

NOTES ON THE GEOLOGICAL MAP OF THE
BELLEFLORE PLUTON,
Fortune Bay, NEWFOUNDLAND
Project 738844 and Contract 1450, 23233-5-8876
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1. Introduction:

The geological map of the Belleflore Pluton is based on field work carried out during the 1980 and 1985 field seasons as part of a Ph.D. thesis project to study Devonian plutonism in southeastern Newfoundland. The northeast-trending elliptical-shaped pluton outcrops as 58 square km on the coastline and hills between Chapel Island (east), Salmonier Cove Pond (northwest), Great Bay d'Leau (west) and Fortune Bay (south). In general, the contact with the country rocks is as a series of 20-50 m high hills, while the western half of the pluton is relatively flat and the eastern half is hilly.

The country rocks, Belleflore Pluton and post-Belleflore intrusives have been differentiated on the map by the labels C, B, and H or M respectively. For example, "Cp" is the label for the pre-Belleflore Belle Bay Formation while "Mn" is the label for the post-Belleflore Harbour Breton Complex alkali.

2. Country Rocks:

The oldest country rocks intruded by the Belleflore Pluton are the Harbour Breton Bay, Mooring Cove and Rencontre Formations. The Belle Bay Fm. (Cb) consists of fine- to medium-grained, dark grey to black, cross-bedded sandstone and grey shale (Cb) is the Mooring Cove Fm. This formation is present between Ironskull Point and Cluett's Pond, and also on Long Island. It is overlain by the Rencontre Fm. (Cr), a cross-bedded purple sandstone, pebble conglomerate and red argillite, which is locally hornfelsed adjacent to the pluton. On Chapel Island, the formation is intruded by the "Farmer's Cove plug" (Hf), which appears to be intensely metamorphosed conglomerate of the Rencontre Formation.

Unconformably above the Rencontre Fm. are the Cambrian Chapel Island, Blue Pinon Cove and Chamberlain's Brook Formations. The Chapel Island Fm. (Ca) is a sequence of grey ripple-marked siltstone, shale and sandstones located southeast of Salmonier Cove Pond, north of Cluett's Pond, on Chapel Island and in the hills between St. Jacques and English Harbour. The best exposures of the Chapel Island Fm. - Belleflore Pluton contact are on Chapel Island where the roof zone of the granite magma chamber can be seen intruding the hornfelsed sediments. Contact metamorphism hornfels (Ch) is restricted to within a few hundred meters of the contact. These metapelites are locally host to hematite or magnetite mineralization (Cb) at the southwest end of Salmonier Cove Pond. The Chapel Island Fm. appears to be the source of many of the xenoliths within the Belleflore Pluton.

The Blue Pinon Cove Fm. (Cp), a cross-bedded orthoquartzite, with minor red and green sandstone and shale, conformably overlies the Chapel Island Fm. at Blue Pinon Cove, where the pluton adjacent to the contact (Bix) is rich (18-36% by volume) in orthoquartzite xenoliths. The Chamberlain's Brook Fm. (Cb) conformably overlies the Blue Pinon Cove Fm. and is composed of red and green shale, with quartzose sandstone and pink limestone beds. It is not in contact with the pluton.

Devonian (or earlier) conglomerates are the youngest country rocks intruded by the pluton. The Cinq Isles Fm. (Ci), located between the southwest end of Salmonier Cove Pond and Weck Cove, is a red to grey quartz-pebble and granite-pebble conglomerate with minor cross-bedded sandstone. The Great Bay d'Leau Fm. (Gb), a buff-pink, locally cross-bedded pebble and boulder conglomerate, with slate and sandstone lenses, outcrops along the southern border of the pluton. A zone of up to 1.5 km wide hydrothermally altered conglomerate (Ca) is in contact with the pluton. The contact between the Cinq Isles and Great Bay d'Leau Fms. is not exposed.

2b. Post-Belleflore: The Harbour Breton Complex and Boxey Head Basalt:

The main mass of the late Devonian Harbour Breton Complex is located north of Salmonier Cove Pond where it outcrops as two distinct stocks plus many smaller plugs, sills and dykes. Within the map area, lithologies found within the main body of the complex outcrop south of Salmonier Cove Pond, as sills located southwest of Weck Cove (Hn) and west of English Harbour (Hn), and as separate outcrops within the main body of the Belleflore Pluton. The lithologies vary from red to orange, locally-microcrystic quartz-feldspar rhyolite porphyry (Hn) to fine-grained K-feldspar-phryic granite (Hr) and fine- to medium-grained biotite-hornblende seriate granite (Hg). Alaskite (alaskite-feldspar granite) of three lithologies occurs within the map area. (Hna) dark red with a mafic content of 15% (Hna) red-orange, medium-grained, equigranular and microcrystic; and, (Hnb) orange alaskite with seriate texture. At the contact between the alaskite and the Chapel Island Fm. sediments is found an orange-red microcrystic contact-zone microgranite with local phenocrysts of quartz, K-feldspar, biotite and/or hornblende, and biotite schlieren, with local zones of white microgranite associated with quartz and epidote veins, clay minerals and disseminated molybdenum mineralization.

The Harbour Breton Complex has been intruded by post-Devonian dykes (Hd) petrographically similar to the Carboniferous Boxey Head Basalt, (Hb), which outcrops along the coast between English Harbour West and the town of Boxey. The dykes are composed of aphanitic and fine-grained green-black diabase and host to spherical cm-wide enclaves. The Boxey Head Basalt unit consists of fine- to medium-grained dark grey to purple amygdaloidal basalt flows and pillows.

3. The Belleflore Pluton:

The Belleflore Pluton consists of two intrusive phases: B1, the main mass of the pluton; and B2, located between Blue Pinon Cove and Belleflore, and outcropping on Chapel Island. The best exposures of both phases are along the coast between Blue Pinon Cove and Ironskull Point, and on Chapel Island. Inland outcrops located atop forested hills and in stream valleys are generally altered and lack the detail available along the coast.

As an exception to this rule, the contacts with country rocks are exposed in cliff faces from Ironskull Point to north of Three Mile Pond, and from English Harbour West to St. Jacques. The chill margin of the first phase consists of orange-red quartz-feldspar rhyolite porphyry and microcrystic microgranite (B1r) with dykes (Bdr) of similar composition intruding the country rocks. The chill margin grades into a quartz (B1c) border unit (B1c), host to country rock xenoliths (18-28% by volume) and fragments of unit B1r (5-18% by volume). These units (B1r and B1c) are absent in the south and west where the pluton is in contact with the Great Bay d'Leau Fm. Here, and gradational from the B1c unit, is the dominant lithology of the pluton, an enclave-rich, fine-grained grey-pink quartz monzonite and granodiorite of the first intrusive phase (B1g). This unit is homogeneous throughout the map area except for variations in the orientation of magmatic enclaves. Locally, the B1g unit may be fractured, altered and occasionally cut by cm-wide dykes of fine and/or calcite veins. The altered rock has been labelled B1a because the alteration is associated with later intrusion of the Harbour Breton Complex.

The second phase consists of orange-red quartz-feldspar rhyolite porphyry and microcrystic microgranite (B2r) with dykes (B2d) of similar composition intruding the first phase of the pluton. The best exposures of B2r occur on Chapel Island, where the microgranite is rhythmically layered (chilled) against the B1g, and in the hills north of St. Jacques. Layers of red microgranite dykes (B2d) with quartz-feldspar rhyolite porphyry cores and brown-green dacitic margins have been associated with the second phase. Within these dykes, margin and core material may appear as enclaves within the other and in the transition zone. The B1g north of St. Jacques is altered to medium-grained green-brown granodiorite (B1a).

4. Structural Geology:

North-, northwest- and northeast-trending faults cut the country rocks but more difficult to trace into the pluton. Within the country rocks they are defined by shear-sense and slickensides. A possible explanation for the consistently northward trend of Belleflore granite hills and the intervening valleys and ponds may be the continuation of these faults into the pluton. Major northeast-trending faults are parallel to directions of regional tectonic shear and act as foci for the intrusion of sills associated with the Harbour Breton Complex. Subsequent northwest-trending normal faults offset earlier faults.

5. Economic Geology:

The Belleflore Pluton is devoid of any sulphide, oxide or significant mineralization of any type. Dark purple fluorite veins (cm-wide) intrude the rhythmically chilled roof of the second phase on Chapel Island, and may be associated with rare quartz breccia. Within the country rocks, pyrite occurs as small (2.1 to 1 cm) crystals in the Chapel Island Formation at the south end of Salmonier Cove Pond. Magnetite occurs within the Chapel Island Fm. in the hills between English Harbour and Blue Pinon Cove, and in the Mooring Cove Fm. rhyolite at Ironskull Point. Calcite veins in the Belleflore Pluton are probably associated with country-rock hydrothermal alteration by the Harbour Breton Complex, and disseminated molybdenite crystals (2.1 to 1 cm) are associated with the contact microalkali (Hm).

6. References:

Furey, D.J., Geology of the Belleflore Pluton, Southeast Newfoundland, in Current Research, Part A, SSC Paper 85-1A, p. 151-156, 1985.
Furey, D.J. and Strong, D.F., Geology of the Harbour Breton Complex, Newfoundland, in Current Research, Part A, SSC Paper 85-1A, p. 157-164, 1985.

