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LA POILE PROJECT, SOUTHWESTERN NEWFOUNDLAND

by Lesley Chorlton

INTRODUCTION

The La Poile map area is situated on the western side of the south coast of Newfoundland, halfway between Port aux Basques and Burgeo, and between 58°00′ and 58°30′ west longitude and 47°30′ and 48°00′ north latitude. It contains no roads, and is pubicly accessible by Canadian National coastal boats, which land at La Poile and Grand Bruit, private boats, or aircraft.

The geology is well exposed along the coast and in the jagged hills stretching from the coast of Grand Bruit to East Bay. Resistant rock types are as well exposed further north; however, the amount of glacial drift increases to the north and northeast, covering all but the most precipitous brooks and resistant craigs.

The area was previously mapped in the summers of 1937 through 1940 by J.R. Cooper (Cooper, 1954), and included in a compilation by J.W. Gillis (Gillis, 1972). The area covered by the Department of Energy, Mines and Resources 1:50,000 scale topographic maps of La Poile (11O/9) and part of La Poile River (11O/16) were remapped during 1977. A summary of the major units is shown in Table 1, and a map of their distribution in Figure 1.

GENERAL GEOLOGY

The rocks in this area are characterized by great lithological diversity, but can be divided into contrasting terrains separated by the east striking Grand Bruit, East Bay and Cape Ray Faults. (The Grand Bruit Fault is a new name applied to a fault running through Grand Bruit between Roti Bay and Cinq Cerf Bay.) The area south of the East Bay Fault is underlain predominantly by a suite of low grade subaerial volcanic rocks, and related intrusive and sedimentary rocks. These were cut by a variety of granitic rocks and dikes at different stages in their tectonic history, the most extensive of which include the La Poile Batholith in the west and the Chetwynd Complex in the east. An extensive porphyritic biotite granite, outcropping from Roti Bay eastward past Couteau Bay, is thought to be related to the La Poile Batholith, but may be distinct.

The area between the East Bay and Cape Ray Faults is underlain by polydeformed schistose volcanic, sedimentary, and intrusive rocks of lower middle to upper amphibolite facies; the metamorphic grade increases in general to the north and east, though it is retrogressive near shear zones. These rocks are also intruded by the La Poile Batholith in the west and central portions of the block, and by the Chetwynd Complex in the southeast.

The area north of the Cape Ray Fault is underlain by complexly deformed felsic gneiss with mafic inliers; these rocks are cut and intruded by a foliated granite, which is in turn intruded by an unfoliated, hornblende bearing, trondhjemite. Spanning the Cape Ray lineament a greenschist facies assemblage of basic volcanic rocks, sedimentary rocks, and basic volcanic rocks with abundant mafic intrusives is exposed from south to north in that order. The mafic intrusive rocks are extensive north of the Cape Ray lineament and to the east and west where they intrude the more deformed and metamorphosed rocks. The volcanic and sedimentary rocks apparently disappear to the east and continue only a few miles to the west of the map area.

All of the rocks near the Cape Ray Fault were affected by at least late stages of deformation on the fault.

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The Southern Block

The volcanogenic rocks south of the East Bay Fault are included in the La Poile Group. Although there is almost certainly some overlap, these rocks can be subdivided into three assemblages according to their order of emplacement. The earliest deposits are rhyolite, felsic pyroclastics, and sediments, intruded by a subvolcanic granite, the Roti granite, followed by mafic pyroclastics, flows and fine grained intrusives. Numerous fine grained gabbroic dikes and several bodies of coarse gabbro are intimately associated with the latter. The latest deposits seem to be rhyolite; a massive, porphyritic phase is centred around Eastern Point and flow banded and brecciated varieties are present in the highlands overlooking Cinq Cerf. A large amount of acidic crystal-rich tuff with sporadic sedimentary lenses is also present. These rocks are intruded by a porphyritic microgranite, called the La Poile Porphyry by Cooper (1954).

Lithologies very similar to those of the La Poile Group are intruded by a granodiorite along the coasts of Grand Bruit and Cinq Cerf near a prominent shear zone, the Grand Bruit Fault. This granodiorite is intruded by a porphyritic biotite granite, which is in turn intruded by the porphyritic to equigranular Chetwynd granite. The Chetwynd granite is essentially undeformed, whereas the porphyritic biotite granite displays a well to weakly developed foliation concordant with that of the Grand Bruit Fault where it is exposed near the fault; the granodiorite locally displays an additional fabric, as do its shistose inclusions. East trending dikes with foliations parallel to their margins cut the granodiorite and perhaps, the Roti granite in the vicinity of the coast.

The prominent structures of the southern block appear to be related to the deformation of the major faults. Strong shearing, sometimes in conjugate sets, is heterogeneously developed on a regional scale. In some areas, chlorite and sericite schists derived from acidic and basic volcanics are tightly interfolded, and bedding is transposed parallel the schistosity on the limbs. The shear deformation is most intense (1) south of the Highlands of Grand Bruit from Roti Bay through the bed of the Cinq Cerf River, (2) in the centre of the upland area north of the highlands, and (3) near the East Bay Fault. An additional fracture cleavage observed in some of the tuffs near the East Bay Fault, recumbent isoclinal folding of tuffs and sediments east of Georges Brook, refolding of what appear to be early slide zones in sediments near Little Roti Bay, and composite schistosities north of Grand Bruit constitute evidence of an earlier tectonic event. The nonpervasive nature of the structures and fabrics related to both events is probably a function of the high tectonic level of the rocks at the time of deformation. A late north to northwest striking crenulation cleavage is locally developed in many exposures throughout the block. This is often axial planar to fairly open dragfolds.

The Central Block

Amphibolite grade schists with igneous and sedimentary protoliths are exposed between the East Bay and Cape Ray Faults. The southern part of this terrain is underlain by a large wedge of felsic schist, referred to by Cooper as the Dolman gneiss, which may be similar to the upper La Poile tuff but of higher metamorphic grade. This wedge is bordered, and underlain, by metamorphosed graywacke,siltstone, sandstone and conglomerate, which also appear as concordant lenses and tectonic inliers. What appears in thin section to be an alkali rhyolite extrusive and injection phase forms a simple or compound sheet, probably underlying the felsic schist, but overlying and soometimes injecting the sediments. This is folded about shallowly plunging axes so that, at the present level of erosion, it covers wide outcrop areas at the flatlying fold hinges, and forms narrow tongues on the moderately to steeply dipping limbs. It outcrops as infolds in the Dolman schist and to the north of it, as do the sediments. The next belt of schists, referred to as the Bay du Nord schists by Cooper (1954), consists of semipelites, pelites, psammites, rhyolites or rhyolite tuffs with associates conglomerates, and possibly basic volcanics, metamorphosed to garnet grade and higher. Psammitic and semipelitic schists seem to dominate in the western part of the area bordering the La Poile Batholith; the schists in the central and eastern areas contain a higher proportion of metavolcanics, the felsic rocks remaining recognizable in outcrop and the mafic rocks being transformed into garnet amphibolite and anthophyllite schists.

These rocks are intruded first by the Rocky Ridge granite and porphyritic microgranite, then by a severely altered gabbro and associated diabases, the latter which are found cutting the sediments and alkali rhyolite to the south, but not the Dolman schist. They are intruded at a later stage by an "injection phase", or synkinematic granitoid, which is found with the highest grade schists, and finally by the porphyritic granite, aplite and pegmatite of the La Poile Batholith. Definitive relations between the various rock units are obscured by strong shearing parallel to the east-northeast trending grain, probably a regionally penetrative manifestation of the faults. Although it postdates an earlier deformation, the shearing locally transposes the earlier schistosity. The earlier fabric is usually preserved in the cores of porphyroblasts. A late, north to northwest striking crenulation cleavage is superimposed on these fabrics.

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This is axial planar to minor folds, which are often of chevron or box styles.

The Northern Block

As there is little continuous outcrop, except along streams, little is yet known about the northern gneisses and intrusives. The oldest rock unit in the area mapped is a layered felsic gneiss, referred to as the Keepings gneiss, which locally contains garnet and muscovite. The layering in the gneiss aappears to be folded about random axes, but is refolded locally and transposed along the east-northeast striking axial plane which is prominent regionally. Concordant bodies of amphibolite and biotite schist exposed in Morg Keepings Brook share the same tectonic history. Several granitoids, quartz veins and pegmatites intrude the gneisses. One of these, the northern granite, displays an east-northeast striking foliation, whereas later intrusions, especially fine grained, hornblende bearing monzonite and pink, granular dikes, lack fabrics. A considerable amount of remobilization is indicated in this area.

To the south of these rocks greenschist facies mafic pyroclastics, flows, and intrusives, together with plant fossil bearing slate, graywacke, sandstone, and conglomerate, are exposed. The diabase,gabbro, and diorite, which are related to the mafic volcanics, cut the foliated granitoid and gneissic terrain to the north, and provide detritus for the sediments. However, the southern contact of the mafic volcanics with the more metamorphosed Bay du Nord schists is not exposed. The sediments display a number of fracture cleavages and are locally strongly flattened, and the igneous rocks show a widely spaced to penetrative shearing which is probably related to deformation on the Cape Ray Fault, which they seem to span. These rocks may be equivalent in age and origin to the Windsor Point Group of Brown (1973, 1975, 1976, 1977). They are provisionally referred to as the Billiards Brook Group, pending further investigation.

ECONOMIC GEOLOGY

The most noteworthy metalliferous deposits in the southern part of the map area are those represented by the copper-gold showings on the Cinq Cerf River, described by Snelgrove (1935, 1938) and Cooper (1954). Sulphides of iron and copper are the most abundant ore bearing minerals. These occur in shear zones, accompanied by silicification and argillic alteration, which follow an east-northeast trend, parallel to the main faults, and are cut off by the Chetwynd granite. Similarly oriented, altered shear zones were found in the acidic volcanics north of the highlands, but no concentrations of ore minerals were found on the surface. The ore minerals at Cinq Cerf, although remobilized in part by the late granitic intrusives, may be dependent on the presence of basic volcanics. Both basic and acidic volcanics occur near the Cinq Cerf showings, whereas little or no basic rocks were found north of the highlands.

Neither the Big Pond copper deposits nor the Strickland lead-zinc-copper showings, both located near Bay du Nord on the La Poile River, were covered in the regional mapping this summer. However, amphibolite grade felsic and mafic schists, probably equivalent to those found near those showings, were traced to the northeast along the tectonic grain. Besides minor disseminations of pyrite and a few outcrops of rusty weathering, micaceous schists, no significant mineralization was noted on the surface.

The retrograded mafic amphibolites associated with the Keepings gneiss in Morg Keepings Brook and in its tributaries were locally found to be rich in pyrite aand chalcopyrite. Many mineralized boulders were also found in the area, probably belonging to the same rock unit.

Most of the acidic rocks were tested using a portable scintillometer. Only the sugary, pink weathering rhyolite, or rhyolite tuff, underlying the Dolman tuff and the Rocky Ridge granite gave readings that were appreciably above background. No analyses have yet been obtained.

Many of the coarse, porphyritic granites would make superb building stone.

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REFERENCES

Brown, P.A.

1973: The Cape Ray Fault, a cryptic suture?; Nature, Volume 245, pages 9-10.

1975: Basement-cover relationships in southwest Newfoundland; Ph.D. thesis, Memorial University of Newfoundland, 221 pages.

1976: Geology of the Rose Blanche map area (11O/10), Newfoundland; Newfoundland Department of Mines and Energy, Mineral Development Division, Report 76-5, 16 pages.

1977: Geology of the Port aux Basques map area (11O/11), Newfoundland; Newfoundland Department of Mines and Energy, Mineral Development Division, Report 77-2, 11 pages.

Cooper, J.R.

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LEGEND

15 **CHETWYND COMPLEX:** *A posttectonic suite of equigranular granite, aplite, porphyritic granodiorite and diorite.*

14 **LA POILE BATHOLITH:** *A late tectonic, porphyritic biotite or hornblende bearing granite with associated pegmatite and aplite.*

13 **PORPHYRITIC BIOTITE GRANITE:** *A foliated, biotite bearing granite with large microcline phenocrysts, exposed along the coast from Roti Bay eastward.*

12 **GRANODIORITE: 12a,** *Syntectonic, foliated, hornblende bearing granodiorite, exposed along the coasts of Grand Bruit and Cinq Cerf;* **12b,** *syntectonic, foliated, hornblende bearing granodiorite, exposed between Partridge Pond and Mouse Pond.*

11 **GARNETIFEROUS LEUCOGRANITE**

10 **GABBRO:** *Coarse grained, altered pyroxenite, gabbro, and diorite.*

9 **LA POILE PORPHYRY:** *Coarsely feldspar phyric microgranite.*

8 **ROTI GRANITE:** *Medium grained granodiorite and feldspar and/or quartz phyric microgranite.*

7 *Greenschist facies volcanic and sedimentary rocks of the* **LA POILE GROUP,** *including low grade rocks overlying the Cape Ray Fault;* **7a,** *the upper tuff;* **7b,** *rhyolite;* **7c,** *mafic volcanic rocks and subvolcanic intrusives;* **7d,** *lower rhyolite, rhyolite tuff, and sediments;* **7e,** *siltstone, graywacke, grit, slate, and conglomerate.*

6 **DOLMAN TUFF: 6a,** *Rhyolite tuff, coarser pyroclastics and associated magmatic rocks;* **6b,** *fine grained, sugary, pink rhyolite or rhyolite tuff.*

5 **MAFIC METAVOLCANICS:** *Garnet bearing, mafic amphibolites and anthophyllite-actinolite schists, locally retrograded.*

4 **ROCKY RIDGE GRANITE: 4a,** *Porphyritic microgranite, granophyre;* **4b,** *medium grained, equigranular granite.*

3 **BAY DU NORD SCHISTS: 3a,** *Rhyolite tuff, agglomerate;* **3b,** *undivided biotite-(garnet) schist;* **3c,** *mostly metapelite;* **3d,** *mostly metapsammite;* **3e,** *injected amphibolite gneisses.*

2 **NORTHERN GRANITE**

1 **KEEPINGS GNEISS: 1a,** *Felsic gneiss; injected felsic and intermediate gneiss;* **1b,** *mafic schist.*

SYMBOLS

Geological contact (defined, approximate)

Major fault (circles on downthrow side)

Drag fold with plunge indicated 10

Lineation 55

Schistosity

Bedding (tops undetermined)

Mine shaft

Showing or prospect

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1954: The La Poile-Cinq Cerf map area; Geological Survey of Canada, Memoir 276, 62 pages.

Gillis, J.W.

1972: Geology of the Port aux Basques map area; Geological Survey of Canada, Paper 71-42, 6 pages.

Snelgrove, A.K.

1935: Geology of the gold deposits of Newfoundland; Newfoundland Department of Natural Resources, Geological Section, Bulletin No. 2, 46 pages.

1938: Mines and mineral resources in Newfoundland; Geological Survey of Newfoundland, Information Circular No. 4, 149 pages.