scott, 2166.
Dunegan formation, Cretaceous, British Columbia: Spiker, 1847.
Duplin marl, Miocene, Georgia: McCullie, 1184.
Durham quartz dorsiite, Carboniferous (?), New Hampshire: Wandke, 2026.
Dutcher sand, Oklahoma: White and Greene, 2102.
Eager formation, Cambrian, British Columbia: Schofield, 1667.
Eagle formation, Cretaceous, Montana: Thom and Dobbie, 1874.
Eagle limestone and shale, Pennsylvanian, West Virginia: Reger, 1573.
Eagle sandstone, Cretaceous, Montana: Clapp et al., 330; Collier and Cathcart, 391; Kemp and Billingsley, 951; Lupton and Lee, 1177; Thom, 1575.
Eagle sandstone, Pennsylvanian, West Virginia: Reger, 1573.
Eagleford formation, Cretaceous, Texas: Liddle, 1128; Winton and Scott, 2106.
Eagleford shales, Cretaceous, Texas: Pace, 1457.
East Lynn sandstone, Pennsylvanian, West Virginia: Reger, 1573.
East Lynn (Upper) sandstone, Pennsylvanian, West Virginia: Reger, 1573.
East Mountain shale, Pennsylvanian, Texas: Moore and Plummer, 1358; Plummer and Moore, 1492.
Eau Claire beds, Cambrian, Wisconsin: Keyes, 1035.
Eckman sandstone, Pennsylvanian, West Virginia: Reger, 1573.
Ector tongue of Austin chalk, Cretaceous, Texas: Hopkins et al., 821.
Eden beds, Pliocene, California: Frick, 613; Osborn, 1434.
Eden formation, Ordovician, Indiana: Cumings, 493.
Edmonton formation, Cretaceous, Alberta: Allan, 20; Slipher, 1751.
Edwards formation, Cretaceous, Texas: Liddle, 1828.
Edwards limestone, Cretaceous, Texas: Baker, 59; Hill, 783; Pace, 1457; Udden, 1958.
Elbrook dolomite, Cambrian, Pennsylvania: Stose and Jonas, 1840.
Elden limestines, Mississippian, Arizona: Keyes, 1030.
Elden terrane, Carboniferous, Arizona: Keyes, 1029.
Elitoh phylite, Carboniferous, Maine: Wandke, 2026.
Elk conglomerates, Cretaceous, British Columbia: Marshall, 1227.
Elkhorn formation, Ordovician, Indiana: Cumings, 493.
Elko formation, Cambrian, British Columbia: Schofield, 1667.
Ellenburger limestone, Cambrian and Ordovician, Texas: Reeves, 1570; Udden, 1953.
Ellenburger limestone, Ordovician, Texas: Goldman, 565.
Ellis formation, Jurassic, Montana: Clapp et al., 330; Collier and Cathcart, 391; Kemp and Billingsley, 951; Lupton and Lee, 1177.
Ellis Bay formation, Ordovician, Anticosti Island: Twinhofel, 1948.
Eln Creek limestone, Permian, Texas: Plummer and Moore, 1492.
El Paso formation, Ordovician, Arizona: Keyes, 1029.
El Paso limestone, Ordovician, New Mexico: Darton, 467.
Elston formation, Eocene, Texas: Liddle, 1128.
Elwren member, Mississippian, Indiana: Cumings, 493.
Embar limestone, Permian, Montana: Kemp and Billingsley, 961.
Empire formation, Pliocene, Oregon: Howe, 330, 331.
English Head formation, Ordovician, Anticosti Island: Twehnofel, 1948.
Englestown sand, Cretaceous, New Jersey: Mansfield, 1223.
Enid formation, Permian, Oklahoma: Fenneman, 576.
Enterprise (?) shale, Permian, Kansas: Fath, 572.
Enterprise shale member, Permian, Kansas: Elledge, 552.
Escondido formation, Cretaceous, Texas: Liddle, 1128; Udden, 1953.
Eskota or Greer beds, Permian, Texas: Beede and Bentley, 118.
Esmeralda formation, Tertiary, Nevada: Knopf, 1061, 1062.
Espanola formation, pre-Cambrian, Ontario: Quirke, 1527, 1528.
Etchegoin formation, Pliocene, California: Clark, 336.
Eutaw formation, Cretaceous, Georgia: McCallie, 1184; Teas, 1863.
Eutaw sand, Cretaceous, Tennessee: Miser, 1325.
Everton dolomite, Ordovician, Missouri: Dake, 452.
Everton formation, Ordovician, Missouri, Arkansas: Dake, 450.
Famine series, Devonian, Quebec: MacKay, 1198.
Furnace limestone, Cambrian and Ordovician, California: Vaughan, 1979.
Furnace formation, Ordovician, Arkansas: Dake, 450.
Furnace formation, Ordovician (Silurian), Tennessee: Moore, 1538.
Furnace formation, Ordovician, Missouri, Arkansas: Dake, 450.
Furnace formation, Ordovician, Arkansas: Dake, 450.
Furnace formation, Ordovician, Missouri: Dake, 450.
Furnace formation, Ordovician, Arkansas: Dake, 450.
Furnace formation, Ordovician, Arkansas: Dake, 450.
Furnace formation, Ordovician, Missouri: Dake, 450.
GEOLOGIC FORMATIONS DESCRIBED. 255
Embar limestone, Permian, Montana: Kemp and Billingsley, 961.
Empire formation, Pliocene, Oregon: Howe, 330, 331.
English Head formation, Ordovician, Anticosti Island: Twehnofel, 1948.
Englestown sand, Cretaceous, New Jersey: Mansfield, 1223.
Enid formation, Permian, Oklahoma: Fenneman, 576.
Enterprise (?) shale, Permian, Kansas: Fath, 572.
Enterprise shale member, Permian, Kansas: Elledge, 552.
Escondido formation, Cretaceous, Texas: Liddle, 1128; Udden, 1953.
Eskota or Greer beds, Permian, Texas: Beede and Bentley, 118.
Esmeralda formation, Tertiary, Nevada: Knopf, 1061, 1062.
Espanola formation, pre-Cambrian, Ontario: Quirke, 1527, 1528.
Etchegoin formation, Pliocene, California: Clark, 336.
Eutaw formation, Cretaceous, Georgia: McCallie, 1184; Teas, 1863.
Eutaw sand, Cretaceous, Tennessee: Miser, 1325.
Everton dolomite, Ordovician, Missouri: Dake, 452.
Everton formation, Ordovician, Missouri, Arkansas: Dake, 450.
Famine series, Devonian, Quebec: MacKay, 1198.
Farrnington sandstone member, Cretaceous, New Mexico: Bauer and Reeside, 94; Reeside, 1567.
Fayectevillc formation, Mississippian, Oklahoma-Aurin et al., 55.
Fernando series, Miocene, California: Vander Leek, 1976.
Fernando series, Pliocene, California: Clark, 336.
Fernie formation, Jurassic, British Columbia: MacKenzie, 1233.
Fernvale formation, Ordovician, Arkansas: Dake, 1527.
Fernvale group, Cretaceous, Louisiana: Hammill, 709.
Fernvale limestone, Ordovician, Arkansas: Dake, 1527.
Fernvale (Richmond) formation, Ordovician, Missouri, Arkansas: Dake, 450.
Flinis shales, Pennsylvanian, Texas: Plummer and Moore, 1452.
Flinis shales and sandstones, Pennsylvanian, Texas: Moore and Plummer, 1358.
Fitzgerald dolomites, Silurian, Northwest Territory (Canada): Cameron, 274.
Fishtop Mountain sandstone, Pennsylvanian, West Virginia: Reber, 1573.
Fleming Clay, Miocene and Pliocene, Texas: Burton, 75.
Florence flint, Permian, Kansas: Elledge, 552.
Fooly shale, Carboniferous, Georgia: McCallie, 1184.
Fort Ancient division, Ordovician, Indiana: Cummings, 439.
Fort Creek shale, Devenian, Mackenzie: Bosworth, 173, Kindle, 1943.
Fort Payne chert, Carboniferous, Georgia: McCallie, 1184.
Fort Payne chert, Mississippian, Tennessee: Miser, 1325.
Fort Payne formation, Mississippian, Kentucky: Butts, 262; Foyle, 607.
Fort Riley limestone, Permian, Kansas: Elledge, 552; Fath, 572.
Fort Union formation, Cretaceous: Schuchert, 1967.
Fort Union formation, Eocene, Montana: Clapp et al., 330; Thom and Dobbin, 1874.
Fort Union formation, Tertiary, Montana: Knowlton, 1076; Thom, 1875.
Fort Union formation, Tertiary, North Dakota: Bauer and Herald, 95; Hancock, 711.
Fort Worth formation, Cretaceous, Texas: Winton and Scott, 2166.
Fort Worth limestone, Cretaceous, Oklahoma: Hopkins et al., 521.
Fox Hills formation, Cretaceous, Colorado: Coffin, 377.
Fox Hills formation, Cretaceous, South Dakota: Ward and Wilson, 2034.
Fraction rhyolite breccia, Tertiary, Nevada: Knopf, 1081.
Franciscan formation, Jurassic (?), California: English, 562.
Franciscan group, Jurassic (?), California: Dickerson, 497.
Franklin limestone, pre-Cambrian, New Jersey: Ries and Bowen, 1596.
Franklin limestone, pre-Cambrian, Pennsylvania: Gordon, 679.
Franks conglomerate, Pennsylvanian, Oklahoma: Moore, 1355, 1356.
Freeport (Lower) sandstone, Pennsylvanian, West Virginia: Reber, 1573.
Freeport (Upper) sandstone, Pennsylvanian, West Virginia: Reber, 1573.
Frederickburg formation, Cretaceous, Texas: Baker, 59.
Frederickburg group, Cretaceous, Louisiana: Hammill, 709.
Fredonia limestone member, Mississippian, Kentucky: Weller, 2061.
Frontier formation, Cretaceous, Idaho: Kirkham, 1033.
Frontier formation, Cretaceous, Montana: Thom, 1875.
Frontier member, Cretaceous, Montana: Kemp and Billingsley, 961.
Fruitland formation, Cretaceous, New Mexico: Bauer and Reeside, 94; Darton, 467.
Furnace limestone, Cambrian and Ordovician, California: Vaughan, 1979.
Fusion formation, Cretaceous, Nebraska: Schramm and Cook, 1872.
Fusion formation, Cretaceous, Wyoming: Collier, 290.
Fusselman limestone, Silurian, New Mexico: Darton, 467.
Galisteo sandstone, Eocene (?), New Mexico: Dar-ton, 467.
Galena dolomite, Ordovician, Illinois: Culver, 438;
Savage and Udden, 1649.
Galena dolomite, Ordovician, Iowa, Illinois, Min-
nesota: Wisconsin: Dake, 450.
Galton series, pre-Cambrian, British Columbia: 
Schofield, 1667.
Gammett group, Cretaceous and Jurassic, Idaho: 
Kirkham, 1053.
Garrett Mill sandstone member, Mississippian, 
Kentucky: Butts, 262.
Gaspe limestones, Devonian, Quebec: Alcock, 12.
Gaspe sandstone, Devonian, Quebec: Alcock, 12.
Gatun stage, Miocene, Costa Rica: Olsson, 1414.
Georgetown formation, Mississippian, Kentucky: 
Foyles, 607.
Georgetown limestone, Mississippian, Kentucky: 
Butts, 262; Jillson, 890; Weller, 2061.
Glenda limestone member, Oligocene, Mississip-
pian: Cooke, 413.
Glenn formation, Carboniferous, Oklahoma: 
Hopkins et al., 821.
Glenogle shales, Ordovician, British Columbia: 
Walcott, in 1774.
Glenwood formation, pre-Cambrian, British Colum-
bia: Schofield, 1667.
Glen Rose formation, Cretaceous, Texas: Baker, 
59.
Glenrosa formation, Cretaceous, Texas: Liddle, 
1128; Udden, 1933; Winton and Scott, 2166.
Glorietta sandstone, Permian, New Mexico: Rich, 
1583.
Golconda formation, Mississippian, Kentucky: 
Butts, 262.
Golconda limestone, Mississippian, Indiana: Cum-
ing, 439.
Golconda limestone, Mississippian, Kentucky: 
Jillson, 890; Weller, 2061.
Gonic schist, New Hampshire: Wandke, 2026.
Gonzales limestone, Pennsylvanian, Texas: Ross, 
1616.
Gonzales limestone member, Carboniferous, Texas: 
Reeves, 1570.
Gonzales Creek shale, Pennsylvanian, Texas: 
Moore and Plummer, 1538.
Gonzales Creek shale and sandstone, Pennsylva-
nian, Texas: Plummer and Moore, 1492.
Goodland formation, Cretaceous, Texas: Winton 
and Scott, 2166.
Goodland limestone, Cretaceous, Oklahoma: Gold-
ston, 666; Hopkins et al., 821.
Gogderg formation, Permian, Utah: Long-
well et al., 1147.
Gogderg (?) formation, Pennsylvanian, Utah: 
Moore, 1492.
Gogderg formation, Ordovician and Cambrian, 
British Columbia: Burling, 245.
Gowganda formation, pre-Cambrian, Ontario: 
Quirke, 1537, 1528.
Grafton formation, Carboniferous, Texas: Dobbin, 
506.
Grafton formation, Pennsylvanian, Texas: Moore 
and Plummer, 1338; Plummer and Moore, 1492.
Graham formation, Pennsylvanian, Texas: Moore 
and Plummer, 1338; Plummer and Moore, 1492.
Grand Gorge limestone, Devonian, Quebec: Al-
ocock, 12.
Graneros formation, Cretaceous, Wyoming: Heald, 
747.
Graneros shale, Cretaceous, Nebraska: Schramm 
and Cook, 1672.
Graneros formation, Cretaceous, New Mexico: Dar-
ton, 467.
Grape Creek shale and limestone bed, Permian, 
Texas: Plummer and Moore, 1492.
Grass black shale, Mississippian, Missouri: Keys, 
1002.
Graves Creek formation, Pleistocene, Kentucky 
Glenn, 653.
Grayson formation, Cretaceous, Texas: Winton 
and Scott, 2166.
Great Smoky formation, Cambrian, Georgia: Mc-
callie, 1194.
Greenhorn formation, Cretaceous, Oklahoma: 
Moore, 1355, 1356.
Greenhorn formation, Pennsylvanian, Oklahoma and 
Texas: Goldston, 667.
Green sand, Oklahoma: White and Greene, 2102.
Glenwood shales, Ordovician, British Columbia: 
Burling, 242, 245.
Glen Rose formation, Cretaceous, Texas: Baker, 
59.
Glenrose formation, Cretaceous, Texas: Liddle, 
1128; Udden, 1933; Winton and Scott, 2166.
Glorietta sandstone, Permian, New Mexico: Rich, 
1583.
Gonella formation, Mississippian, Kentucky: 
Butts, 262.
Gonella limestone, Mississippian, Indiana: Cum-
ing, 439.
Gonella limestone, Mississippian, Kentucky: 
Jillson, 890; Weller, 2061.
Gonic schist, New Hampshire: Wandke, 2026.
Goblin formation, Cretaceous, Wyoming: Heald, 
747.
Goblin formation, Pennsylvanian, Texas: Ross, 
1616.
GEOLOGIC FORMATIONS DESCRIBED.

Gulf series, Cretaceous, Texas and Oklahoma: Hopkins et al., 821.
Gun River formation, Silurian, Anticosti Island: Twenhofel, 1948.
Gun sight limestone, Pennsylvanian, Texas: Moore and Plummer, 1358; Plummer and Moore, 1492.
Gurabo formation, Miocene, Dominican Republic: Vaughan et al., 1985.
Guyandot sandstone, Pennsylvanian, West Virginia: Reger, 1573.
Hackberry formation, Devonian, Iowa: Fenton, 579a.
Hare Indian River shale, Devonian, Mackenzie: Kindle, 1043.
Hare River shales, Devonian, Mackenzie: Bosworth, 173.
Harmony formation, Ordovician, Indiana: Cumings, 439.
Hartshorne sandstone, Pennsylvanian, Arkansas and Oklahoma: Miser, 1326.
Havasupai sandstones, Arizona: Keys, 1856.
Havasupai terrane, Carboniferous, Arizona: Keys, 1029.
Hay River beds, Devonian, Mackenzie: Whittaker, 2118.
Hay River series, Devonian, Northwest Territory (Canada): Cameron, 274.
Heights fanglomerate, Quaternary, California: Vaughan, 1979.
Hollam conglomerate member, Cambrian, Pennsylvanian: Stose and Jonas, 1840.
Henley shale member, Mississippian, Kentucky: Butts, 79.
Henryhouse shale, Pennsylvanian, Oklahoma: Moore, 1355.
Hersch sandstone, Pennsylvanian, West Virginia: Reger, 1573.
Hercules shale member, Tertiary, California: Trask, 1918.
Herington limestone, Permian, Kansas: Elledge, 552.
Herington (?) limestone, Permian, Kansas: Fath, 579.
Herkimer formation, Cambrian, Utah: Olmstead, 1413.
Hermit shale, Permian, Arizona: Noble, 1400.
Hermitage formation, Ordovician, Tennessee: Miser, 1325.
Hermosa formation, Pennsylvanian, Colorado: Coffin, 377.
Hidden Treasure limestone, Mississippian, Utah: Olmstead, 1413.
Highlands gneiss, pre-Cambrian, New York: Berkshire and Rice, 131.
Hillaboe schist, post-Carboniferous, Alabama: Prouty, 1921.
Hillsborough series, Carboniferous, New Brunswick: Wright, 2290.
Hinche formation, Floeone, Haiti: Woodring, 2198.
Hinckley sandstone, Cambrian, Minnesota: Keys, 1035.
Hog Creek shale, Pennsylvanian, Texas: Moore and Plummer, 1358; Plummer and Moore, 1492.
Holbrook sandstones, Arizona: Keys, 1035.
Holbrook terrane, Carboniferous, Arizona: Keys, 1029.
Holdenville shale, Pennsylvanian, Oklahoma: Moore, 1355.
Holtsclaw sandstones, Mississippian, Kentucky: Butts, 262.
Home Creek limestone, Carboniferous, Texas: Dobbin, 506.
Home Creek limestone, Pennsylvanian, Texas: Moore and Plummer, 1358; Plummer and Moore, 1492; Ross, 1968.
Home Creek limestone member, Carboniferous, Texas: Reeves, 1570.
Homewood sandstone, Pennsylvanian, West Virginia: Reger, 1573.
Honekert limestone, Cambrian, Virginia: Stose and Miser, 1941.
Hordes Creek limestone lentil, Permian, Texas: Plummer and Moore, 1492.
Hornestown marl, Cretaceous, New Jersey: Mansfield, 2525.
Horn River shales, Devonian, Mackenzie: Whittaker, 1342.
Horse Creek limestone, Pennsylvanian, Texas: Moore and Plummer, 1358.
Horse Spring formation, Miocene (?), Nevada: Noble, 1399.
Horse Spring formation, Tertiary, Nevada: Longwell, 1144, 1146.
Horsehead formation, Cretaceous, Montana: Clapp et al., 330.
Horsehead sandstone, Cretaceous or Tertiary, Montana: Clapp et al., 330.
Horton formation, Mississippian, Nova Scotia: Bell, 162.
Hotaua terrane, pre-Cambrian, Arizona: Keyes, 1029.
Hot Springs sandstone, Mississippian, Arkansas: Miser, 1326.
Hoxbar member, Pennsylvanian, Oklahoma: Goldston, 696, 697.
Hudson River formation, Cambro-Ordovician, New York: Berkey and Rice, 131.
Huethawali limestone, Arizona: Keyes, 1036.
Huethawali terrane, Carboniferous, Arizona: Keyes, 1029.
Hull formation, Ordovician, Canada: Raymond, 1540.
Humber Grit series, Carboniferous, Newfoundland: Landell-Mills et al., 1085.
Humbug formation, Mississippian, Utah: Olmstead, 1413.
Huntington formation, Silurian, Indiana: Cumings, 439.
Huron limestone, Silurian, Oklahoma: Hewett, 785.
Huron limestone, Silurian and Silurian, Oklahoma: Goldston, 660.
Iaeger (Lower) shale, Pennsylvanian, West Virginia: Reger, 1573.
Iaeger (Middle) sandstone, Pennsylvanian, West Virginia: Reger, 1573.
Iaeger, (Upper) shale, Pennsylvanian, West Virginia: Reger, 1573.
Iatan limestone, Carboniferous, Kansas: Twenhofel and Edwards, 1944.
Illinois drift, Pleistocene, Iowa: Cable, 256.
Illinoian glaciation, Quaternary: Upham, 1975.
Illinoian till, Pleistocene, Illinois: Savage and Udden, 1694.
Illinois glacial stage, Pleistocene, Indiana: Malott, 1216.
Indian Creek clay bed, Permian, Texas: Plummer and Moore, 1492.
Indian Springs shale, Mississippian, Indiana: Cumings, 439.
Inwood limestone, pre-Cambrian, New York: Berkey and Rice, 131.

Iowa series, Mississippian: Weller, 3061.
Iowan drift, Pleistocene, Iowa: Cable, 256.
Iowan glaciation, Quaternary: Upham, 1975.
Irasburg conglomerate, Ordovician, Vermont: Richardson and Cabeen, 1356.
Isidro formation, Tertiary, Lower California: Heim, 762.
Ivan limestone, Pennsylvanian, Texas: Moore and Plummer, 1358.
Ivan limestone member, Pennsylvanian, Texas: Plummer and Moore, 1492.
Jacalitos formation, Pliocene, California: Clark, 336.
Jackfork sandstone, Mississippian, Arkansas and Oklahoma: Miser, 1326.
Jacksboro limestone, Pennsylvanian, Texas: Moore and Plummer, 1358.
Jacksboro limestone lentil, Pennsylvanian, Texas: Plummer and Moore, 1492.
Javanville formation, Miocene, Florida: Sellards, 1691.
Jagger Bend limestone, Permian, Texas: Plummer and Moore, 1492.
Jasper limestone, Ordovician, Arkansas: Miser, 1326.
Jefferson dolomite, Ordovician, Missouri: Miser, 1422.
Jefferson limestone, Devonian, Montana: Collier and Cathcart, 391.
Jefferson City formation, Ordovician, Missouri: Duke, 450.
Jeffersonville limestone, Devonian, Indiana: Cumings, 439.
Jennings formation, Devonian, Virginia: Stose and Miser, 1341.
Joachim dolomite, Ordovician, Missouri: Miser, 1422.
Joachim limestone, Ordovician, Arkansas: Miser, 1327.
John Day formation, Miocene, Oregon: Buwalda, 264.
John Day formation, Oligocene, Oregon: Thorpe, 1890.
Jordan sandstone, Cambrian, Minnesota: Keyes, 1035.
Judith River formation, Cretaceous, Montana: Clapp et al., 330; Collier and Cathcart, 391; Lupton and Lee, 1177; Knowlton, 1070.
Julian formation, Ordovician, Iowa and Illinois: Keyes, 988.
Julian schist series, Triassic (?), California: Hudson, 840.
Jupiter River formation, Silurian, Anticosti Island: Twenhofel, 1945.
Kaibab limestone, Carboniferous, Arizona: Keyes, 1040.
Kaibab limestone, Carboniferous, Utah and Arizona: Reeside and Bassler, 1588.
Kaibab limestone, Permian, Arizona: Hager, 704; Noble, 1400.
Kaibab limestone, Permian, Utah: Bassler and Reeside, 76; Moore, 1302.
Kaibab limestone, Permian, Nevada: Longwell, 1144, 1146.
Kaibab terrane, Carboniferous, Arizona: Keyes, 1029.
GEOLOGIC FORMATIONS DESCRIBED.

Kaminis granite, pre-Cambrian, Manitoba: Alcock and Bruce, 11.
Kanawha black flint, Pennsylvanian, West Virginia: Reger, 1573.
Kanawha group, Pennsylvanian, West Virginia: Reger, 1573.
Kansa drift, Pleistocene, Iowa: Cable, 266.
Kansa glaciation, Quaternary: Upham, 1975.
Kaskaskia limestone, Mississippian, Missouri, Illinois, Kentucky: Keyes, 1037.
Kaskaskia series: Keyes, 1037.
Katahdin formation, Tertiary, Alaska: Martin, 1229.
Keechis Creek sandstone and shale, Pennsylvanian, Texas: Plummer and Moore, 1492.
Keechis Creek shale, Pennsylvanian, Texas: Moore and Plummer, 1358.
Keewatin, pre-Cambrian, Canada: Burrows, 250; Burrows and Hopkins, ?53.
Keewatin, pre-Cambrian, Ontario: Bruce, 222.
Keokuk formation, Mississippian, Illinois: Currier, 440.
Keokuk limestone, Mississippian, Illinois: Jillson, 890; Weller, 2061.
Keweenawan, pre-Cambrian, Canada: Miller, 1308.
Keweenawan, pre-Cambrian, Ontario: Burwash, 1667.
Kielagvik formation, Jurassic, Alaska: Capps, 289.
Kiemichi clay, Cretaceous, Oklahoma: Hopkins et al., 821.
Kiamitia formation, Cretaceous, Texas: Winton and Scott, 2168.
Kibbey sandstone, Carboniferous, Montana: Freeman, 615.
Kimmiswick formation, Ordovician, Missouri, Arkansas, Illinois: Dake, 450.
Kimmiswick limestone, Ordovician, Arkansas: Miller, 1337.
Kingena conglomerate, Cretaceous, Texas: Pace, 1457.
Kings River sandstone member, Ordovician, Arkansas: Dake, 450.
Kinkaid limestone, Mississippian, Kentucky: Jillson, 890; Weller, 2061.
Kimbers formation, Cambrian, Pennsylvania: Scott and Jones, 1840.
Kiowa formation, Cretaceous, Kansas: Lupton et al., 1178.
Kirker group, Oligocene, California: Clark, 336.
Kirksville sandstone and shale, Pennsylvanian, New Mexico: Barton, 75.
Lake Pinto sandstone, Pennsylvanian, Texas: Moore and Plummer, 1358; Plummer and Moore, 1492.
Lake Valley limestone, Mississippian, New Mexico: Darter, 467.
Kaminis granite, pre-Cambrian, Manitoba: Alcock and Bruce, 11.
Kiseynew gneiss, pre-Cambrian, Manitoba: Alcock and Bruce, 11.
Kitchener formation, pre-Cambrian, British Columbia: Schofield, 1667.
Kittatinny limestone, Cambro-Ordovician, New Jersey: Ries and Bowen, 1596.
Kittery quartzite, Cambro-Ordovician, Maine: Wandke, 2026.
Kitsault River formation, Jurassic, British Columbia: Hanson, 718.
Klondike series (?), pre-Cambrian, Yukon: Cockfield, 372.
Knoebôte or Borden formation, Mississippian, Indiana: Cumings, 439.
Knox dolomite, Cambrian, Georgia: McCallie, 1184.
Knox dolomite, Cambrian and Ordovician, Virginia: Stone and Miser, 1841.
Knoxbone, Cambrian, Virginia: McCallie, 1184.
Koonsville formation, Cretaceous, California: Van der Leek, 1976.
Kokomo limestone, Silurian, Indiana: Cumings, 439.
Kootenai formation, Comanchean, Montana: Clapp et al., 330; Collier and Cathcart, 391; Kemp and Billingsley, 961; Lupton and Lee, 1177.
Kootenay formation, Cretaceous, Alberta: Marshall, 1228; Slipper, 1751.
Kootenay formation, Cretaceous, British Columbia: Marshall, 1227.
Kreyenhagen shale, Oligocene, California: Clark, 336; Vander Leek, 1976.
Kushtaka formation, Tertiary, Alaska: Martin, 1229.
Lac Seul series, pre-Cambrian, Ontario: Burwash, 257.
Lake Valley limestone, Mississippian, New Mexico: Darter, 467.
Lafayette formation, Pliocene, Kentucky: Glenn, 653.
Lafayette formation, Tertiary, Indiana: Malott, 1216.
Lafayette gravel, Pliocene, Texas: Barton, 75.
Lafferty limestone, Silurian, Arkansas: Miser, 1327.
Lake Pinto sandstone, Pennsylvanian, Texas: Moore and Plummer, 1358; Plummer and Moore, 1492.
Lake Valley limestone, Mississippian, New Mexico: Darter, 467.
Lakota sandstone, Cretaceous, Nebraska: Schramm and Cook, 1872.
Lance formation, Cretaceous: Schuchert, 2034.
Lance formation, Cretaceous, South Dakota: Wilson, 1617.
Lancet formation, Cretaceous, Montana: Clapp et al., 330.
Lance formation, Cretaceous, South Dakota: Ward and Wilson, 2034.
Lance formation, Cretaceous or Tertiary, Montana: Clapp et al., 330.
Lance formation, Montana, Texas: Thom and Dobbin, 1874.
Lance formation, Tertiary, Montana: Lupton and Lee, 1177.
Lance formation, Tertiary (?), Montana: Knowlton, 1070; Thom, 1875.
Lance formation, Tertiary (?), North Dakota: Hancock, 711.
<table>
<thead>
<tr>
<th>Formation/Group</th>
<th>Age</th>
<th>Location</th>
<th>Author(s)</th>
<th>Page(s)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Lance formation</td>
<td>Tertiary (?)</td>
<td>Wyoming</td>
<td>Collier</td>
<td>390</td>
</tr>
<tr>
<td>Lance series</td>
<td>Tertiary</td>
<td>Montana</td>
<td>Keyes</td>
<td>581</td>
</tr>
<tr>
<td>La Plata formation</td>
<td>Jurassic</td>
<td>Colorado</td>
<td>Coffin</td>
<td>377</td>
</tr>
<tr>
<td>La Plata group</td>
<td>Jurassic</td>
<td>New Mexico</td>
<td>Darton</td>
<td>467</td>
</tr>
<tr>
<td>Laramie formation</td>
<td>Cretaceous</td>
<td>Colorado</td>
<td>Coffin</td>
<td>377</td>
</tr>
<tr>
<td>Lefkiv d.</td>
<td>Jurassic</td>
<td>Colorado</td>
<td>Skovitz</td>
<td>1070</td>
</tr>
<tr>
<td>Lance series</td>
<td>Tertiary</td>
<td>Montana</td>
<td>Keyes</td>
<td>981</td>
</tr>
<tr>
<td>La Plata formation</td>
<td>Jurassic</td>
<td>Colorado</td>
<td>Coffin</td>
<td>377</td>
</tr>
<tr>
<td>Laramie formation</td>
<td>Cretaceous</td>
<td>Wyoming</td>
<td>Knowlton</td>
<td>1070</td>
</tr>
<tr>
<td>&quot;Laramie&quot; sandstone</td>
<td>Cretaceous</td>
<td>Utah</td>
<td>Moore</td>
<td>1362</td>
</tr>
<tr>
<td>Larke dolomite</td>
<td>Cambrian</td>
<td>Pennsylvania</td>
<td>Gordon</td>
<td>670</td>
</tr>
<tr>
<td>Las Cahobas formation</td>
<td>Miocene</td>
<td>Haiti</td>
<td>Houding</td>
<td>2189</td>
</tr>
<tr>
<td>Las Matas formation</td>
<td>Miocene</td>
<td>Dominican Republic</td>
<td>Vaughan et al.,</td>
<td>1985</td>
</tr>
<tr>
<td>Laurel formation</td>
<td>Silurian</td>
<td>Indiana</td>
<td>Cummings</td>
<td>439</td>
</tr>
<tr>
<td>Laurel limestone</td>
<td>Silurian</td>
<td>Tennessee</td>
<td>Miser</td>
<td>1325</td>
</tr>
<tr>
<td>Laurentian formation</td>
<td>pre-Cambrian</td>
<td>Ontario</td>
<td>Burrows</td>
<td>250</td>
</tr>
<tr>
<td>Lawrence shale member</td>
<td>Carboniferous</td>
<td>Kansas</td>
<td>Twnhoefel and Edwards</td>
<td>1944</td>
</tr>
<tr>
<td>Lemon formation</td>
<td>Ordovician</td>
<td>Tennessee</td>
<td>Coryell</td>
<td>417</td>
</tr>
<tr>
<td>Lebanon granite</td>
<td>New Hampshire</td>
<td>Merritt</td>
<td>1288</td>
<td></td>
</tr>
<tr>
<td>Lebo shale member</td>
<td>Eocene</td>
<td>Montana</td>
<td>Clapp et al.</td>
<td>330</td>
</tr>
<tr>
<td>Ledger dolomite</td>
<td>Cambrian</td>
<td>Pennsylvania</td>
<td>Stos and Jonas</td>
<td>1840</td>
</tr>
<tr>
<td>Lee formation</td>
<td>Pennsylvania</td>
<td>Virginia</td>
<td>Giles, Wentworth</td>
<td>635,2070</td>
</tr>
<tr>
<td>Lego limestone</td>
<td>Silurian</td>
<td>Tennessee</td>
<td>Miser</td>
<td>1325</td>
</tr>
<tr>
<td>Lepers limestone</td>
<td>Ordovician</td>
<td>Tennessee</td>
<td>Miser</td>
<td>1325</td>
</tr>
<tr>
<td>Leitchfield formation</td>
<td>Mississippian</td>
<td>Kentucky</td>
<td>Glenn, 653</td>
<td></td>
</tr>
<tr>
<td>Leithsville or Tomstown formation</td>
<td>Pennsylvania</td>
<td>Gordon, 679</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Leon formation</td>
<td>Pleistocene</td>
<td>Tennessee</td>
<td>Virginia</td>
<td>Liddell, 1128</td>
</tr>
<tr>
<td>Lexay beds</td>
<td>Ordovician</td>
<td>Ontario</td>
<td>Wilson</td>
<td>2145</td>
</tr>
<tr>
<td>Le Roux limestones</td>
<td>Arizona</td>
<td>Keys, 1036</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Le Roux terrane</td>
<td>Triassic</td>
<td>Arizona</td>
<td>Keys, 1029</td>
<td></td>
</tr>
<tr>
<td>Lewis shale</td>
<td>Cretaceous</td>
<td>New Mexico</td>
<td>Bauer and Reeside</td>
<td>94; Darton, 467</td>
</tr>
<tr>
<td>Lewis shale</td>
<td>Cretaceous</td>
<td>Utah</td>
<td>Moore</td>
<td>1362</td>
</tr>
<tr>
<td>Liberty formation</td>
<td>Ordovician</td>
<td>Indiana</td>
<td>Cummings</td>
<td>439</td>
</tr>
<tr>
<td>Lincoln horizon</td>
<td>Oligocene</td>
<td>Washington</td>
<td>Clark, 336</td>
<td></td>
</tr>
<tr>
<td>Lion sandstone</td>
<td>Tertiary</td>
<td>California</td>
<td>Vaughan</td>
<td>1079</td>
</tr>
<tr>
<td>Lisman formation</td>
<td>Ordovician</td>
<td>Pennsylvania</td>
<td>Kentucky</td>
<td>Glenn, 653</td>
</tr>
<tr>
<td>Livingston formation</td>
<td>Cretaceous</td>
<td>Montana</td>
<td>Clapp et al., 330</td>
<td></td>
</tr>
<tr>
<td>Lobelville limestone member</td>
<td>Silurian</td>
<td>Tennessee</td>
<td>Miser, 1325</td>
<td></td>
</tr>
<tr>
<td>Lobo formation</td>
<td>Triassic</td>
<td>New Mexico</td>
<td>Darton</td>
<td>467</td>
</tr>
<tr>
<td>Lockatong formation</td>
<td>Triassic</td>
<td>Pennsylvania</td>
<td>Gordon</td>
<td>679</td>
</tr>
<tr>
<td>Lodgypole limestone</td>
<td>Mississippian</td>
<td>Montana</td>
<td>Coffin and Cathcart</td>
<td>391</td>
</tr>
<tr>
<td>Logan formation</td>
<td>Mississippian</td>
<td>Kentucky</td>
<td>Butts, 262</td>
<td></td>
</tr>
<tr>
<td>Logan formation</td>
<td>Mississippian</td>
<td>Ohio</td>
<td>Conrey, 403; Hyde, 859</td>
<td></td>
</tr>
<tr>
<td>Logistic formation</td>
<td>pre-Cambrian</td>
<td>Canada</td>
<td>Miller, 1395</td>
<td></td>
</tr>
</tbody>
</table>

Lohali sandstones, Arizona: Keys, 1036.  
Lohali terrane, Cretaceous, Arizona: Keys, 1029.  
Lone Mountain dolomite, Silurian, Mackenzie: Kindlo, 1043.  
Longfellow terrane, Ordovician, Arizona: Keys, 1029.  
Lonsdale or Rock Creek limestone, Pennsylvanian, Illinois: Cadz, 260.  
Lookout formation, Carboniferous, Georgia: McCallie, 1914.  
Lorrain quartzite, pre-Cambrian, Ontario: Quirke, 1527, 1528.  
Losee gneiss, pre-Cambrian, New Jersey: Ries and Bott, 1565.  
Lost Creek shale bed, Permian, Texas: Plummer and Moore, 1492.  
Louisville limestone, Silurian, Indiana: Cummings, 439.  
Lowellville (Poverty Run) limestone, Pennsylvania, Ohio: Morningstar, 1371.  
Lowerre quartzite, pre-Cambrian, New York: Berkley and Rice, 131.  
Lowville formation, Ordovician, Vermont: Gordon, 673.  
Lowville limestone, Ordovician, Pennsylvania: Gordon, 679.  
Ludlow lignitic member, Cretaceous: Schuchert, 1677.  
Lukashukai terrane, Triassic, Arizona: Keys, 1029.  
Lukashukai sandstones, Arizona: Keys, 1029.  
Luta limestone, Permian, Kansas: Elledge, 552.  
Lynn volcanics, Devonian (?) and Carboniferous, Massachusetts: Clapp, 329.  
Lynx formation, Cambrian, British Columbia: Burlington, 243.  
McAlester shale, Pennsylvanian, Arkansas and Oklahoma: Miser, 1326.  
McArthur member, Pennsylvanian, Ohio: Morningstar, 1371.  
McBean formation, Eocene, Georgia: McCallie, 1184; Teas, 1863.  
McClesky sand, Texas: Reeves, 1570.  
McElmo formation, Cretaceous (?), New Mexico: Darton, 467.  
McElmo formation, Cretaceous (?), Utah: Moore, 1362.  
McKittrick formation, Ordovician, Montana: Clapp et al., 330.  
McKenzie limestone, Triassic or Cretaceous, Colorado: Coffin, 377.  
McKittrick group, Ordovician, California: English, 562.  
McKittrick group, Ordovician, California: Vander Leck, 1976.  
McLeansboro formation, Pennsylvanian, Illinois: Cadz, 269; Currier, 440; Savage, 1659; Savage and Udden, 1649; Shaw, 1710.  
McNaury sand member, Cretaceous, Illinois: Pardee and Schroyer, 1467.  
Madame Jole formation, Miocene, Haiti: Woodring, 2189.  
Maderan series, New Mexico: Keys, 1027.  
Madison group, Mississippian, Montana: Collier and Cathcart, 391.  

GEOLOGIC FORMATIONS DESCRIBED.

Madison limestone, Carboniferous, Montana: Clapp et al., 330.

Madison limestone, Mississippian, Montana: Kemp and Bolling, 961; Lupton and Lee, 1177; Thom, 1875.


Magdalena group, New Mexico: Keys, 1027.

Magdalena group, Pennsylvanian, New Mexico: Barton, 407; Ellis, 555.

Magdalena limestone, Mississippian, Montana: Lupton and Lee, 1177; Thorn, 1875.

Magdalena limestone, Mississippian, Wyoming: Heald, 747.

Magdalena group, Pennsylvania, New Mexico: Keyes, 1027.

Magdalena group, Pennsylvanian, New Mexico: Barton, 407; Ellis, 555.

Magdalena limestone, Pennsylvanian, New Mexico: Lee, 1102.

Magog shale, Ordovician, New York: Ruedemann, 1124.

Magogy formation, Cretaceous, New Jersey: Mansfield, 1223.

Mahomet beds, Pleistocene, Iowa: Cable, 266.

Mahoning (Lower) sandstone, Pennsylvanian, West Virginia: Virgin, 1573.

Mahoning (Upper) sandstone, Pennsylvanian, West Virginia: Virgin, 1573.

Mahopac granite, pre-Cambrian, New York: Berkey and Rice, 131.

Mahto formation, Cambrian, British Columbia: Burling, 243.

Main Street formation, Cretaceous, Texas: Winton and Scott, 2166.

Main Street limestone, Cretaceous, Oklahoma: Hopkins et al., 391.

Malmside tongue, Miocene, Haiti: Woordring, 2189.

Mammouth andesite, Tertiary, Nevada: Knoyf, 1062.

Manasquan marl, Cretaceous, New Jersey: Mansfield, 1223.


Manistocksand, Mississippian, Kentucky: Jillson, 897.

Mayfield formation, Cretaceous, New York: Rockefeller and Miller, 245.

Mayville formation, Silurian, Michigan: Ehlers, 555.

Mansfield formation, Pennsylvanian, Indiana: Cummings, 439.

Mansfield group, New Mexico: Keys, 1027.

Manxano group, Pennsylvanian, New Mexico: Barton, 407; Ellis, 555.

Mao clay, Miocene, Dominican Republic: Vaughan et al., 1985.

Mao Adentro limestone, Miocene, Dominican Republic: Vaughan et al., 1985.

Maquoketa formation, Ordovician, Illinois: Culver, 438.

Maquoketa formation, Ordovician, Iowa, Illinois, Minnesota, Wisconsin: Dake, 450.

Maquoketa shale, Ordovician, Illinois: Savage and Udden, 164.

Maquoketa formation, Ordovician, Iowa: Bradley, 191.

Marathon formation, Ordovician, Texas: Powers, 1501.

Maravillas formation, Ordovician, Texas: Powers, 1501.

Marble Bay limestone, Triassic or Jurassic, British Columbia: Dolmage, 511.

Marble Falls limestone, Carboniferous, Texas: Dobin, 350; Reeves, 1570.
Menefee formation, Cretaceous, New Mexico: 
Bauer and Reeside, 94.

Meramee group, Mississippian: Weller, 2061.

Merced formation, Pliocene, California: Clark, 336.

Vander Leek, 1976.

Merced group, Cretaceous, New Mexico: Bauer and Reeside, 94; Darton, 467.

Merced formation, Cretaceous, California: Clark, 336.

Mercer (Lower) formation, Pennsylvania, Ohio: 
Conrey, 436.

Mercer (Upper) limestone, Pennsylvania, Ohio: 
Conrey, 436.

Mercer (Upper) member, Pennsylvania, Ohio: 
Morningstar, 1371.

Merchantville clay, Cretaceous, New Jersey: Mansfield, 1223.

Meron sandstone, Pennsylvania, Indiana: Cummings, 439.

Merrimack quartzite, Carboniferous, Massachusetts: 
Clapp, 329.

Merriman limestone member, Carboniferous, Texas: 
Reeves, 1570.

Mesa sandstone, Tertiary, Lower California: Darnton, 466.

Mesaverde formation, Cretaceous, Colorado: Coffin, 377.

Mesaverde group, Cretaceous, New Mexico: Bauer and Reeside, 94; Darton, 467.

Minneola limestone, Devonian, Missouri: Branson, 103.

Minooka deposits, Pleistocene, Illinois: Culver, 436; 
Mint Spring calcareous marl member of Marianna limestone, Oligocene, Mississippi: Cushman, 446.

Miners group, Devonian, New Brunswick: Matthews, 1244.

Miss (Lower) series, pre-Cambrian, Manitoba: 
Alcock and Bruce, 11.

Miss (Upper) series, pre-Cambrian, Manitoba: 
Alcock and Bruce, 11.

Mission Canyon limestone, Mississippian, Montana: 
Collie and Cathcart, 391.

Mississippian group, Cambrian, Vermont: Richardson and Cabeen, 1385.

Mississagi formation, pre-Cambrian, Ontario: 
Quirke, 1527, 1528.

Mississippian series: Keyes, 1037.

Mississippi series, Carboniferous: Williams, 2133.

Missouri Mountain slate, Silurian, Arkansas and Oklahoma: Miser, 1326.

Mitchell limestone, Mississippian, Indiana: Stockdale, 1819.

Mocasin limestone, Ordovician, Virginia: Stone and Miser, 1841.

Moenkopi formation, Triassic, Arizona: Noble, 1400.

Moenkopi formation, Triassic, Nevada: Longwell, 1144.

Moenkopi formation, Triassic, New Mexico: Darton, 467.

Moenkopi formation, Triassic, Utah: Bassler and Reeside, 79; Longwell et al., 1147; Moore, 1392.

Moenkopi formation, Triassic, Utah and Arizona: 
Reeside and Bassler, 1568.

Moenkopian series, Carboniferous, Arizona: Keyes, 1029.

Moenkopian formation, Permian, Arizona: Hager, 704.

Moorcroft sandstone, Pennsylvania, West Virginia: 
Reger, 1573.


Montana group, Cretaceous, Montana: Clapp et al., 330; Kemp and Billingsley, 861.

Monteith beds, Miocene, Lower California: Darton, 497.

Monteith formation, Tertiary, Lower California: 
Heim, 762.

Monteith group, Miocene, California: Dickerson, 497.

Monteith series, Miocene, California: Clark, 335, 336; Vander Leek, 1976.

Monteith formation, Tertiary, Colorado: 
Knowlton, 1070.

Monument Creek group, Tertiary, Colorado: 
Knowlton, 1070.

Montesano formation, Miocene, Washington: 
Clark, 335, 336.

Montoya limestone, Ordovician, New Mexico: 
Darton, 467.

Morning group, Pleistocene, California: Dickerson, 497.

Mound formation, Pennsylvanian, Texas: Moore and Plummer, 1358; Plummer and Moore, 1492.

Munroan shale, Carboniferous, Arkansas: Miser, 1327.

Moorheadtown, member, Mississippian, Indiana: 
Cummings, 439.

Moran formation, Pennsylvanian, Texas: Moore and Plummer, 1358; Plummer and Moore, 1492.

Moreci shales, Cambrian, Montana: Keyes, 1036.

Moreci terrane, Devonian, Arizona: Keyes, 1029.

Morris Mountain shaly member, Mississippian, Kentucky: Butts, 202.
GEOLOGIC FORMATIONS DESCRIBED.

Morrison formation, Comanchean(?), Montana: Clapp et al., 330.
Morrison formation, Cretaceous(?), New Mexico: Darton, 467.
Morrison formation, Cretaceous(?), Wyoming: Collier, 390.
Morrison formation, Cretaceous or Jurassic, Montana: Thom, 1875.
Morrison formation, Jurassic, Montana: Lupton and Lee, 1177.
Morrow group, Pennsylvanian, Oklahoma: Aurin et al., 55.
Moscovy series, Tertiary, Trinidad: Milner, 1322.
Mosby sand, Cretaceous, Montana: Collier and Cathcart, 391.
Mosby sand member, Cretaceous, Montana: Collier and Cathcart, 391.
Mosby shale, Cretaceous, Montana: Thom and Dobbin, 1874.
Mount Auburn formation, Ordovician, Indiana: Cumings, 439.
Mount Cap formation, Cambrian, Mackenzie: Williams, 2140.
Mount Gilead sandstone, Pennsylvanian, Kentucky: Glenn, 653.
Mount Gilead shales, Pennsylvanian, Kentucky: Glenn, 653.
Mount Laurel sand, Cretaceous, New Jersey: Mansfield, 1223.
Mount Selman formation, Eocene, Texas: Powers and Hopkins, 1504.
Mount Simon sandstone, Cambrian, Minnesota: Keys, 1035.
Mount Simon sandstone member, Cretaceous, Montana: Collier and Cathcart, 391; Thom, 1875.
Mount Silverton limestone, Ordovician, Tennessee: Culver, 439.
Mountsboro limestone, Ordovician, Tennessee: Culver, 439.
Murphy marble, Cambrian, Georgia: McCollie, 1154.
Muscogee shales, Carboniferous, Oklahoma, Kansas, and Missouri: Keyes, 997.
Nacatoh sand, Cretaceous, Louisiana: Hanshaw, 709.
Nacial limestones, Arizona: Keys, 1036.
Nacatoh terrane, Silurian, Arizona: Keys, 1029.
Naknek formation, Jurassic, Alaska: Capps, 289; Martin, 1229; Moffit, 1355, 1356.
Nantahala slate, Cambrian, Georgia: McCollie, 1184.
Naparima marl, Tertiary, Trinidad: Milner, 1322.
Nariva series, Tertiary, Trinidad: Milner, 1322.
Nashua marls, Pliocene, Florida: Sollards, 1691.
Nauna series, pre-Cambrian, Yukon: Cooper, 372.
Nass formation, British Columbia: Mertle, 1200.
Nass formation, Jurassic, British Columbia: Schofield and Hanson, 1602, 1606.
Naugatuck sandstone, Pennsylvanian, West Virginia: Reger, 1573.
Navajo sandstone, Jurassic, New Mexico: Darton, 467.
Navajo sandstone, Jurassic, Utah: Moore, 1362.
Navarro formation, Cretaceous, Texas: Udden, 1953.
New Albany slate, Devonian, Indiana: Cumings, 439.
Newark terrane, Ordovician, Massachusetts: Clapp, 329.
Newcastle sandstone member, Cretaceous, Nebraska: Schramm and Cook, 1672.
New River group, Pennsylvanian, West Virginia: Reger, 1573.
Niagara, Silurian, Indiana: Cumings, 439.
Niagar limestone, Silurian, Illinois: Savage and Udden, 1649.
Niobrara formation, Cretaceous, Kansas: Lupton et al., 1178.
Niobrara limestone, Cretaceous, Montana: Kemp and Billingsley, 981.
Niobrara limestone, Cretaceous, Nebraska: Schramm and Cook, 1672.
Niobrara shale, Cretaceous, Montana: Thorn, 1875.
Nipissing diabase, pre-Cambrian, Ontario: Burrows, 250.
Nisky or Lehigh limestone, Ordovician, Pennsylvania: Gordon, 679.
Noblesville formation, Silurian, Indiana: Cumings, 439.
Noix limestone, Silurian, Missouri: Keyes, 990.
Nolichucky shales, Cambrian, Virginia: Stose and Miser, 1841.
North Leon limestone member, Carboniferous, Texas: Reeves, 1570.
Norton formation, Pennsylvanian, Virginia: Giles, 638; Wentworth, 2070.
Ocala formation, Eocene, Florida: Sellards, 1691.
Ocala formation, Eocene, Colorado: Coffin, 377.
Ocala formation, Eocene, Colorado: Coffin, 377.
Oceano group, Pleistocene, California: Clark, 336.
Oklahoma sandstone, Carboniferous, Oklahoma: O'Connell, 1412.
Olive Hill formation, Devonian, Tennessee: Miser, 1325.
Oneonta formation, Ordovician, Illinois: Culver, 438.
Oneota dolomite, Ordovician, Iowa, Minnesota, Wisconsin: Dake, 450.
Opeche formation, Permian (?), Wyoming: Collier, 390.
Opet formation, Cambrian, Utah: Olmstead, 1413.
Ophir formation, Cambrian, Utah: Olmstead, 1413.
Oraba sandstones, Arizona: Keys, 1038.
Oraba terrane, Cretaceous, Arizona: Keys, 1029.
Oregon division, Ordovician, Indiana: Cuminings, 430.
Orinom group, Pliocene, California: Clark, 336.
Owascoian stage, Ordovician, Pennsylvania: Gordon, 679.
Owasco limestone, Ordovician, Pennsylvania: Gordon, 679.
Owasco limestone, Ordovician, Pennsylvania: Gordon, 679.
Owasco sandstone, Ontario: Ontario, 1616.
Ohama, Mississippian, Ohio: Hyde, 859.
Ohio shales, Devonian, Ohio: Hyde, 859.
Ohio shales, Devonian or Mississippian, Kentucky: Butts, 262.
Ohio River formation, Indiana: Malott, 1216.
Oko formation, Mississippian, Illinois: Shaw, 1719.
Oko formation, Mississippian, Illinois: Shaw, 1719.
Okefenokee formation, Pleistocene, Georgia: McCallie, 1184; Teas, 1883.
Olive Hill formation, Devonian, Tennessee: Miser, 1325.
Oneonta formation, Cretaceous, Montana: Keys, 1038.
GEOLOGIC FORMATIONS DESCRIBED.

Parkman sandstone, Cretaceous, Montana: Thom, 1873.


Paskapoo formation, Cretaceous, Alberta: Slipper, 1751.

Paso Robles beds, Pliocene, California: Clark, 336.


Pawpaw formation, Cretaceous, Texas: Winton and Scott, 2106.

Peachbottom slate member, Ordovician, Pennsylvania: Gordon, 679.

Pearl shale, Permian, Kansas: Elledge, 552.

Pecan Gap chalk member, Cretaceous, Texas: Hopkins et al., 821.

Peekskill granite, Cambro-Ordovician, New York: Berkey and Rice, 131.

Peerless sandstone, Pennsylvanian, West Virginia: Reger, 1573.

Peekskill slate, Ordovician, New York: Berkey and Rice, 131.

Pendleton sandstone, Devonian, Indiana: Cumings, 439.

Pennington formation, Mississippian, Kentucky: Butts, 269.

Pennington formation, Mississippian, Virginia: Wentworth, 2070.

Penrod sand, Mississippian, Kentucky: Jillson, 897.

Peachbottom formation, Cretaceous, Montana: Thom, 1873.

Pearl formation, Cretaceous, Kansas: Lupton et al., 1178.

Pierceton limestone, Ordovician, Indiana: Cumings, 55.

Pine Point limestones, Devonian, Mackenzie: Whitaker, 2118.

Pine Point limestones, Devonian, Northwest Territory (Canada): Cameron, 274.

Pine River formation, Jurassic (?), British Columbia: Spieker, 1784.

Pineville sandstone, Pennsylvanian, West Virginia: Reger, 1573.

Pinevalle formation, Pliocene, California: Clark, 336.

Pipes fanglomerate, Pliocene or Pleistocene, California: Vaughan, 1979.

Pitkin limestones, Mississippian, Oklahoma: Aurin et al., 55.

Placid shale, Pennsylvanian, Texas: Moore and Plummer, 1335; Plummer and Moore, 1492.

Platteville formation, Ordovician, Iowa, Illinois, Minnesota, Wisconsin: Dake, 450.

Platteville formation, Ordovician, Illinois: Culver, 438; Savage and Udden, 1649.

Platteville limestone, Ordovician, Arkansas: Dake, 450.

Platteville limestone, Ordovician, Arkansas: Dake, 450.


Pocahontas group, Pennsylvanian, West Virginia: Reger, 1573.

Pochuck diorite, pre-Cambrian, New Jersey: Ries and Bowen, 1596.

Pochuck gneiss, pre-Cambrian, New Jersey: Ries and Bowen, 1596.

Point Pleasant beds, Ordovician, Indiana: Cumings, 55.

Point Lookout sandstone, Cretaceous, New Mexico: Bauer and Reeside, 94; Darton, 467.

Poleo sandstone, Triassic, New Mexico: Darton, 467.

Pomeroy sandstone, Mississippian, West Virginia: Reger, 1573.

Pomona formation, Pliocene, California: Clark, 336.

Pomona series, Devonian, Arizona: Keyes, 1029, 1030.

Portsmouth shale, Mississippian, Ohio: Hyde, 859.

Powersville formation, Pennsylvanian, Indiana: Cumings, 439.

Powers Creek schist, Cambrian, Pennsylvania and Maryland: Jonas and Knopf, 931.

Potomac River formation, Pennsylvanian, West Virginia: Butts, 269.

Pottawatomie formation, Ordovician, Kansas: Elledge, 552.

Potholes formation, Cretaceous, Montana: Thom, 1873.

Potomac River formation, Cambrian, Kentucky: Jullson, 897.

Pottawatomie formation, Ordovician, Kansas: Elledge, 552.

Poughkeepsie formation, Cretaceous, New York: Reger, 1573.

Poughkeepsie limestone, Ordovician, New York: Berkey and Rice, 131.


Powell formation, Pliocene, California: Clark, 336.

Prairie formation, Cretaceous, Kansas: Lupton et al., 1178.

Prairie formation, Cretaceous, South Dakota: Ward, 2033; Ward and Wilson, 2034.


Prairie shale, Cretaceous, Nebraska: Schramm and Cook, 1672.

Prairie shale, Cretaceous, New Mexico: Darton, 467; Lee, 1105.


Pine Point limestones, Devonian, Mackenzie: Whitaker, 2118.

Pine Point limestones, Devonian, Northwest Territory (Canada): Cameron, 274.

Pinus formation, Cretaceous, Montana: Thom, 1873.


Pinus formation, Cretaceous, Montana: Thom, 1873.

Potsdam sandstone, Cambrian, Ontario: Wright, 2307.

Potsdam sandstone, Cambrian, Quebec: Kelee and Cole, 948.


Pottsville formation, Pennsylvanian, Illinois: Cady, 269; Culver, 438; Currier, 440; Savage, 1650; Savage and Nebel, 1651; Savage and Udden, 1649; Shaw, 1719.

Pottsville formation, Pennsylvanian, Kentucky: Foyles, 607.


Pottsville sands, Pennsylvanian, Kentucky: Jillson, 897.

Pottsville series, Pennsylvanian, West Virginia: Reger, 1573.

Poughquag quartzite, Cambro-Ordovician, New York: Berkey and Rice, 131.

Powell formation, Ordovician, Missouri: Dake, 452.

Powell formation, Ordovician, Missouri, Arkansas: Dake, 450.


Prairie du Chien limestone, Ordovician, Illinois: Savage and Udden, 1649.

Quadrant formation, Carboniferous, Montana: Clapp et al., 330; Freeman, 610.

Quadrant formation, Pennsylvanian, Montana: Kemp and Billingsley, 261.

Quadrant formation, Pennsylvanian (?), Montana: Lupton and Lee, 1177.

Rampart limestone, Devonian, Mackenzie: Kindle, 1043.

Ranger limestone, Carboniferous, Texas: Dobbin, 506.

Ray sand, Texas: Reeves, 1570.

Ray sand, New Mexico: Mansfield, 1223.

Raton formation, Cretaceous, New Jersey: Mansfield, 1223.

Redbank sand, Cretaceous, New Jersey: Mansfield, 1223.

Rattlesnake formation, Pliocene, Oregon: Buwalda, 264.

Rattlesnake granite, California: Hudson, 840.

Rattlesnake granite, Arizona: Keys, 1039.

Rattlesnake formation, Cretaceous, Arizona: Keys, 1039.

Redwall limestone, Carboniferous, Utah and Arizona: Reeside and Bassler, 79.

Redwall limestone, Mississippian, Arizona: Noble, 1400.

Redwall limestone, Pennsylvanian, Arizona: Hager, 704.

Redwall limestone, Pennsylvanian and Mississippian, Utah: Bassler and Reeside, 79.

Rampart limestone, Devonian, Mackenzie: Bosworth, 173.

Ramparts limestone, Pennsylvanian, Mackenzie: Kindle, 1043.

Ranger limestone, Carboniferous, Texas: Dobbin, 506.

Ranger limestone, Pennsylvanian, Texas: Moore and Plummer, 1358; Plummer and Moore, 1492; Ross, 1616.

Ranger limestone member, Carboniferous, Texas: Reeves, 1570.

Raritan formation, Cretaceous, New Jersey: Mansfield, 1223.

Raton formation, Tertiary, New Mexico: Lee, 1105.


Risesdale formation, Pliocene, Oregon: Buwalda, 264.

Renault formation, Tertiary, New Mexico: Darton, 467.

R Dataset formation, Cretaceous, Arizona: Keys, 1040.

Redwall limestone, Carboniferous, Utah and Arizona: Reeside and Bassler, 1568.

Redwall limestone, Mississippian, Arizona: Noble, 1400.

Redwall limestone, Pennsylvanian, Arizona: Hafer, 704.

Redwall limestone, Pennsylvanian and Mississippian, Utah: Bassler and Reeside, 79.

Redwall limestone, Mississippian, Indiana: Cumings, 439.

Renault formation, Mississippian, Illinois: Shaw, 1719.

Renault formation, Mississippian, Kentucky: Jillson, 806; Weller, 2061.
GEOLOGIC FORMATIONS DESCRIBED.

Reservoir granite, pre-Cambrian, New York: Berkey and Rice, 131.
Revard sandstone, Pennsylvanian, Oklahoma: Rounyd et al., 1620.
Rexmount porphyry, Tertiary, British Columbia: McCann, 1187.
Rice Lake series, pre-Cambrian, Manitoba: Cooke, 415.
Rice Lake series, pre-Cambrian, Ontario: Burwash, 267.
Richmond beds, Ordovician, Kentucky: Foyles, 607.
Richmond group, Ordovician, Indiana: Cumings, 439.
Ridgstop shale, Mississippian, Tennessee: Miser, 1325.
Ridley limestone, Ordovician, Tennessee: Coryell, 417.
Rift shale, Pennsylvanian, West Virginia: Reger, 1573.
Ripley formation, Cretaceous, Georgia: McCallie, 1184; Teas, 1563.
Ripley formation, Cretaceous, Illinois: Parmelee and Schroyer, 1467.
Rittman conglomerate lentil, Mississippian, Ohio: Conrey, 403.
Riverside (or Koltsclaw) formation, Mississippian, Indiana: Cumings, 439.
Rhea gneiss, Archean, Georgia: McCallie, 1184.
Roberson formation, Ordovician, British Columbia: Butling, 243.
Rochelle conglomerate, Pennsylvania, Texas: Moore and Plummer, 1358; Plummer and Moore, 1492.
Rochester biotite granite, Devonian (?), New Hampshire: Wandke, 2026.
Rock Canyon conglomeratic member, Triassic, Arizona and Utah: Reeside and Bassler, 1568.
Rock Canyon conglomeratic member, Triassic, Utah: Bassler and Reeside, 79.
Reeford formation, Mississippian, Indiana: Cumings, 439.
Reno Lewis beds, Ordovician, Ontario: Wilson, 2145.
Rockland formation, Ordovician, Canada: Raymond, 1540.
Rockwood formation, Mississippian, Tennessee: Miser, 1325.
Rodman limestone, Ordovician, Pennsylvania: Gordon, 679.
Reger formation, Cambrian, Georgia: McCallie, 1184.
Romney formation, Devonian, Virginia: Stose and Miser, 1541.
Roosville formation, pre-Cambrian, British Columbia: Schofield, 1667.
Rosewood shale, Mississippian, Indiana: Cumings, 439.
Rosewood shale, Mississippian, Kentucky: Butts, 282.
Rosiclare sandstone member, Mississippian, Kentucky: Weller, 2061.
Roes limestone, Devonian, Tennessee: Miser, 1325.
Roublidoux formation, Ordovician, Missouri: Dake, 450.
Roubidoux sandstone, Ordovician, Missouri: Dake, 452.
Royal shale, Pennsylvanian, West Virginia: Reger, 1573.
Rye gneiss, New Hampshire and Maine: Wandke, 2026.
Saddle Creek limestone member, Pennsylvanian, Texas: Plummer and Moore, 1492.
Saddle Creek member, Pennsylvanian, Texas: Plummer and Moore, 1538.
Sago Hen limestone, Cretaceous, Montana: Lupton and Lee, 1177.
St. Albans beds, Devonian, Quebec: Alecock, 12.
St. Clair limestone, Silurian, Arkansas: Miser, 1327.
St. Clair marble, Silurian, Oklahoma: Aurin et al., 55.
St. Genevieve formation, Mississippian, Kentucky: Foyles, 607.
St. Genevieve group, Mississippian, Missouri: Williams, 2135.
St. Genevieve limestone, Mississippian, Indiana: Cumings, 439.
St. Genevieve limestone, Mississippian, Kentucky: Butts, 202; Jillson, 890; Weller, 2061.
St. Joe limestone, Mississippian, Oklahoma: Aurin et al., 55.
St. John formation, Cretaceous, British Columbia: Spieler, 1754.
St. Lawrence dolomite, Cambrian, Minnesota: Keyes, 1035.
St. Louis formation, Mississippian, Illinois: Currier, 449.
St. Louis formation, Mississippian, Kentucky: Foyles, 607.
St. Louis formation, Mississippian, Illinois: Savage and Nebel, 1651.
St. Louis limestone, Mississippian, Indiana: Cumings, 439.
St. Louis limestone, Mississippian, Kentucky: Butts, 202; Jillson, 890.
St. Louis limestone, Mississippian, Kentucky: Weller, 2061.
St. Louis limestone, Mississippian, Tennessee: Miser, 1325.
St. Maurice formation, Eocene, Louisiana: Glnnk, 619.
St. Peter formation, Ordovician, Missouri, Arkansas: Bishaw, 450.
St. Peter formation, Ordovician, Missouri, Arkansas, Iowa, Illinois, Minnesota: Dake, 450.
St. Peter group, Ordovician, Missouri: Dake, 450.
St. Peter sandstone, Ordovician, Missouri: Keyes, 996.
St. Peter sandstone, Ordovician, Arkansas: Miser, 1327.
St. Peter sandstone, Ordovician, Illinois: Culver, 438; Savage and Udowen, 1649.
St. Peter sandstone, Ordovician, Mississippi Valley: Dake, 450.
St. Peter sandstone, Ordovician, Missouri: Dake, 452.
Salada formation, Tertiary, Lower California: Heim, 782.
Salem formation, Mississippian, Illinois: Currier, 440; Savage and Nebel, 1651.
Salem formation, Mississippian, Indiana: Cumings, 439.
Salem gabbro-diorite, Devonian (?), Massachusetts: Clapp, 329.
Salem limestone, Mississippian, Indiana: Stockdale, 1819.
Salesville shale, Pennsylvanian, Texas: Moore and Plummer, 1358; Plummer and Moore, 1492.
Salmon River formation, Jurassic, British Columbia: Schofield, 1666; Schofield and Hanson, 1662.
Saltsburg sandstone, Pennsylvanian, West Virginia: Reger, 1492.
Saluda formation, Ordovician, Indiana: Cumings, 439.
Sample sandstone, Mississippian, Indiana: Cumings, 439.
Sample sandstone member, Mississippian, Kentucky: Butts, 262.
San Andreas limestone, New Mexico: Keyes, 1027.
San Andreas limestone, Permian, New Mexico: Ellis, 555; Rich, 1583.
San Angelo formation, Permian, Texas: Beede and Bentloy, 118.
Sandia formation, New Mexico: Keyes, 1027.
Sandia formation, Pennsylvanian, New Mexico: Ellis, 555.
Sandy Huff shale, Pennsylvanian, West Virginia: Reger, 1573.
San Felipe formation, Cretaceous, Mexico: Stan-ton, 1794; Stephenson, 1903.
San Fernando sandstone series, Tertiary, Trinidad: Milner, 1322.
San Jacinto interglacial epoch, Pleistocene, Iowa: Cable, 266.
San Jacinto interglacial stage, Quaternary: Upham, 1975.
San Jacinto soil zone, Pleistocene, Illinois: Savage and Udden, 1649.
San Lorenzo formation, Oligocene, California: Clark, 335; Vander Leek, 1976.
San Lorenzo series, Oligocene, California: Clark, 336.
San Pablo series, Miocene, California: Clark, 335, 336.
San Ramon formation, Oligocene, California: Clark, 336.
Santa Ana sandstone, California: Vaughan, 1979.
Santa Anna shale, Mississippian, Texas: Moore and Plummer, 1358.
Santa Anna Branch shale, Pennsylvanian, Texas: Moore and Plummer, 1358.
Santa Anna Branch beds, Pennsylvanian, Texas: Moore and Plummer, 1492.
Santa Clara beds, Pennsylvanian, Texas: Clark, 336.
Santa Fe formation, Tertiary, New Mexico: Dar-ton, 467.
Santa Margarita formation, Miocene, California: Vander Leek, 1976.
Santa Margarita group, Miocene, California: Clark, 336.
Santa Rita series, Silurian, Arizona: Keyes, 1029, 1036.
Santa Rosa sandstone, Triassic, New Mexico: Dar-ton, 467; Rich, 1583.
San Timoteo beds, Pennsylvanian, California: Frick, 613.
Saragossa quartzite, Silurian or Devonian, California: Vaughan, 1979.
### GEOLOGIC FORMATIONS DESCRIBED.

<table>
<thead>
<tr>
<th>Formation</th>
<th>Age</th>
<th>Location</th>
<th>Author(s)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Sharon ore</td>
<td>Pennsylvanian</td>
<td>Ohio</td>
<td>Morningstar, 1371.</td>
</tr>
<tr>
<td>Sheffield formation</td>
<td>Devonian</td>
<td>Iowa</td>
<td>Fenton, 579a.</td>
</tr>
<tr>
<td>Shetland formation</td>
<td>Pennsylvanian</td>
<td>Indiana</td>
<td>Cumings, 439.</td>
</tr>
<tr>
<td>Shetland formation</td>
<td>Jurassic</td>
<td>Alaska</td>
<td>Capps, 289.</td>
</tr>
<tr>
<td>Shetland formation</td>
<td>Ordovician</td>
<td>Pennsylvania</td>
<td>Gordon, 679.</td>
</tr>
<tr>
<td>Shetland member</td>
<td>Mississippian</td>
<td>Kentucky</td>
<td>Weiler, 2061.</td>
</tr>
<tr>
<td>Shinarump conglomerate</td>
<td>Triassic</td>
<td>Arizona</td>
<td>Elager, 704.</td>
</tr>
<tr>
<td>Shinarump conglomerate</td>
<td>Triassic</td>
<td>Nevada</td>
<td>Longwell, 1144, 1146.</td>
</tr>
<tr>
<td>Shinarump conglomerate</td>
<td>Triassic</td>
<td>Utah</td>
<td>Reeside and Bassler, 1568.</td>
</tr>
<tr>
<td>Shinarump sandstone</td>
<td>Triassic</td>
<td>Utah</td>
<td>Moore, 1362.</td>
</tr>
<tr>
<td>Shiwits shales</td>
<td>Carboniferous</td>
<td>Arizona</td>
<td>Keyes, 1036.</td>
</tr>
<tr>
<td>Shiwits terrane</td>
<td>Carboniferous</td>
<td>Arizona</td>
<td>Keyes, 1029.</td>
</tr>
<tr>
<td>Shoal Creek limestone</td>
<td>Pennsylvanian</td>
<td>Illinois</td>
<td>Cady, 269.</td>
</tr>
<tr>
<td>Shoal Creek limestone member</td>
<td>Pennsylvanian</td>
<td>Illinois</td>
<td>Keyes, 1029.</td>
</tr>
<tr>
<td>Shoal Creek limestone member</td>
<td>Pennsylvanian</td>
<td>Illinois</td>
<td>Keyes, 1029.</td>
</tr>
<tr>
<td>Shioap volcanics</td>
<td>Triassic</td>
<td>(?), British Columbia</td>
<td>McCann, 1187.</td>
</tr>
<tr>
<td>Shuswap series</td>
<td>pre-Cambrian</td>
<td>British Columbia</td>
<td>Schofield, 1663.</td>
</tr>
<tr>
<td>Siberia limestone</td>
<td>Mississippian</td>
<td>Indiana</td>
<td>Cumings, 439.</td>
</tr>
<tr>
<td>Siebert lake beds</td>
<td>Tertiary</td>
<td>Nevada</td>
<td>Knopf, 1061.</td>
</tr>
<tr>
<td>Sibes group</td>
<td>Pennsylvanian</td>
<td>California</td>
<td>Clark, 336.</td>
</tr>
<tr>
<td>Silver shales</td>
<td>Arizona</td>
<td>Keyes, 1036.</td>
<td></td>
</tr>
<tr>
<td>Silver terrane</td>
<td>Devonian</td>
<td>Arizona, Indiana</td>
<td>Keyes, 1029.</td>
</tr>
<tr>
<td>Simon limestones</td>
<td>Mississippian</td>
<td>Arizona</td>
<td>Keyes, 1029.</td>
</tr>
<tr>
<td>Simon quartz keratophyre</td>
<td>Triassic</td>
<td>Nevada</td>
<td>Keyop, 1092.</td>
</tr>
<tr>
<td>Simon terrane</td>
<td>Carboniferous</td>
<td>Arizona</td>
<td>Keyes, 1029.</td>
</tr>
<tr>
<td>Simpson formation</td>
<td>Ordovician, Oklahoma</td>
<td>Dake</td>
<td>450; Goldston, 666; Hewett, 785.</td>
</tr>
<tr>
<td>Simpson formation</td>
<td>Oklahoma</td>
<td>Howell, 836.</td>
<td></td>
</tr>
<tr>
<td>Simpson shales</td>
<td>Devonian, Mackenzie</td>
<td>Whitaker, 2118; Williams, 2140.</td>
<td></td>
</tr>
<tr>
<td>Simpson shales</td>
<td>Devonian</td>
<td>Northwest Territory (Canada)</td>
<td>Cameron, 274.</td>
</tr>
<tr>
<td>Siyuha formation</td>
<td>pre-Cambrian, British Columbia</td>
<td>Schofield, 1663.</td>
<td></td>
</tr>
<tr>
<td>Skolt shale</td>
<td>Pennsylvanian</td>
<td>West Virginia</td>
<td>Reger, 1573.</td>
</tr>
<tr>
<td>Skull Creek shale member</td>
<td>Cretaceous, Wyoming</td>
<td>Collier, 390.</td>
<td></td>
</tr>
<tr>
<td>Skull Creek formation</td>
<td>Miocene, British Columbia</td>
<td>Uglow, 1957.</td>
<td></td>
</tr>
<tr>
<td>Slave Point limestones</td>
<td>Devonian</td>
<td>Northwest Territory (Canada)</td>
<td>Cameron, 274.</td>
</tr>
<tr>
<td>Smithwick shale</td>
<td>Carboniferous, Texas</td>
<td>Dobbin, 505; Reeves, 1570.</td>
<td></td>
</tr>
<tr>
<td>Smithwick shale</td>
<td>Pennsylvanian, Texas</td>
<td>Goldman, 656; Moore and Plummer, 1358; Plummer and Moore, 1492; Udden, 1953.</td>
<td></td>
</tr>
<tr>
<td>Snake Hill shale</td>
<td>Ordovician, New York</td>
<td>Ruedemann, 1624.</td>
<td></td>
</tr>
<tr>
<td>Sneddy limestone</td>
<td>Ordovician, Arkansas</td>
<td>Dake, 450.</td>
<td></td>
</tr>
<tr>
<td>Snyder shales</td>
<td>Mississippian, Missouri</td>
<td>Keyes, 1092.</td>
<td></td>
</tr>
<tr>
<td>Snyder Creek shale</td>
<td>Devonian, Missouri</td>
<td>Branson, 198.</td>
<td></td>
</tr>
<tr>
<td>Somerset shale member</td>
<td>Mississippian, Indiana</td>
<td>Butts, 262.</td>
<td></td>
</tr>
<tr>
<td>Somerville limestone</td>
<td>Pennsylvanian, Indiana</td>
<td>Cumings, 439.</td>
<td></td>
</tr>
<tr>
<td>Sonoma group</td>
<td>Pennsylvanian, California</td>
<td>Dickerson, 497.</td>
<td></td>
</tr>
<tr>
<td>Spergen limestone</td>
<td>Mississippian, Indiana</td>
<td>Keyes, 1036.</td>
<td></td>
</tr>
<tr>
<td>Spergen limestone</td>
<td>Mississippian, Indiana</td>
<td>Keyes, 1029.</td>
<td></td>
</tr>
<tr>
<td>Spergen or Salem limestone</td>
<td>Mississippian, Kansas</td>
<td>Jollison, 890.</td>
<td></td>
</tr>
<tr>
<td>Springer member</td>
<td>Carboniferous, Oklahoma</td>
<td>Goldston, 666, 667.</td>
<td></td>
</tr>
<tr>
<td>Squam granite</td>
<td>Carboniferous, Massachusetts</td>
<td>Clapp, 339.</td>
<td></td>
</tr>
<tr>
<td>Squirrel Creek formation</td>
<td>Eocene, Texas</td>
<td>Liddle, 1128.</td>
<td></td>
</tr>
<tr>
<td>Stanley shale</td>
<td>Carboniferous</td>
<td>Oklahoma, Arkansas</td>
<td>Honess, 816.</td>
</tr>
<tr>
<td>Stanley shale</td>
<td>Mississippian, Arkansas</td>
<td>Misur, 1326.</td>
<td></td>
</tr>
<tr>
<td>Stanton limestone</td>
<td>Carboniferous, Kansas</td>
<td>Twenhofel and Edwards, 1944.</td>
<td></td>
</tr>
<tr>
<td>Stanton formation</td>
<td>Pennsylvania, Indiana</td>
<td>Cumings, 439.</td>
<td></td>
</tr>
<tr>
<td>Stephensport division</td>
<td>Mississippian, Indiana</td>
<td>Cumings, 439.</td>
<td></td>
</tr>
<tr>
<td>Stillwater formation</td>
<td>Tertiary, Alaska</td>
<td>Martin, 1229.</td>
<td></td>
</tr>
<tr>
<td>Stockton (Canalton) limestone</td>
<td>Pennsylvanian, West Virginia</td>
<td>Reger, 1573.</td>
<td></td>
</tr>
<tr>
<td>Stone River group</td>
<td>Ordovician, Tennessee</td>
<td>Corvell, 417.</td>
<td></td>
</tr>
<tr>
<td>Stonewall quartz diorite</td>
<td>pre-Cretaceous, California</td>
<td>Hudson, 540.</td>
<td></td>
</tr>
<tr>
<td>Storm King granite</td>
<td>pre-Cambrian, New York</td>
<td>Berruy and Rice, 131.</td>
<td></td>
</tr>
<tr>
<td>Strawn formation</td>
<td>Carboniferous, Texas</td>
<td>Dobbin, 505; Reeves, 1570.</td>
<td></td>
</tr>
<tr>
<td>Strawn formation</td>
<td>Pennsylvanian, Texas</td>
<td>Goldman, 656; Udden, 1953.</td>
<td></td>
</tr>
<tr>
<td>Strawn formation</td>
<td>Pennsylvania, Texas</td>
<td>Moore and Plummer, 1358; Plummer and Moore, 1492.</td>
<td></td>
</tr>
<tr>
<td>Stuart shale</td>
<td>Pennsylvanian, Oklahoma</td>
<td>Moore, 1356.</td>
<td></td>
</tr>
</tbody>
</table>
Sukunka beds, Cretaceous, British Columbia: Spieker, 1784.
Sunbury shale, Mississippian, Kentucky: Butts, 262; Foyle, 607.
Sunbury shale, Mississippian, Ohio: Hyde, 859.
Sundance formation, Jurassic, Montana: Thom, 1875.
Sundance formation, Jurassic, Wyoming: Collier, 390; Heald, 747.
Sunnybrook (Upper), Ordovician, Kentucky: Jillson, 897.
Sunset division, Ordovician, Indiana: Cumings, 1144.
Supai formation, Carboniferous, Utah and Arizona: Reeside and Bassler, 1568.
Supai formation, Pennsylvanian and Permian (?), Arizona: Noble, 1400.
Supai formation, Permian, Arizona: Hager, 704.
Supai (?), formation, Permian, Utah: Moore, 1362.
Supai sandstone, Permian, Nevada: Longwell, 1144.
Supai series, Carboniferous, Arizona: Keyes, 1029, 1040.
Sweatland Creek shale, Devonian, Illinois: Savage and Udden, 1649.
Sycamore limestone, Carboniferous, Oklahoma: Goldston, 660.
Sylamore sandstone, Devonian, Oklahoma: Aurin et al., 55; Schuchert, 1683.
Sylvan shale, Ordovician, Oklahoma: Hewett, 785.
Sylvan shale, Silurian, Oklahoma: Goldston, 666.
Tabena formation, Oligocene, Dominican Republic: Vaughan et al., 1985.
Talladega conglomerate, Carboniferous, Alabama: Prouty, 1521.
Talladega phyllite, Carboniferous, Alabama: Prouty, 1519.
Talladega slates, Carboniferous, Alabama: Prouty, 1520.
Talpa limestone, Permian, Texas: Plummer and Moore, 1492.
Tanana series, Tertiary, Trinidad: Milner, 1322.
Tampa formation, Oligocene, Florida: Sellards, 1691.
Taneka sand, Oklahoma: White and Greene, 2102.
Tanner shales, Arizona: Keyes, 1036.
Tanner terrane, Carboniferous, Arizona: Keyes, 1029.
Tapeats sandstone, Cambrian, Arizona: Noble, 1400; Reber, 1557.
Tapeats sandstone, pre-Cambrian, Arizona: Wilson, 2147.
Tar Springs sandstone, Mississippian, Indiana: Cumings, 439.
Tar Springs sandstone, Mississippian, Kentucky: Jillson, 890; Weller, 2061.
Tasako formation, Oligocene (?), British Columbia: MacKenzie, 1209.
Tatei formation, Cambrian, British Columbia: Burling, 243.
Tatonda Formation, Ordovician, Yukon: Burling, 242.
Taylor formation, Cretaceous, Texas: Pace, 1437.
Taylor marl, Cretaceous, Texas: Powers and Hopkins, 1504; Udden, 1933.
Tejuca beds, Oligocene, California: Clark, 336.
Tejon group, Eocene, California: Clark, 336.
Tejon formation, Eocene, California: English, 592; Vander Leek, 1976.
Telegraph Creek formation, Cretaceous, Montana: Thom, 1875.
Temblor group, Miocene, California: Clark, 336.
Temple Butte limestone, Devonian, Arizona: Keyes, 1049; Noble, 1400.
Tennessean series: Keyes, 1037.
Tensleep formation, Pennsylvanian, Montana: Thom, 1875.
Tepetae formation, Tertiary, Lower California: Heim, 702.
Terry limestone, Mississippian, West Virginia: Reger, 1573.
Tesnos formation, Pennsylvanian, Texas: Powers, 1501.
Teutonic formation, Cambrian, Utah: Olmstead, 1413.
Texada formation, British Columbia: Dolmage, 541.
Thaynes limestone, Triassic, Idaho: Kirkham, 1033.
Thermopolis shale, Cretaceous, Montana: Collier and Cathcart, 391; Thom, 1875.
Thomonde formation, Miocene, Haiti: Woodring, 2189.
Thirtty formation, Pennsylvanian, Texas: Moore and Plummer, 1358; Plummer and Moore, 1492.
Thurman sandstone, Pennsylvania, Oklahoma: Moore, 1355.
Timiskamin, pre-Cambrian, Canada: Miller, 1308.
Timiskamining series, pre-Cambrian, Ontario: Cooke, 414.
Tomasas limestone, Cretaceous, New Mexico: Darton, 467.
Tinton sand member, Cretaceous, New Jersey: Mansfield, 1223.
Tishomingo granite, Cambrian, Oklahoma: Hewett, 785.
Tishomingo granite, Ordovician, Oklahoma: Goldston, 666.
Tikana formation, Cambrian, British Columbia: Burling, 243.
Tolcoo formation, Jurassic, New Mexico: Darton, 467.
Tolcoo formation, Jurassic, Utah: Moore, 1362.
Tokun formation, Tertiary, Alaska: Martin, 1229.
Tolcocco shales, Arizona: Keyes, 1036.
Tolchoo terrane, Carboniferous, Arizona: Keyes, 1029.
Tomasales formation, Pleistocene, California: Dickerson, 497.
Tombigbee sand, Cretaceous, Georgia: McCallie, 1184.
GEOLOGIC FORMATIONS DESCRIBED.

Tonto group, Cambrian, Arizona: Hager, 704; Noble, 1409.
Torpedo sandstone, Pennsylvanian, Oklahoma: Roundsy et al., 1623.
Torrejon formation, Eocene, New Mexico: Bauer and Reeside, 94; Darton, 467.
Towanda limestone bed, Permian, Kansas: Fath, 572.
Tradewater formation, Pennsylvanian, Kentucky: Glenn, 653; Jillson, 890.
Trenton, Ordovician, Indiana: Cumings, 439.
Trenton, Ordovician, Kentucky: Jillson, 897.
Trenton, Ordovician, Vermont: Perkins, 1482.
Trenton formation, Ordovician, Vermont: Gordon, 673.
Trenton limestone, Pennsylvanian, Oklahoma: Gordon, 679.
Trenton, Ordovician, Ontario: Keele and Coile, 948.
Trenton limestone, Ordovician, Ontario: Wilson, 2145.
Trenton limestone, Ordovician, Pennsylvania: Gordon, 679.
Trenton, Ordovician, Indiana: Cumings, 439.
Trinity conglomerate, Cretaceous, Texas: Powers, 1501.
Trinity formation, Cretaceous, Texas: Uddin, 1933; Winton and Scott, 2608.
Trinity group, Cretaceous, Louisiana: Hammill, 709.
Trinity sand (?), Cretaceous, Oklahoma: Robinson, 1603.
Trinity sand, Cretaceous, Texas: Reeves, 1570.
Trinity sandstone, Cretaceous, Oklahoma: Goldston, 666.
Trinity terrane, Cretaceous, Arizona: Keyes, 1029.
Truxton terrane, Carboniferous, Arizona: Keyes, 1029.
Turkmen formation, Cretaceous, California: Clark, 336.
Turkey Creek sandstone, Pennsylvanian, Texas: Moore and Plummer, 1338; Plummer and Moore, 1492.
Tuscaloosa gravel, Cretaceous, Tennessee: Miser, 1325.
Tusquilloe quartzite, Cambrian, Georgia: McCallie, 1184.
Tuxedni sandstone, Jurassic, Alaska: Martin, 1229; Moffitt, 1335, 1336.
Twiggs clay, Eocene, Georgia: McCallie, 1184.
Twin Creek limestone, Jurassic, Idaho: Kirkham, 1033.
Two Medicine formation, Cretaceous, Montana: Clapp et al., 330.
Tyler sandstone, Carboniferous, Montana: Free- man, 610.
Tyner formation, Ordovician, Oklahoma: Aurin, et al., 55; Dake, 450.

Union formation, Cretaceous: Schuchert, 1681.
Union formation, Pleistocene, Kentucky: Glenn, 653.
Upson clay, Cretaceous, Texas: Liddle, 1128.
Usari stage, Miocene, Costa Rica: Olson, 1414.
Utsa shale, Ordovician, New York: Ruedemann, 1634.
Uvalde formation, Pliocene or Pleistocene, Texas: Liddle, 1128.
Valera shale, Permian, Texas: Plummer and Moore, 1492.
Valleytown formation, Cambrian, Georgia: McCallie, 1184.
Vanderburg sandstone, Pennsylvanian, Kentucky: Glenn, 653.
Vaqueros group, Miocene, California: Clark, 336.
Vaqueros sandstone, Miocene, California: Vander Leek, 1976.
Vaqueros shale, Miocene, California: English, 562.
Vaurial formation, Ordovician, Anticosti Island: Twenhofel, 1948.
Ventana sandstones, Arizona: Keyes, 1063.
Vernonia terrane, Triassic, Arizona: Keyes, 1029.
Verdan series, Carboniferous, Arizona: Keyes, 1029, 1036.
Verde formation, Quaternary, Arizona: Reber, 1557.
Vermonti formation, Cretaceous, New Mexico: Dar- ton, 467; Lee, 1105.
Vicksburg formation, Oligocene, Georgia: McCal- lio, 1184.
Vienna limestone, Mississippian, Kentucky: Jill- son, 890; Weller, 2061.
Vincentown sand, Cretaceous, New Jersey: Mans- field, 1223.
Vintage dolomite, Cambrian, Pennsylvania: Stowe and Jones, 1840.
Vincentown member, Mississippian, Ohio: Conrey, 403; Hyde, 859.
Viola limestone, Ordovician, Oklahoma: Dake, 450; Hewett, 785.
Viola limestone, Ordovician, Oklahoma: Dake, 450; Hewett, 785.
Viola limestone, Ordovician, Oklahoma: Dake, 450; Hewett, 785.
Viola limestone, Ordovician, Oklahoma: Dake, 450; Hewett, 785.
Virgin formation, Cretaceous, New Mexico: Dar- ton, 467; Lee, 1105.
Vinton member, Mississippian, Ohio: Conrey, 403; Hyde, 859.
Virginia limestone member, Triassic, Utah: Dake, 450; Hewett, 785.
Virginia limestone, Ordovician, Oklahoma: Dake, 450; Hewett, 785.
Virginia limestone, Ordovician, Oklahoma: Dake, 450; Hewett, 785.
Virginia limestone, Ordovician, Oklahoma: Dake, 450; Hewett, 785.
Virginia limestone, Ordovician, Oklahoma: Dake, 450; Hewett, 785.
Virginia limestone, Ordovician, Oklahoma: Dake, 450; Hewett, 785.
Virginia limestone, Ordovician, Oklahoma: Dake, 450; Hewett, 785.
Virginia limestone, Ordovician, Oklahoma: Dake, 450; Hewett, 785.
Virginia limestone, Ordovician, Oklahoma: Dake, 450; Hewett, 785.
Virginia limestone, Ordovician, Oklahoma: Dake, 450; Hewett, 785.
Virginia limestone, Ordovician, Oklahoma: Dake, 450; Hewett, 785.
Virginia limestone, Ordovician, Oklahoma: Dake, 450; Hewett, 785.
Virginia limestone, Ordovician, Oklahoma: Dake, 450; Hewett, 785.
Virginian formation, Carboniferous, Ohio: Conrey, 403; Hyde, 859.
Virginian formation, Carboniferous, Ohio: Conrey, 403; Hyde, 859.
Virgell sandstone, Cretaceous, Montana: Clapp et al., 330.
Virgin formation, Cretaceous, Montana: Clapp et al., 330.
Virgin formation, Cretaceous, Montana: Clapp et al., 330.
Virgin formation, Cretaceous, Montana: Clapp et al., 330.
Virgin formation, Cretaceous, Montana: Clapp et al., 330.
Walnut formation, Cretaceous, Texas: Liddle, 1128; Winton and Scott, 2166.

Waltersburg sandstone, Mississippian, Kentucky: Jillson, 880; Weiler, 2601.

Waupligow series, pre-Cambrian, Ontario: Burwash, 237.

Wapanucka limestone, Carboniferous, Oklahoma: Hewett, 758.

Wapanucka limestone, Pennsylvanian, Oklahoma: Miser, 1326.

Wapplinge limestone, Cambro-Ordovician, New York: Berkey and Rice, 131.

Wapsipinicon limestone, Devonian, Illinois: Savage and Udden, 1649.

War Eagle (Lower) sandstone, Pennsylvanian, West Virginia: Reger, 1573.

Warm Creek shale, Cretaceous, Montana: Collier and Cathcart, 391.


Warsaw formation, Mississippian, Illinois: Currier, 440; Savage and Nebel, 1651.

Warsaw formation, Mississippian, Indiana: Cumings, 439.

Warsaw formation, Mississippian, Kentucky: Butts, 262; Foyles, 607.

Warsaw limestone, Mississippian, Kentucky: Jillson, 897.

Wasatch formation, Eocene, New Mexico: Bauer and Reeside, 94; Darton, 467.


Washington group, Tertiary, Utah: Moore, 1355.


Washita group, Cretaceous, Louisiana: Hammill, 709.

Washita group, Cretaceous, Oklahoma: Goldston, 666.

Washita shales, Arizona: Keyses, 1036.

Washita terrane, Cretaceous, Arizona: Keyses, 1029.

Watauga shale, Cambrian, Virginia: Stose and Miser, 1841.

Watts Creek shale, Pennsylvanian, Texas: Moore and Plummer, 1358.

Waukon sandstone, Cambrian, Iowa, Minnesota Keyses, 1035.

Waverleyan series: Keyses, 1037.

Wayne formation, Silurian, Tennessee: Miser, 1325.

Wayland shale, Pennsylvanian, Texas: Moore and Plummer, 1358; Plummer and Moore, 1492.


Waynesville formation, Ordovician, Indiana: Cummings, 439.

Weisner quartzite, Cambrian, Georgia: McCaffie, 1184.

Welkosko group, pre-Cambrian, Manitoba: Alcock and Bruce, 11.

Welch sandstone, Pennsylvanian, West Virginia: Reger, 1573.

Weldon series, Carboniferous, New Brunswick: Wright, 2299.

Wellington formation, Permian, Kansas: Elledge, 552.

Wells formation, Pennsylvanian, Idaho: Kirkham, 1053.

Weno formation, Cretaceous, Texas: Winton and Scott, 2166.

Wenonah sand, Cretaceous, New Jersey: Mansfield, 1223.

West Baden division, Mississippian, Indiana: Cummings, 439.

Weston shale, Carboniferous, Kansas; Twenhofel and Edwards, 1944.

Wetumka shale, Pennsylvanian, Oklahoma: Clark and Bauer, 344; Moore, 1355.


Whitescnne sandstone member, Permian, Oklahoma: Fenneman, 576; Reeves, 1509.

White River forma, Oligocene, Nebraska: Schramm and Cook, 16/2.

White River formation, Oligocene, North Dakota: Leonard, 1116.


White River formation, Tertiary, South Dakota: Ward, 2035.

White River series, Tertiary, South Dakota: Wannless, 2028.

Whitewater formation, Ordovician, Indiana: Cummings, 439.

Whitewater series, pre-Cambrian, Ontario: Quirke, 1528.

Wichita formation, Permian, Oklahoma: Robinson, 1603.

Wichita group, Permian, Texas: Plummer and Moore, 1492.

Wier sand, Mississippian, Kentucky: Jillson, 887.


Wilcox formation, Eocene, Georgia: McCaffie, 1184; Teas, 1803.

Wilcox formation, Eocene, Louisiana: Glenn, 649; Hammill, 709.

Wilcox formation, Eocene, Texas: Keyses, 1036.

Williamson sandstone, Pennsylvanian, West Virginia: Reger, 1573.

Willow Creek formation, Cretaceous, Montana: Ciapp et al., 330.

Wills Creek shale, Silurian, Pennsylvania: Gordon, 679.

"Wilcox" sand, Oklahoma: White and Greene, 2102.

Wildie sandstone member, Mississippian, Kentucky: Butts, 262.

Wiles limestone, Carboniferous, Texas: Dobbin, 506.

Williamson sandstone, Pennsylvanian, West Virginia: Reger, 1573.

Windsor series, Mississippian, Nova Scotia: Bell, 126.


Windrow formation, Cretaceous (?), upper Mississippi Valley: Thwaites and Twenhofel, 1935.

Windsor series, Mississippian, Nova Scotia: Bell, 126.

Winfield limestone, Permian, Kansas: Elledge, 552; Fath, 572.

Wingate sandstone, Arizona: Keyses, 1036.

Wingate sandstone, Jurassic, New Mexico: Darton, 467.
GEOLOGIC FORMATIONS DESCRIBED.

Wingate sandstone, Jurassic, Utah: Moore, 1362.
Winifrede (Upper) sandstone, Pennsylvanian, West Virginia: Reger, 1573.
Winslow shales, Arizona: Keyes, 1036.
Winslow terrane, Carboniferous, Arizona: Keyes, 1029.
Wisconsin drift, Pleistocene, Iowa: Cable, 266.
Wisconsin glacial stage, Pleistocene, Indiana: Malott, 1216.
Wisconsin glaciation, Quaternary: Upham, 1975
Wise formation, Pennsylvanian, Virginia: Giles, 638; Wentworth, 2070.
Wissahickon mica gneiss, Ordovician, Pennsylvania: Gordon, 679.
Wolfe City sand member, Cretaceous, Texas: Hopkins et al., 821.
Womble shale, Ordovician, Arkansas: Dake, 450.
Womble shale, Ordovician, Arkansas and Oklahoma: Miser, 1326.
Wompats limestones, Arizona: Keyes, 1036.
Wompats terrane, Carboniferous, Arizona: Keyes, 1029.
Woodbine formation, Cretaceous, Texas: Pace, 1437.
Woodbine sand, Cretaceous, Texas: Berry, 144.
Woodbury clay, Cretaceous, New Jersey: Mansfield, 1223.
Woodford chert, Devonian, Oklahoma: Goldston, 666; Hawett, 785.
Woodside shale, Triassic, Idaho: Kirkham, 1053.
Woodward formation, Permian, Oklahoma: Fenneman, 576; Reeves, 1569.
Wreck Bay formation, Pleistocene, British Columbia: Dolmage, 509.
Wreford limestone, Permian, Kansas: Elledge, 552.
Wykoff formation, Ordovician, Minnesota: Dake, 450.
Yampa sandstones, Arizona: Keyes, 1036.
Yampa terrane, Carboniferous, Arizona: Keyes, 1029.
Yanketown chert, Mississippian, Illinois: Shaw, 1719.
Yaque group, Miocene, Dominican Republic: Vaughan et al., 1985.
Yarmouth interglacial epoch, Pleistocene, Iowa: Cable, 266.
Yarmouth interglacial stage, Quaternary: Upham, 1975.
Yegua formation, Eocene, Louisiana: Glank, 649.
Yeso formation, Permian, New Mexico: Ellis, 555; Rich, 1833.
Yorkie: Keyes, 995.
Yukon group, pre-Cambrian, Yukon: Cockfield, 372.
Zunian series, Jurassic, Arizona: Keyes, 1029, 1036.