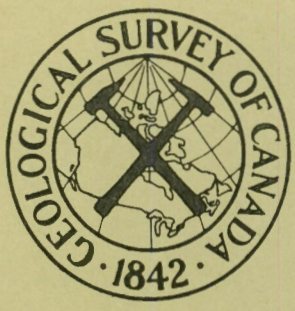

GEOLOGICAL
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DEPARTMENT OF ENERGY,
MINES AND RESOURCES

PAPER 68-63

NOTES TO ACCOMPANY A MAP OF THE GEOLOGY OF THE PROTEROZOIC ROCKS OF LAKE PANACHE-COLLINS INLET MAP-AREAS, ONTARIO (41 1/3, H/14)

(Report and P.S. Map 21-1968)

M. J. Frarey and R. T. Cannon

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ABSTRACT

The map-area comprises rocks of both the Southern and Grenville Structural Provinces. The former consist of more than 30,000 feet of Huronian sedimentary rocks intruded by granite and diabase of two or more ages. The Grenville rocks constitute gneisses of supracrustal origin invaded by and mingled with granitic and dioritic intrusions.

The postulate, made many years ago, that the Grenville gneiss complex in this map-area is the metamorphosed equivalent of Huronian strata is, in general, supported.

NOTES TO ACCOMPANY A MAP OF THE GEOLOGY OF THE PROTEROZOIC ROCKS OF LAKE PANACHE-COLLINS INLET MAP-AREAS, ONTARIO

INTRODUCTION

The map-area may be reached from the east via Highway 637, from the north via Highway 549 leading to Lake Panache, or from the northwest via Highway 68 and secondary road, also to Lake Panache. The latter two routes require additional travel by boat. The village of Killarney, just west of the area mapped, is the only settlement in the district.

The area was first mapped by Robert Bell (1898). The northern part was studied in more detail by Collins (1925), and the remainder remapped by Quirke (Quirke and Collins, 1930). Aeromagnetic maps at a scale of one mile to the inch are available (Geol. Surv. Can., Maps 1515G, 1516G).

The rocks are divided into those of the Southern Province and those of the Grenville Province. In the Southern Province, the rocks comprise an extensive, stratigraphically continuous, and well-exposed section of Huronian strata, some 30,000 feet thick, including all formations from the Ramsay Lake Formation of the Hough Lake Group and possibly the McKim Formation of the Elliot Lake Group, to the uppermost known formation of the Cobalt Group. These rocks are intruded by two or more ages of diabase and by granite. The rocks of Grenville Province constitute a complex of various gneisses of supracrustal origin extensively invaded by and mingled with granitic to dioritic intrusions, all subjected to shearing and cataclasis.

SOUTHERN PROVINCE

The Huronian strata are classified and arranged in this paper in accordance with recommendations recently made by a Committee on Huronian Stratigraphy constituted jointly by the Geological Survey of Canada and the Ontario Department of Mines (Robertson et al., 1969).

Beds of argillite and subgreywacke at the north edge of the map-area have been tentatively assigned to the McKim Formation (1) but may be part of the Pecors Formation (3).

Conglomerate of the Ramsay Lake Formation (2) consists of scattered clasts, mostly grey granite and quartz, dispersed in a featureless siliceous matrix, and may be of glacial origin. The overlying Pecors Formation (3), formerly included in this area in the Mississagi Formation (see Collins, 1925; Collins and Quirke, 1930) consists of an apparently irregular succession of argillaceous quartzite, feldspathic quartzite and pelitic beds but detailed study of the formation is hampered by water cover in Lake Panache, numerous folds, indifferent exposure, and by intrusions. At Gabodin Lake and to the north the pelitic beds are metamorphosed and contain prominent porphyroblasts of andalusite and staurolite. The Pecors - Mississagi

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boundary is transitional. The Bruce Formation (5) appears to be entirely conglomeratic, weathers a distinctive brownish tone, is pyritic, and, in part at least, is calcareous. Near the northwest corner of the area, it is conspicuously scapolitic. The Espanola Formation (6) is similar to occurrences elsewhere in the North Shore region, except for the much greater thickness of the dominant middle member. The customary threefold division can be observed where exposure is sufficient, such as between Bassoon Lake and the northwest corner of Goschen Township. Scapolite and tremolite occur irregularly and locally in the Espanola beds. The feldspathic quartzite of the Serpent Formation (7) closely resembles that of the Bruce Mines and Elliot Lake districts. Additional features here are: a thin limestone member at or near the top of the formation at Threenarrows Lake; a conspicuous arkose at Bear Lake at the same stratigraphic level; and a substantial basal unit of intercalated fine-grained sandstone, siltstone, and argillite which is over a thousand feet thick near the northwest corner of the map-area.

The Gowganda Formation (8) is more amenable to subdivision here than in areas west of Blind River. A basal conglomerate- paraconglomerate member and an upper thin bedded argillite member are persistently developed; between these is a variable assemblage of paraconglomerate, quartzite, argillite, and siltstone. Conspicuous soft sediment load features characterize particular horizons; also notable is an irregular, in places almost chaotic, mixing of arenaceous blocks in pelitic beds. The Gowganda appears to be everywhere structurally conformable with the underlying Serpent Formation, and at Threenarrows and Bear Lakes is interbedded with the Serpent at the contact. Consequently, no unconformity is recognized in this map-area between the Quirke Lake and Cobalt Groups. The Lorrain Formation (9), made up of an estimated 7,000 feet or more of resistant arkose and quartzite divided into four members, dominates the terrain volumetrically and topographically. The formation becomes progressively purer, finer-grained and thinner-bedded upwards and the two upper members commonly consist almost entirely of quartz. A few quartz-pebble beds occur near the base of the third member. The formation is crossbedded throughout. Around David Lake the Lorrain is thickened by faulting and by a thicker basal arkose than elsewhere.

The upper Lorrain unit passes conformably upward through an intercalated zone, possibly 100 - 200 feet thick, into siltstones and other sediments of the Gordon Lake Formation (10). The Gordon Lake comprises thin-bedded, variously coloured, soft argillite, dense cherty siltstone, and fine-grained quartz arenite. True chert was not observed, and shallow water deposition is indicated by ripple-marks and some mudcracks. The beds are commonly spotted due at least in part to sericitic clots. The formation was formerly mapped as Gowganda (Quirke and Collins, 1930).

The Gordon Lake similarly grades by intercalation into fine-grained white quartzite of the Bar River Formation (11), formerly mapped as Lorrain (Quirke and Collins, 1930). Preparations for quarrying this unit for silicate were in progress in 1968 a short distance west of the map-area. Subunit (11a) is intensely folded and in part fault-bounded and stratigraphically ill-defined; south of Baie Fine it overlies about 2,000 feet of orthoquartzite of the formation but near Lake George it occupies more than one stratigraphic position, each evidently overlain by orthoquartzite. It contains prominent bluish grey siltstone beds, a few feet thick, some of which carry appreciable amounts of hematite. Andalusite has been tentatively identified near Lumsden Lake, in buff-coloured pelitic beds.

The Huronian formations, particularly the Quirke Lake Group, are cut by prominent sheet-like intrusions of metadiabase, which almost everywhere follow the strike of the enclosing beds. Near the outlet of Balsam Lake one of these sheets is capped by a differentiated granophyric layer. Small masses of granitic composition,

many too small to map, invade the older rocks. They vary lithologically from medium-grained, grey, aplitic masses, to coarse-grained, buff-coloured, syenitic, sill-like layers most common in the eastern part of Lake Panache, to larger plug-like grey muscovite granite masses, as at Balsam Lake.

Cutting all other rocks of the Southern Province are prominent northwest-trending, variably magnetic, fresh, diabase dykes (15). Included with these are rare gabbroic dykes that may be somewhat older.

The McGregor Bay Anticline, and the La Cloche Syncline north of it, belong to the system of large, east- to northeast-trending folds that characterizes the Huronian rocks of this part of Southern Province. The syncline is faulted and severely compressed between David Lake and Nellie Lake.

The broad north limb of the La Cloche Syncline corresponds to the south limb of a second large anticline whose axis evidently trends through Lake Panache just north of the map-area (see Map 1515G). The McGregor Bay Anticline plunges gently to moderately eastward, and the La Cloche Syncline westward, in this map-area. Second-order folds trending north to northeast, and in one case northwest, appear on the limbs of the above folds especially in a belt along and south of the south shores of Lake Panache. East of that lake, too, the gross trend of the Huronian strata swings abruptly northeast. It is noteworthy that almost everywhere along the Grenville boundary, structures in immediately adjacent Huronian strata are parallel to it; along Bell Lake the trend is abruptly assumed in small-scale folds in a zone 1,000 feet or less in width.

All the pre-granite rocks in the Southern Province have been sporadically brecciated after consolidation. Breccias range from a few feet in length and diameter to about 2 miles in length and 2,000 feet in width. They resemble the well-known Sudbury breccia as, for the most part, they seem unrelated to folds or faults, commonly carry foreign blocks and possess a milled matrix with or without fluxion lines. The large breccia zone at the head of Killarney Bay (Lamorandiére Bay) and also seen on small islands in the bay, is interesting for its content of carbonate blocks of unknown origin.

GRENVILLE PROVINCE

The boundary of the Grenville and Southern Provinces is defined by three commonly used criteria, namely: the appearance of reconstituted gneissic rocks exhibiting no primary features; a marked change in structural style; and the appearance of minerals yielding radiometric ages of 900-1100 m.y. In this map-area the boundary coincides for the most part with the northwest edge of the northeast-trending strip of granite masses that were formerly collectively called 'Killarney Granite' (Collins and Quirke, 1930; Bell, 1898). Much of the boundary marks the position of faults and mylonite zones, directly along the edge of the granites, but at Johnnie Lake and a few other places a screen of gneiss intervenes. Three mineral ages in the granite fall at about 1000 m.y.

The units of the gneiss group (G1-G10) of the Grenville Province are inhomogeneous, intergradational, and irregular in occurrence and consequently considerable generalization is required in mapping them. Further, most of these units are considerably altered by a pervasive potash metasomatism that has commonly produced feldspar porphyroblasts; the gneisses also have been strongly crushed and sheared. The layered gneisses (G1) are considered to be paragneisses for the most part. Of special interest are thin layers of calcareous gneiss (1b) exposed on points in the north end of Tyson Lake and north of that lake, and distinctive greenish to brown amphibole and pyroxene-bearing gneisses (1e) that may be metamorphic granulites,

occurring west and northwest of Attlee Lake. The Lorrain quartzite equivalent (G2), in part retains its characteristics as seen in the Southern Province, and may even exhibit measurable bedding. However much of the large remnant west of Tyson Lake is badly deformed and 'soaked' with granitic material. Similar bodies too small to map occur near Strata Lake and Lone Lake. Much of the metaquartzite (G3), is fine- to medium-grained although apparently completely recrystallized. It characteristically weathers a dirty cream to yellowish brown and is rather micaceous and friable. Amphibolite (G4) is believed to be partly sedimentary in origin and partly derived from diabase. The metaconglomerate (G5) resembles tillite, and may be Gowganda equivalent. One occurrence is well exposed near the southwest corner of Tyson Lake.

The origin of these gneisses is of great interest in view of the postulate of Quirke and Collins that they represent metamorphosed Huronian strata, and of other subsequent opinions. Although some of Quirke's arguments and specific correlations are not acceptable, his principle conclusion regarding the "disappearance of the Huronian" appears to be substantiated.

The granitic to dioritic masses (G6-10) are intergradational compositionally. From field observations, there appears to be relatively little true granite, and coarse-grained, foliated, pink, syenitic rocks dominate, at least southeast of Highway 637. These igneous rocks too have been variously affected by faulting, shearing, and cataclasis. The least deformed (G7) appear to be those along the Grenville Front, particularly southwest from Johnnie Lake. Field relations suggest more than one period of intrusion along the Front. The through-going dykes, and sill-like, and plug-like bodies of diabase cutting the gneisses and granitic rocks are most abundant around Tyson Lake. Some, at least, differ in appearance from the late diabase of the Southern Province, but geological evidence as to the relative ages of the two types is lacking.

The foliated rocks of Grenville Province display a remarkably uniform structural attitude across the map-area. This may be essentially a late, superimposed feature, as in detail the gneisses show evidence of several deformations and metamorphic episodes. Developed still later are prominent ubiquitous cataclasis and lineation. The latter is commonly formed by striations and mullions that plunge southeast to southerly, except for a small domain in the southwest part of the map-area where northeasterly and southwesterly plunges appear. Numerous faults, mylonite zones, and augen zones, some of very late origin, affect all the pre-diabase units of the Grenville Province.

The map-area contains few features of economic interest. A few sulphide showings, previously investigated, were seen. A small open-pit quartz mining operation was in progress during the period of field work near the south shore of the west arm of Lake Panache. A number of other fairly large, though barren, quartz veins of possible future interest occur in the area. Large tonnages of high silica quartzite exist in the upper Lorrain members and in parts of the Bar River Formation. Except possibly those at Killarney Bay or Baie Fine, these are probably only to be considered as reserves for the distant future. Reported radioactive occurrences in the Grenville Province north of Collins Inlet are due to allanite as far as the writer is aware.

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