

CANADA
DEPARTMENT
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MINES AND TECHNICAL SURVEYS

GEOLOGICAL SURVEY OF CANADA

PAPER 50-11

PRELIMINARY MAPS
ORILLIA - BRECHIN
AND
BEAVERTON
ONTARIO

(TWO MAPS AND DESCRIPTIVE NOTES)

By

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Descriptive Notes for Orillia-Brechin

and Beaverton Maps, Ontario

STRATIGRAPHY

Precambrian rocks of the Canadian Shield occupy the northern part of the Orillia-Brechin map-area. They consist chiefly of pink granite and granite-gneiss, with minor pegmatitic material. The uneven surface of these rocks forms the floor upon which the Palaeozoic sediments rest.

The 'Basal' beds rest unconformably upon the Precambrian rocks. They consist, in ascending order, of coarse, greenish grey, calcareous sandstone or 'arkose' overlain by red and green shales, which commonly contain frosted and rounded sand grains. These beds are not everywhere present, and appear to be thickest in depressions on the surface of the crystalline rocks where they may have accumulated to depths of as much as 40 feet. No fossils have been found in these basal beds and, therefore, their age is not definitely known. However, as they are overlain with apparent conformity by limestone enclosing Black River fossils they have been mapped tentatively with other strata of Black River age.

Resting on the 'Basal' shales are limestones that may be equivalent to the Pamela beds. In most places they are divisible into three lithological units. The lowest, about 18 feet thick, consists of buff-weathered, pale greenish grey and grey, fine-grained limestone in beds ranging in thickness from a few inches to 14 inches. Small cavities and calcite vugs are common. Fossils are rare, although brachiopods and ostracods have been observed. The intermediate unit comprises about 18 feet of strata, the lower 8 feet of which is grey to brownish grey, fine-grained and lithographic limestone in beds from 8 to 12 inches thick: the remainder is brownish grey, fine-grained limestone weathered into irregular beds 1 inch to 3 inches thick.

Green glauconitic patches and small chert nodules may occur in this rock, and at some localities trilobites (Bathyurus), flat-spined gastropods, and Beatricca were observed. The uppermost division of the Pamela? beds comprises about 8 feet of buff-weathered, pale greenish grey, fine-grained magnesian limestone in beds up to 18 inches thick. Stylolites is common, and the rock tends to break with conchoidal fracture. Both ¹W.A. Johnston and ²V.J. Okulitch have

¹ Johnston, W.A.: Geol. Surv., Canada, Sum. Rept. 1911, pp. 253-261 (1912).

² Okulitch, V.J.: Trans. Roy. Can. Inst., vol. 22, pt. 2, 1939, pp. 319-333.

collected fossils from this succession, and although certain species suggest Lowville age others are so strongly suggestive of the Pamela that Okulitch considers the enclosing strata to be its correlative.

The Lowville succeeds the Pamela?beds. It consists, in ascending order, of several feet of thinly laminated lithographic limestone, with green shaly partings, succeeded by about 20 feet of grey-weathered, dense, lithographic limestone that may be light buff, grey, or brownish grey on fresh surfaces, and is in even beds from a few inches to more than 2 feet thick. The lower half of this limestone is characterized by the presence of the worm burrow Phytopsis tubulosa, which imparts a 'bird's-eye' appearance to the rock. The upper half is replete with the coral Tetradium, both T. fibratum and T. cellulosum being present in considerable numbers. A $\frac{1}{2}$ -inch zone of greenish grey meta-bentonite has been observed at the base of the Tetradium-bearing beds.

The Leray beds (Coboconk limestone) overlie the Lowville and constitute the uppermost Black River rocks in the Orillia-Brechin map-area. They consist of grey to bluish grey weathered, grey and brownish grey, fine- and medium-grained limestone, commonly in beds upward of a foot thick that in places weather thin, irregular, and rubbly. Chert, as irregular nodules, occurs within 3 or 4 feet of the top of the Leray and

affords a consistent stratigraphic marker throughout the map-area. These beds are characterized by the presence of many corals of the genus Lyopora (Columnaria) and have been referred to as the Columnaria beds. Although this fossil is known to be present both above and below the Leray beds, it occurs in profusion in the lower few feet. Associated with Columnaria are Stromatocerium, Streptelasma, Calapoecia, Actinoceras, and several brachiopod genera. The genus Receptaculites has been observed at widely separated localities at and near the top of the Leray as here mapped.

Rocks of Trenton age succeed these Black River strata with apparent conformity, but a recognizable physical change occurs at the top of the Leray beds, the succeeding strata being in general more crystalline and thinner bedded. This physical change appears to coincide with a great reduction in numbers of Columnaria and the appearance of the brachiopod Dalmanella in relatively large numbers. As this stratigraphic horizon is widespread and readily recognized, it has been used as a basis for separating the Black River and overlying Trenton rocks in the Orillia-Brechin map-area.

The Trenton beds are generally divisible into several lithological units, which appear to conform generally with palaeontological zones of earlier workers. In ascending order, they are the Rockland, Hull, Sherman Fall, and Cobourg beds. The first three are here mapped together, the Cobourg being represented as a separate map-unit. Although each of the foregoing subdivisions of the Trenton is represented in the Orillia-Brechin map-area, outcrop sections are limited by the low topographic relief, the low regional dips, and the prevalence of glacial overburden. However, more complete sections are present in the adjoining area to the east, and certain thickness determinations made there have been applied in the present map-area.

The Rockland beds are well exposed in the vicinity of Upper Mud Lake, south of ~~Sobright~~. They consist of fine- to medium-grained, grey and bluish grey, crystalline limestone, overlain by fine- and medium-grained, grey, bluish grey, and brown limestone, the whole in beds from 2 to 6 inches thick. About 20 feet of these beds is represented, and the brachiopod Dalmanella, which occurs throughout, is very numerous in the lower few feet.

The Hull, or Crinoid, beds overlie the Rockland, but the contact is not exposed within the present map-area. They are represented in a small quarry about $2\frac{1}{2}$ miles east of Brechin, where they consist of fine- and medium-grained, grey, brownish grey, and bluish grey limestone in beds from 3 to 14 inches thick. At Kirkfield, in the adjoining area to the east, these beds attain a thickness of about 35 feet.

The Sherman Fall beds succeed the Hull, and constitute the uppermost sedimentary rock in the Orillia-Brechin map-area. They consist, in ascending order, of buff to rusty weathering, fine- to medium-grained, grey and brownish grey, argillaceous limestone, with greenish grey shale partings, succeeded by grey-weathered, brownish grey and brown, medium-grained and crystalline limestone, the whole in irregular beds from 1 inch to 3 inches thick. The total thickness of Sherman Fall beds is difficult to determine in the Orillia-Brechin map-area, but in the adjoining area to the east they have a measured thickness of about 150 feet, of which the lower 125 feet represents the lower, argillaceous division, and the remaining 25 feet the upper, more crystalline division. A hat-shaped bryozoan resembling the genus Prasapora occurs throughout the Sherman Fall beds, but is much more numerous in the lower, argillaceous part.

Cobourg beds succeed the Sherman Fall, and constitute the uppermost bedrock throughout the greater part of Beaverton map-area. They are well exposed on the north shore of Georgina Island in Lake

Simcoe, where 30-foot cliff sections may be seen. These rocks may also be seen to advantage on Thorah Island and on Pefferlaw Creek at the village of Pefferlaw. They consist of grey, bluish grey, and brownish, fine-grained and dense limestone and argillaceous limestone in beds from a few inches to more than a foot thick, with shaly partings along most bedding planes. Much of this rock commonly weathers to a loose, greenish grey rubble. Occasional bands of crinoidal and crystalline limestone from 2 inches to a foot thick are interbedded with the more typical argillaceous limestone. Fossils are common in most outcrops, but only a few appear to be confined to these beds; the most common restricted forms are the brachiopods Cyclospira bisulcata and Rafinesquina deltoidea, and the gastropods Hormotoma trentonensis and Trochonema umbilicatum. Subsurface data indicate that in the southern part of Beaverton map-area the Cobourg is about 200 feet thick.

GLACIAL GEOLOGY

The entire area has been glaciated, and the rock is largely concealed beneath a mantle of glacial drift. In the northern part of the Orillia-Brechin map-area, the drift averages only a few feet in thickness, and the physiography is essentially a reflection of the bedrock geology. Extensive flats are common, and bedrock terraces and low cliffs appear to have resulted from differential erosion of alternating resistant and softer beds. In the Beaverton and southernmost part of Orillia-Brechin map-area the rock is more deeply buried, and outcrops are less numerous. There the physiographic expression is controlled largely by the glacial overburden, and bears little or no relation to the structure of the underlying bedrock.

STRUCTURE

The Precambrian **surface** beneath the Palaeozoic sediments has considerable relief, as indicated by the presence of several granite outliers that 'protrude' through the younger limestones, and by the variation in thickness of the 'Basal' beds. The largest outlier near Rohallion rises about 50 feet above the surface of the Leray limestone, which can be seen resting on its flanks with dips up to 10 degrees. Minimum relief at this **locality** is about 75 feet. Near the border of the Canadian Shield, Ordovician strata show dips as high as 22 degrees. Farther south, however, these rocks appear to be almost flat-lying. The most reliable horizon for attitude determinations is the Leray-Lowville contact, which is exposed at several places. The regional dip of this contact horizon averages about 12 feet a mile in a general south-southwest direction, but locally exhibits some variation as shown in the following table:

Locality	Dip (Feet/mile)	Direction of dip
Upper Mud Lake	17	South-southeast
Lower Mud Lake	24	South-southeast
Lake St. John and east	24	South-southwest
Lake Couchiching and west	12	South-southwest

ECONOMIC GEOLOGY

The Palaeozoic limestones of these map-areas have been utilized for various purposes. Several quarries have been opened, the most extensive being at **Uthoff**, $6\frac{1}{2}$ miles northwest of Orillia, and at Longford on the east side of Lake Couchiching. Only the Uthoff quarry is currently in operation, and there the high-calcium Lowville beds provide chemical limestone and crushed stone. At

Longford, the Lowville beds have been quarried for building stone, flux, and lime, and the underlying Pamela? beds for building stone (Rama stone).

In the recent past, small excavations near Lake St. George, Millington, and Gamebridge were opened in Pamela?, Rockland, and Sherman Fall beds respectively. Road metal was obtained from the first two, crushed stone and agricultural limestone from the last. Other quarries have been opened near Brechin and **Sebright**, in Hull and Leray-Lowville beds respectively, probably for production of crushed stone for local use.

Small gravel pits in the glacial overburden are numerous and have been worked for production of road metal.