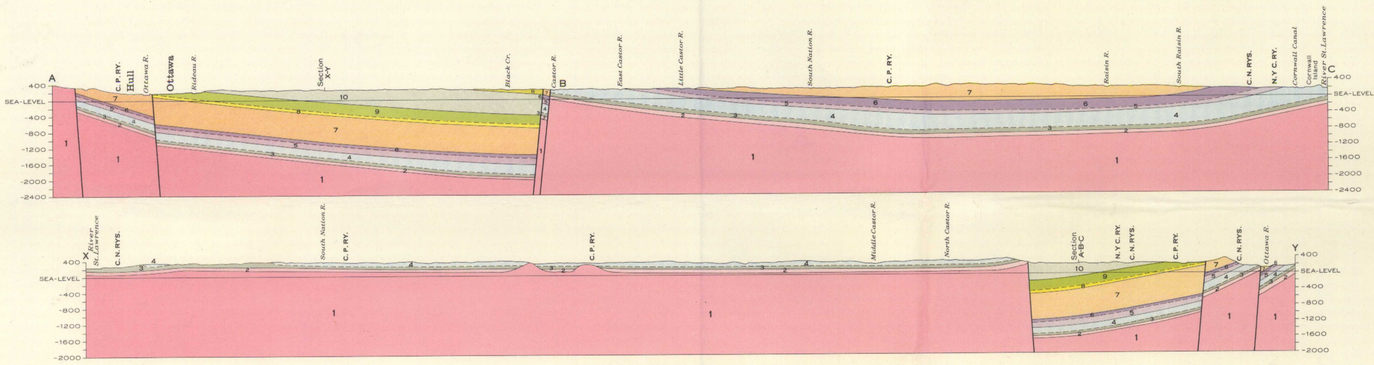
CANADA

DEPARTMENT OF MINES AND RESOURCES

MINES AND GEOLOGY BRANCH

BUREAU OF GEOLOGY AND TOPOGRAPHY



Structure sections along lines A-B-C and X-Y

HORIZONTAL SCALE, 1 INCH TO 4 MILES
VERTICAL SCALE, 1 INCH TO 2112 FEET.

76°00' GEOLOGICAL SURVEY

MAP 852A

OTTAWA-CORNWALL

ONTARIO AND QUEBEC

Scale, 253,440 or 1 Inch to 4 Miles

4 0 4 8 12 Miles

Approximate magnetic declination, 13° to 15° West.

DESCRIPTIVE NOTES

The undifferentiated PRECAMBRIAN formations (1) consist of various types of altered sedimentary rocks, crystalline limestones and dolomites, gneisses, and quartzites of the Grenville series, intruded, metamorphosed, and deformed by bodies of granite, syenite, and other igneous rocks. The irregularly eroded surface of this basal complex forms the floor upon which the Palaeozoic strata lie in an almost horizontal position, except in immediate proximity to some of the larger faults.

The NEPEAN FORMATION (2) everywhere underlies the next younger formation, so far as known. It consists of thin and thick beds of coarse-grained, cream-coloured, silica sandstone, weathering grey, and with irregular rusty stains. In places near the base it is a conglomerate containing pebbles of pure quartzite varying from 1 to 3 inches in diameter. Where silica forms the cementing material the sandstone is hard, with thin bands of pure quartzite. In one or two localities it contains a few thick beds of quartzite. Near the top of the formation, where the cement is calcareous or of iron oxide, the rock disintegrates after long exposure. As the formation was deposited on an irregular surface it has a wide range in thickness, the known maximum in the area mapped being 500 feet. The Nepean has been formerly correlated with the Potsdam of New York, and was assumed to be of Upper Cambrian age, but as no indisputably diagnostic fossils occur in it, and as there is no discernible break between it and the overlying March formation, it may be of Ordovician age.

The MARCH FORMATION (3) is thin and rusty weathering. It is composed of thick beds of grey sandstone with a calcareous cement, alternating with thick and thin beds of sandy, blue-grey dolomite. The formation lies conformably upon the Nepean, its lower boundary being placed arbitrarily at the base of the lowest dolomite layer, but in places the contact is difficult to detect because the sandstone layers of the March are very like those of the Nepean. At the top, the dolomitic layers grade into the overlying Oxford formation. The March has an estimated thickness of 25 to 30 feet in the north-central part of the area, but no wells penetrate it in the east or the west. It is transitional between the Nepean sandstone and the Oxford dolomite, but as its characteristics persist over a wide area, and as it is known to be water-bearing, it has been mapped separately. The formation contains fossils of Beekmantown age.

The OXFORD FORMATION (4) consists of thick, rusty weathering beds of dove-grey limestone, magnesian limestone, and blue-grey, dense dolomite. In places at the top it is dark and somewhat argillaceous. In the lower dolomite beds irregular cavities ½ inch to 2 inches or more in diameter are commonly filled with pink or white calcite, or in some places even larger cavities are lined with small quartz crystals. The Oxford lies conformably upon the March formation, or in a few localities rests against knobs of Precambrian quartzite, in the latter case it commonly contains irregular pebbles of the quartzite 1 to 10 inches long. At Ottawa the formation has an approximate thickness of 230 feet, which increases rapidly to the east within the centre of the map-area. The few fossils found are indicative of an early Beekmantown age.

The ROCKCLIFFE FORMATION (5) is separated from the Oxford by a disconformity representing an erosional interval during which the upper Beekmantown and lower and middle Chazy beds were deposited in the Lake Champlain area. It consists of grey-green shale enclosing fine-grained, grey, sandstone lenses that vary greatly in their dimensions. In places where the sandstone rests directly upon the Oxford formation it is coarse, almost conglomeratic. So far as known the Rockcliffe has a maximum thickness of 140 to 160 feet. The few fossils it contains are indicative of late Chazy age.

The ST. MARTIN FORMATION (6) overlies the Rockcliffe conformably, but does not extend west of Ottawa. It is composed at the base of grey shale and limestone bands, and passes upward into thick beds of limestone interbedded with occasional thick, siliceous and dolomitic beds. At its western margin it is only a few feet thick, but the thickness increases eastward to about 155 feet. Some beds contain abundant Camarotoechia plena, indicating a late Chazy age.

The OTTAWA FORMATION (7) in the east and centre of the Palaeozoic basin rests upon the St. Martin with a disconformity that probably does not represent a long period of time. West of Ottawa the formation rests successively upon the Rockcliffe and Oxford, and perhaps upon still older formations farther up Ottawa River Valley. At its base the Ottawa consists of brown, or locally black, shale, grey-brown sandstone, and thin bands of limestone, giving place upward to grey shales interbedded with grey limestone, dolomite, and occasional bands of sandstone. These basal beds grade upward into a group of thick beds of pure crystalline limestone. About 240 or 250 feet above the base the thick-bedded pure limestones are succeeded by thin beds of impure limestone interbedded with some shale, followed by heavier, purer limestone, though occasional shaly partings persist. There is no evidence of a break in the deposition of the formation, but in the past it has been divided on the basis of its contained fauna into three Black River subdivisions (7a, 7b, 7c) and four Trenton subdivisions (7d, 7e, 7f, 7g). The line separating rocks of Black River and Trenton ages has been placed within the pure crystalline limestone deposits. The Ottawa limestone is here regarded as one formation, and the various subdivisions as zones of faunal associations. The formation is 700 feet thick at Ottawa, and, as this thickness is also recorded at Montreal, it is probably maintained in the central and eastern parts of the basin. There is some evidence, however, that it thinned slightly in the northwestern part.

The EASTVIEW FORMATION (8) overlies the Ottawa in the neighbourhood of Ottawa. The contact is nowhere exposed, and the formation has been studied mainly from excavations. It may not extend beyond the centre of the basin. The formation is composed of rather thick beds of very dark grey, almost black, brown weathering limestone interbedded at the base with thin bands of shale that becomes more abundant near the top. The limestone is comparatively fine-grained, but much of it contains large, separate calcite crystals. The formation is about 20 feet thick at Ottawa. Fossils from it indicate a Collingwood age.

The BILLINGS FORMATION (9) succeeds the Eastview conformably. It is composed of about 15 feet of brown shale grading upwards imperceptibly into dark, almost black, fissile shales. Exposures of the Billings are few, and it is difficult to obtain the exact thickness from well borings. One record, however, indicates that just southeast of Ottawa it has a thickness of more than 255 feet. Fossils from it indicate a Collingwood-Gloucester age.

The CARLSBAD FORMATION (10) succeeds the Billings formation with no discernible break. It is made up of grey shales and sandy, rusty weathering shales, with interbedded dolomitic layers at some horizons near the top. It attains a maximum thickness of nearly 550 feet, and is approximately of Dundas-Lorraine age.

The RUSSELL FORMATION (11, in part) succeeds the Carlsbad with no apparent break. It consists of grey shale and interbedded, heavy rusty weathering dolomite, and may be of the same age as the Meaford formation of Georgian Bay. Upwards the Russell shales and dolomites give place to red shales of the Queenston formation. The QUEENSTON FORMATION (11, in part) consists of red shales, in a few instances mottled with green. Only a few outcrops occur, and the exact thickness of the formation is not known. The Russell and the Queenston are mapped together because exposures of the Russell are poor and definite information on its thickness and areal extent is lacking. The combined thickness of the two formations is about 100 feet. The Russell and Queenston formations are both of late Ordovician, Richmond age.

A mantle of Pleistocene and Recent deposits conceals much of the Precambrian and Palaeozoic rocks. It consists of glacial till, marine clay and sands, and recent alluvium. It has been mapped only where it is known to have a considerable depth over large areas.

STRUCTURE

The northern half of the Ottawa-St. Lawrence Lowland is cut by many faults, the pattern of which suggests a certain amount of torsional movement. Many of the longest faults follow broad arcs, and displacement along them is greatest at their centres. In the northwest part of the basin, both within the area mapped and beyond it, the general trend is northwest with a slight convexity towards the southwest. In the central and east part of the basin the trend becomes more nearly east-west. The main structural result is the downfaulting of the Palaeozoic rocks along the northern boundary of the basin. West and east of the mapped area the Palaeozoic and Precambrian rocks are sharply separated by the faults, whereas in the central part of the area the faulting occurs within the Palaeozoic rocks themselves. One large, roughly oblong, downfaulted block has its longest dimension a little north of east, and its greatest displacement at the southwest corner. The fault or fault zones bounding it on the west and south are comparatively simple, but the northern margin is cut by a system of nearly parallel faults from which subsidiary faults diverge at varying angles and cut off small blocks that are tilted at different angles and in different directions.

LEGEND

PALÆOZOIC

ORDOVICIAN

RICHMOND

11 — *QUEENSTON FORMATION: red shale*
RUSSELL FORMATION: interbedded grey shale and dolomite

DUNDAS – LORRAINE

10 — *CARLSBAD FORMATION: grey shale, sandy shale, some dolomite layers*

COLLINGWOOD AND GLOUCESTER

9 — *BILLINGS FORMATION: black shale; minor brown shale*

8 — *EASTVIEW FORMATION: dark grey limestone with shale bands*

BLACK RIVER AND TRENTON

7 — *OTTAWA FORMATION: chiefly grey limestone, some dolomite, shale and sandstone in the lower part; 7a, Pamelia beds: limestone, dolomite, shale and thin-bedded sandstone; 7b, Lowville beds: chiefly shaly limestone; 7c, Leray beds: limestone; 7d, Rockland beds: limestone; 7e, Hull beds: limestone; 7f, Sherman Fall beds: thin-bedded limestone with some shaly partings; 7g, Cobourg beds: limestone*

CHAZY

6 — *ST. MARTIN FORMATION: limestone, minor shale and dolomite*

5 — *ROCKCLIFFE FORMATION: grey-green shale with lenses of grey sandstone*

BEEKMANTOWN

4 — *OXFORD FORMATION: grey limestone, magnesian limestone, and dolomite*

3 — *MARCH FORMATION: interbedded grey calcareous sandstone and blue-grey dolomite*

CAMBRIAN OR ORDOVICIAN

2 — *NEPEAN FORMATION: sandstone*

PRECAMBRIAN

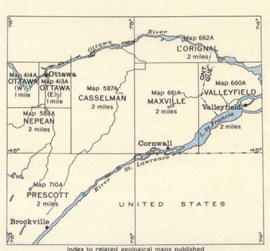
1 — *Crystalline limestone, quartzite, and gneiss of the Grenville series intruded by granite, syenite, and other rocks*

Heavily drift-covered area
Rock outcrop and area of outcrop (outcrops are not shown within areas of Precambrian rocks west of Brockville)
Bedding (inclined)
Fault

Road well travelled
International boundary
Interprovincial boundary
County boundary
Township boundary
Marsh

Geology by A.E. Wilson, 1929, and 1935 to 1940.

Cartography by the Drafting and Reproducing Division, 1946.



Index to related geological maps published on scales of one mile and two miles to one inch

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