State of Michigan
DEPARTMENT OF CONSERVATION
Gerald E. Eddy, Director
GEOLOGICAL SURVEY DIVISION
William L. Daoust, State Geologist

Publication 50
AN INDEX
of the
GEOLOGY OF MICHIGAN
1823-1955

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FOREWORD
To the Director, and Commissioners of the Department
of Conservation:

Gentlemen:

I have the honor and pleasure to transmit herewith
An Index to The Geology of Michigan, prepared and
compiled by Helen M. Martin and Muriel Tara
Straight.

Publication of such an index or survey has become of
paramount importance. It will be of value not only to
students and teachers of geology as a pure science,
but of greater importance to those interested in the
economic development of the mineral resources of
Michigan. It will be of value to industries, now
developing, that not only require a knowledge of the
rocks and their resources that industry needs but also
require a knowledge of rock formations that will aid in
disposal of waste. It will answer numerous requests
for reference material on Michigan's basic resources
received from industrial, educational, agricultural and
even social groups. The maps, the chart, and list of
publications and laws are a brief of the history of the
Geological Survey since 1837. The Index to
Nomenclature and the Author-Subject References to
Michigan Geology review the geological work that
has been done in the State and by their numbers
show the geologic value of our area.

Respectfully submitted,

[Signed] William L Daoust
State Geologist
April 1956
PREFACE

Compilation of various parts of this book was started by both authors before becoming staff members of the Geological Survey Division, to meet our needs as geologists in public and private enterprise and later was put to continuous use as reference material for consultation on the Survey. Compilation of the chart showing the development of the geological nomenclature of Michigan formations was an outgrowth of a request to the senior author by Professor E. C. Case, late of the University of Michigan, to compile such a chart for the Devonian formations. Much of the other material in the book is from notes accumulated for a history of the Survey, for discussions of stratigraphy, for use as lecture material, and in response to requests for information made by students, teachers, and geologists in industry newly come to the State, and geologists employed by the State.

The References to Michigan Geology with a subject index was an indispensable tool of readily obtainable references prepared by the junior author when an undergraduate and later a geologist on the staff of the United States Geological Survey.

We have felt that compilation of all this material was needed by other members of the Survey staff, by students of geology and especially by professional geologists in industry. We are happy to share our accumulated data hoping our sins of omission are not too many.

Such a sharing would not be possible without the encouragement of four State Geologists: R. A. Smith, Gerald E. Eddy, Franklin G. Pardee, and William L. Daoust. Nor would it be possible if we had not had the devoted assistance of Mrs. Norma Guyer in preparation of the junior author’s manuscript, and of Mrs. Joyce D’Valentine who not only typed but edited the manuscript of the senior author, discovered and corrected elisions, errors in dates, spelling, locations, and made numerous suggestions which will make this book of value to others than geologists. James Campbell has painstakingly drafted the maps and Robert Kelley compiled the section of laws relating to the Survey. To all of these we express our appreciation and thanks.

[Signed] Helen M. Martin
[Signed] Muriel Tara Straight

AN INDEX OF MICHIGAN GEOLOGY

by
HELEN M. MARTIN
and
MURIEL TARA STRAIGHT

PUBLICATIONS
of the
MICHIGAN GEOLOGICAL SURVEY
1838-1921
and of the
GEOLOGICAL SURVEY DIVISION
MICHIGAN DEPARTMENT OF CONSERVATION
1921-1955

DOUGLASS HOUGHTON, State Geologist
1838-1846.

The first reports of the Michigan Geological Survey under the direction of Douglass Houghton were made directly to the legislature and were issued as twenty-six legislative documents in the House and Senate Journals of the Michigan Legislature of 1838 through 1846.


1838.

1839.
3. Report of the S. G. in relation to the iron ore, etc., on the school section in town five south, range seven west, in Branch County: H. D. No. 21, pp. 342-344.
5. Report of the Committee of the Senate on Manufacturers, to whom was referred the communication of the S. G. relative to salt springs and the salines of the State: S. D. No. 3, pp. 85-86 (Parallel to H. D. No. 4).
1840.
4. Report of the majority of the Committee on Finance on the communication and accounts of the S. G. for 1839; Report of the minority of the Committee on Finance on the same subject; Report of the select committee on S. G.’s report and account relative to improvement of salt springs, etc.; S. G.’s account for the year 1839, the same being the subject matter of the three preceding reports: S. D.Nos. 15, 16, 17, 18, pp. 209-224.

1841.

1842.

1843.

1844.


The work of the Geological Survey was interrupted by the death of D. Houghton while actively engaged in exploration.

1846.

The annual reports for 1838, 1839, 1840, 1841, 1842, 1843, 1844, and 1846 were collected and reprinted in a single volume by the Michigan Historical Commission in 1928.

The early reports on Michigan geology by Jackson, and by Foster and Whitney, were published as Federal documents in the United States Senate House of Representatives Journals.

[1. Geologic map of Michigan, Houghton-Hall, 1843]
[2. Geologic map of Michigan, Foster and Whitney, 1858]

[3. Geologic map of Michigan, Alexander Winchell, 1873]

[4. Geologic map of Michigan, Rominger, Pumpelly, Brooks, 1876]

[5. Geologic map of Michigan, A. C. Lane, 1893]
ALEXANDER WINCHELL, State Geologist
1859-1863, 1869-1871

Formal reports under the imprimatur of the Michigan Geological Survey and I direction of the State Geologist began with the small volume issued in 1861, First biennial report of the progress of the Geological Survey, Alexander Winchell.

1860.
First biennial report of the progress of the Geological Survey of Michigan embracing observations on the geology, zoology and botany of the Lower Peninsula.
Part III—Botany, pp. 243-330. Contains: Catalogue of phaenogamous and acrogenous plants ... of Michigan and the islands at the head of Lake Huron.

1869-1955
Since 1873 printed reports have been issued in three types of format and binding known as: Volumes, Annual Reports, Publications. Summary, Progress, and Technical reports are mimeographed and bound. Reports of the State Geologist were made to the Board of the Geological Survey until 1921. Since 1921 summary reports of the State Geologist and Geological Survey Division are a part of the Biennial Reports of the Department of Conservation.

VOLUMES
Part I—Iron-bearing rocks (economic), T. B. Brooks (320 pp., 24 pls., 29 figs.).
Part II—Copper district, Raphael Pumpelly (144 pp.).
Part III—Paleozoic rocks, Carl Rominger (106 pp.).
Part I was also issued as a separate publication.

Vol. II Upper Peninsula, 1869-1873.

CARL ROMINGER, State Geologist 1872-1885
Vol. III Lower Peninsula, 1873-1876.
Part I—Geology of Lower Peninsula, Carl Rominger (226 pp., 4 pls., map).
Part II—Palaeontology; fossil corals, Carl Rominger (162 pp., 55 pls.).

Vol. IV Upper Peninsula, 1878-1880 (248 pp., map).
Part I—Marquette iron region, Carl Rominger.
Part II—Menominee iron region, Carl Rominger.

C. E. WRIGHT and M. E. WADSWORTH, State Geologists 1885-1893
Report of the State Board of Geological Survey for 1891 and 1892.
Includes reports of State Geologist Dr. Carl Rominger for 1881 and 1882; of State Geologist C. E. Wright for 1885 to 1888; and of State Geologist M. E. Wadsworth for 1889, 1890, 1891, 1892 and a provisional report by Dr. Wadsworth on the Geology of the Iron, Gold and Copper Districts of Michigan (192 pp.).

L. L. HUBBARD, State Geologist 1893-1899
Vol. V Upper Peninsula, 1881-1884; Lower Peninsula, 1885-1893.
Part I—Geological report on the Upper Peninsula of Michigan, iron and copper regions, Carl Rominger (180 pp., 2 pls., map).
Part II—The geology of Lower Michigan with reference to deep borings, edited by A. C. Lane from notes of C. E. Wright (101 pp. 73 pls., map).

Vol. VI Upper Peninsula, 1893-1897.
Part I—Geological report on Isle Royale, A. C. Lane (282 pp., 16 pls., 29 figs.).
Part II—Keweenaw Point, with particular reference to the felsites and their associated rocks, L. L. Hubbard (pp. 1-156, 10 pls., 11 figs.).
Part II—Appendix. The crystallization of the calcite from the copper mines of Lake Superior, Charles Palache (pp. 157-184, 6 pls.).

A. C. LANE, State Geologist 1899-1909
During Dr. Lane’s administration, the activities of the Survey were formally enlarged to include a biological survey. Parts of Volumes VII, VIII, IX were issued also as separate publications.

Part I—Geological report on Monroe County, Michigan, W. H. Sherzer (240 pp., 17 pls., 8 figs., incl. 3 maps).
Part II—Geological report on Huron County, Michigan, A. C. Lane (330 pp., 11 pls., 12 figs., incl. 2 maps).
Part III—Geological report on Sanilac County, Michigan, C. H. Gordon (34 pp., 5 pls., 2 figs., incl. map).

Vol. VIII Lower Peninsula, 1900-1903.
Part I—Clays and shales of Michigan, Heinrich Ries (68 pp., 4 pls., 6 figs.).
Part II—Coal of Michigan, A. C. Lane (234 pp., 9 pls., 9 figs., incl. map).
Part III—Marl (bog lime) and its application to the manufacture of Portland cement, D. J. Hale, et al (400 pp., 23 pls., 44 figs.).

Vol. IX 1903-1904.
Part I—The delta of the St. Clair River, L. J. Cole (28 pp., 4 pls., 2 figs., incl. map).
Part II—The gypsum of Michigan and the plaster industry, G. P. Grimsley (248 pp., 29 pls., 49 figs., incl. 6 maps).
ANNUAL REPORTS

Annual Reports by the State Geologist were bound in black cloth. Parts of several of the Annual Reports were also bound and issued as separates.

Annual Report for 1901 (304 pp.).
(a)—Notes on the progress of work in Tuscola, Saginaw, Bay, Alpena, Kent, Washtenaw, and Muskegon counties.
(b)—Preliminary report on Arenac County, W. M. Gregory: limestone, gypsum, coal, water supplies, water power and flowing wells, clays and shales.
(c)—Report on Alcona County: Surface geology, Frank Leverett; subsurface geology, A. C. Lane. Climate, glacial deposits, lake history, economic resources, soils, marl, clay, water power, wells and borings, oil and gas possibilities, salt, water and mineral water, peat, etc., maps of surface and bedrock geology.
(d)—The distribution of the plant societies of Kent County, Michigan, B. E. Livingston.
(e)—Surface geology of Lapeer County, Michigan. Map of surface deposits, F. B. Taylor.
(f)—Economic geology.
(g)—Limestones: Distribution, character, and analyses of various limestone formations in the state; development of deposits.
(h)—Stratigraphy of the Traverse group of Michigan, A. W. Grabau.
(i)—Deep wells and borings for oil and gas in Michigan.
(j)—Salt.
(k)—Meteorites.
(l)—Geothermal gradient.
(m)—The Port Huron oil field; Wave cutting on west shore of Lake Huron, Sanilac County, Michigan, C. H. Gordon.

Annual Report for 1902 (26 pp., map), published in Michigan Miner, Saginaw, 1903.
(a)—Preliminary report on the gypsum deposits of Michigan, G. P. Grimsley.
(b)—Field and laboratory tests of Bay County waters.
(c)—Notes on economic products: Molding sand, peat, limestone, road metal, iron bearing rocks, water power, wells and deep borings, etc.

Annual Report for 1903 (342 pp., 6 pls., 10 figs., soil, vegetation, geologic maps).
(a)—Progress reports on county geological surveys.
(b)—Relation of soils to natural vegetation in Roscommon and Crawford counties, B. E. Livingston.
(c)—Report on progress made in Porcupine Mountains.
(d)—Water supply of the Lower Peninsula of Michigan, W. F. Cooper.
(e)—Waters of the Upper Peninsula of Michigan, A. C. Lane.
(f)—Limestone.
(g)—Building and road materials.
(h)—Analyses.
(i)—Transmission of heat into the earth, A. C. Lane.
(j)—The theory of copper deposition, A. C. Lane.
(k)—The Tamarack mine cross-section and the Keweenawan lodes.
(l)—Deep borings for oil and gas (2 well records).
(m)—Peat.
(n)—Topographical survey.
(o)—Recent shore forms.

Annual Report for 1904 (182 pp., 3 maps).
(a)—Failure of wells along the lower Huron River, Michigan, in 1904, M. L. Fuller.
(b)—A geological reconnaissance along the north shores of lakes Huron and Michigan, I. C. Russell.
(c)—Executive report on some non-metallies.
(d)—Report of special committee on nomenclature and correlation for the Lake Superior region.
(e)—Lake Superior gold mining.
(f)—Black River work.
(g)—Wells and borings.

Annual Report for 1905 (638 pp.). Parts a, b, c, were bound and issued as separates.
(a)—An ecological survey in northern Michigan (Porcupine Mountains and Isle Royale), C. C. Adams and others.
(b)—Geological report on Bay County, W. F. Cooper.
(c)—An illustrated catalogue of the Mollusca of Michigan, Bryant Walker.
(d)—Annual report of the State Geologist. Contains notes on the origin of strontium, on wells, artesian and mineral waters, building material, marl, shale, sand lime brick, road metal, gypsum, paint, iron, coal.

Annual Report for 1906 (602 pp., illus., incl. maps). Parts a, b, c, d, were issued as separates.
(a)—The surface geology of portions of Menominee, Dickinson, and Iron counties, Michigan, I. C. Russell.
(b)—Peat, essays on its origin, uses and distribution in Michigan, C. A. Davis.
(c)—A geological section from Bessemer down Black River, W. C. Gordon.
(d)—Crataegus in southern Michigan, C. S. Sargent.
(e)—Annual report of the State Geologist, containing notes on gold (placer) in Michigan, limestone, earthquakes, molding sand, clay, water and water supplies, coal, oil and gas, sand lime brick, biological and topographic surveys, etc.

Annual Report for 1907 (288 pp., illus., incl. maps). Parts b, c, d, were issued as separates.
(a)—State Geologist's report containing notes on the topographic survey, on reforestation, leasing of state lands for oil and gas etc. exploration, peat, coal and coal analyses, limestone, cement and lime, tests, and analyses.
(b)—Foundry sands, Heinrich Ries and J. A. Rosen.
(c)—Summary of the surface geology of Michigan, A. C. Lane. Map.
(d)—A biological survey of Walnut Lake (Oakland County), Michigan, T. L. Hankinson, C. A. Davis and J. G. Needham.

Annual Report for 1908 (402 pp., illus., incl. maps). Parts b, c, d, were issued as separates.
(a)—Annual report of the State Geologist, containing notes on water, sand lime brick, peat, and salt licks.
(b)—Notes on the geological section of Michigan, A. C. Lane and A. E. Seaman.
(c)—Report on the geology of Tuscola County, C. A. Davis.
(d)—The intrusive rocks of Mount Bohemia, Michigan, F. E. Wright. An Ecological Survey of Isle Royale, Lake Superior prepared under the direction of C. C. Adams; published as part of the report of the Board of the Geological Survey for 1908 (468 pp., 63 figs., incl. 5 maps). Contains annotated lists of fauna and flora and contributions from twelve biologists.
R. C. ALLEN, State Geologist 1909-1919
A. G. RUTHVEN, Chief Naturalist 1908-1921

PUBLICATIONS

Publication of the Annual Report was discontinued after 1908 and reports were issued as Publications in two series—Geological and Biological. Publications have consecutive numbers followed by series numbers. They are bound in paper and in gray vellum. Parts of the Biological Series were published also as separates.

In 1911 the office of Commissioner of Mineral Statistics was abolished and his duties were transferred to the Survey. Statistical data in Publications 21, 24, 27, 29, 32, 33, 34, 35, and 37 were collected in co-operation with the United States Department of the Interior, Bureau of Mines.

Publication 1, Biological Series 1, 1910 (96 pp., 17 pls., incl. map).
(a)—The crawfishes of Michigan, A. S. Pearse.
(b)—The insect galls of Michigan, M. T. Cook.
(c)—The birds of School Girl’s Glen region, Ann Arbor, Michigan: A study in local ornithology, A. D. Tinker.
(d)—Preliminary list of the sites of aboriginal remains in Michigan, H. I. Smith.

Publication 2, Geological Series 1, 1910 (248 pp., 32 pls., 9 figs.).

[10. Geologic map of Michigan, H. M. Martin, 1937]

R. A. SMITH, State Geologist 1919-1946

Reports were issued as formal Publications and mimeographed progress reports.

Publication 30, Geological Series 25, 1921 (384 pp., 20 pls., 93 figs., incl. maps).
Inland lakes of Michigan, I. D. Scott.

Publication 31, Biological Series 6, 1921 (234 pp., map).
Miscellaneous papers on the botany of Michigan, C. K. Dodge.

In 1921, the Geological Survey became a Division of the Department of Conservation and publications of the biological series were discontinued by the Survey; thus, Publication 31, Biological Series 6 is the final report of the series. Annual and biennial reports of the Geological Survey Division are published in the Biennial Reports of the Department of Conservation.

Publication 32, Geological Series 26, 1922 (146 pp.).
Mineral resources of Michigan . . . for 1920 and prior years.
Part I—Metallic minerals, L. P. Barrett.
Part II—Non-metallic minerals, H. M. Martin.
Oil and gas in Michigan, W. I. Robinson.

Publication 33, Geological Series 27, 1923 (138 pp.).
Mineral resources of Michigan . . . for 1921 and prior years.
Part I—Metallic minerals.
Part II—Non-metallic minerals, H. M. Martin.
Publication 44, Geological Series 37, 1945 (204 pp., 14 pls., incl. maps).

**G. E. EDDY, State Geologist 1946-1951**

Reports were issued as Publications, Progress Reports, Technical Reports and Research Publications. Many of these reports were in co-operation with various federal, state and educational agencies.

Occasional papers on the geology of Michigan for 1946.
Part I—The post-glacial geology of the Grand Marais embayment in Berrien County, Michigan, G. C. Tague (82 pp., 27 pls., 6 figs., incl. maps).
Part II—The glacial and post-glacial history of the Platte and Crystal lake depressions, Benzie County, Michigan, J. L. Calver (70 pp., 16 pls., 9 figs., map).

**F. G. PARDEE, State Geologist 1951-1952**

Publication 46, Geological Series 39, 1952 (90 pp., 10 pls., 11 figs.).
The Middle and Upper Ordovician rocks of Michigan, R. C. Hussey.

**W. L. DAOUST, Acting State Geologist 1952-1954**

State Geologist 1954—

In 1953, use of the term "Geological Series" was discontinued and only publication numbers retained.

Publication 47, 1954.
Oil and gas conservation in Michigan, L. S. Miller.

Occasional papers on the geology of Michigan for 1954.
Part I—The glacial geology and groundwater resources of Van Buren County, Michigan, F. W. Terwilliger.
Part II—A survey of the groundwater resources in Oakland County, Michigan, A. J. Mozola.

Map of the surface formations of the Southern Peninsula of Michigan (Scale: 1:500,000), H. M. Martin.

Publication 50, 1956.

**PROGRESS REPORTS**

Progress reports have been issued during the administration of State Geologists Smith, Eddy, Pardee, and Daoust. They are mimeographed and bound. Editions have been small as it is the intent of the Geological Survey to combine them eventually in several monographic reports.

Progress Report No. 1, 1936.
Geology of the Crystal oil field, Montcalm County, G. E. Eddy.

Geology of Ogemaw County and the West Branch oil field, E. A. Newman.

Geology of Arenac County, G. H. Pringle.

Progress Report No. 4, 1938.
Geology of Allegan County, C. H. Riggs.

Progress Report No. 5, 1939.

Progress Report No. 6, 1941.

Progress Report No. 7, 1941.
Dip-needle survey of the Wyandotte-Winona area, Houghton County, and Cherokee area, Ontonagon County, Kiril Spiroff.

Progress Report No. 8, 1942.
Geology of the Menominee Range, Norway to Waucedah, C. A. Lamey and C. E. Dutton.

Progress Report No. 9, 1942.
Ground water resources of the Benton Harhor area, W. T. Stuart.
(In co-operation with the U. S. Dept. of Interior, Geological Survey)

Progress Report No. 10, 1944.
Ground-water resources of the glacial deposits in the Bessemer area, Michigan, W. T. Stuart and R. W. Stallman.
(In co-operation with the U. S. Dept. of Interior, Geological Survey)

Progress Report No. 11, 1945.
Geology of the Spruce River and Peshekee River areas, Marquette and Baraga counties, A. K. Snelgrove, W. A. Seaman and V. L. Ayres.
(In co-operation with the Michigan College of Mining and Technology)

Progress Report No. 12, 1945.
Ground water resources of the Benton Harhor area, W. T. Stuart and R. W. Stallman.
(In co-operation with the U. S. Dept. of Interior, Geological Survey)

Ground water resources of the Lansing area, Michigan, W. T. Stuart.
(In co-operation with the U. S. Dept. of Interior, Geological Survey)

Ground-water resources of the glacial deposits in the Bessemer area, Michigan, E. A. Brown and W. T. Stuart.
(In co-operation with the U. S. Dept. of Interior, Geological Survey)

The Richfield challenge, G. H. Hautau.
(In co-operation with the U. S. Dept. of Interior, Geological Survey)

TECHNICAL REPORTS
The first technical report was published in March 1948 in co-operation with the United States Department of the Interior, Geological Survey. These reports are mimeographed and bound. Editions are limited.

Ground water hydraulics as a geophysical aid, J. G. Ferris.


RESEARCH PUBLICATIONS
Research publications are published by the University of Michigan, Engineering Research Institute, Lake Hydraulics Laboratory as part of a co-operative project with the Michigan Department of Conservation, Geological Survey Division.

Bibliography on beach erosion and related subjects.

Beach erosion in Michigan, E. F. Brater.

Low cost shore protection for the Great Lakes.
(In co-operation with Michigan Water Resources Commission)

MISCELLANEOUS PUBLICATIONS
Mines and mineral statistics,
Annual reports of the Commissioners of mineral statistics, 1877 and previous years to 1909.
Statistics covering costs and production of Michigan iron mines. Published annually since 1927.
Summary of operations, oil and gas fields. Published annually since 1946.
Logs of water wells, oil and gas wells, other borings, drillers, company and sample logs. Filed and issued as requested.
General regulations governing oil and gas operations in the state of Michigan, June 9, 1949.
General regulations governing the spacing, drilling, deepening and plugging of wells for natural dry gas, June 9, 1949.
ACT NO. 61, PUBLIC ACTS 1939 as amended.
This Act provides for a Supervisor of wells.
ACT NO. 326, PUBLIC ACTS 1937 as amended.
This Act provides for a Supervisor of natural dry gas wells.
Price list of oil and gas and geologic maps available from Geological Survey Division.
Index maps to topographic quadrangles in Michigan.

A guide to uranium prospectors in Michigan, 1949, B. E. Kennedy.
Lake gazetteer, Gogebic County, Michigan, compiled by Michigan Committee on Geographic Names, June 1952, revised July 1954.
A quantitative method for determining ground-water characteristics for drainage design, J. G. Ferris.
List of publications Geological Survey Division, with prices.

CO-OPERATIVE REPORTS
In co-operation with United States Department of Interior Bureau of Mines

Publications 21, 24, 27, 29, 32, 33, 34, 35, and 37.
Statistical data on mineral resources.
Summary Report No. 1, 1933.
Production and value of minerals and mineral products in Michigan, 1927 to 1931 and prior years, Wayland Osgood and O. F. Poindexter.
Production and value of minerals and mineral products in Michigan, 1930 to 1934 and prior years, Wayland Osgood and O. F. Poindexter.
Mineral industries of Michigan, 1934 to 1938 and prior years, O. F. Poindexter.
In co-operation with United States Department of Interior Geological Survey

Magnetic survey and geology of the eastern and southeastern parts of the Iron River district, Iron County, Michigan, H. L. James and K. L. Wier.
Geology of the central part of the Iron River district, Iron County, Michigan, C. E. Dutton.
Magnetic survey and geology of the Stager area, Iron County, Michigan, S. E. Good and F. J. Pettijohn.
Coal resources of Michigan, G. V. Cohee et al.
(In co-operation with the University of Michigan).
Progress of geologic work in Iron and Dickinson counties, Michigan, C. E. Dutton.
Geology of the northern part of the Iron River district, Iron County, Michigan, H. L. James and C. E. Dutton.
Detroit River group in the Michigan basin, K. K. Landes.
Geology of the northern Crystal Falls area, Iron County, Michigan, F. J. Pettijohn.


U. S. Geological Survey Strategic Minerals Investigations
Preliminary Map 3-181, 1946.

Geology of the Crystal Falls-Alpha iron-bearing district, Iron County, Michigan, F. J. Pettijohn.

U. S. Geological Survey Strategic Minerals Investigations
Preliminary Map 3-213, 1947.

Magnetic survey and geology of the Ice Lake-Chicagon Creek area, Iron County, Michigan, H. L. James, L. B. Clark and L. E. Smith.


Aeromagnetic survey of parts of Baraga, Iron and Houghton counties, Michigan, with preliminary geologic interpretation, J. R. Balsley, H. L. James and K. L. Wier.


Aeromagnetic survey of part of Bickinson County, Michigan, with preliminary geologic interpretation, K. L. Wier, J. R. Balsley and W. P. Pratt.

In co-operation with
United States Department of Interior, Geological Survey
and
Department of Geology, University of Michigan

Map No. 11, 1944.
   Geology and oil and gas possibilities of south-central Michigan, G. V. Cohee.
Map No. 17, 1944.
   Map and sections of the Berea sandstone of eastern Michigan, G. V. Cohee and L. B. Underwood.
Map No. 28, 1945.
   Geology and oil and gas possibilities of Sylvania and Bois Blanc formations of Michigan, K. K. Landes.
Map No. 38, 1945.
   Lithology and thickness of the Dundee formation and the Rogers City limestone in the Michigan basin, G. V. Cohee and L. B. Underwood.
Map No. 40, 1945.
   The Salina and Bass Island rocks in the Michigan basin, K. K. Landes.
Chart No. 4, 1944.
   Thickness and character of the Traverse group and Dundee formation in southwestern Michigan, G. V. Cohee.
Chart No. 9, 1945.
   Sections and maps of Lower Ordovician and Cambrian rocks in the Michigan basin, Michigan and adjoining areas, G. V. Cohee.
Chart No. 11, 1945.
   Geology and oil and gas possibilities of Trenton and Black River limestones of the Michigan basin, Michigan and adjacent areas, G. V. Cohee.
Chart No. 28, 1947.
   Lithology and thickness of the Traverse group in the Michigan basin, G. V. Cohee.
Chart No. 33, 1948.
   Thickness and lithology of Upper Ordovician, and Lower and Middle Silurian rocks in the Michigan basin, G. V. Cohee (2 sheets).

Chart No. 41, 1951.
   Thickness and lithology of Upper Devonian and Carboniferous rocks in Michigan, G. V. Cohee, Carol Mocha, and Marjorie Holk (5 sheets).

FIELD EXCURSION GUIDEBOOKS
In co-operation with the Geology Section
Michigan Academy of Science, Arts and Letters
and the Michigan Geological Society

1931. First Annual Excursion, Michigan Academy of Science. Field Excursion to Saginaw Bay Region.

1932. Section Geology and Geography, Michigan Academy of Science. Pleistocene of southwestern Southern Peninsula.

1933. Michigan Academy of Science Field Excursion. Pennsylvanian in Grand Ledge area.


1939. Ninth Annual Field Excursion of the Michigan Academy of Science, Arts and Letters, Section Geology and Geography. Marquette and Menominee Districts.


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Two reports not published by the Survey are briefly indexed; (1) Report of the C. T. Jackson Survey, Lake Superior Mineral Lands; (2) Report of the Geology and Topography of the Lake Superior Land District, Part I, Copper Lands and Geology of the Lake Superior Land District; Part II, Iron Lands, by J. W. Foster and J. D. Whitney. These reports were published as United States Congressional Documents. The Jackson report is Part III of the message of the President of the United States to the 31st Congress, Senate Document No. 1, 1849, House of Representatives Executive Document No. 5. The Foster and Whitney Reports were a part of the President's message to the Special Session of the United States 31st Congress and were published for the House of Representatives as Executive Document No. 69, 1850.

These documents are included in this index inasmuch as the surveys they report were continuations of the plans and surveys of Douglass Houghton. Work of the surveys was done by men associated with Houghton and trained by him; and the reports embody maps and reports of work started under Houghton and continued after his death by such men as Bela Hubbard, C. C. Douglass, S. W. Hill, Jacob Houghton, Judge Burt, James Hall, S. W. Higgins, William Ives, and other members of the original Survey staff.

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3590 Enterprise Township, T.23N., R.5W.
3584 Norwich Township, T.24N., R.5W.
3571 Riverside Township, T.21N., R.7W.

Monroe County:
3505 Monroe County.
3552 Dundee Township, T.6S., R.6E.

Montcalm County:
3454 Montcalm County.
3462 Belvidere Township, T.12N., R.7W.
3598 Bloomer Field, T.8-9N., R.5W.
3505 Cato Township, T.12N., R.8W.
3438A Crystal Township, T.10N., R.5W.
3446A Day Township, T.11N., R.6W.
3667 Douglass Oil Field, T.11-12N., R.7W.
3603 Douglass Township, T.11N., R.7W.
3446 Ferris Township, T.11N., R.5W.
3467 Home Township, T.12N., R.6W.
3678 Reynolds Oil Field, T.12-13N., R.9-10W.
3670 Stanton Oil and Gas Field, T.11N., R.7W.

Muskegon County:
3557 Muskegon County.
3229B Laketon Township, T.10N., R.17W.
3229A Muskegon Township, T.10N., R.16W.
3659 Ravenna Field, T.8-9N., R.14-15W.

Newaygo County:
3581 Newaygo County.
3668 Croton Oil Field, T.12N., R.11W.
3679 E nsley Oil Field, T.11N., R.11-12W.
3606 Garfield Township, T.12N., R.13W.
3684 Goodwell Gas Field, T.14N., R.11W.
3674 Goodwell Oil Field, T.14N., R.11W.
3593 Goodwell Township, T.14N., R.11W.
3675 Huber Gas Field, T.14-15N., R.14W.
3592 Norwich Township, T.13N., R.11W.
3677 Woodville Gas Field, T.15N., R.11W.
3676 Woodville Oil Field, T.15N., R.11W.

Oakland County:
3664 Oakland County.

Oceana County:
3455 Oceana County.
3607 Claybanks Township, T.13N., R.18W.
3311 Elbridge Township, T.15N., R.16W.
3311A Hart Township, T.15N., R.17W.
3632 Mears Township, T.14-15N., R.18-19W.
3625 Pentwater Township, T.16-17N., R.17-18W.
INDEX OF THE NOMENCLATURE
OF MICHIGAN GEOLOGIC FORMATIONS

compiled by
HELEN M. MARTIN

Derivation of name, introduction in Michigan, and significant usage in Michigan Geological Survey publications. For usage elsewhere, consult U.S.G.S. Bull. 769, 896 and later bibliographies, and the list of References in Part II of this volume.

ABBREVIATIONS

A.A.A.S. Proc.—American Association for the Advancement of Science Proceedings.
Am. Geol.—American Geologist.
Annales sci. nat.—Annales des sciences naturelles.
Chicago Acad. Sci. and Nat. Hist. Surv.—Chicago Academy of Science and Natural History Survey.
Chi. Geol. and Nat. Hist. Surv.—Chicago Geological and Natural History Survey.
Co.—County.
Eng. and Min. Jour.—Engineering and Mining Journal.
Geol. Soc.—Geology Section.
Indiana Acad. Sci. Proc.—Indiana Academy of Science Proceedings.
Jour. Geol.—Journal of Geology.
Man. Geol.—Manual of Geology.
M.G.S.—Michigan Geological Survey.
NOMENCLATURE

**Acadian.**


**Acervularia beds.** Devonian.


**Adair Moraine.** Pleistocene.

**Adventure Lode.** Keweenawan.

**Afton beds.** Devonian.

**Aftonian.** Pleistocene.

**Agoebic.** Huronian.
R. C. Allen, 1912. M.G.S. Pub. 8. Former name of eastern end of Penokee iron range.

**Ajibik fm.** Huronian.

**Ajibik quartzite.** Huronian.

**Albany conglomerates, Albany and Boston amygdaloid.** Keweenawan.

**Alcona Moraine.** Pleistocene.

**Alexandrian.**


**Algoma granite.**
Algomah amygdaloid. Keweenawan.
Long local usage.

Algomah, glacial lake beach. Pleistocene.
Algomah Mills, Ontario.

Algonian.
I. C. Russell, 1907. M.G.S. Ann. Rept. 1906. A. C. Lane:
Equivalent to Huronian.
R. C. Allen, 1910. M.G.S. Pub. 3; 1915, M.G.S. Pub. 18.
Pub. 23, legend geol. map.

Algonquin beach; glacial lake. Pleistocene.
F. Leverett, 1902. M.G.S. Ann. Rept. 1901; 1916, M.G.S.
Pub. 7; 1912, M.G.S. Pub. 9; 1917, M.G.S. Pub. 25.
A. C. Lane, 1908. M.G.S. Ann. Rept. 1907; 1909, M.G.S.
Ann. Rept. 1908.
W. M. Gregory, 1912. M.G.S. Pub. 11.
G. M. Stanley, 1945. M.G.S. Pub. 43, 44.

Allouez Conglomerate. Keweenawan.
A. C. Lane, 1898. M.G.S. Vol. VI; 1911, M.G.S. Pub. 6.
Albany and Boston.

Alpena limestone. Devonian.
Pub. 23, legend geol. map.
Mich. Acad. Sci. Arts and Lett. Geol. Sec. and M.G.S.,
1937, 1938, and 1940. 7th, 8th, and 10th Ann. Geol.
Excur. Guidebooks.

1908, neo-Huronian.
Animikie, Indian name for Thunder Bay on north shore L. Superior.

Antoine dolomite. Lower Huronian.
Antrim shale. Upper Devonian, Mississippian (see St. Clair, Huron, Genesee).
A. C. Lane, 1901. Michigan Miner Vol. 3, No. 1; 1902, M.G.S. Ann. Rept. 1901. "It is this outcrop (half mile south of the pier of Norwood) which has led me when informed by the U.S. Survey that the name of St. Clair . . . has been used . . . to apply the term Antrim to the shale lying above the Traverse up to the Berea Grit, since they are well exposed here in Antrim County."
Antrim Co., Michigan.

Anvil chert. Upper Huronian.

Arcadian amygdaloid. Keweenawan.

Archean system; series.
A. C. Lane, 1902. M.G.S. Ann. Rept. 1901. "I use Archean to include all pre-Cambrian."
R. C. Allen, 1912. M.G.S. Pub. 8; 1915, M.G.S. Pub. 18.

Archeozoic.
J. D. Dana, 1872. Corals and Coral Islands, appendix.

Arenaceous slate group. Huronian.
C. Rominger, 1881. M.G.S. Vol. IV.

Arkona, glacial lake. Pleistocene.
Arkona, Ontario.

Arnhem. Upper Ordovician.
Arnhem, Brown Co., Ohio.

Arnold amygdaloid. Keweenawan.
Long local usage.

Ashbed amygdaloid. Keweenawan.

Ashbed group. Keweenawan.

Atlantic amygdaloid. Keweenawan.
Long local usage.

AuGres limestone. Mississippian. See Point Au Gres.

Augusta. Mississippian.
Augusta, Des Moines Co., Iowa.

Azoic system.
R. I. Murchison, E. de Verneuil and A. von Keyserling, 1845. Geol. of Russia in Europe and the Ural Mountains.
W. A. Seaman, 1944. M.G.S. P.R. 10.
Babbitt sandstone  Mississippian.

Bad River gabbro.  Keweenawan.
Bad River, Iron Co., Wisconsin.

Bad River limestone.  Lower Huronian.

Bad River dolomite.
Bad River, in Penokee Gap section, Iron Co., Wisconsin.

Baltic amygdaloid.  Keweenawan.

Baltic conglomerate.  Keweenawan.
A. C. Lane, 1911.  M.G.S. Pub. 6.

Baltic sandstone.  Keweenawan.
A. C. Lane, 1911.  M.G.S. Pub. 6.

Baltic West amygdaloid.  Keweenawan.
Long local usage.
First amygdaloid west of Baltic lode.

Basement complex.  Keewatin and Laurentian.

Bass Island dolomite.  Silurian, Cayugan.
Renamed Bass Island.
G. M. Ehlers, 1945.  M.G.S. Pub. 44.
Bass Islands, Lake Erie.

Bass Islands dolomite.  Silurian, Cayugan.  See Bass Island.
Bass Islands, Lake Erie.

Battle Creek Moraine.  Pleistocene.
Battle Creek, Calhoun Co., Michigan.

Battlefield Beach.  Pleistocene.
Battlefield, Mackinac Island.

Bay City Moraine.  Pleistocene.
Southern Peninsula Michigan.
Bay City, Bay Co., Michigan.

Bay de Noc member.  Upper Ordovician, Richmond.
Stonington.
East shore Little Bay de Noc, Delta Co., Michigan.

Bayport limestone.  Mississippian.
"The term Bayport may be used for that upper part of the Grand Rapids characterized by the predominance of light colored high grade limestone (90%CaCO₃) and white sandstone and freedom from gypsum and much shale."
Bayport, Huron Co., Michigan.
Bedford shale. Mississippian.
   A. C. Lane, 1895. M.G.S. Vol. V, pt. 2. Edited notes of C.
   E. Wright.
   Rept. 1901; 1909, M.G.S. Ann. Rept. 1908.
   Pub. 23, legend geol. map.
   Dept. Geol.) Oil and gas investigations map 11.
   Subsurface.
   Dept. Geol.) Oil and gas investigations chart 41.
   Subsurface.
   Bedford, Cuyahoga Co., Ohio.

Beebe School shale. Devonian.
   and M.G.S. Guidebook; A.A.P.G. Vol. 31.
   Beebe School, Koehler Twp., T.34N., R.2W.,
   Cheboygan Co., Michigan.

Beekmantown. Lower Ordovician.
   Calciferous Lower Magnesian which apparently includes
   the Hermansville ls.
   Pub. 23, legend geol. map.
   R. B. Newcombe, 1928. M.G.S. Pub. 37; 1933, M.G.S.
   Pub. 38.
   Dept. Geol.) Oil and gas investigations map 11; 1944,
   map 17; 1951, chart 41. Subsurface.
   Beekmantown, New York.

Bell shale. Middle Devonian.
   1908.
   Pub. 23, legend geol. map.
   Dept. Geol.) Oil and gas investigations chart 28.
   Guidebooks.
   Bell, Presque Isle Co., Michigan.

Belmore beach. Pleistocene.
   Belmore, Putnam Co., Ohio.

Berea grit; shale. Mississippian.
   A. C. Lane, 1895. M.G.S. Vol. V, pt. 2. Edited notes of C.
   E. Wright.
   VIII, pt. 2; M.G.S. Ann. Repts. 1901, 1904, 1905, and
   1906.
to Sunbury.
   Berea, Cuyahoga Co., Ohio.

Berea sandstone. Mississippian.
   1891-1892.
   sandstone which may as well be called Berea as it is
   much better developed in Ohio."
   1908.
   Pub. 23, legend geol. map.
   R. B. Newcombe, 1928. M.G.S. Pub. 37; 1933, M.G.S.
   Pub. 38.
   Dept. Geol.) Oil and gas investigations map 11; 1944,
   map 17; 1951, chart 41. Subsurface.
   Berea, Cuyahoga Co, Ohio.

Berville Moraine. Pleistocene.
   Berville, Macomb Co., Michigan.

Bessemer sandstone. Huronian.
   W. A. Seaman, 1944. M.G.S. P.R. 10.

Big Buffalo. Lower Ordovician.
   Buffalo River, Newton Co., Arkansas.

Big Hill. Upper Ordovician. Richmond.
   No. 8.
   Dept. Geol.) Oil and gas investigations chart 33.
   Guidebooks.
   Big or Hinkers Hill, Sec. 11, T.39N., R.21W., Delta Co.,
   Michigan.

Big Trap. Keweenawan.
   Long local usage.
Bijiki iron fm.  Upper Huronian.
R. C. Allen, 1910.  M.G.S. Pub. 3; 1912, M.G.S. Pub. 8; 1915, M.G.S. Pub. 18.
W. A. Seaman, 1944.  M.G.S. P.R. 10; 1945, M.G.S. P.R. 11.
V. L. Ayres, 1944.  M.G.S. P.R. 11.
Bijiki River, Marquette Co., Michigan.

Bills Creek.  Upper Ordovician, Richmond.
Bills Creek, T. 41 N., R. 20 W., Delta Co., Michigan.

Birdseye.  Ordovician. See Lowville.
L. Vanuxem, 1838.  N.Y. Geol. Surv. 2d Rept. (After Amos Eaton, 1824 ?).
Replaced 1899 by Lowville.

Birmingham Moraine.  Pleistocene.
Birmingham, Oakland Co., Michigan.

Black River.  Middle Ordovician.
L. Vanuxem, 1842.  Geol. of N.Y., Pt. 3.
Cliffs on Black River, New York.

Black shales of Ohio.  See St. Clair, Huron, Antrim shales.
C. Rominger, 1876.  M.G.S. Vol. III.

Blaney Segment of Newberry Moraine.  Pleistocene.

Bohemia Conglomerate. Keweenawan.

Bohemia Range Group.  Keweenawan.

Bois Blanc.  Devonian.
Bois Blanc Island, Mackinac Straits area, Michigan.

Bony Falls.  Ordovician.

Brier slate fm. Huronian.

Brule volcanics, schists. Upper Huronian.
R. C. Allen, 1910.  M.G.S. Pub. 3.


Bucks Moraine.  Pleistocene.
Southern Peninsula Michigan.

Buena Vista.  Mississippian.
Buena Vista, Scioto Co., Ohio.


C. E. Dutton, 1942. M.G.S. P.R. 9
W A. Seaman, 1944. M.G.S. P.R. 10. Includes Upper Keweenawan.

Canadian.
C. Rominger, 1876. M.G.S. Vol. III.

Carboniferous limestone.
C. Rominger, 1876. M.G.S. Vol. III.

Carboniferous.
C. Rominger, 1876. M.G.S. Vol. III.

Catskill series. Upper and Middle Devonian and Carboniferous.

Cayugan. Silurian.
G. M. Ehlers, 1945. M.G.S. Pub. 44.

Cazenovian. Middle Devonian.
G. M. Ehlers, 1945. M.G.S. Pub. 44.

Cedar Point beach. Pleistocene. Algonquin.

Central Mine. Keweenawan.
A. C. Lane, 1911. M.G.S. Pub. 6.

Champion Revolution.

Champlain epoch. Pleistocene. Terrace.

Champlain. Middle Ordovician.

Chandler Falls. Ordovician.

Charlevoix stage. Devonian.

Charlotte morainic system. Pleistocene.
Clinton fm. Silurian.
1891-1892.
1908.
23, legend geol. map.
Clinton, Oneida Co., New York.

Coal Measures. Carboniferous.
C. Rominger, 1873. M.G.S. Vol. I, pt. 3; 1876, M.G.S. Vol. III.
1891-1892.

Coldwater limestone. Mississippian.
Subsurface limestone in Coldwater fm.

Coldwater shale. Mississippian.
W. M. Gregory, 1912. M.G.S. Pub. 11.
R. A. Smith, 1914. M.G.S. Pub. 14; 1924, M.G.S. Pub. 34.
Pub. 23, legend geol. map.
R. B. Newcombe, 1928. M.G.S. Pub. 37; 1933, M.G.S.
Pub. 38.
Coldwater River, Branch Co., Michigan.

Collingwood fm. Middle Ordovician.
1911.
W. I. Robinson, 1922. M.G.S. Pub. 32.
G. M. Ehlers, 1924. M.G.S. Pub. 34, well log interpretation.
Guidebooks.
Collingwood, Ontario.

Conemaugh. Pennsylvanian.
F. Platt, 1875. Pennsylvania Geol. Surv. 2d Rept. H.
Conemaugh River, Pennsylvania.

Conglomerate No. 8 Keweenawan.
Pub. 23, legend geol. map.
Eagle River Dist., Keweenaw Peninsula, Michigan.

Cooks Moraine. Pleistocene.

Copper bearing rocks, sandstones.

Copper City flow. Keweenawan.
Bedrock geology of the Ahmeek Quadrangle, Michigan.
(H. R. Cornwall and R. W. Swanson).
Copper City, Houghton Co., Michigan.

Copper Falls conglomerate. Keweenawan.
A. C. Lane, 1911. M.G.S. Pub. 6.
Copper Falls, Keweenaw Co., Michigan.

Copper Harbor fm. Keweenawan.
1908. Conglomerate.
Copper Harbor, Keweenaw Co., Michigan.

Copper Range. Keweenawan.

Copps gr. Upper Huronian.
Cordell Member. Silurian. Niagaraan.
Cordell, Chippewa Co., Michigan.

Corniferous. Devonian.
Applied by early geologists to limestone of Devonian Age.

Coring A. zone. Middle Huronian.
Corning Creek, Marquette Co., Michigan.

Covert Ridge; Moraine. Pleistocene.
Covert, Van Buren Co., Michigan.

Coy Moraine. Pleistocene.
Coy, Roscommon Co., Michigan.

Crisp Point Moraine. Pleistocene.
Crisp Point, Chippewa Co., Michigan.

Crystal Falls fm. Upper Huronian.

Crystal Falls series.
Used in early reports on Huronian rocks of Crystal Falls District.

Cumber spillway; outlet. Pleistocene.

Cupriferous series (also trap and Trappean series). Keweenawan.

Curry iron fm. Middle Huronian.
Curry Mine, Menominee District, Michigan.

Cuyahoga fm.; gr. Mississippian.
Cuyahoga River, Ohio.

Dana, glacial lake. Pleistocene. See Lundy and Elkton.
Named for J. D. Dana.

Deanville Moraine. Pleistocene.

Decorah. Middle Ordovician.
Upper Blue (Wis.).
Decorah, Winneshiek Co., Iowa.

Deerpark group. Silurian.

Defiance Moraine. Pleistocene.
Defiance, Ohio.

Detroit Interlobate Moraine. Pleistocene.
Detroit, Michigan.
Detroit River dolomite; series.  Lower Devonian.
R. A. Smith, 1914.  M.G.S. Pub. 14; 1915, M.G.S. Pub. 19; 1924, M.G.S. Pub. 34.
Detroit River channel.

Devonian.  Upper, Middle, Lower.
All succeeding geological reports.

Dock St. Clay.  Middle Devonian.
Dock St., Alpena, Alpena Co., Michigan.


Dowagiac Glacial Lake.

Dresbach sandstone.  Upper Cambrian.
Dresbach, Winona Co., Minnesota.

Drift, glacial.  Pleistocene.
"Ancient alluvium" of early Houghton-Hubbard reports.  Recognized as of continental glacial origin after 1840.
B. Hubbard, 1841.  Erratic Block group.
All geological reports since 1873.

Drummond Is. limestone.  Silurian.
Drummond Island, Michigan.

Duluth Gabbro.  Keweenawan.
Duluth, Minnesota.

Duluth, glacial lake.  Pleistocene.
"Western Superior Glacial Lake".
A. C. Lane, 1911.  M.G.S. Pub. 6.
F. Leverett, 1911.  M.G.S. Pub. 7; 1917, M.G.S. Pub. 25.
Duluth, Minnesota.

Dundee.  Middle Devonian.
R. A. Smith, 1924.  M.G.S. Pub. 34.
Dundee, Monroe Co., Michigan.

DuPlain beach.  Pleistocene.
DuPlain, Illinois.
Dyer Bay dolomite. Silurian.
Dyer Bay, Ontario.

A. C. Lane, 1911. M.G.S. Pub. 6.

Eastern sandstone. Upper Cambrian (Jacobsville).

Eau Claire. Upper Cambrian.
Eau Claire River, Eau Claire Co., Wisconsin.

Echinochoncus zone. Mississippian. Bayport.

Eden Group. Upper Ordovician.
Eden Park, Cincinnati, Ohio.

El Cajon sh. Devonian. See Genshaw.
Shale bed of Genshaw fm.
El Cajon Beach, Alpena Co., Michigan.

Eldorado Moraine. Pleistocene.
Southern Peninsula Michigan.
Eldorado P.O., Crawford Co., Michigan.

Elkton, glacial lake; beach. Pleistocene.
F. Leverett, 1912. M.G.S. Pub. 9; 1917, M.G.S. Pub. 25.
Grassmere and Elkton beaches.

Ellsworth shale. Mississippian.
Described but unnamed by C. C. Douglass 1855, and A. Winchell 1861.

Emmet Moraine. Pleistocene.
Southern Peninsula Michigan.
Emmet, St. Clair Co., Michigan.

Encrinal limestone—cnidoidal limestones of early reports.

Defined.
G. M. Ehlers, 1945. M.G.S. Pub. 44.
Engadine, Mackinac Co., Michigan.

Eo-Carboniferous limestone (Bayport). Mississippian.

Eo-Huronian.

Eozoic.
W. A. Seaman, 1944. M.G.S. P.R. 10.

Erian group; series. Middle and Upper Devonian.
G. M. Ehlers, 1945. M.G.S. Pub. 44.

Erie shales. Upper Devonian.
Replaced by Chagrin sh.
Exposures shore Lake Erie, New York.

Erratic block group. (Glacial drift).
**Escanaba limestone.** Middle Ordovician.

**Escanaba, Delta Co., Michigan.**

**Evergreen amygdaloid.** Keweenawan.
Long local usage.

**Fayette Moraine.** Pleistocene.
Fayette Station, Crawford Co., Michigan.

**Felch schist.** Upper Huronian.

**Fiborn limestone.** Silurian. Niagaran.
Fiborn Quarry, Mackinac Co., Michigan. (Rockport Quarry)

**Flat Rock dolomite, member Detroit River series.** Lower Devonian.

**Flat Rock Point sandstone.** Mississippian.

**Flinn Moraine.** Pleistocene.

**Footwall series.** Huronian.

**Ford River granite.**

**Forest Moraine.** Keweenawan.
Long local usage.

**Forest beach, glacial.** Pleistocene.

**Forest Conglomerate.** Keweenawan.

**Forestville shales.** Mississippian.

**Fort Brady beach.** Pleistocene. Algonquin.
Fort Brady, Mackinac Island, Michigan.

**Fort Wayne Moraine.** Pleistocene.

**Fort Wayne Outlet.** Pleistocene.
F. Leverett, 1912. M.G.S. Pub. 9.
Fort Wayne, Indiana.

**Fossiliferous strata.** Paleozoic.
Four Mile Dam. Devonian.

Fowler Moraine. Pleistocene.
Fowler, Clinton Co., Michigan.

Franconia. Upper Cambrian.
Franconia, Chisago Co., Minnesota.

Freda sandstone. Keweenawan.
A. C. Lane, 1911. M.G.S. Pub. 6.

Galena. Middle Ordovician.
Galena, Joe Daviess Co., Illinois.

Garden Island. Devonian.
Garden Island, Beaver Island Group, Leelanau Co., Michigan.

Genesee shale group. Upper Devonian.
Genesee River valley, New York.

Genshaw. Middle Devonian.

Gladowin Moraine. Pleistocene.

Glenwood, glacial lake; beach. Pleistocene.
F. Leverett, 1912. M.G.S. Pub. 9; 1917, M.G.S. Pub. 25.
Glenwood, Illinois.

Glenwood. Middle Ordovician.
Glenwood Twp., Winneshiek Co., Iowa.

Goodland Moraine. Pleistocene.

Goodrich quartzite. Upper Huronian.
R. C. Allen, 1910. M.G.S. Pub. 3; 1912, M.G.S. Pub. 8; 1915, M.G.S. Pub. 18.
W. A. Seaman, 1944. M.G.S. P.R. 10; 1945, M.G.S. P.R. 11.

Grand Lake member. Devonian. Traverse.


Great Conglomerate. Keweenawan.
1908.
A. C. Lane, 1911. M.G.S. Pub. 6.
Pub. 23, legend geol. map.

Great Copper Harbor conglomerate. Keweenawan.
A. C. Lane, 1911. M.G.S. Pub. 6.
Copper Harbor, Keweenaw Co., Michigan.

Green amygdaloid. Keweenawan.

Greenfield dolomite. Silurian, Cayugan.
Pub. 23, legend geol. map.
R. B. Newcombe, 1928. M.G.S. Pub. 37; 1933, M.G.S.
Pub. 38.
Guidebooks.
Greenfield, Highland Co., Ohio.

Greenstone flows. Keweenawan.
A. C. Lane, 1911. M.G.S. Pub. 6.

Greenwood iron fm. Upper Huronian.
184.
Mich. Acad. Sci., Arts and Lett., Geol. Sec. and M.G.S.,
Marquette Co., Michigan.

Gros QuaRRy. Ordovician.
Gros QuaRRy, Sec. 1, T.39N., R.23W., Delta Co.,
Michigan.

Grosse Isle Moraine. Pleistocene.

Groveland fm. Upper Huronian.
Guelph dolomite. Silurian.
   Pub. 23, legend geol. map.
   R. B. Newcombe, 1928. M.G.S. Pub. 37. (Racine or
   Engadine).
   Guidebooks.
   Guelph, Ontario.

Gwinn series. Middle Huronian.
   Gwinn, Marquette Co., Michigan.

Hamilton group; formation. Middle Devonian.
   L. Vanuxem, 1840. New York Geol. Surv. 4th Dist.
   C. Rominger, 1876. M.G.S. Vol. III.
   1891-1892
   Rept. 1906.
   Hamilton, New York.

Hanbury slate. Upper Huronian.
   Menominee Folio No. 62.
   R. C. Allen, 1910. M.G.S. Pub. 3; 1915, M.G.S. Pub. 18.
   Pub. 23, legend geol. map.
   Object to use of Hanbury.

Hancock amygdaloid; conglomerate. Keweenawan.
   Long local usage.

Hancock West conglomerate. Keweenawan.
   West of old Hancock Mine, Houghton Co., Michigan.

   Huron Co., Michigan.

Harrison Moraine. Pleistocene.
   Southern Peninsula Michigan.
   Harrison, Clare Co., Michigan.

Hat Point sandstone. Mississippian. Napoleon.
   Huron Co., Michigan.

Haymeadow Creek. Ordovician.

Helderberg group. Lower Devonian.
   III.
   1891-1892.

Hemlock greenstone. Middle Huronian.
   R. C. Allen, 1910. M.G.S. Pub. 3.
   Pub. 23, legend geol. map.
   W. A. Seaman, 1944. M.G.S. P.R. 10.

Henderson Moraine. Pleistocene.

   Pub. 23, legend geol. map.
   Guidebooks.
   Hendricks Quarry, Mackinac Co., Michigan.

Hermansville limestone. Lower Ordovician.
   Menominee Folio No. 62.
   W. S. Bayley, 1904. U.S.G.S. Mon. 46.
   Calciferous.
   Pub. 23, legend geol. map.
   R. B. Newcombe, 1928. M.G.S. Pub. 37; 1933, M.G.S.
   Pub. 38.
   E. O. Ulrich, 1936. Personal communication to G. M.
   Ehlers = Oneota.
   Dept. Geol.) Oil and gas investigations chart 9.
   Hermansville, Menominee Co., Michigan.

Hiawatha segment of Newberry Moraine. Pleistocene.
   Hiawatha National Forest, Northern Peninsula,
   Michigan.
Huron Bay slates. Upper Huronian.  
Huron Bay, Baraga Co., Michigan.

Huron Bay slates. Upper Huronian.  
Huron Bay, Baraga Co., Michigan.

Huron Moraine. Pleistocene.  

Huron group. Upper Devonian. Mississippian.  

Huron shale. Upper Devonian. See Antrim.  
Huron River, Ohio.  
A. C. Lane, 1895. M.G.S. Vol. V, pt. 2. Changed to St. Clair black shale (see Antrim).  

Huron group. Upper Devonian. Mississippian.  

Huron Moraine. Pleistocene.  

Ionia Moraine. Pleistocene.  

Ionia sandstone.  
Ionia Mine location, Ontonagon Co., Michigan.

Ionia Moraine. Pleistocene.  

Ionia sandstone.  
Ionia Mine location, Ontonagon Co., Michigan.

Ionia Moraine. Pleistocene.  

Ionia sandstone.  
Ionia Mine location, Ontonagon Co., Michigan.
Iowan. Mississippian.  
Iowa.

Iowan.  
Iowa.

Iron River iron formation, Michigamme slate. Huronian.  

Ironwood iron formation. Middle Huronian.  
R. C. Allen, 1910.  M.G.S. Pub. 3.  
R. C. Allen, 1912.  M.G.S. Pub. 8; 1914, M.G.S. Pub. 16 (Animikie).  
Ironwood, Gogebic Co., Michigan.

Ishpeming. Huronian.  
W. A. Seaman, 1944.  M.G.S. P.R. 10.  
Ishpeming, Marquette Co., Michigan.

Island Mine Conglomerate. Keweenawan.  
Island Mine, Isle Royale, Michigan.

Isle Royale amygdaloid. Keweenawan.  
Isle Royale, Michigan.

Isle Royale trap. Keweenawan.  
Long local usage.  

Jackson fm. Pennsylvanian.  
Jackson Co., Michigan.

Jackson coal group. Pennsylvanian.  
Jackson Co., Michigan.

Jackson Coal Measures.  
A. C. Lane, 1900.  M.G.S. Vol. VIII, pt. 2.  (Jackson coal group).  
Jackson Co., Michigan.

Jacobsville sandstone. Upper Cambrian.  
A. C. Lane, 1911.  M.G.S. Pub. 6.  

Jasper Knob zone, Negaunee fm. Huronian.  

Jean Nicollet, glacial lake. Pleistocene.  
Named for J. N. Nicollet.

Johnson Creek conglomerate. Keweenawan.  
A. C. Lane, 1911.  M.G.S. Pub. 6.  
Johnson Creek, Houghton Co., Michigan.

Jordan sandstone. Upper Cambrian.  
E. O. Ulrich, 1936.  Personal communication to G. M. Ehlers.  

Juniata Moraine. Pleistocene.  
Southern Peninsula Michigan.  

Kalamazoo Moraine. Pleistocene.  
Southern Peninsula Michigan.  
Kalamazoo Co., Michigan.

Kalkaska Moraine. Pleistocene.  
Southern Peninsula Michigan.  
Kalkaska Co., Michigan.

Kansas stage. Pleistocene.  

Kaskaskia. Mississippian.  

Kawkawlin beach. Pleistocene.  
Kearsarge amygdaloid; flow; trap. Keweenawan.

Kearsarge conglomerate. Keweenawan.

Kearsage West amygdaloid; flow. Keweenawan.

Local usage.

Keewatin Center. Pleistocene.
A. C. Lane, 1911. M.G.S. Pub. 6.
Keewatin, Ontario.

Keewatin. Oldest pre-Cambrian of Lake Superior region.
R. C. Allen, 1910. M.G.S. Pub. 3; 1915, M.G.S. Pub. 18.
Keweenaw Peninsula, Michigan.

Quarries in Branch Co., Michigan.

Killarney, north shore of L. Huron, Ontario.

Killarney revolution.

Killians limestone; fm. Middle Devonian.

Kinderhook. Mississippian.
Kinderhook, Pike Co., Illinois.

Kirkfield Outlet. Pleistocene.

Kingston conglomerate. Keweenawan.
Kingston Farm, Keweenaw Co., Michigan.

Kinross Moraine. Pleistocene.
Kinross, Chippewa Co., Michigan.

Kirkfield Outlet. Pleistocene.
Kirkfield, Ontario.
Kitchi schist. Keewatin.
R. C. Allen, 1910. M.G.S. Pub. 3; 1912, M.G.S. Pub. 8.
W. A. Seaman, 1944. M.G.S. P.R. 10; 1945, M.G.S. P.R. 11.
Kitchi Hills, Marquette, Michigan.

Knowlton amygdaloid. Keweenawan.
Long local usage.

Knox. Cambrian.
Knox Co., Tennessee.

Koehler limestone. Devonian.
Koehler Twp., Cheboygan Co., Michigan.

Kona dolomite. Lower Huronian.
R. C. Allen, 1910. M.G.S. Pub. 3; 1912, M.G.S. Pub. 8.
W. A. Seaman, 1944. M.G.S. P.R. 10.

Lake Algonquin, glacial. Keweenawan.
In his Annual Report for 1841, Mich. Leg. J.D. 1841, Vol. 1, No. 11, Houghton divided the Lake Superior sandstone as Lower red, and Upper gray sandstone.
A. C. Lane, 1911. M.G.S. Pub. 6.
South shore Lake Superior.

Lake Whittlesey, glacial. Pleistocene. See Whittlesey.

L'Anse series. Huronian.

Lansing Moraine. Pleistocene.
La Grange, Indiana.

Lake Superior sandstone. Upper Cambrian.
In his Annual Report for 1841, Mich. Leg. J.D. 1841, Vol. 1, No. 11, Houghton divided the Lake Superior sandstone as Lower red, and Upper gray sandstone.
A. C. Lane, 1911. M.G.S. Pub. 6.
South shore Lake Superior.

Lake Shore trap. Keweenawan.
A. C. Lane, 1898. M.G.S. Vol. VI, pt. 1; 1911, M.G.S. Pub. 6.

Laramide (?)
J. D. Dana 1895. Textbook geol. 4th Ed. Revolution.
Laramide Mountain Range.

Laurentian Center. Pleistocene.
A. C. Lane, 1911. M.G.S. Pub. 6.
Laurentian Highlands, Quebec.
Laurentian epoch; series.
R. C. Allen, 1910. M.G.S. Pub. 3; 1912, M.G.S. Pub. 8; 1915, M.G.S. Pub. 19.
Logan, Hocking Co., Ohio.

Long Lake series. Middle Devonian.

Loretto slate. Huronian.

Lorraine group. Upper Ordovician.
Eden.

Lower Grand Rapids. Mississippian.
R. A. Smith, 1912. M.G.S. Pub. 8.

Lower Helderberg. See Helderberg.

Lower Keweenawan.

Lower Limerock fm.
Northern Peninsula Ordovician of modern nomenclature.

Lower Magnesian. See Prairie du Chien.
W. M. Gregory, 1912. M.G.S. Pub. 11.
Pub. 23, legend geol. map.
R. A. Smith, 1924. M.G.S. Pub. 34.
R. B. Newcome, 1928. M.G.S. Pub. 37; 1933, M.G.S.
Pub. 38.

Lower Monroe. Silurian.
M.G.S. Pub. 21; 1917, M.G.S. Pub. 24.
Pub. 23, legend geol. map.

Lower Munising. Cambrian. Dresbach (?)
E. O. Ulrich, 1936. Personal communication to G. M.
Ehlers.

Lower Ontarian (Niagaran). Silurian.
South shore Lake Ontario.

Lower Pentamerus. Silurian.

Lower Saginaw. Pennsylvanian.
W. A. Kelly, 1936. M.G.S. Pub. 40. (Pre-Verne cyclical fm.)
Coal mines, Saginaw Co., Michigan.

Lower St. Louis. Mississippian.
St. Louis, Missouri.

Lower Silurian.
C. Rominger, 1876. M.G.S. Vol. III. Includes Potsdam,
Calicheferous, Chazy, Trenton, Hudson River group.
1891-1892. Trenton, Silurian shales.
A. C. Lane, 1895. M.G.S. Vol. V, pt. 2. Edited notes of C.
E. Wright, Hudson River, Utica, Trenton.
Pub. 23, legend geol. map. Niagaran.

Lower Silurian or Ordovician.
A. C. Lane, 1905. M.G.S. Ann. Rept. 1904; 1907, M.G.S.
Ann. Rept. 1906.
1908.

Lower Verne. See Verne. Pennsylvanian.

Lowville. Middle Ordovician. Black River group. See
Birdseye.
Replaced Birdseye.
R. B. Newcombe, 1928. M.G.S. Pub. 37; 1933, M.G.S.
Pub. 38.

Lucas dolomite. Lower Devonian.
A. C. Lane, 1905. M.G.S. Ann. Rept. 1903; 1909, M.G.S.
Ann. Rept. 1908.
A. C. Lane, C. S. Prosser, W. H. Sherzer, and A. W.
Pub. 23, legend geol. map.
R. B. Newcombe, 1928. M.G.S. Pub. 37; 1933, M.G.S.
Pub. 38.
Lucas Co., Ohio.

Lundy, glacial lake. Pleistocene. See Elkton.

Lyons Moraine. Pleistocene.
Southern Peninsula Michigan.

Mabb aplite. Keweenawan.
A. C. Lane, 1911. M.G.S. Pub. 6.

Mackinac breccia. Devonian-Silurian.
Mackinac Straits area, Michigan.

Mackinac limestone. Middle Devonian.
C. C. Douglass, 1841. M.G.S. Ann. Rept. St. Geologist,
Mich. Leg. J.D. 1841, Vol. 1, No. 11, H.D. No. 27; S.D.
No. 16.
Mackinac Island, Michigan.

Maclurites zone. Ordovician. Chandler Falls.

Madison. Cambrian.
R. B. Newcombe, 1933. M.G.S. Pub. 38. Suggests use of
term.
Southern Wisconsin.

Mandon amygdaloid. Keweenawan.
A. C. Lane, 1911. M.G.S. Pub. 6.


Marvin beds. Devonian.
Marvin Quarry, Sec 7, T.34N., R.1W., Cheboygan Co., Michigan.

Local usage.

Mattawa-Ottawa outlet. Pleistocene.
Mattawa and Ottawa rivers, Ontario.

Maumee, glacial lake; beach. Pleistocene.
Maumee River valley, Ohio.

Maxville limestone. Mississippian. Bayport.
Maxville, Perry Co., Ohio.

Mayflower amygdaloid; flows. Keweenawan.

Mayville. Silurian.
Mayville, Dodge Co., Wisconsin.

Mayville Moraine. Pleistocene.
Southern Peninsula Michigan.
Mayville, Tuscola Co., Michigan.

Maysville. Upper Ordovician.
Maysville, Kentucky.

Mazomanie. Upper Cambrian.
E. O. Ulrich, 1936. Personal communication to G. M. Ehlers.
Mazomanie on Wisconsin River, Dane Co., Wisconsin.

Medina. Silurian and Upper Ordovician.

Medora amygdaloid. Keweenawan.

Mendota. Upper Cambrian.
Lake Mendota, Wisconsin.

Menominee series.
Used in early reports for Huronian of Menominee District, Michigan.

Meramec group. Mississippian.
Meramec Highlands and River west of St. Louis, Missouri.

Merchants amygdaloid. Keweenawan.

Mesnard epidote. Keweenawan.
A. C. Lane, 111. M.G.S. Pub. 6.

Mesnard fm. Huronian.
Mesnard quartzite. Huronian.
R. C. Allen, 1910. M.G.S. Pub. 3; 1915, M.G.S. Pub. 18.
W. A. Seaman, 1944. M.G.S. P.R. 10; 1945, M.G.S. P.R. 11.

Meso-Devonian.

Michigamme jasper. Upper Huronian.
Michigamme Mt., Iron Co., Michigan.

Michigamme slate. Upper Huronian.
R. C. Allen, 1912. M.G.S. Pub. 8; 1915, M.G.S. Pub. 18.
W. A. Seaman, 1944. M.G.S. P.R. 10; 1945, M.G.S. P.R. 11.
Lake Michigamme, Marquette Co., Michigan.

R. C. Allen, 1910. M.G.S. Pub. 3; 1915, M.G.S. Pub. 18.

"Michigan stray". Mississippian.
Oil well drillers' usage.

Middle Conglomerate. Keweenawan.
Keweenaw Peninsula, Michigan.

Middle Lake shale. Devonian. See Ferron Point.
Ferron Point of Warthin and Cooper.

Middle Ordovician or Champlainian.

Middle Silurian or Niagaran.

Millington Moraine. Pleistocene.

Millstone grit. Mississippian.

Minesota conglomerate; trap. Keweenawan.

Minong breccia; porphyrite; trap; conglomerate. Keweenawan.
Minong Mine, Isle Royale, Michigan.

Mio-Cambrian.

Mio-Huronian.

Mississinewa morainic system. Pleistocene.
Mississinewa River, Wabash Co., Indiana.

Mississinewa River, Wabash Co., Indiana.
**Mississippian system.**
A. C. Lane, 1900. M.G.S. Vol. VII. Sub-Carboniferous (Mississippian).
All subsequent reports.
Upper Mississippian Valley.

**Mohawkian series.** Middle Ordovician.
Mohawk River valley, New York.

**Mona schist.** Keewatin.
R. C. Allen, 1910. M.G.S. Pub. 3; 1915, M.G.S. Pub. 18.

**Monroan.** Upper Silurian.

**Monroe beds; formation; group.** Lower Devonian and Silurian, Lower, Middle, Upper. (See Bass Island, Detroit River, Sylvania.)

**Montreal amygdaloid.** Keweenawan.

**Mountain limestone.**
Nongeographic name used by D. Houghton and B. Hubbard in 1840 for limestones of southeastern Michigan to correlate with "Mountain limestone" of Indiana.

**Mountain Bohemia conglomerate; gabbro; felsite.**
Keweenawan.
A. C. Lane, 1906. Mines and minerals Vol. 27.
A. C. Lane, 1911. M.G.S. Pub. 6. Same as Bohemia or No. 8 Conglomerate.

**Mt. Clemens Moraine.** Pleistocene.
Mt. Clemens, Macomb Co., Michigan.

**Mount Houghton felsite; quartz porphyry.** Keweenawan.
A. C. Lane, 1898. M.G.S. Vol. VI, pt. 1; 1911, M.G.S. Pub. 6.

**Mount Mesnard quartzite.** Huronian.

**Mount Simon sandstone.** Upper Cambrian.

**Munising Moraine.** Pleistocene.

**Munising sandstone.** Upper Cambrian.

**Naples goniatite beds.** Devonian.
J. M. Clarke, 1885. U.S.G.S. Bull. 16.

**Napoleon sandstone.** Mississippian.
R. A. Smith, 1912. M.G.S. Pub. 8; 1914, M.G.S. Pub. 14; 1924, M.G.S. Pub 34.

Napoleon, Jackson Co., Michigan.

National sandstone. Keweenawan.
S. H. Broughton, 1863. Remarks on the mining interest and details of the geology of Ontonagon Co.

Negaunee iron fm. Middle Huronian.
R. C. Allen, 1910. M.G.S. Pub. 3.
A. C. Lane, 1911. M.G.S. Pub. 6.
W. A. Seaman, 1944. M.G.S. P.R. 10; 1945, M.G.S. P.R. 11.
Negaunee, Marquette Co., Michigan.

Neo-Cambrian.


New Albany shale. Upper Devonian.

New Albany, Floyd Co., Indiana.

Newberry Moraine. Pleistocene.
Newberry, Luce Co., Michigan.

New Mass amygdaloid. Keweenawan.

New Mayflower amygdaloid. Keweenawan.
Local usage.

New Richmond. Lower Orдовician.
New Richmond, St. Croix Co., Wisconsin.

Newton Creek. Devonian.
Newton Creek, Alpena Co., Michigan.

Niagaran fm.; limestone; dolomite. Silurian.
A. C. Lane, 1902. M.G.S. Ann. Rept. 1901. "Niagaran (Manitoulin) dolomite".
G. M. Ehlers, 1945. M.G.S. Pub. 44.
Niagara Co., New York.

Lake Nipigon, Ontario.

Nipissing, glacial lake; beach. Pleistocene.
F. Leverett, 1902. M.G.S. Ann. Rept. 1901; 1911, M.G.S. Pub. 7; 1912, M.G.S. Pub. 9; 1917, M.G.S. Pub. 25.
G. M. Stanley, 1945. M.G.S. Pub. 43; 1945, M.G.S. Pub. 44.
Lake Nipissing, Ontario.

No. 8 Conglomerate. Keweenawan.
A. C. Lane, 1911. M.G.S. Pub. 6.
Eagle River District, Keweenaw Peninsula, Michigan.

Nonesuch Lode. Keweenawan.

Nonesuch shale; sandstone. Keweenawan.
A. C. Lane, 1911. M.G.S. Pub. 6.

Norrie member iron fm. Upper Huronian.

North amygdaloid. Keweenawan.
Local usage.

North Bay outlet. Pleistocene.
G. M. Stanley, 1945. M.G.S. Pub. 44.
North Bay, Ontario.

North Butler amygdaloid; flow. Keweenawan. Local usage.
North of Butler amygdaloid, Keweenaw Co., Michigan.

North Higgins Moraïne. Pleistocene.

North Star conglomerate. Keweenawan.

Northville Moraïne. Pleistocene.

Norway limestone. Huronian.

Norway Point fm. Middle Devonian.
Norway Point (Seven Mile) Dam, Thunder Bay River, Alpena Co., Michigan.

Norwich conglomerate; trap. Keweenawan.
S. H. Broughton, 1863. Remarks on the mining interest and details of the geology of Ontonagon Co.

Norwood shale. Devonian.

Local usage.

Ogontz member Stonington beds. Upper Ordovician.
R. C. Hussey, 1936. M.G.S. Pub. 40, pt. 3; 1952; M.G.S. Pub. 46.
Ogontz Creek, Delta Co., Michigan.

Ohio shale. Upper Devonian. (See Huron shale, St. Clair shale, Antrim shales).
Ohio River hills.

Ohio Trap Rock traps. Keweenawan.
S. H. Broughton, 1863. Remarks on the mining interest and details of the geology of Ontonagon County.
Ohio Trap Rock or Colling locations, Ontonagon Co., Michigan.

Old Colony amygdaloid; flow. Keweenawan. Local usage.

A. C. Lane, 1911. M.G.S. Pub. 6.

Old Pewabic amygdaloid; flow. Keweenawan. Ashbed group.
Pewabic property, Keweenaw Co., Michigan.
Oneida conglomerate. Keweenawan.
S. H. Broughton, 1863. Remarks on the mining interest and details of the geology of Ontonagon Co.
Oneida Location, Ontonagon Co., Michigan.

E. O. Ulrich, 1936. Personal communication to G. M. Ehlers.


Onesquethaw group. Silurian.

Onesquethaw group. Silurian.

Onondaga. Middle Devonian.

Onondaga salt group. Silurian-Cayugan.

Ontarian.

Ontario. Silurian.

Ontonagon, glacial lake. Pleistocene.
F. Leverett, 1911. M.G.S. Pub. 7; 1917, M.G.S. Pub. 25.

Oriskany. Lower Devonian.

Osage group. Mississippian.
H. S. Williams, 1891. U.S.G.S. Bull. 80.


Osceola Moraine. Pleistocene.

Otisville Moraine. Pleistocene.

Otter Lake Moraine. Pleistocene.

A. C. Lane, 1911. M.G.S. Pub. 6.
On Keweenaw Point the Outer Conglomerate is nearest the lake shore. The thicker, Great Conglomerate is the inner conglomerate of the Point.

**Outer Copper Harbor Conglomerate.** Keweenawan.
A. C. Lane, 1911. M.G.S. Pub. 6. Outer Conglomerate of Copper Harbor Group.
Copper Harbor, Keweenaw Co., Michigan.

**Outer morainic system.** Pleistocene.

**Owosso Moraine.** Pleistocene.
Southern Peninsula Michigan.

**Ozarkian.**
Ozark region, Missouri.

**Pabst member of Tyler slate.** Upper Huronian.

**Paint slate.** Upper Huronian.
R. C. Allen, 1910. M.G.S. Pub. 3; 1915, M.G.S. Pub. 18.

**Palaeozoic, Paleozoic.**
C. Rominger, 1873. M.G.S. Vol. I, pt. 3; 1876, M.G.S. Vol. III.
All subsequent reports.

**Palmer gneiss.** Laurentian.
R. C. Allen, 1910. M.G.S. Pub. 3; 1915, M.G.S. Pub. 18.

**Palms quartzite.** Middle Huronian.

**Parma conglomerate;** sandstone. Pennsylvanian. Pottsville.
Conglomerate.
R. A. Smith, 1924. M.G.S. Pub. 34.
Parma, Jackson Co., Michigan. Sec. 34 Sandstone Twp. East of Parma said to be type loc.

**Partridge Point fm.** Middle Devonian.

**Payette stage; beach.** Pleistocene.

**Peanut Conglomerates.** Mississippian. Marshall-Coldwater.

**Penetang stage; beach.** Pleistocene.
Pennsylvanian system.

Penokee Range. Huronian.
Penokee District, Wisconsin.

Peorian interglacial stage. Pleistocene.
Peoria, Tazewell Co., Illinois.

Permian system.

Perm-Carboniferous? "Red Beds".

Petoskey limestone. Middle Devonian.

Pewabic amygdaloid; flow. Keweenawan.
Pewabic cupriferous bed.

Pewamo Strait, Grand River outlet. Pleistocene.


Platte Moraine. Pleistocene.
Platte River, Benzie Co., Michigan.

Platteville limestone. Middle Ordovician. Black River.
Platteville, Grant Co., Wisconsin.

Pleistocene "Glacial epoch", Great Ice Age.
R. A. Smith, 1917. M.G.S. Pub. 24
Subsequent reports.

Plutonic group.

Pointe aux Barques.

Pointe aux Barques Lighthouse sandstone; conglomerate. Mississippian. Coldwater.

Pointe aux Chenes fm. Silurian.
Pointe aux Chenes, Mackinac Co., Michigan.

Point Au Gres. Mississippian.

Point Betsie Moraine. Pleistocene.
Point Betsie, Benzio Co., Michigan.
**Portage group.** Upper Devonian.
Portage, New York.

**Portage Entry redstone.** Keweenawan.

**Portage Lake lava series.** Keweenawan. (Proposed).

**Port Austin ss.** Mississippian. Marshall.

**Port Huron morainic system.** Pleistocene. Wisconsin.

**Port Huron morainic system.** Pleistocene. Wisconsin.
F. Leverett, 1912. M.G.S. Pub. 9; 1917; M.G.S. Pub. 25.
Port Huron, St. Clair Co., Michigan.

**Portland Moraine.** Pleistocene.

**Potsdam sandstone.** Upper Cambrian.

**Potter Farm.** Devonian.

**Pottsville.** Pennsylvanian.
J. P. Lesley, 1876. Pennsylvania Geol. Surv. 2d Rept. L. Appendix E.

**Prairie du Chien.** Lower Ordovician.

**Prasopora zone.** Ordovician. Chandler Falls.

**Pre-Cambrian.**

**Presque Isle granite.** Post-Keweenawan.

**Presque Isle series.** Middle Devonian.

**Primary rocks.**

**Princeton series.** Upper Huronian.
Prosser. Middle Ordovician.
   Prosser Ravine, Fillmore Co., Minnesota.

Proterozoic era.
   Algokian.
   W. A. Seaman, 1944. M.G.S. P.R. 10.

Pullman, glacial lake. Pleistocene.
   Pullman, Allegan Co., Michigan.

   Pub. 23, legend geol. map.
   R. B. Newcombe, 1928. M.G.S. Pub. 37; 1933, M.G.S.
   Pub. 38.
   Put-in-Bay, Lake Erie.

Quaternary.
   1891-1892.
   Pub. 23, legend geol. map.
   Subsequent reports.

Queenston shale. Upper Ordovician. Richmond.
   Pub. 23, legend geol. map.
   G. M. Ehlers, 1924. M.G.S. Pub. 34. Well log.
   Dept. Geol.) Oil and gas investigations chart 33.
   Queenston, on Niagara River, opposite Lewiston, New
   York.

Quincy amygdaloid. Keweenawan.
   Local usage.

Quincy Pewabic amygdaloid. Keweenawan.

Quinnesec schists. Huronian.
   R. C. Allen, 1910. M.G.S. Pub. 3.
   Pub. 23, legend geol. map.
   Quinnesec, Dickinson Co., Michigan.

   Smith's Engadine probably Racine. Later reversed
   opinion.
   Racine, Wisconsin.

   19.
   R. A. Smith, 1913. M.G.S. Pub. 12; 1916, M.G.S. Pub. 21;
   1917, M.G.S. Pub. 24.
   Pub. 23, legend geol. map.
   R. B. Newcombe, 1928. M.G.S. Pub. 37; 1933, M.G.S.
   Pub. 38.
   Guidebooks.
   Raisin River, Monroe Co., Michigan.

Randville dolomite. Lower Huronian.
   R. C. Allen, 1910. M.G.S. Pub. 3; 1915, M.G.S. Pub. 18.
   Pub. 23, legend geol. map.

Recent.
   Pub. 23, legend geol. map.
   (See Quaternary).

Red Beds. Permian? Perm-Carboniferous? See Perm-
   Carboniferous.

Republic fm. Archean.
   1891-1892.
   Republic, Marquette Co., Michigan.

Republic granite. Post-Upper Huronian.
   Republic, Marquette Co., Michigan.

Richfield zone. Devonian. Subsurface Detroit River.
   Richfield (now AuSable) Twp., Roscommon Co.,
   Michigan.
Richmond group. Upper Ordovician.
C. Rominger, 1876. M.G.S. Vol. III.
Richmond, Indiana.

Richmondville. Mississippian.

Rochester shale. Silurian.
H. M. Martin, 1937. M.G.S. Pub. 39, legend geol. map. Mississinewa (Rochester?).
Rochester, New York.

Huron Co., Michigan.

Rockland (or National) sandstone. Keweenawan.
    Rockland, Ontonagon Co., Michigan.

Rockport limestone. Middle Devonian.

Rockport Quarry limestone. Middle Devonian.
    Rockport Quarry, Alpena Co., Michigan.

Rogers City limestone. Devonian.
G. M. Ehlers, 1945. M.G.S. Pub. 44.
    Rogers City, Presque Isle Co., Michigan.

Rouge, glacial lake. Pleistocene.

Saganing beach. Pleistocene.
Saganing Creek, Bay Co., Michigan.

W. M. Gregory, 1912. M.G.S. Pub. 11.
G. M. Ehlers, 1945. M.G.S. Pub. 44.
    Rogers City, Presque Isle Co., Michigan.

"Saginaw sand". Drillers' term. Middle Devonian. Subsurface.

Saginaw River drainage basin, Michigan.

Saginaw Moraine. Pleistocene.
Used by F. B. Taylor in early reports for the Saginaw Valley section of the moraine now known as the Port Huron morainic system.


St. Louis fm. Mississippian.
St. Louis, Missouri.

J. D. Dana, 1863. Man. of Geol. 1st ed.

St. Ignace, Mackinac Co., Michigan.

A. C. Lane, 1911. M.G.S. Pub. 6. Same as Mesnard stripe.
St. Ignace. Michigan.

St. Lawrence. Upper Cambrian. Subsurface.
St. Lawrence, Scott Co., Minnesota.

St. Louis amygdaloid. Keweenawan.
Long local usage.

St. Louisan. Lower Ordovician.
R. A. Smith, 1916. M.G.S. Pub. 21; 1924, M.G.S. Pub. 34.
St. Louis River area, Michigan.

J. D. Dana, 1863. Man. of Geol. 1st ed.
A. C. Lane, 1895. M.G.S. Vol. V, pt. 2; 1908. Lane states A. W. Grabau suggested part of Lake Superior ss. is St. Peter and accepted suggestion. Lane used St. Peter and St. Peters.
R. A. Smith, 1914. M.G.S. Pub. 14; 1917, M.G.S. Pub. 24; 1924, M.G.S. Pub. 34.
St. Peter, now Minnesota, River, Minnesota.

T. B. Brooks, 1880. Geol. Wisconsin Vol. 3. (Also Potsdam).
St. Marys Peninsula of Rominger, eastern half of Northern Peninsula, Michigan.

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T. B. Brooks, 1880. Geol. Wisconsin Vol. 3. (Also Potsdam).
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T. B. Brooks, 1880. Geol. Wisconsin Vol. 3. (Also Potsdam).
St. Marys Peninsula of Rominger, eastern half of Northern Peninsula, Michigan.


Sangamon stage.  Pleistocene.

Saragoton.  Upper Cambrian or St. Croixan.


Saunders fm.  Huronian.


Senecan.  Devonian.

Seney complex.  Pleistocene.

Seven Mile Dam.  See Norway Point.


Shawmut amygdaloid; flow.  Keweenawan.
Long local usage.

Shawmut conglomerate.  Keweenawan.

Sheridan fm.  Middle Ordovician.  Iron River Dist.

Siamese slate.  Middle Huronian.
R. C. Allen, 1910.  M.G.S. Pub. 3; 1915, M.G.S. Pub. 18.

Sibley fm.  Huronian.

Silica shale.  Middle Devonian.

Silurian period; system.
G. M. Ehlers, 1924.  M.G.S. Pub. 34.  Well log.

Slender (Deployed) moraines.  Pleistocene.

Solen series.  Mississippian.
Soule beds. Mississippian.
  Huron Co., Michigan.

South Butler amygdaloid. Keweenawan.
  Long local usage.
  South of Butler amygdaloid, Ontonagon Co., Michigan.

South Higgins Moraine. Pleistocene.
  Vol. 7.
  Southern Peninsula Michigan.

South Pewabic amygdaloid; flow. Keweenawan.
  Old South Pewabic Mine, Houghton Co., Michigan.

Stony Point. Devonian. (Name used by H. H. Hindshaw).
  Stony Point, Alpena, Alpena Co., Michigan.

Stromatopora beds. Devonian, Traverse.
  these beds be named Petoskey.

Strophedonta nacreata beds. Devonian. Traverse.
  Acervularia beds the equivalent of Winchell's Bryozoa
  beds.

Sturgeon quartzite. Lower Huronian.
  R. C. Allen, 1910. M.G.S. Pub. 3; 1915, M.G.S. Pub. 18.
  Pub. 23, legend geol. map.

Sturgeon River Moraine. Pleistocene.
  Sturgeon River, Delta Co., Michigan.

Sturgis Moraine. Pleistocene.
  Southern Peninsula, Michigan.

Sub-Carboniferous.
  1891-1892.

Summerville limestone. Devonian. See Genshaw.
  File. Upper Is. of Genshaw above El Cajon sh.
  Summerville, south shore Long Lake, Alpena Co.,
  Michigan.

Sunbury shale. Mississippian.
  W. F. Cooper, 1906. M.G.S. Ann. Rept. 1905; 1907,
  M.G.S. Ann. Rept. 1906.
  Pub. 23, legend geol. map.
  R. A. Smith, 1924. M.G.S. Pub. 34.
  R. B. Newcombe, 1928. M.G.S. Pub. 37; 1933, M.G.S.
  Pub. 38.
  Dept. Geol.) Oil and gas investigations chart 41.
  Sunbury, Delaware Co., Ohio.

Sunday quartzite. Lower Huronian.
  Pub. 23, legend geol. map.

Sunnyside limestone. Devonian. See Genshaw.
  File. Lower Is. of Genshaw below El Cajon sh.
  Sunnyside, east shore Long Lake, Alpena Co.,
  Michigan.
Long local usage.

Superior granite.
W. A. Seaman, 1944.  M.G.S. P.R. 10.  Killarney or
Republic granite.
Lake Superior Region.

Superior West amygdaloid.  Keweenawan.
Long local usage.

Sylvania sandstone.  Lower Devonian.
to Middle Monroe.
R. A. Smith, 1914.  M.G.S. Pub. 14; 1916, M.G.S. Pub. 21;
1917, M.G.S. Pub. 24.  Middle Monroe.
Pub. 23, legend geol. map.
R. B. Newcombe, 1928.  M.G.S. Pub. 37; 1933, M.G.S.
Pub. 38.
Dept. Geol.) Oil and gas investigations map 28; 1945,
M.G.S. Pub. 44.
Guidebooks.
Excur. Guidebook.  Included in Detroit River group.
Sylvania, Lucas Co., Ohio.

Tawas Moraine.  Pleistocene.  Port Huron system.
Southern Peninsula Michigan.
Tawas, Iosco Co., Michigan.

Tazewell stage.  Pleistocene.  Early Wisconsin.
Tazewell Co., Illinois.

Tekonsha Moraine.  Pleistocene.
Southern Peninsula Michigan.
Tekonsha, Calhoun Co., Michigan.

Tennessean system.
Vol. 22.

Thunder Bay limestone.  Middle Devonian.
Leg. J.D. 1841, Vol. 1, No. 11.
Redefined.
Pub. 23, legend geol. map.
Mich. Acad. Sci., Arts and Lett., and M.G.S., 1938 and
Guidebooks.

Timiskaming (also Timiskamian).  Lower Huronian.
Timiskaming.
Guidebook.  Timiskaming.
Lake Temiskaming, Ontario.

Tolleston beach.  Pleistocene.
53.
F. Leverett, 1912.  M.G.S. Pub. 9; 1917, M.G.S. Pub. 25.
Tolleston, Lake Co., Indiana (absorbed by Gary, Indiana).

Toll pit beds.  Devonian.
Toll pit quarry, near Scofield, Monroe Co., Michigan.

Torch Lake amygdaloid.  Keweenawan.
Local usage.
Torch Lake Mining Co. property, Houghton Co., Michigan.

Traders iron fm.  Middle Huronian.  Member Vulcan fm.
Menominee Folio No. 62.
184.
C. A. Lamey and C. E. Dutton, 1941.  M.G.S. P.R. 6; 1942,
M.G.S. P.R. 8.
Traders Mine, Menominee District, Michigan.

Leg. J.D. 1841, Vol. 1, No. 11.
Traverse fm. Middle Devonian.
A. C. Lane, 1895. M.G.S. Vol. V, pt. 2. Dropped “Little” of Winchell. (Traverse includes Hamilton and Marcellus = Erian of Clarke and Schuchert.)

Trempealeau fm. Upper Cambrian.
Trempealeau Bluff, Trempealeau Co., Wisconsin.

Trenton limestone; group. Middle Ordovician.
R. A. Smith, 1914. M.G.S. Pub. 14; 1916, M.G.S. Pub. 21, Galena and Platteville; 1917, M.G.S. Pub. 24; 1924, M.G.S. Pub. 34.
Trenton Falls, New York.

Tropidoleptus beds. Middle Devonian. Traverse.

Tyler slate. Upper Huronian.
R. C. Allen, 1910. M.G.S. Pub. 3; 1915, M.G.S. Pub. 18.

Tymochtee shale. Silurian. Cayugan.

Tyre-Ubly Channel. See Ubly.
Ubly Outlet (Tyre-Ubly Channel).  Pleistocene.

Ulsterian.  Middle Devonian.
        G. M. Ehlers and K. K. Landes, 1944.  Mackinac Straits
          Field Conference Guidebook.
     Ulster Co., New York.

Upper Algonquin beaches.  (See Algonquin).

          10.  St. Croixan.
          Pub. 23, legend geol. map.  Or Potsdam.

Upper Carboniferous (Pennsylvanian).
    Early reports.
        R. A. Smith, 1912.  M.G.S. Pub. 8.

Upper Grand Rapids or Maxville.  Mississippian.
        W. M. Gregory, 1902.  M.G.S. Ann. Rept. 1901; 1913,
          M.G.S. Pub. 12.  Maxville or Bayport.
        W. F. Cooper, 1906.  M.G.S. Ann. Rept. 1905.  Maxville or
          Bayport.
          Pub. 23, legend geol. map.
     Grand Rapids, Michigan.

Upper Helderberg.  See Helderberg.

Upper Keweenawan.  See Keweenawan.
          1908.
          Pub. 23, legend geol. map.  (Cambrian?).

Upper Limerock formation.
    Divided into "the lower or Pentamerus portion, the middle
      or Polypterus portion and the upper or Mackinac and
      Manitoine portion."
     Northern Peninsula Silurian of modern nomenclature.

Upper Limerock group.
     . . embracing as members the Drummond Island and
      Mackinac limestone."

Upper Marshall or Napoleon.  Mississippian.
        W. M. Gregory, 1912.  M.G.S. Pub. 11.

          Pub. 23, legend geol. map.

Upper Ordovician.
          Pub. 23, legend geol. map.  Or Cincinnati.
          Dept. Geol.) Oil and gas investigations chart 33.

Upper Pentamerus.  Becraft of New York reports.

Upper Saginaw.  Pennsylvanian.
        W. A. Kelly, 1936.  M.G.S. Pub. 40, pt. 2.  (Post-Verne
          cyclical fms.).

Upper Silurian.
          Onondaga Salt Group.
          1891-1892.
          1908.  Or Ontarian.
          Pub. 23, legend geol. map.  Or Monroan.

Upper Traverse shales and limestone.  Middle Devonian.
          Pub. 23, legend geol. map.

Utica shales.  Upper Ordovician.
          2d dist.
        A. C. Lane, 1895.  M.G.S. Vol. V, pt. 2.  Edited notes of C.
          E. Wright.
        A. C. Lane, 1902.  M.G.S. Ann. Rept. 1901; 1905, M.G.S.
          Ann. Rept. 1903; 1907, M.G.S. Ann. Rept. 1906, legend
          geol. map.
          1908.
        R. A. Smith, 1914.  M.G.S. Pub. 14, Eden; 1917, M.G.S.
          Pub. 24; 1924, M.G.S. Pub. 34.
          Pub. 23, legend geol. map.
        R. B. Newcombe, 1928.  M.G.S. Pub. 37; 1933, M.G.S.
          Pub. 38.
          (Eden).
          Dept. Geol.) Oil and gas investigations chart 33.
     Utica, New York.
Valparaiso morainic system. Pleistocene. Wisconsin.
L. C. Wooster ms.
F. Leverett, 1897. Geol. and Nat. Hist. Surv. Chicago
Acad. Sci. No. 2; 1899, U.S.G.S. Mon. 38. Proposed by
L. C. Wooster.
F. Leverett, 1912. M.G.S. Pub. 9; 1917, M.G.S. Pub. 25.
Valparaiso-Charlotte.
Rept. 1906, legend geol. map.
Van Wert stage; beach. Pleistocene.
Van Wert, Ohio.
Verne limestone. Pennsylvanian.
revived from Verne coal of A. C. Lane, 1900. M.G.S. Vol.
VIII, pt. 2.
Volcanic group.
Vulcan fm. Middle Huronian.
36.
Menominee Folio No. 62.
R. C. Allen, 1910. M.G.S. Pub. 3; 1912, M.G.S. Pub. 8;
1915, M.G.S. Pub. 18.
and Met. Eng. Trans. Vol. 63 (Bull. 153, September,
1919).
Pub. 23, legend geol. map.
Vulcan, Menominee Co., Michigan.
name to a restricted lake.
Pub. 12.
F. Leverett, 1902. M.G.S. Ann. Rept. 1901; 1912, M.G.S.
Pub. 9; 1917, M.G.S. Pub. 25.
Named for General G. K. Warren.
Waterlime groups.
Early New York reports.
Warsaw limestone. Mississippian.
Warsaw, Hancock Co., Illinois.

Waverliam, early.
Waverly group. Mississippian.
C. Rominger, 1876. M.G.S. Vol. III.
1891-1892.
Rept. 1906, legend geol. map.
Waverly, Pike Co., Ohio.
Wayne, glacial lake. Pleistocene.
F. Leverett, 1912. M.G.S. Pub. 9; 1917, M.G.S. Pub. 25.
Wayne Co., Michigan.
West Branch Moraine. Pleistocene.
F. Leverett, 1915. U.S.G.S. Mon. 53; 1912, M.G.S. Pub. 9;
1917, M.G.S. Pub. 25.
Southern Peninsula Michigan.
West Branch, Ogemaw Co., Michigan.
West Haven Moraine. Pleistocene. Wisconsin.
West Haven, Shiawassee Co., Michigan.
West Minesota conglomerate; trap. Keweenawan.
S. H. Broughton, 1863. Remarks on the mining interest
and details of the geology of Ontonagon Co.
West Minesota Mining Co. property, Ontonagon Co.,
Michigan.
Wetmore outwash plain. Pleistocene.
Wewe slate. Lower Huronian.
Ann. Rept.
1908.
Pub. 23, legend geol. map.
Guidebook.
Southern Peninsula Michigan.
Whitehall, Muskegon Co., Michigan.
Whitefish Bay. Devonian. Replaced by Newton Creek.
Guidebook.
Whittlesey, glacial lake; beach. Pleistocene.
Pub. 12.
Rept. 1907.
F. Leverett, 1902. M.G.S. Ann. Rept. 1901; 1912, M.G.S.
Pub. 9; 1917, M.G.S. Pub. 25.
Named for Colonel Charles Whittlesey, Ohio geologist.

"Wier sand". Mississippian. Subsurface. Berea?
Oil well drillers' usage. West Branch oil field, Ogemaw
Co., Michigan.

Winona conglomerate. Keweenawan.
Long local usage.

Wisconsin glaciation; drift.
T. C. Chamberlin, 1894. (Great Ice Age, by James Geikie,
3d ed.). Proposed and used East Wisconsin stage and
East Wisconsin fm.
"East".
Pub. 12.
Ann. Rept. 1906.
F. Leverett, 1912. M.G.S. Pub. 9; 1917, M.G.S. Pub. 25.
Pub. 23, legend geol. map.
R. B. Newcombe, 1928. M.G.S. Pub. 37; 1933, M.G.S.
Pub. 38.
F. Leverett, 1929. U.S.G.S. P.P. 154a. Recognized Early,
Middle, Late Wisconsin but objected to introduction of
G. M. Stanley, 1945. M.G.S. Pub. 44.

Wolverine sandstone; amygdaloid. Keweenawan. Central
Mine Group.

Woodville sandstone. Pennsylvanian.
R. A. Smith, 1914. M.G.S. Pub. 14, Conemaugh; 1925,
M.G.S. Pub. 35.
Pub. 23, legend geol. map.
R. B. Newcombe, 1928. M.G.S. Pub. 37; 1933, M.G.S.
Pub. 38.
Woodville Mine, NW¼ Sec. 31, T.2S., R.1W., Jackson
Co., Michigan.

Wyandotte amygdaloid; flow; trap. Keweenawan.
Long local usage.
B. S. Butler, 1929. U.S.G.S. P.P. 144. (Winona
amygdaloid?)

Wyandotte No. 8 amygdaloid; flow. Keweenawan.
Long local usage.

Wyebridge stage; glacial lake. Pleistocene.
E. F. Greenman and G. M. Stanley, 1942. Mich. Acad,
Wyebridge, Ontario.

Yale member Ironwood fm. Upper Huronian.

Yale Moraine. Pleistocene. Wisconsin.
Southern Peninsula Michigan.
Yale, St. Clair Co., Michigan.

Yarmouth glaciation. Pleistocene.
Yarmouth, Des Moines Co., Iowa.

Zee1 and Ridge. Pleistocene.
Zeeland, Ottawa Co., Michigan.