FIELD TRIP NO. 3C — Mineral Collecting

Itinerary same as for Field Trip No. 1A-1 (see p. 75) from U of R River Campus to Penfield Quarry of Dolomite Products Company (miles 0.0 to 10.3).

General geology.--The rock quarried is a hard dense dark gray dolomitic limestone (Lockport dolomite) of Middle Silurian age. Irregular cavities of secondary origin in the upper levels of the quarry are frequently lined with crystallized dolomite and other minerals. Occasional small fissures in the rock are filled with sphalerite, gypsum or galena.

The dolomite rock of the Penfield quarry was permeated, in the geologic past, by petroleum-type hydrocarbons. When the rock is struct with a hammer, it emits a bituminous odor. Residual hydrocarbons, described below, are often found. Some minerals, fossils and some areas of the rock will fluoresce bluish white to orange under long wave ultra violet light. (This fluoresence is typical of many petroleum-type hydrocarbons).

Economic uses.--The crushed dolomite from the quarry is used for concrete aggregate, highway construction, and asphalt pavements.

Minerals.--(Abbreviations: a - abundant; c - common; m - museum quality may be found; o - occasional; r - rare.

Anhydrite	(o)	Gypsum	(c,m)
Aragonite	(r)	Marcasite	(o)
Barite	(r)	Pyrite	(r)
Calcite	(a,m)	Quartz	(o)
Celestite	(c,m)	Residual hydrocarbon	(o)
Dolomite	(a,m)	Sphalerite	(c)
Fluorite	(c,m)	Strontianite	(r)
Galena	(r)	Sulfur	(r)

Notes on minerals.--

Anhydrite - White to light blue in color; finely to coarsely crystalline masses that show 3 pinacoidal cleavages which closely resemble cubic cleavage. All gradations from anhydrite to gypsum may be found.

Aragonite - Found as white crusts.

Barite - Closely resembles celestite. Flame test will distinguish between the two minerals.

Calcite - White to yellow and some smoky scalenohedral crystals are often found with crystallized dolomite. Larger crystals consist of multiple scalenohedral crystals in parallel position.

Celestite - Crystals with very good terminations are occasionally found, sometimes embedded in clear selenite. Fibrous and radiated crystals without terminations are also common.

Dolomite - The rock itself is composed mostly of very fine dolomite crystals. The cavities in the rock are frequently lined with white rhombohedral crystals that are slightly curved and have a pearly luster. Some crystals are pinkish in color.

Fluorite - Individual crystals and groups range up to two inches and more on an edge. Light blue is the common color, yellow and dark blue less common. Zoning of colors is frequent and some crystal faces are highly etched. Occasional crystals have unusual negative cavities that are possibly formed around anhydrite that has been removed by solutions.

Galena - This occurs as thin seams in the rock. Crystal faces are very rare.

Gypsum - This mineral is found in various forms from snow white masses completely filling cavities to clear selenite. All gradations to anhydrite are found. The selenite often encloses other minerals. The best clear selenite is of optical quality.

Marcasite - This mineral occurs as tiny bronze-colored to black bristle-like crystals on dolomite and calcite. The crystals are striated, sometimes having a slight iridescence. This mineral has been erroneously identified in the past as rutile.

Pyrite - Very tiny, highly modified crystals of typical yellow color are sometimes seen.

Quartz - Drusy quartz is common in some parts of the quarry where it may be found forming crusts and sugary masses with dolomite and other minerals.

Sphalerite - Shiny brown, partly transparent crystals up to 3/4 inch may be found, though smaller crystals in small groups are more common. Occasional fissures in the rock are filled with a light brown resinous sphalerite.

Strontianite - This white crystalline mineral is sometimes associated with celestite.

Sulfur - This is usually found as yellow films on rock.

Residual hydrocarbon - This material ranges in consistency and appearance from that of petroleum to heavy lubricating grease and brown or black films and globules in cavities. It is apparently a residual hydrocarbon formed from petroleum-like materials which permeated the rock. It can sometimes be removed by immersing the grease covered minerals in very hot water.

References

Cannon, Helen L., Geochemical relations of zinc-bearing peat to the Lockport Dolomite, Orleans County, New York: U.S.G.S. Bull. 1000-D, 1955.

Giles, A. W., Minerals in the Niagara limestone of Western New York: Rochester Acad. Sci. Proc., vol. 6, no. 2, pp. 57-72, 1920.

Hartnagel, C. A., Geologic map of the Rochester and Ontario Beach quadrangles: New York State Mus. Bull. 114, 1907.

Jensen, D. E., Minerals of the Lockport dolomite in the vicinity of Rochester, New York: Rocks and Minerals Mag., vol. 17, no. 6, pp. 119-203, June 1942.

The notes above were prepared by the Minerals Section, Rochester Academy of Science.

Platt (1949) attempted an evaluation of the three possible modes of origin of the "exotic" minerals in the Lockport, namely, secondary introduction by magmatic emenation, or by meteoric water, or concentration of indigenous materials. Special attention was paid to the lead and zinc. He discounted a hydrothermal origin because of the absence of major structural channelways and the presence of the thick impermeable shale sequence below the Lockport, which would act as a barrier to the upward migration of hydrothermal solutions. Platt reasoned that if meteoric waters were the agent that introduced the minerals, then an eroded source area must be postulated. The nearest such area would be the Canadian shield to the north. If lead and zinc as well as the other "exotic" metals could be shown to be present in zones where no evidences of solution were present, then the hypothesis favoring the concentration of indigenous material would be strengthened. If these metals were not present, then the introduction by meteoric water would be more probable. Spectroscopic analysis of cores by Platt showed that lead and zinc were present without exception in every specimen. Thus, the theory of genesis proposing indigenous lead, zinc, etc., and subsequent concentration by circulating ground water is held to be most probable.

PLATE I

COMMON SILURIAN FOSSILS

Figure

1. Eurypterus remipes; Bertie waterlime. x-1/3
2. Eurypterus lacustris; Bertie waterlime. x-1/3
3. Liocalymene clintoni; Clinton group
4. Dalmanites limulurus; Clinton group. x-1/3
5. Trimerus delphinocephalus; Clinton group. x-1/4
6. Halysites sp.; Silurian. x-1/2
7. Favosites niagarensis; Middle Silurian. x-1/2
8. Pentamerus laevis, brachial valve of an elongate specimen; Middle Silurian. x-1/2
9. Pentamerus laevis, brachial valve of a subquadrate specimen; Middle Silurian. x-1/2
10. Atrypa "reticularis", brachial valve; common throughout Silurian and Devonian. x-2/3
11. Whitfieldella cylindrica, pedicle valve; Clinton group. x-1
12. Whitfieldella cylindrica, lateral view; Clinton group. x-1
13. Stropheodonta corrugata, pedicle valve; Clinton group. x-1/3
14. Leptaena "rhomboidalis"; common throughout Silurian and Devonian. x-1/2
15. Camarotechia neglecta, brachial valve; Clinton group. x-1/2
16. Camarotechia neglecta, anterior view; Clinton group. x-1/2
17. Dictyonella corallifera, brachial valve; Clinton group. x-1
18. Dalmanella elegantula, pedicle valve; Clinton group. x-1
19. Whitfieldella nitida, brachial valve; Clinton group. x-1/2
20. Eospirifer radiatus, brachial valve; Clinton group. x-2/3
21. Dicoelosia biloba, brachial valve; Clinton group. x-1
22. Dicoelosia biloba, pedicle valve; Clinton group. x-1
23. Chonetes cornuta, pedicle valve; Clinton group. x-1

Figure

24. _Tellinomya machaeriformis_, right valve; Clinton group. x-2/3

25. _Pyrenomoeus cuneatus_, left valve; Clinton group. x-2/3

26. _Tentaculites minutus_; Clinton group. Greatly enlarged.

All figures from Hall; Natural History of New York, Part 6.

PLATE II

COMMON DEVONIAN FOSSILS

Figure

1. _Sulcoretepora incisurata_; Hamilton group. x-5

2. _Phacops rana_; Hamilton group. x-2/3

3. _Spinocyrtia granulosa_, brachial valve; Hamilton group. x-1/2

4. Athyris spiriferoides, brachial valve; common throughout Silurian and Devonian. x-1

5. _Mucrospirifer mucronatus_, pedicle valve; Hamilton group. x-1/2

6. _Rhipidomella penelope_, pedicle valve; Hamilton group. x-1

7,8. _Chonetes coronatus_, brachial and pedicle valves; Hamilton group. x-1

9,10. _Tropidoleptus carinatus_, pedicle and lateral views; Hamilton group. x-1

11,12. _Leiorhynchus laura_, pedicle and brachial valves; Hamilton group. x-1

13,14. _Megastrophia concava_, brachial and lateral views; Hamilton group. x-1/3

15. _Brachyspirifer audaculus_, brachial valve; Hamilton group. x-1/2

16. _Mucrospirifer consobrinus_, brachial valve; Hamilton group. x-1/2

17. _Chonetes mucronatus_, brachial valve; Hamilton group. x-1-1/2

18,19. _Ambocoelia praeumbona_, brachial and lateral views; Hamilton group. x-1

20,21. _Douvillina inaequistriata_, pedicle and brachial valves; Hamilton group. x-2/3.

22-24. _Ambocoelia umbonata_, brachial, pedicle and lateral views; Hamilton group. x-1

25. _Lingula spatula_; Genesee group, x-1

26. _Centronella impressa_, brachial valve; Hamilton group. x-2/3

Figure

27. Loxonema hamiltoniae; Hamilton group. x-2/3

28. Euryzone lucina; Hamilton group. x-2/3

29. Bembexia sulcomarginata; Hamilton group. x-2/3

30. Nuculites triquiter; left valve; Hamilton group. x-1

31,32. Paracardium doris, left and right valves; Genesee, Naples groups. x-1/2

33. Bellerophon sp.; Hamilton group. x-2/3

34. Euryzone itys; Hamilton group. x-2/3

35,36. Styliolina fissurella; Hamilton, Genesee, Naples groups. Greatly enlarged.

37. Heliophyllum halli; Hamilton group. x-1/2

All figures except No. 37 from Hall; Natural History of New York, Part 6.

BIBLIOGRAPHY

Alling, H. L., 1928, The geology and origin of the Silurian salt of New York State: New York State Mus, Bull. 275, 139 p.

- - - - - - - - 1947, Diagenesis of the Clinton hematite ores of New York: Geol. Soc. Am. Bull., no. 11, p. 991-1017.

Chadwick, G. H., 1917, The lake deposits and evolution of the lower Irondequoit Valley, Rochester Acad. Sci. Proc., vol. 5, p. 123-160.

- - - - - - - - - 1920, Large fault in western New York: Geol. Soc. Am. Bull., vol. 31, p. 117-120.

- - - - - - - - - 1933, Upper Devonian revision in New York and Pennsylvania: Pan. Amer. Geol., vol. 60.

- - - - - - - - - 1935, Faunal differentiation in the Upper Devonian: Geol. Soc. Am. Bull., vol. 46, p. 305-342.

Clarke, J. M., 1885, On the higher Devonian faunas of Ontario County, New York: U.S. Geol. Surv. Bull., vol. 3, p. 43-120.

- - - - - - - - -1894, Succession of fossil fauna in the section of the Livonia salt shaft: New York State Mus. Ann. Rept. 47, p. 325-352.

- - - - - - - - 1899, The Naples fauna (fauna with Manticoceras intumescens) in Western New York: New York State Mus. 16th Ann. Rept., p. 31-41.

- - - - - - - - 1903, New York State Museum Handbook 19, p. 23-24.

- - - - - - - - 1904, The Naples fauna in Western New York: New York State Mus. Mem. 6, p. 199-454.

Clarke, J. M., and Luther, D. D., 1904, Stratigraphic and paleontologic map of the Canandaigua and Naples quadrangles: New York State Mus. Bull. 63, 76 p.

- - - - - - - - - - - - - - - - - - 1908, Geologic map and description of the Portage and Nunda quadrangles: New York State Mus. Bull. 118.

Cooper, G. A., 1930, Stratigraphy of the Hamilton Group: Am. Jour. Sci., ser. 5, vol. 19, p. 214-236.

- - - - - - - - and Williams, C. S., 1935, Tully formation in New York: Bull. Geol. Soc. Am., vol. 46, p. 781-868.

- - - - - - - - et al., 1942, Correlation of Devonian sedimentary formations of North America: Bull. Geol. Soc. Am., vol. 53, p. 1729-1793.

Dryer, C., 1890, The glacial geology of the Irondequoit region: Am. Geol., vol. 5, p. 202-207.

Fairchild, H. L., 1906, Geology of Irondequoit Bay, Rochester Acad. Sci. Proc., vol. 6, p. 217-242.

Fairchild, H. L., 1909, Glacial waters in Central New York: New York State Mus. Bull. 127, p. 1-61.

- - - - - - - - - - 1919, The Rochester canyon and Genesee River base levels: Roch. Acad. Sci. Proc., vol. 6, p. 1-55.

- - - - - - - - - - 1923, The Pinnacle Hills or the Rochester kame moraine: Roch. Acad. Sci., vol. 6, p. 141-194.

- - - - - - - - - - 1926, The Dansville Valley and drainage history of Western New York: Roch. Acad. Sci. Proc., vol. 6, p. 217-242.

- - - - - - - - - - 1932, Closing stage of New York glacial history: Geol. Soc. Am., vol. 43, p. 603-626.

Fisher, D. W., 1953, A microflora in the Maplewood and Neahga shales: Buffalo Soc. Nat. Sci. Bull., vol. 21, no. 2, p. 13-18.

- - - - - - - - 1954, Stratigraphy of the Medina group, New York and Ontario: Am. Assoc. Petrol. Geologists, Bull., vol. 38, no. 9, p. 1979-1996.

- - - - - - - - and Rickard, L. V., 1953, Age of the Brayman shale: New York State Mus. Circ. 36, 14 p.

Flint, R. F., 1949, Glacial geology and the Pleistocene epoch: John Wiley and Sons, New York.

Giles, A. W., 1918, Eskers in the vicinity of Rochester, New York: Roch. Acad. Sci. Proc., vol. 5, p. 161-240.

Gillette, Tracy, 1947, The Clinton of western and central New York: New York State Mus. Bull., 341, p. 5-191.

Goldring, Winifred, 1931, Handbook of paleontology for beginners and amateurs: Part II: The formations: New York State Mus. Handbook 10, 488 p.

- - - - - - - - - - - 1950, Handbook of paleontology for beginners and amateurs: Part I: The fossils: New York State Mus. Handbook 9, 396 p.

Grabau, A. W., 1909, Physical and faunal evolution of North America during Siluric, Ordovicic and early Devonic time: Jour. Geol., vol. 17, p. 209-252.

Grossman, W. L., 1944, Stratigraphy of the Genesee Group of New York: Geol. Soc. Am. Bull., vol. 55, no. 1, p. 41-76.

Hall, James, 1840, Fourth annual report of the fourth geologic district of the State of New York: New York State Geol. Surv. Ann. Rept. 4, p. 389-456.

- - - - - - 1843, Geology of New York, Part IV, Comprising the survey of the fourth geologic district: 683 p.

Hamilton, S. H., 1937, Oriskany exploration in Pennsylvania and New York: Am. Assoc. Petrol. Geologists Bull., vol. 21, no. 12, p. 1582-1592.

Loomis, F. B., 1903, The dwarf fauna of the pyrite layer at the horizon of the Tully limestone in western New York: New York State Mus. Bull. 69.

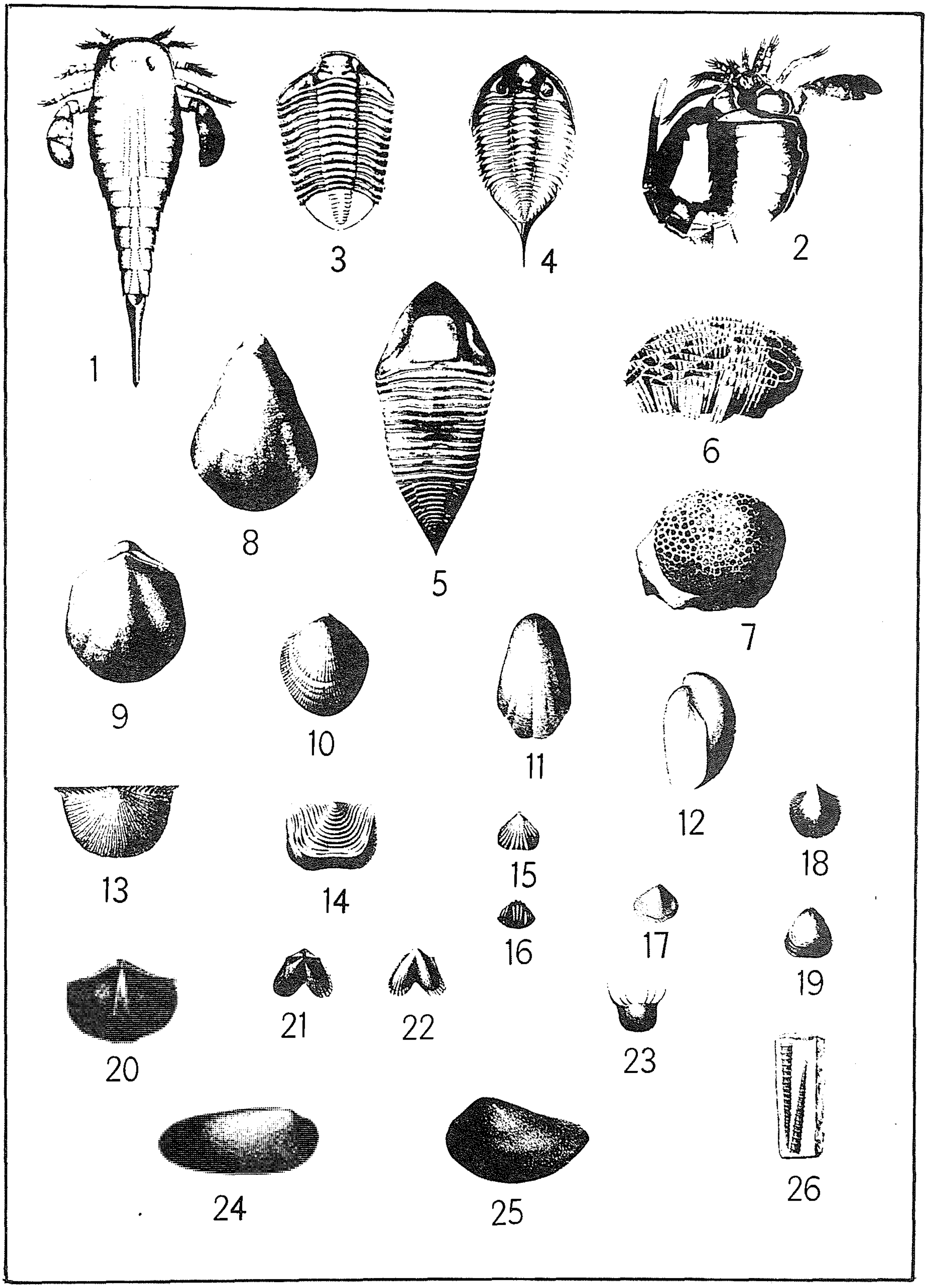

PLATE I

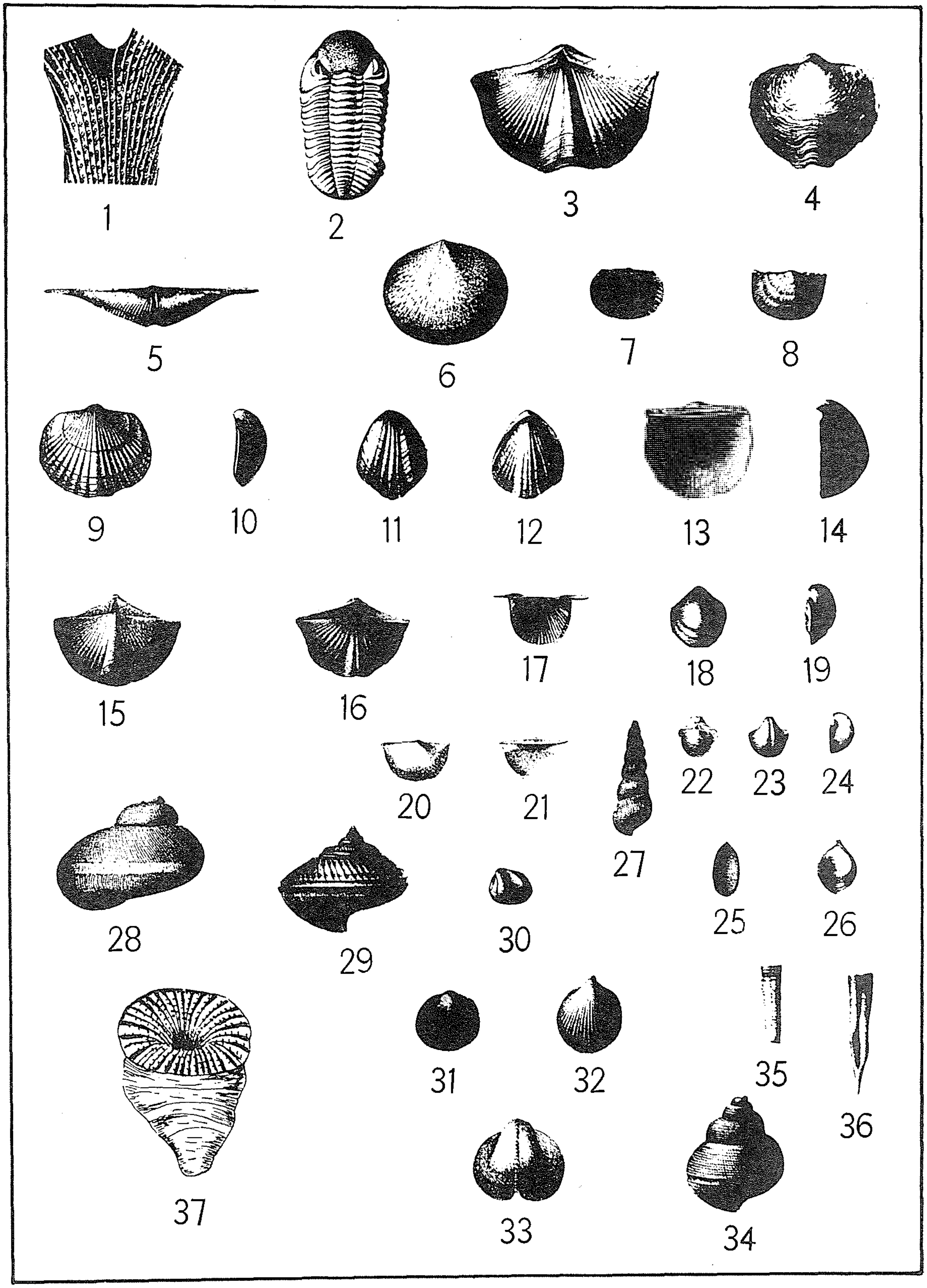
1
2
3
4
5
6
7
8
9
10
11
12
13
14
15
16
17
18
19
20
21
22
23
24
25
26
27
28
29
30
31
32
33
34
35
36
37

PLATE II

Luther, D. D., 1902, Stratigraphic value of the Portage sandstones: New York State Mus. Bull. 52, p. 616-631.

- - - - - - - 1906, Geologic map of the Buffalo quadrangle: New York State Mus. Bull. 99, 29 p.

- - - - - - - 1914, Geology of the Attica-Depew quadrangle: New York State Mus. Bull. 172, 34 p.

MacClintock, P., 1954, Leaching of Wisconsin glacial gravels in Eastern North America: Geol. Soc. Am. Bull. 65, pp. 627-662.

McCallie, S. W., 1908, Fossil iron ores of Georgia: Georgia Geol. Surv. Bull. 17, p. 185-194.

Newland, D. H., and Hartnagel, C. A., Iron ores of the Clinton Formation in New York State: New York State Mus. Bull. 123, 76 p. 1908.

Oliver, W. A., Jr., 1954, Stratigraphy of the Onondaga limestone (Devonian) in central New York: Geol. Soc. Am. Bull., v. 65, p. 621-652.

Platt, R. M., 1949, Lead and zinc occurrence in the Lockport dolomite: Master's Thesis, University of Rochester.

Rickard, L. V., 1953, Stratigraphy of the Upper Silurian, Bertie and Brayman formations of New York State: Master's Thesis, University of Rochester.

Sass, D. B., 1951, Paleoecology and stratigraphy of the Genundewa limestone of Western New York: Master's Thesis, University of Rochester.

Smythe, C. H., Jr., 1911, The Clinton types of iron ore deposits: Types of ore deposits: Mining & Sci. Press, San Francisco, p. 33-52.

Sutton, R. G., 1951, Stratigraphy and structure of the Batavia quadrangle: Proc. Rochester Acad. Sci., vol. 9, p. 348-408.

Swartz, C. K., et al., 1942, Correlations of the Silurian formations of North America: Geol. Soc. Am. Bull., vol. 53, p. 533-538.

Tasch, Paul, 1953, Causes and paleoecological significance of dwarfed fossil marine invertebrates: Jour. Paleo., vol. 27, no. 3, p. 353-444.

Taylor, F. B., 1924, Moraines of the St. Lawrence Valley: Jour. Geol., vol. 32, p. 641-667.

Upham, W., 1893, Eskers near Rochester, New York: A discussion of the structure and origin of the Pinnacle Hills: Rochester Acad. Sci. Proc. 2, p. 181-200.

Vanuxem, L., 1840, Fourth Ann. Rept. of the geological survey of the Third District: New York State Geol. Surv. Ann. Rept. 4, p. 355-383.

- - - - - - -1842, Geology of New York, Part III, Comprising the survey of the Third Geologic District, 306 p.

Willard, B., and Stevenson, R. E., 1950, Northeastern Pennsylvania and Central New York petroleum possibilities: Bull. Am. Assoc. Petrol. Geologists, vol. 34, no. 12, p. 22.

Williams, M. Y., 1919, The Silurian geology and faunas of Ontario peninsula and Manitoulin Island and adjacent islands: Geol. Surv. Canada, Dept. of Mines Mem. III, p. 1-195.