GEOLOGY OF THE MARYSTOWN - ST. LAWRENCE AREA

S.J.F. O'Brien, D.F. Strong, P. Strong, S.W. Taylor, and D.H. Wilton

Introduction

The Marystown (1 M/3) and St. Lawrence (1 L/14) 1:50,000 sheets were mapped during May to September, 1975. O'Brien was responsible for the Marystown west half; Taylor, Marystown east half; Wilton and P. Strong, the St. Lawrence east half; and D.F. Strong, the St. Lawrence west half and overall supervision of the project.

Four groups make up the main stratigraphic sequence in the map area, the Precambrian Rock Harbour, Burin and Marystown Groups, and the Eocambrian-Cambrian Inlet Group. They are intruded by a number of plutons and dykes ranging from gabbroic to granitic in composition, the most extensive and important being the Carboniferous St. Lawrence Granite which contains the fluorspar deposits of the area. The structural history of the area appears to have been relatively simple, with a dominant northeast-striking and northwest-dipping cleavage with associated southeastward thrusting and minor asymetrical folding.

Stratigraphy

Rock Harbour Group

The Rock Harbour Group (Jooste, 1954) is a clastic sedimentary sequence extending along the easternmost edge of the map area. Its base is unexposed, but it is conformably overlain by the Burin Group, and reaches a thickness of about 2000 m. It consists of imbricated, polymictic conglomerates, cross-bedded sandstones, greywackes and cherty argillites, decreasing in grain-size southwards, with several beds of stromatolitic limestone at the top.

Burin Group

The Burin Group (formerly referred to as the Burin Series - Van Alstine, 1948) forms a 6 km.-wide belt extending north-northeast along the eastern part of the map area. It consists mainly of mafic pillow lavas and pyroclastic rocks, with some quartz-rich clastic sedimentary rocks and minor stromatolitic limestones. The Group has been tentatively subdivided into five map-units; three of predominantly pillow lavas, one of predominantly pyroclastic rocks, and one a gabbro sill 1500 m. thick. These have a maximum combined thickness of about 7 km., although there is probably unrecognized repetition and/or exclusion by faulting or folding.

Marystown Group

The Marystown Group is a new name which will be proposed for the predominantly subaerial volcanic and associated sedimentary rocks which underlie the western two-thirds of the map-area. Although they have been previously described under such regional names as the Harbour Main and Bull Arm Groups, such correlations are not certain, and so the terms are avoided for present purposes.

The Marystown Group is thrust southeastward over fault-bounded Eocambrian-Cambrian rocks in the eastern portion of the map area. Conformable contacts with the overlying Eocambrian are thought to be exposed outside the present study area (Walthier, 1948).

Lithologies within the Group are diverse but are dominantly the result of an extensive period of subaerial volcanism, and associated plutonism and sedimentation. The Group consists predominantly of repeated sequences of rhyolite flows and tuffs, ignimbrites and mafic flows and pyroclastics. The rhyolite flows are massive, flow banded and spherulitic. Red sandstones and conglomerates are interbedded with the mafic units.

The Marystown Group is divisible into eight map-units; some of these, however, may be lateral equivalents. If facies changes do not complicate the picture, the exposed thickness of the Group in the map-area may be in excess of 8 km.

Inlet Group

The Inlet Group is a new name which will be proposed for the late Precambrian (Eocambrian) - Cambrian sedimentary rocks which extend from Jean de Baie in the northeast to beyond Little Lawn Harbour in the southwestern corner of the map area and are best exposed along the west shore of Burin Inlet. The Group is divisible into four map-units, with a combined maximum thickness of about 2 km. It is in thrust-fault contact with the Marystown Group in the west, and in fault (undetermined type) contact with the Burin Group in the east. Lowest units in the Group are ripple-marked and mud-cracked, muscovite-rich sandstones with worm-burrows and trails, interbedded with several orthoquartzite beds, possibly equivalents of the Random Formation. These are overlain by red and green mottled shale with abundant limestone lenses (Lower Cambrian?), red mudstones with Lower Cambrian Smith Point-type pink limestone, and black shales rich in Middle Cambrian trilobite fossils, correlative with the Manuels River Formation of the Avalon Peninsula.

LEGEND

PLEISTOCENE

14 Undivided glacial till

CARBONIFEROUS

13 Flow-banded rholite, ignimbrite and acidic agglomerate: 13a, riebeckite-bearing flow banded rholite and ignimbrite; 13b, ignimbrite and acidic agglomerate

CAMBRIAN AND EOCAMBRIAN

12 INLET GROUP: black shale, red and green mudstone, pink limestone, sandy siltstone and quartzite

LATE PRECAMBRIAN

MARYSTOWN GROUP (4-11) (subdivision of the Marystown Group is based on distinctive facies representing unique volcanic and sedimentary environments; no definite stratigraphic sequence is implied)

11 Mafic flows, red sandstone and conglomerate

10 Mafic flows and acidic pyroclastics: 10a, mafic flows; 10b, undivided acidic pyroclastics and volcanic sediments, minor acidic porphyries

9 Acidic pyroclastics and flows: 9a, coarse agglomerate, ignimbrite, spherulitic rhyolite and acidic tuffs; 9b, intermediate and acidic lithic tuffs

8 Basaltic and andesitic flows, acidic pyroclastics

7 Acidic pyroclastics and flows: 7a, coarse acidic and intermediate agglomerate; 7b, rhyolite flows and tuffs, minor mafic lithic tuffs

6 Porphyritic basalt and basaltic agglomerates

5 Hornfelsed volcanics: 5a, hornfelsed flow banded and spherulitic rhyolite (in part equivalent to 4); 5b, hornfelsed basaltic flows and tuffs, minor acidic pyroclastics

4 Rhyolite flows, ignimbrite, acidic lapilli and lithic tuffs

BURIN GROUP (2, 3)

3 Gabbro

2 Pillowed basalts, mafic tuffs and tuffaceous sediments

1 ROCK HARBOUR GROUP: undivided conglomerate, greywacke and limestone

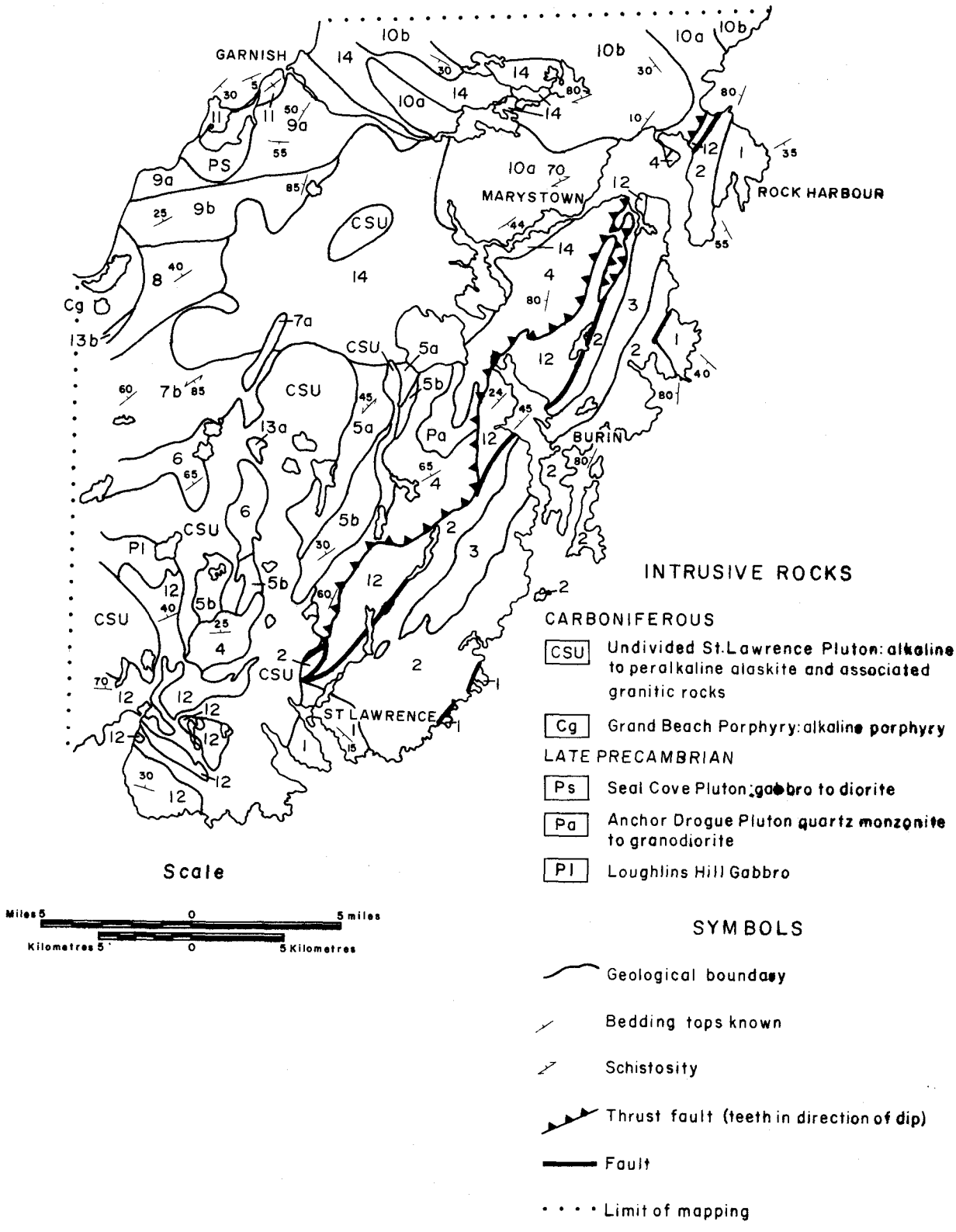

Fig. 1 - Geological map of the Marystown-St. Lawrence area

Intrusive Rocks

Mafic Dykes

The Wandsworth gabbro sill, a map-unit within the Burin Group, is the largest mafic intrusive body in the map area, and since the greatest abundance of mafic dykes is found within the mafic volcanic rocks of Burin Group, a cogenetic relationship is indicated. Several generations of diabase dykes cut the Marystown Group and the St. Lawrence Granite; their precise subdivision awaits detailed petrographic and chemical investigation.

The Seal Cove Pluton

This pluton occupies a small area near Garnish, in the northwestern corner of the map area. No intrusive relations were seen, but there is an extensive zone of sericite-pyrite-epidote alteration around it, within the rocks of map-unit 9a. It ranges in composition from gabbro to diorite, and is extensively saussuritized but undeformed.

The Anchor Drogue Pluton

The Anchor Drogue pluton intrudes the acid pyroclastics and flows of the Marystown Group in the east-central part of the map area. Its boundaries are difficult to map, as in any given area more than half of the outcrop consists of xenoliths and roof pendants of country rock. It differs from the St. Lawrence granite in containing more plagioclase, and being less siliceous and not peralkaline. Its age is not known, but it is inferred to be comagmatic with the Marystown Group.

The St. Lawrence Granite and Associated Plutons

The St. Lawrence pluton consists of alkaline to peralkaline alaskite and associated granitic rocks, dated by the Rb/Sr whole rock method as about 310 m.y. (Carboniferous) in age (Bell and Blenkinsop, 1975). It clearly cuts all stratigraphic units of the map area, and has produced extensive hornfelsed zones, especially in the Cambrian sedimentary rocks. Although the term has generally been used to refer to the two main lobes of granite in the St. Lawrence area, there are large areas of similar rocks to the north and west, some of which are more or less continuous with the two main lobes; these are here included with the St. Lawrence Granite. Examples of these outlying bodies are the Grand Beach Porphyry, the Strouds Pond complex and the Winterland Porphyry. The first is correlated with the granite on the basis of its chemical similarity (especially trace elements) and the latter two on the basis of the presence of riebeckite, characteristic of the St. Lawrence Granite. Both the Grand Beach Porphyry and the St. Lawrence Granite have volcanic equivalents (Unit 13, Fig. 1).

Structural Geology

The major structural feature of the area is the ewins Cove Fault, along which the Marystown Group is thrust southeastwards over the Inlet Group. This is best observed in the quarry on the west side of Route 14 about 1/2 km. south of the Route 12 intersection. Here the upper 3 m. of the quarry face consist of Marystown Group volcanic rocks which tectonically overlie the red and green mudstones of the Inlet Group. This fault strikes northeasterly and dips westwards at about 45°, as can be seen in the roadcut on Route 12 about 100 m. west of its intersection with Route 14. There are numerous other similarly-oriented thrust faults and associated small scale folds which can be recognized in the Salmonier Group, and numerous zones of strongly developed, dominantly northeast-striking, northwest-dipping cleavage in the Marystown Group suggest that similar thrust faults occur within this group. Because the St. Lawrence Granite intruded the Inlet Group after thrusting, this deformation must have occurred between Middle Cambrian and Carboniferous times. Localized schistose zones within the Marystown Group appear to be pre- to syntectonic with respect to the regional northeast-trending structures.

The Burin and Inlet Groups are separated by a large fault of undetermined displacement. Their relative ages would, nowever, imply some uplift of the Burin Group. The Burin Group is more pervasively altered and complexly deformed than the other groups. The St. Lawrence Granite and associated Carboniferous rocks do not display any evidence of deformation.

Economic Geology

The fluorite deposits within the St. Lawrence map sheet are the most important economic minerals of the area. Mineable concentrations occur exclusively within the St. Lawrence Granite, although veins and minor showings are also found in the Inlet Group near its contacts with the granite, and scattered throughout the Marystown Group.

Disseminated chalcopyrite and bornite occur within some of the Marystown Group basalts and in the Burin Group pillowed basalts near the margins of the Wandsworth Gabbro. Chalcopyrite occurs in fractures in the Seal Cove Pluton.

A wide variety of other types of mineralization have been reported from the map area, e.g., U, Pb, Zn, Sn, Mo, but these were not specifically investigated during the present mapping project. It is clear, however, that many of these occur at the contact between the St. Lawrence Granite and the fine-grained sedimentary rocks of the Salmonier Group. One new occurrence was found; a 5 cm.-thick limestone bed in the Inlet Group at Murphy's Cove (just west of the St. Lawrence map sheet) assayed 1.85% Zn, 1.45% Pb, 0.04% Cu and 0.12 oz/T Ag maximum grade.

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