GEOLOGICAL SURVEY OF CANADA

DEPARTMENT OF MINES AND TECHNICAL SURVEYS

PAPER 60-14

RICE LAKE–PORT HOPE AND TRENTON MAP-AREAS, ONTARIO

31D/1, 30M/16, 31C/4, 30N/13

B. A. Liberty

Price 50 cents

1960

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(P.S. Map 16-1960 and P.S. Map 17-1960)

By

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INTRODUCTION

As the map-area embraces a large part of the Oak Ridge Interlobate Moraine (Chapman and Putnam, 1951)[1], outcrop is rather sparse except along the north shore of Lake Ontario and in the Trent River area. The aerial configuration of the map-units is suggestive of a north-facing escarpment that has been covered by a thick mantle of glacial drift. A higher bedrock area is thus suggested (to underlie map-unit 2), and this falls away toward Lake Ontario whose north shore shows a moderate amount of outcrop, (Coleman, 1937).

Some subsurface drilling has been done--mainly water wells--but there are also a few diamond-drill holes. From these, thickness of drift, thickness of the Palaeozoics, and lithologic descriptions have been obtained. Thus the geological interpretation presented is reasonably comprehensive.

STRATIGRAPHY

The outcropping formations of the map-area are of Middle Ordovician age and for the most part belong to the Trentonian stage. The map-units are designated as Sherman Fall beds and Cobourg beds, to conform with nomenclature used by the writer in published reports dealing with areas to the west and north (Liberty, 1952, 1953). These are precisely those same units, and have been traced eastward into the Kingston district. Correlation inferred by the connotations so suggested are only provisional. Actually these names have been used for rock units, Caley and Liberty (1957) notwithstanding, as no other terms were available for the present publication.

A conservative estimated thickness for the Black River - Trenton carbonate sequence in this area is in the order of 600 feet. As the contact of black shale(Collingwood beds) and Trenton limestone (Cobourg beds) is traced northward between Bowmanville and Newcastle, the Black River - Trenton sequence nowhere achieves its true maximum thickness within the map-area. The area is believed to be underlain by two formations only--in the proportion of about 60 percent Cobourg beds to 40 percent Sherman Fall beds, in descending order from the overlying black shale. These units have been discussed from a regional standpoint by Kay (1937).

Sherman Fall Beds--This map-unit includes strata previously referred to as Sherman Fall (Liberty, 1952), and is the 'Prasopora beds' of earlier workers such as Johnston (1912) and Raymond (1914).

For the most part the strata are moderately argillaceous and thus non-resistant. Lowest strata (20 feet) consist of grey, fine-grained, argillaceous limestone, which encloses a profusion of the hat-shaped bryozoan Prasopora. A middle unit (140 feet) comprises buff- to rusty-weathering, grey, fine-grained, sublithographic limestone, and grey, finely to coarsely crystalline limestone. At some localities there is an

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[1]Names and dates in parentheses refer to publications listed in the References.

alteration of finely crystalline and sublithographic textures. Dark grey shale beds are usually prominent in this part of the section. The upper unit (8 to 15 feet) is essentially grey limestone with very few to no shale partings, and is usually medium to coarsely crystalline. This unit is commonly a bioclastic fossiliferous limestone showing crossbedding phenomena and having a salt-and-pepper appearance. Estimated thickness, based on subsurface data, is in the order of 185 feet.

Some of the more important fossils of this unit are: Praspora orientalis, P. grandis, P. insularis, P. simulatrix, P. selwyni, P. semioculata, Hemiarges paulianus, Trematis ottawaensis, Dalmanella rogata, D. whittakeri, and D. truncata; Cryptolithus tesselatus has been found but is rare.

Cobourg Beds--The Cobourg beds overlie the Sherman Fall beds. This is the Cobourg unit described by Sproule (1936) and used by subsequent Ontario workers--Caley and Liberty (1957), and Liberty (1952). It is considered to be the Picton formation described by Raymond (1914) which he subsequently renamed Cobourg in 1921.

These strata are quite argillaceous and are typically non-resistant, although there are two escarpment-forming units at about the 50- and 140-foot levels. The lowest strata (15 feet) are an alternation of thin beds of shale with blue, very finely crystalline to sublithographic limestone. This unit is overlain by at least 35 feet of blue, finely crystalline, resistant, brittle, hard, and sparsely fossiliferous limestone. The overlying unit is soft, non-resistant, and rarely exposed. It comprises thin, finely crystalline limestone beds alternating with thin, irregularly bedded, nodular, 'calcareous claystone'. Some very thin shale partings occur but these have never been seen to comprise more than 15 percent of the individual outcrop section. The upper part of this unit consists of thin, finely crystalline limestone beds alternating at 1- to 2 1/2-foot intervals with calcareous claystone that weathers irregularly and rubbly; yet this part of the unit appears massive and lithographic in texture on a fresh surface. Transitional relations probably obtain from this unit (100 feet ±) to the overlying one (thickness undetermined) which is grey lithographic to sublithographic limestone with thin, wispy, irregular shale partings. It is this unit that underlies the black shale formation containing the Collingwood fossils and which is exposed in the vicinity of Oshawa and Bowmanville, (Liberty, 1953). From subsurface data the Cobourg beds are known to be thicker than 210 feet and probably have a total thickness of about 250 feet.

Some of the more important fossils are: Rafinesquina deltoidea, Cyclospira bisulcata, Hormotoma trentonensis, Fusispira subfusiformis, Trochonema umbilicatum, Pasceolus globosus, Mesotrypa prolifica, Ceraurinus marginatus, and Pseudogygites canadensis.

GLACIAL GEOLOGY

The entire map-area has been glaciated, and most of the bedrock surface has been concealed beneath a mantle of glacial drift.

A few outcrops occur on the points projecting into Lake Ontario (small anticlines), and along a few creeks and rivers--i.e. Trent River--that have been re-excavated. Drift thickness is known to be as great as 220 feet in Cramahe tp. (lot 16, con. VI), and 210 feet in Hope tp. (lot 18, con. III) in the Oak Ridge Interlobate Moraine. Elsewhere it varies, mainly between 5 and 50 feet. Surficial geology of the area has been described by Gravenor (1957).

STRUCTURAL GEOLOGY

Little information is available regarding the structure of the Palaeozoic strata or relief of the Precambrian surface. North of Trenton the gradient of the Trent River is about the same as the apparent dip 22 feet to the mile in a south-southeasterly direction. In the vicinity of Trenton the dip steepens to about 180 feet (or just less than 2 degrees), but it is not known over how wide an area this is effective. Regional strike appears to be about east-west. Regional dip is considered to be in the order of 15 to 20 feet to the mile. One interpretation of the structure of part of the map-area has been presented by Kay (1942, p. 632). The relief of the underlying Precambrian surface is probably considerable. A few miles to the north the Precambrian surface itself can be seen; a few miles to the east in the adjacent map-area, a Precambrian inlier is located within the Sherman Fall bedrock belt, thus indicating a relief of 250 to 400 feet.

ECONOMIC GEOLOGY

The thick mantle of glacial drift provides abundant road material and there are many pits and quarries throughout the map-area.

The Cobourg limestone is sufficiently argillaceous for cement manufacture. The St. Lawrence Cement Co. is presently developing a quarry south of Colborne.

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