

- NOTE: Units 1 to 8 are interbanded

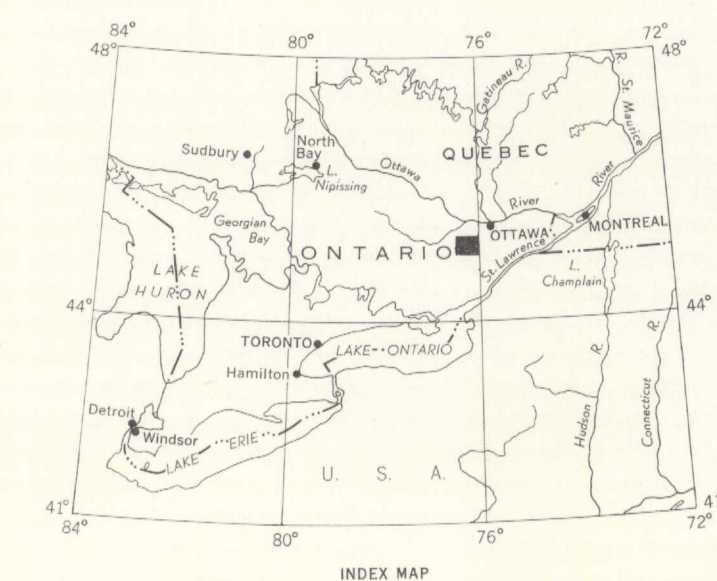
- ## MINERALS

- Precambrian geology by E. W. Reinhardt, 1963
Palaeozoic geology by A. E. Wilson, 1946, compiled by B. A. Liberty, 196

Geological cartography by the Geological Survey of Canada, 1964

- Base-map compiled and drawn by the Army Survey Establishment, R. C. E., 195
with revisions by the Geological Survey of Canada, 1964

Approximate magnetic declination, 12° 46' West, decreasing 0.6' annually



31 F/1

DESCRIPTIVE NOTES

Maximum relief in the area is about 500 feet, but local relief rarely exceeds 250 feet. Topography reflects bedrock lithology and structure and is divisible into the following types: (1) areas of low relief underlain by flat-lying Paleozoic strata; (2) low-lying areas of moderate relief underlain by Precambrian marble; and (3) areas of greater relief characterized by rounded hills or linear ridges and underlain respectively by massive or layered Precambrian rocks. The greatest concentration of outcrop is in the northwestern quarter of the map-area.

Pink to white faintly-layered quartzite (1) is confined to lenses within biotite migmatite (2) and its lack of continuity along strike is due to the emplacement of granite. The biotite migmatite (2) consists of predominant medium-grained biotite granite and less conspicuous layered biotite-quartz-feldspar gneiss. This gneiss has undergone varying degrees of assimilation and granitization, the most advanced stages of which are represented by biotite schlieren. Well-layered, rusty quartz-feldspathic gneiss (3) contains variable amounts of biotite and always occurs in contact with marble.

Marble (4 & 4a) varies in grain size and sharpness of layering, and is contorted in places. Local occurrences of accessory coarse-grained tremolite are prominent mainly between Lanark and Watsons Corners. Other accessory minerals are phlogopite, graphite, scapolite, and diopside.

Rocks that are essentially amphibolites have been separated into map-units 5, 6, and 7. All have over 50 per cent hornblende, and scapolite may be present wherever the plagioclase is altered.

Unit 5 is distinguished by garnet in amounts up to 20 per cent and in addition to amphibolite includes a garnet-biotite-quartz-feldspar gneiss. This gneiss is commonly associated with, but not always distinguishable from the garnet amphibole or its migmatitic equivalent. Units 5 and 6 are metasedimentary if their characteristic layering can be considered to represent original bedding.

Unit 7, a hornblende-rich meta-gabbro, displays a relict subophitic texture, indicating that it is a metamorphosed diabase. Fine-grained amphibolite (7a) is probably of igneous origin because in a few places it exhibits textures similar to those of the meta-gabbro and also because it lacks any extensive compositional banding. Unit 6 differs from unit 7a by having compositional banding, less hornblende, and less disseminated pyrite.

Intrusive hornblende diorite and gabbro (9), which may be garnetiferous in places varies considerably in both grain size and composition over a few feet. Its relations with granodiorite (10) are uncertain.

The large intrusion of granodiorite (10)¹ that lies north of Clayton has a strong marginal foliation, which is parallel to the layering in enclosing marble and amphibolite. This parallelism of foliations indicates that the pluton is syntectonic.

Granite and pegmatite (12), which contain minor amounts of biotite as the chief mafic mineral, cut magnetite-bearing syenite and syenodiorite (11) as well as diorite (9). The white colour of the granites and pegmatites of unit 13 is probably caused by the reducing effect of marble on ferric iron. Many small bodies of white pegmatite occurring in marble are not marble.

The Precambrian rocks of the map-area are part of a northeast-trending belt, which appears to be an extension of the Clare River syncline^{2,3,4} to the southwest. Except for the northwestern quarter of the area the dip is steeply southward. Lignations are few and consist mainly of mineral streaks on the foliation planes of gneissic synite and layered amphibolite in the central part of the area. The complicated structure north of Clayton appears to be mainly anticlinal and is flanked to the south by an eastward-plunging complex, about 2 km. south of the Clare and the

Lineaments, which mainly follow swamp-filled depressions, possibly represent faults. The two northwest-trending lineaments north of Clayton mark zones of closely-spaced joints, and no definite displacements could be observed along these or any other lineaments in the area.

A major angular unconformity separates the steeply-dipping Precambrian rocks from the overlying horizontal Palaeozoic strata.

The Palaeo- to Nepean Formation (14), consisting of fine- to coarse-grained sandstone with minor medium to coarse conglomerates, varies in colour from cream to yellow to grey. Graded bedding, ripple-marks, limited mud-cracks, Liesegang rings, and pyrite have been observed. Thickness varies from 30 to 60 feet, the upper 30 feet of which is an orthoquartzite. Lower strata have a carbonate matrix and a consistently fine-grained texture. The formation is considered to be Lower Ordovician (Beekmantown) in age by Wilson¹.

Unit 15 includes strata of the March and Oxford Formations, as the contact between them is difficult to define in the field. This unit is mainly carbonate; the basal few feet are sandy. It is thick-bedded, blue, very fine crystalline dolomite, weathering rusty and containing goodes of pink and white calcite crystals. Where seen, the lowest 30 feet consists of grey sandstone, sandy dolomite, and blue, very fine crystalline dolomite, weathering brown (March Formation). The Oxford Formation contains spheroidal masses of cryptozoons. Thickness in the map-area is not known; it is 240 feet at Ottawa. It is Lower Ordovician (Beekmantown) in age.

Unit 16, the Rockcliffe Formation, consists of friable, olive-green, iridescent shale with enclosed lenses of sandstone. The lenses vary up to 20 feet in thickness and cover several square miles. The sandstone is fine grained and grey (rarely deep red); green shale and dolomite may be present. Fucoid-like structures, ripple-marks, and green mud-galls have been observed. The unit thins westward to Ashton where it wedges out; it is about 150 feet thick at Ottawa. It is Middle Ordovician (Chapman) in age.

out; it is about 150 feet thick at Ottawa. It is Middle Ordovician (Chazyan) in age. Unit 17, the Ottawa Formation, is a massive gray limestone. The lowest member, about 30 feet in thickness, comprises limestone with thin beds of shale and sandstone. A second member (over 100 feet thick) comprises gray, dove grey, lithographic limestone, with minor dolomite, in thick and thin beds. The third member (25 feet) consists of softer, more thinly bedded limestone, which contains various amounts of grey, fine-grained, argillaceous limestone, calcarenite, and calcisiltite. It is very fossiliferous. The upper part of the formation represents only the lowest 150 feet or so of the Ottawa Formation (650 feet) and as such is Middle Ordovician (Black River - low Trenton) in age.

These Paleozoic formations have been described in more detail by Wilson⁵ and in their Ontario-Quebec context by Caley and Liberty.⁶

Attractive white and blue decorative marbles are being quarried near Tatook and it is possible that more are present farther north near Raycroft. Pink marbles suitable for architectural aggregates occur in contact with granodiorite northeast of Clayton. Graphitic marble from 3 miles west of Carleton Place is used in a lime plant in the city. Numerous small, abundant, fine-kinds used by the early settlers are present in areas where marble outcrops. Much of the sandstone and marble in the area is of building stone quality. The area has a good supply of sand and gravel; notable occurrences are 2 miles northeast of Lanark, 2 miles southwest of Almonte, and near the village of Hopetown.

¹McGlynn, J. C.: Petrology and correlation of the acidic intrusives of Darling township, Lanark county, Ontario; Queen's University, Kingston, unpubl. M.Sc. Thesis, pp. 19-27 (1949).

²Ambrose, J. W., and Burns, C. A.: Structures in the Clare River syncline: a demonstration of granitization; Roy. Soc. Can., Spec. Publ. No. 1, pp. 42-52

³Wilson, M. E.: The Clare River syncline; Trans. Roy. Soc. Can., ser. 3, sec. IV, vol. 27, pp. 7-11 (1933).

⁴Wilson, M. E.: Madoc, Hastings, Lennox and Addington counties, Ontario; Geol. Surv. Can. Map 559A (1940).

⁵Wilson, A. E.: Geology of the Ottawa - St. Lawrence Lowland, Ontario and Quebec;

⁶Caley, J. F., and Liberty, B. A.: The St. Lawrence and Hudson Bay Lowlands and Palaeozoic Outliers; in *Geology and Economic Minerals of Canada*, Ch. IV; Geol. Surv. Can., Econ. Geol. Ser. No. 1, 4th ed. (1957).