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GEOLOGY OF PORT AUX BASQUES MAP-AREA, NEWFOUNDLAND (11-O)

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ABSTRACT

Port aux Basques area comprises soft Carboniferous sediments in the northwest part and harder, pre-Carboniferous metamorphic and crystalline rocks in the central and eastern parts. The age of the latter rocks is uncertain but some may be as old as Precambrian and others as young as Devonian. These rocks and the structural geology of the area are briefly described in this paper.

RÉSUMÉ

La région de Port-aux-Basques est composée, dans la partie nord-ouest, de sédiments tendres du Carbonifère, et dans la partie du centre et de l'est, de roches cristallines et métamorphiques plus dures datant du pré-Carbonifère. L'âge des roches du pré-Carbonifère est incertain, mais on peut penser que certaines remontent au Précambrien, alors que d'autres ne datent que du Dévonien. L'auteur donne une brève description de ces roches et de la géologie structurale de la région.

GEOLOGY OF PORT AUX BASQUES MAP-AREA, NEWFOUNDLAND

Physiographically, the map-area consists of an upland surface at an elevation of about 1,500 feet which slopes gently southward to 800-1,000 feet near the coast. Local rounded hills on the surface rise to about 2,000 feet in the north. South-flowing streams have cut steep-sided valleys in the surface. In the west, Codroy River occupies a broad valley excavated in the soft Carboniferous sedimentary rocks.

The entire map-area has probably been glaciated. The last of the ice moved southward in the central and eastern parts and apparently northwestward off the Anguille Mountains in the northwest. Glacial U-shaped valleys are generally well developed. La Poile Bay and possibly Bay Le Moine are fiords. Tundra covers the central and eastern parts. Spruce and fir grow in some large valleys and particularly on the lower slopes and valley bottoms in the northwest.

Rocks of the Port aux Basques map-area comprise two major divisions separated by the Long Range fault: the relatively soft Carboniferous sediments in the northwestern part of the map-area and the harder, metamorphic and crystalline rocks of pre-Carboniferous age in the central and eastern parts. The terrane of the latter division comprises granitic gneisses and schists of amphibolite metamorphic level which locally in the southeast grade into much less metamorphosed Devonian sedimentary rocks and are faulted against Silurian(?) volcanic and sedimentary rocks. Mafic to ultramafic intrusions are associated with the gneisses in the west, and granitic intrusions are plentiful in the east. Most if not all of the granitic rocks in the east are Devonian whereas the mafic, ultramafic and granitic rocks in the west are probably Ordovician or possibly in part older. The age of the gneisses and schists, that is their age of sedimentation and volcanism, is unknown. Outside limits are Precambrian and Devonian; a Cambro-Ordovician age is favoured for map-units 1 and 2, and Ordovician to Devonian for unit 3.

The general lithologic similarity of gneisses and schists throughout the area presented difficulties in establishing a useful classification for mapping purposes. Three broad belts, separated by two major faults, the Cape Ray and Bay d'Est faults were recognized but the significance of the belts in terms of original stratigraphy and age of strata represented by the gneisses and schists is unknown apart from the age speculations already given.

Gneiss and schist (1) are dominantly of granitic composition. Amphibolite is more common in the western part of the area. Marble occurs in the gneiss on the northern edge of the map-area one third mile southeast of the Long Range fault.

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Between Long Range fault and Cape Ray fault, granitic gneiss and schist of unit 1 pass to the south and southeast into mafic intrusions with some ultramafic and granitic phases, mixed with unseparated gneiss and schist (2a, b). Ultramafic rocks within unit 2a occur in several places (Phair, 1949) on hills bordering a stream from 2 to 2 1/2 miles southeast of Doyles; about 1 mile south of the western end of Little Codroy Pond; and 7 1/2 miles southeast of Coal Brook village. Marble occurs in streams one mile southeast of Coal Brook and two miles east-northeast of Coal Brook. The age of the mafic and ultramafic rocks is uncertain but probably either Precambrian if a correlative of the Indian Head Range intrusive complex near Stephenville (Riley, 1962), or Ordovician if of the Paleozoic bodies elsewhere in Newfoundland (Williams, 1967). The rocks may be a faulted equivalent of the Steel Mountain mafic assemblage, of uncertain age, on the northwest side of the Long Range fault some 60 miles to the northeast (Belt, 1969). Rocks of unit 2b contain granitic gneiss and schist like that in units 1 and 2a, and also abundant unseparated intermediate to mafic plutonic rocks like those of unit 2a, but they lack ultramafic rocks of unit 2a. The pink granitic body (2c) yielded a 445 ± 18 m.y. date suggestive of late Ordovician (Gillis, 1968) like some others to the northeast of the map-area (Neale, 1965).

Between Cape Ray fault and Bay d'Est fault is a terrane of mainly granitic gneiss and schist (3) which grades into generally less metamorphosed strata of the Bay du Nord Group (6) of Devonian age. The gneiss and schist vary slightly from place to place. Sedimentary and metasedimentary rocks are more abundant in the area near the head of La Poile Bay; conglomerates with granitic fragments occur one mile northwest of Strickland Pond. In the west, stretched pebble conglomerate, also with granitic fragments, occurs in the Windsor Point region. Unseparated quartz monzonite and pegmatite are common in that part of the belt extending between Isle aux Morts–Rose Blanche in the south and the northeast corner of the map-area, and within this belt these granitic rocks are more abundant in the area near the ovoid quartz monzonite batholith (8a) centred 8 miles north of Garia Bay. Pegmatites yielded dates of 400 ± 20 m.y. near Rose Blanche (Gillis, 1965) and 415 ± 20 m.y. near Channel–Port aux Basques (Neal, 1963). Similar analyses on biotite and muscovite of interlayered quartz monzonite on the La Poile River yielded 346 ± 20 m.y. and 344 ± 20 m.y. (Gillis, 1967). These dates suggest a late Silurian–early Devonian event for the older pair and a late Devonian–early Mississippian event for the younger pair. The significance of the dates is uncertain: the younger pair may reflect updating or primary intrusion associated with Devonian(?) plutonism. Gabbro was found 7 miles north of Isle aux Morts. Amphibolite is more abundant in the gneisses and schists in the southwest parts (west of Rose Blanche). Sillimanite is also more common in the southwest in the Isle aux Morts–Rose Blanche region, and Cooper (1954) reported staurolite, andalusite and kyanite in schists and gneisses northeast of Northeast Arm of La Poile Bay.

The low-grade metamorphic sedimentary and volcanic rocks of unit 4 underlie the La Poile Group (5A) and according to Cooper (1954), possibly with a slight angular unconformity. The La Poile Group was divided by Cooper into three stratigraphic units: a basal division of conglomerate, sandstone and slate with fragments of granite, sandstone and schist; a middle division of sandstone, slate and minor volcanic rocks; and an upper division of generally acidic volcanics and minor intercalated sedimentary rocks. Quartz-feldspar porphyry (5B) almost assuredly cuts the La Poile Group and is believed to be an intrusive equivalent of the La Poile Group volcanics. Age of the group and the porphyries is uncertain but is probably Silurian.

Bay du Nord Group (6) comprises a pelitic assemblage with some sandstone and conglomerate. These rocks grade laterally into schists and gneisses (3) which Cooper (1954) included in the group. Conglomerate with fragments of sedimentary, metasedimentary and granitic rocks occur on La Poile River between Morg Keepings Brook and Fox Hole Brook. Cooper reported limestone fragments in this conglomerate. Crossbedding is fairly common in the sandstones. Fossil plants found by Cooper suggest an Early and/or Middle Devonian age but a few shale specimens examined by D.C. McGregor of Geological Survey of Canada were found to lack palynomorphs (pers. comm., 1966).

Granitic bodies of mappable dimensions are plentiful. Apart from the small pluton (2c) on the north edge of the map-area, which yielded an Ordovician isotopic age, the remaining granitic bodies have been separated into two groups. Those of map-unit 8 are generally foliated and the borders of most are more or less concordant with the enclosing gneisses and schists. They are probably Devonian, but some may be as old as Ordovician. Those of map-unit 9 on the other hand are massive, non-foliated granitic rocks which are probably Devonian.

Granitic rocks (8a) are similar to smaller bodies associated with pegmatite in gneisses and schists (3). The quartz monzonite consists commonly of 30-40 per cent oligoclase, 30-35 per cent potash feldspar, 15-30 per cent quartz, and as much as 10 per cent biotite. Granites (8b) cut the Bay du Nord Group (6); granodioritic phases consist commonly of 40-45 per cent plagioclase (albite to oligoclase), 20-25 per cent quartz, 5-20 per cent potash feldspar, and as much as 20 per cent biotite. The Baggs Hill Granite (8c) was described by Cooper (1954). Granodiorite and quartz diorite (8d) and quartz monzonite and granodiorite (8e) extend eastward into the Burgeo-Ramea map-area (Riley, 1959). Quartz monzonite and granodiorite (8f) have been described by Cooper (1954). They cut the La Poile Group (5A) and diorite and gabbro stocks (7).

Pegmatite associated with the granitic rocks on the coast 3 1/2 miles east of Grand Brint contains beryl (Cooper, 1954). Biotite from granodiorite (8f) was dated at 350 ± 16 m.y. (Gillis, 1967).

Pink and tan granitic plutons (9a) clearly cut gneisses and schists northwest of Cape Ray fault. Granitic rocks (9b) at Little Garia Bay have intruded the Bay du Nord Group (6) and have yielded a biotite date of 350 ± 16 m.y. (Gillis, 1967). The Chetwynd Granite (9e), described by Cooper (1954), has intruded the La Poile Group (5A) and the granitic rocks of unit 8f. The age and provenance of the granitic clasts in the gneiss and schist (3), La Poile Group (5A), and Bay du Nord Group (6) are unknown.

The regional metamorphism is probably Devonian in view of the gradational relations of the gneiss and schist (3) with the Devonian Bay du Nord Group (6), but it is unknown whether there was only one regional metamorphic event or more than one throughout the map-area.

Unmapped felsite and basalt dykes of presumed Devonian age cut rocks of units 1 and 2b, and felsite dykes cut rocks of unit 3.

Only Carboniferous sedimentary rocks 10-12 are found northwest of the Long Range fault within the map-area. They comprise three units: a basal mainly nonmarine grey shaly and sandy unit, the Anguille Group (10); an alternating marine and nonmarine, varicoloured silty and shaly unit with limestone and gypsum, the Codroy Group (11); and an upper mainly nonmarine red and grey sandy and shaly unit, the undivided Searston Beds and Barachois Group (12). Baird and Cote (1964) divided the Anguille Group (10) into three

conformable formations, in ascending order, the Cape John, the Snakes Bright, and Seacliffs. The base of the group is not exposed. Megaplant fossils and spores (Baird and Cote, 1964; Bell, 1948) indicate an early Mississippian age correlative of the Horton Group in the Maritime Provinces. The Codroy Group (11) conformably overlies the Anguille Group, and was divided by Baird and Cote into a lower unit containing gypsum and limestone among other strata and an upper unit. Marine fauna and spores (Bell, 1948; Utting, 1965) indicate a Mississippian age, correlative of the Windsor Group in the Maritime Provinces. The Searston Beds and generally younger Barachois Group (12) gradationally overlie the Codroy Group. Megaplant fossils and spores (Bell, 1948; Utting, 1965; Hacquebard et al., 1960) indicate a late Mississippian to Pennsylvanian age for these youngest strata.

The dip of the Long Range fault varies from vertical to 40 degrees northwest. The fault zone is exposed on the coast 1/2 mile south of Trainvain Brook and on a stream about 1 1/4 miles south of South Branch. Fractured and sheared gneiss and schist (2a) and Searston–Barachois strata (12) border the fault. Regionally the Carboniferous strata dip southeasterly towards the fault and locally adjacent to the fault they dip steeply northwest. Dip-slip component of movement is several thousand feet and the strike-slip component is unknown. Belt (1969) suggested a major right-lateral movement and Williams and others (1970) a major left-lateral movement, both on regional relationships identified outside the map-area.

The Cape Ray fault is marked by a prominent lineament extending about 40 miles northeast from the coast. Fractured and sheared rocks of units 2b and 6 mark the fault on Fox Hole Brook. Bay d'Est fault also forms a distinct lineament, and is represented by a gouge on a tributary of Couteau Brook one mile east of the map-area.

Carboniferous strata are openly folded, except in southern Cape Anguille Mountains where some beds are overturned towards the southeast.

Cooper (1954) described the mineral prospects in the Baggs Hill and Cinq Cerf areas. A thin coal seam occurs one mile southeast of Coal Brook (Hayes and Johnson, 1938). Gypsum occurrences are numerous in the area underlain by Codroy Group (Baird, 1951, 1959).

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