GRANDYS LAKE (110/15), NEWFOUNDLAND

by

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INTRODUCTION

Preliminary 1:50,000 scale mapping of the Grandys Lake area southeast of the Long Range Fault was started during 1979 (Chorlton, 1980a) and completed during the 1980 field season. Knight (1975) completed a 1:50,000 scale map of the Carboniferous rocks northwest of the fault. The area was previously included in a 1:250,000 scale reconnaissance and compilation map (Gillis, 1972). The adjoining Codroy (110/14, southeast part; Brown, 1976a), Port aux Basques (110/11; Brown, 1977) Rose Blanche (110/10; Brown, 1976b), La Poile River (110/16; Chorlton, in press) and La Poile (110/9; Chorlton, 1978) areas have been mapped on a 1:50,000 scale. Phair (1949) produced a 1:63,360 scale map of parts of the Codroy and Port aux Basques areas, and Riocanex has mapped their current holdings in the Port aux Basques, Rose Blanche, and Grandys Lake areas on a 1:19,680 scale (Harris, 1978, confidential).

The map area is not accessible by road, although numerous all-terrain vehicle tracks crisscross the western and northern ground; nine hunting cabins were noted. Most ponds are too shallow to be used by float planes so helicopters are the most viable form of rapid access. Mapping for this project was accomplished by traversing radially from helicopter-positioned fly camps, and by spot checking using a helicopter at the end of the field season.

GENERAL GEOLOGY

The oldest rocks in the area are mafic meta-igneous rocks (1) and medium to high grade metasedimentary rocks (2). These were variably deformed and brought to their regional metamorphic peak before the intrusion of voluminous tonalite, granodiorite, and granite (3) and, possibly, the Cape Ray Granite (4), a coarse grained quartz monzonite. Further deformation at medium to high metamorphic grade was responsible for the prominent regional fabric. This was followed by the emplacement of several leucogranite stocks (5, 8) and one porphyritic granite to diorite body (7), and by the eruption and deposition of the Windsor Point Group (6), a Devonian volcanic and sedimentary assemblage. The Windsor Point Group was sited along the Cape Ray Fault, a major fault which passes diagonally through the area. Further deformation involved the refolding of earlier structures, locally intense transposition, and the deformation of the Windsor Point Group within the Cape Ray Fault zone, bringing it into fault contact with the metamorphic terrain to the south. A major shear zone between the Long Range and Cape Ray Faults was reactivated at this time. Late rhyolite and diabase dikes postdate this deformation.

Brown (1973) suggested that the Cape Ray Fault may be a cryptic suture which juxtaposed Precambrian rocks from opposite sides of the early Paleozoic proto-Atlantic Ocean. Until Precambrian ages for the oldest rocks on either side of the fault are confirmed, this hypothesis is difficult to support, particularly because the metasedimentary schists and gneisses southeast of the fault strongly resemble parts of the Lower Paleozoic Bay du Nord Group (Chorlton, 1979, 1980a, in press). In this report, similar lithologies from both sides of the fault have been lumped together pending further investigation, and an attempt has been made to describe spatial variations on either side of the fault.

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LEGEND

DEVONIAN

8 Medium to coarse grained, pink, biotite leucogranite; associated aplite and pegmatite restricted to major shear zones.

7 Medium grained diorite to megacrystic granite and quartz monzonite.

6 Windsor Point Group: Deformed, low grade felsic and mafic volcanic rocks with sedimentary intercalations.

5 Fine grained, equigranular, pink granite with local carbonate-rich breccia and fracture fillings.

PRE-DEVONIAN?

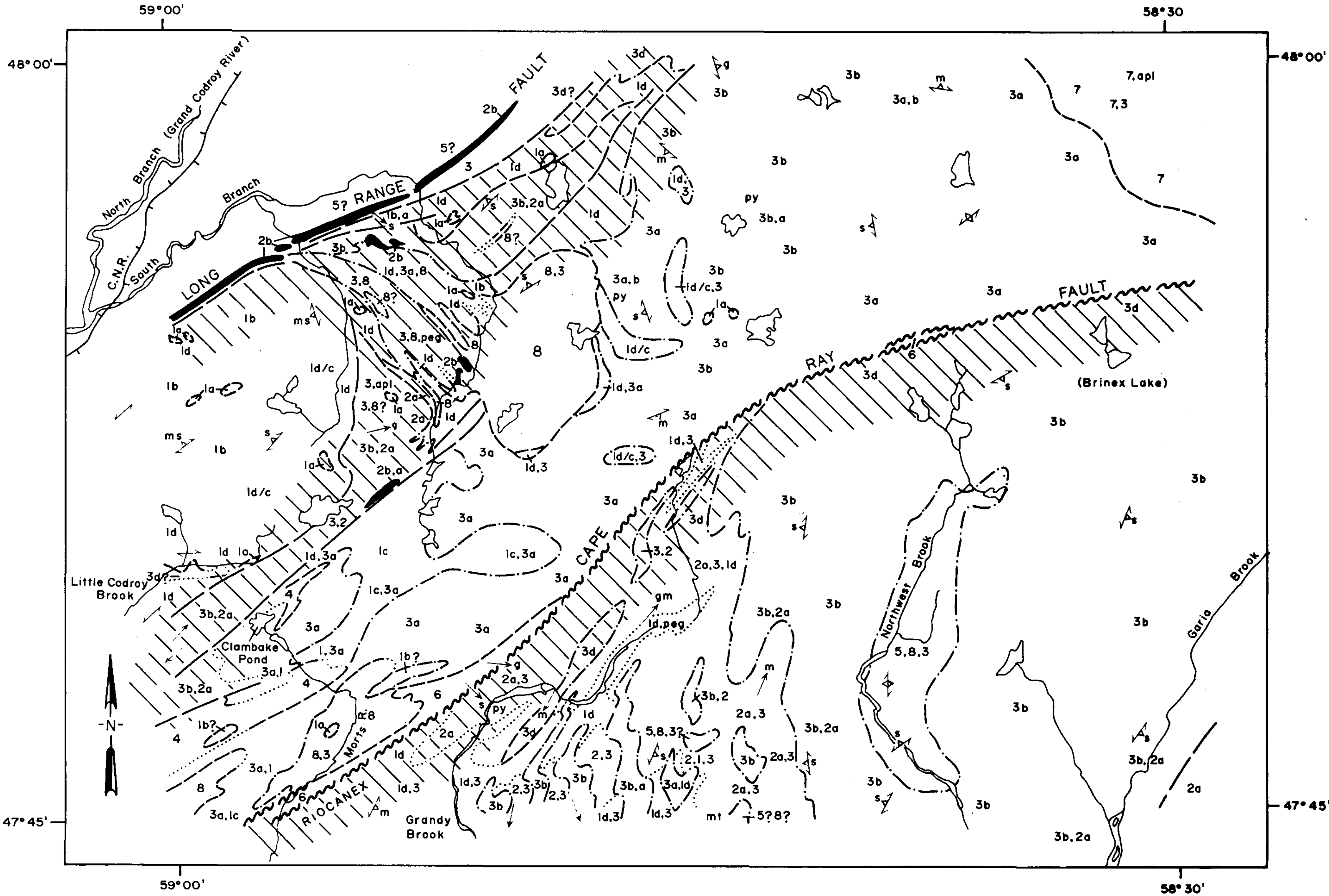
4? Cape Ray Granite: Megacrystic quartz monzonite; augen gneiss.

3 Synkinematic, equigranular, locally gneissic granitoid rocks showing local remobilization; 3a, tonalite with largely mafic inclusions; 3b, biotite granodiorite to granite with largely metasedimentary inclusions; 3c, coarsely garnetiferous granitoid with mixture of amphibolitic and metasedimentary inclusions; 3d, pink to white, muscovite-rich phases.

ORDOVICIAN AND EARLIER?

2 Amphibolite facies polydeformed metasedimentary rocks; 2a, largely semipelitic, but locally pelitic or quartzofeldspathic schists; 2d, marble, carbonate.

1 Variably metamorphosed and deformed mafic igneous rocks; 1a, altered dunite, peridotite; 1b, layered gabbro with anorthosite bands; 1c, unlayered gabbro, coarse grained subophitic gabbro, associated diabase, basalt; 1d, coarse to fine grained amphibolite with little or no remnant igneous texture; includes local anthophyllite and garnet bearing veined phases.


59°00'
58°30
48°00'
47°45'
59°00'
58°30'
North Branch (Grand Codroy River)
South Branch
C.N.R.
LONG RANGE FAULT
CAPE RAY FAULT
RIOCANEX
(Brinex Lake)
Little Codroy Brook
Clambake Pond
Morts
Grandy Brook
Northwest Brook
Garia Brook
-N-

Mafic and ultramafic rocks (1)

The mafic and ultramafic rocks are informally assigned to the Long Range Mafic-Ultramafic Complex (Brown, 1976a, 1976b, 1977). They include metamorphosed peridotite and dunite (1a), layered gabbro and anorthosite (1b), medium to coarse grained gabbro and pyroxenite with associated diabase or basalt and possibly some tuffaceous rocks (1c), and amphibolite with well developed regional tectonite fabrics (1d). The layered sequence (1b) is largely separated from the nonlayered complex (1c) by a prominent shear zone extending northeast from Little Codroy Brook in this map area; these units are part of a continuous sequence in the Codroy and Port aux Basques areas (Phair, 1949; Brown, 1976a, 1976c). Altered ultramafic rocks (1a) occur both within the layered sequence and throughout the area occupied by segments of the nonlayered complex (1c) included in synkinematic granitoid rocks (3).

Regional metamorphic modification is variable. Mafic rocks, especially those not engulfed in granitoid rocks, are well tectonized in and near shear zones. The layered sequence (1b) between the Long Range Fault and the "Little Codroy" shear zone appears little affected by regional metamorphism in the northwest, but grades into amphibolite (1d) with a strong L-S fabric toward the shear zone. A narrower highly tectonized belt occurs along the Long Range Fault. To the southeast of the shear zone, rafts of mafic rock surrounded by tonalite (3) have locally well preserved igneous textures which grade into weak to moderately well developed tectonite fabrics. In many places, mafic xenoliths are apparently undeformed, although the enclosing granitoid rock is foliated. The amphibolite within the shear zone south of the Cape Ray Fault displays a strong tectonic fabric, whereas undeformed metagabbro and coarse grained metapyroxenite occur as rafts in the synkinematic and younger granites along Northwest Brook.

The ultramafic rocks form rubbly, brown weathering outcrops within the layered sequence and the granitoid and inclusion complex to the east. They include partly to thoroughly altered wehrlite, feldspathic dunite, dunite, and harzburgite. Disseminated chromite is common, and crosscutting serpentine and enstatolite veins occur locally. Rodingite accompanies one serpentinite and metagabbro exposure near the "Little Codroy" shear zone, and was also observed within the layered gabbro wedge in the northern part of the shear zone and in the cliffs overlooking Mollichignic Brook.

The layered gabbros consist of gabbro, olivine gabbro, troctolite, anorthositic gabbro, and anorthosite. Bands range from 5 cm to 100 cm thick. Thin, rhythmic, graded beds were observed in a piece of troctolite float. A poorly to well developed foliation parallel or subparallel to the layering may reflect either a primary igneous lamination or the effects of high temperature deformation. Anorthositic gabbro bands have a cumulate texture, with poikilitic crystals of augite and magnetite surrounding plagioclase laths. Ferromagnesian-poor anorthosite or plagiogranite occurs as sheets mainly parallel to the layering. However, similar rock was observed locally crosscutting the layering and also forms the abundant plagiogranite stringers which cut the nonlayered gabbro complex east of the "Little Codroy" shear zone. Several quartz-feldspar-biotite pegmatites and one augite-hornblende-plagioclase pegmatite were observed in the central part of the layered block.

The nonlayered gabbro complex occurs as rafts of several kilometres in diameter and smaller inclusions in the granitoid terrane east of the "Little Codroy" shear zone. Two facies of this complex can be broadly distinguished in some areas: (1) mainly coarse and medium grained subophitic metagabbro intruded by metadiabase; and (2) possibly extrusive and hypabyssal mafic volcanic rocks. The former is similar to mafic rocks underlying the Blue Hills of Couteau (Chorlton, 1980b), and the entire granitoid-mafic rock assemblage is remarkably similar to the Southwest Brook formation mapped by Herd (personal communication, 1980) in the Puddle Pond area (12A/5).

The massive metagabbro forms dark weathering outcrops of clinopyroxene metagabbro, metapyroxenite, and actinolite metagabbro irregularly cut by metadiabase or microdiorite. These rocks are net veined locally by profuse stringers of plagiogranite. The clinopyroxene metagabbro ranges from coarse to medium grained; the coarse grained phase is characterized by plagioclase laths ophitically to subophitically enclosed in large, uralitized clinopyroxene crystals, and the medium grained phase shows a less well developed subophitic texture. Medium grained metapyroxenite occurs in several areas and contains minor interstitial plagioclase. The actinolite metagabbro occurs as very coarse grained bands or lenses. The plagiogranite is white weathering and consists largely of plagioclase with minor quartz, sparse poikilitic crystals of pale green amphibole, and small, conspicuous, brown crystals of sphene, zircon, or allanite. East and southeast of Clambake Pond (local name) a very coarse breccia of many of the above rock types has been intruded by tonalite (3) and Cape Ray Granite (4).

Patches of metamorphically reconstituted, possibly extrusive and hypabyssal mafic volcanic rocks are intruded and incorporated into the granitoid terrain east of the large ovoid plug of late granite (8) in the north. Pillowlike structures were noted in one area. Most of these rocks consist of amphibolitized aphyric to plagioclase porphyritic basalt and/or diabase, medium grained metagabbro, and aphanitic, green to buff, color banded metatuff. The granitoid complex next to these patches contains abundant xenoliths of metabasalt or metadiabase, well banded metasedimentary schist, and deep red, chunky microcrystalline-garnet-quartz rock (ferruginous metachert ?).

Amphibolite with well developed L-S to S-L fabrics occurs mainly along or within shear zones. Extremely fine grained, black amphibolite with a steeply plunging mineral lineation and strong schistosity occurs along the southeast margin of the layered block. This amphibolite is cut by magnetite-rich plagioclase-clinopyroxene-hornblende pegmatite which appears to be less deformed and recrystallized than its host, and by pink, foliated granite. Within the northern part of the adjacent "Little Codroy" shear zone, similar fine grained amphibolite is tectonically interleaved with highly sheared pink granite (3d?) and potassium feldspar porphyritic granite (8b?). A more massive, tectonically bounded wedge of metagabbro, anorthosite, serpentinite, and rodingite with a steeply plunging L-fabric displays remnant igneous layering. These amphibolites apparently swing around to the northeast. Coarse grained anthophyllite and garnet-bearing amphibolite, interbanded with garnetiferous granitoid (3), appears locally at the eastern side of this shear zone.

Other noteworthy amphibolites occur within the shear zone to the southeast of the Cape Ray Fault. S-L tectonite fabrics in green hornblende-plagioclase rocks are locally overgrown by acicular amphibole; some of these rocks display spectacular development of gedrite and garnet. Several amphibolite outcrops exposed in a west-flowing tributary of Grandys Brook display a thick banding which reflects the alternation of coarse grained, feldspathic metagabbro and medium grained, relatively mafic metagabbro; this layering may have had a primary igneous origin.

Metasedimentary rocks (2)

Most of the pre-Devonian metasedimentary rocks are semipelitic to pelitic schist and migmatite, which commonly grade into injection gneisses and, thence, into metasedimentary inclusion-rich granitoid rocks (3). Siliceous siltstone is exposed in the southeastern corner of the area. Feldspathic quartzite and local carbonate inclusions are locally present in the granitoid terrain in the north-central part of the map area. Metachert (?) and banded semipelitic schist are associated with mafic inclusions in the granitoid terrain in the neighboring area to the south. Marble bands follow the face of the Long Range Fault escarpment, and are boudinaged and folded along the "Little Codroy" shear zone.

The semipelitic rocks underlying the area southeast of the Cape Ray Fault and within the southern part of the "Little Codroy" shear zone consist largely of garnet-biotite-quartz±sillimanite schists, commonly with thin migmatitic veining and thicker granitic injections. A megabreccia consisting of disoriented, previously folded, migmatite blocks underlies several hills at the apparent flexure of the latter shear zone. Kyanite appears near the Cape Ray Fault, and coarse grained staurolite-garnet-aluminosilicate-biotite-quartz schists are exposed between Grandys Brook and the fault.

The siliceous siltstone in the southeastern part of the area weathers buff to gray and is well banded, with beds 2 to 5 cm thick. It comprises the metasedimentary screens in the adjacent granitoid rock.

The quartzofeldspathic rocks in the north vary from well sorted quartzitic sandstone to fine grained, sheared felsite of unknown origin. Locally, the latter was thought to resemble portions of the Keepings Gneiss described by Cooper (1954) and Chorlton (in press).

The metachert (?) occurs as deep red, chunky inclusions in highly garnetiferous granitoid rock, and consists of microcrystalline intergrowths of almandine garnet and quartz. Associated banded semipelitic schists are both garnetiferous and garnet-free. Partly migmatized intraformational breccia composed of disoriented, angular, finely laminated blocks 5 to 10 cm in diameter was observed locally. Rare inclusions of siliceous schist were also noted.

The marble is a white, yellow, and pale gray weathering, very deformed and recrystallized carbonate grading to carbonate-diopside rock with locally abundant detrital quartz grains and pebbles. Some exposures are characterized by abundant tiny orange garnets, and others by fine grained graphite. In the Cape Ray Fault zone, the marble forms thick, openly folded beds or layers associated with carbonaceous semipelitic schist, garnet biotite gneiss, and amphibolite. Some of the carbonate-rich xenoliths in the granitoid rock along the northern margin of the area are banded.

Synkinematic granitoid rocks (3)

This term is applied to the voluminous, foliated, equigranular tonalite, granodiorite, and granite which was emplaced into the metabasic and metasedimentary terrain after the possibly diachronous attainment of the regional metamorphic peak. Hosts and inclusions range from entirely mafic meta-igneous rocks in some areas to largely metasedimentary in others, and many show evidence of regional metamorphism and even local migmatization before final incorporation into the granitoid phase. Some also show evidence of reaction and limited partial melting during postemplacement deformation. The proportion of inclusions to granitoid varies between 5% and over 70% within short distances. The granitoid rocks may have ranged considerably in primary composition and texture, and were variously modified by penetrative deformation, recrystallization, and metasomatism at medium to high grade. Thin, relatively coarse grained, leucocratic stringers cutting the main granitoid phase in some areas possibly reflect limited remelting.

The transition from one granitoid and inclusion assemblage to another is only abrupt across major structural discontinuities. In general, tonalite is the dominant phase north of the Cape Ray Fault and tonalite, granodiorite and granite are all well represented south of it.

North of the Cape Ray Fault, coarse grained, weakly foliated biotite tonalite predominates where the rafts and inclusions of mafic rock make up most of the outcrop area; however, the tonalite displays a penetrative schistosity with an accompanying reduction in grain size in many areas along the Cape Ray Fault. Highly schistose, sparsely garnetiferous granodiorite contains many metasedimentary, and a few amphibolitic, partly assimilated xenoliths in the north-central part of the area. This phase becomes very coarsely garnetiferous to the south where metasedimentary and metamafic xenoliths intermingle, but garnet-poor where the inclusions are exclusively mafic. Gneissic banding is well developed toward the west in this terrain; sillimanite replaces the micaceous bands near the late granite plug (8b). Gneissic gray tonalite and/or granodiorite with screens of semipelitic schist along the "Little Codroy" shear zone passes northeastward into a locally pink, foliated granite and metasedimentary schist cut by rare veins of unfoliated equigranular granite (8?). Coarsely garnetiferous, strongly rodded granitoid schist underlies Stag Hill in the apparent bend of the "Little Codroy" shear zone, southwest of the hills underlain by megabreccia mentioned in the previous section. In the northern part of this shear zone, cataclastically foliated, garnet-free, pink granite is associated with highly deformed amphibolite (1d) and porphyritic granite (8?); gray, garnetiferous granitoid schist is associated with metasedimentary schists. Pink, fine grained, gneissic granite also occurs in Little Codroy Brook, where it intrudes metabasic rocks.

South of the Cape Ray Fault, the Rose Blanche Granite (Brown, 1975, 1976b) is the most abundant phase in the eastern half of the area. This body consists largely of medium grained, moderately to highly schistose, biotite-rich, gray tonalite and granodiorite characterized locally by a few small plagioclase phenocrysts. The penetrative schistosity grades westward into a well developed gneissosity, and migmatite screens become more abundant. Pink weathering, locally muscovite-bearing, gneissic granite occurs in sheets along the west end of the Cape Ray shear zone, and may possibly be correlated with the Port aux Basques Granite (Brown, 1976b, 1977). Similar, foliated, pink leucogranite appears to cut the gray granodiorite further east, particularly around the zone of younger granite intrusion along Northwest Brook. The Rose Blanche Granite becomes coarse grained and rich in coarse muscovite and porphyroclastic feldspar along the eastern half of the Cape Ray shear zone. Blebs of disseminated magnetite occur locally in both the gray and pink foliated granites.

Cape Ray Granite (4)

The name Cape Ray Granite (Brown, 1972, 1977) is here tentatively applied to a coarse grained, porphyritic granite to granodiorite which cuts the synkinematic granitoid, metabasite, and metasedimentary schist complex in the southwest part of the map area. The least deformed exposures are characterized by 3 cm and larger alkali feldspar and plagioclase phenocrysts in a mildly foliated, medium grained granodioritic matrix. The intrusion lacks phenocrysts in rare patches near its northeast margin, but the coarse grained granitic dikes which cut the older rocks to the north are very porphyritic. Most of the unit has been severely deformed in this area to produce a pink to gray, feldspar "augen" schist.

Fine grained pink granite (5)

Pink, fine grained, granular granite and patches of slightly younger(?), pink, medium grained granite intruded the Rose Blanche Granite and older rocks in a broad intrusion zone centered around Northwest Brook. Discrete lenses of the fine grained granite cut the Rose Blanche Granite along and across the regional tectonic grain away from the main intrusion zone, and also occur in the La Poile River area (Chorlton, 1979, in press).

The fine grained granite consists of an allotriomorphic granular intergrowth of quartz and reddened alkali feldspars and plagioclase with less than 10 percent combined muscovite and chloritized biotite. Coarser grained granite is mineralogically similar, but may contain more coarse muscovite. Many exposures are affected by easterly, and rarely northerly, trending fractures. Zones of brecciation are common. Carbonate is abundant both as fracture and void fillings, and as breccia matrix. Shear and fracture zones in Northwest Brook locally show yellowish alteration and pervasive reddening of the late granite and the Rose Blanche Granite host. Scintillometer readings of two to three times background (total counts) were obtained, but did not correlate consistently with alteration.

Windsor Point Group (6)

The Windsor Point Group was defined by Brown (1975, 1976b, 1977) as a series of metasedimentary and metavolcanic rocks that overlies the Cape Ray Fault. The unit has been correlated with a similar assemblage, the Billiards Brook formation, which is exposed within the fault zone in the La Poile River area (Chorlton, 1979, in press) and has recently been mapped in the King George IV area (Kean and Jayasinghe, this volume). Latest Early Devonian or early Middle Devonian plant fossils (W.R. Forbes, personal communication; Dorf and Cooper, 1946) have been found in the latter areas. Therefore, the Windsor Point Group is also considered to be Devonian.

In the present area, the Windsor Point Group is exposed within the Cape Ray Fault zone in the southwest, but is pinched out along the fault in the central part of the area. A zone of mylonitization marks its contact with the metamorphic and granitoid terrain to the south. The presence of foliated tonalite, granodiorite, and metabasite clasts in Windsor Point Group and Billiards Brook formation conglomerates indicates unconformity with the granitoid inclusion terrain to the north (Brown, 1975, 1977; Chorlton, in press; Kean, personal communication). Its relationship with the medium grained pink biotite granite (8) is controversial (C. Mackenzie and D. Wilton, personal communication) since the contact coincides with a zone of fault gouge; however, the writer tentatively interprets the granite to be intrusive and the small clasts of fine grained pink granite contained in some of the clastic rocks to originate from the Windowglass Hill granite, a subvolcanic granite in the Rose Blanche map area. All three units are probably similar in age, however.

The Windsor Point Group is represented in the present area by felsic and mafic volcanic rocks, and sedimentary (including volcaniclastic) rocks. The felsic volcanic rocks include quartz porphyry, aphyric rhyolite tuff, quartz crystal tuff, and siliceous ash-flow tuff or agglomerate. Patches of rhyolite in the southwest and northeast are brecciated, and a rhyolite band along the southern contact with the late, red, biotite granite (8) is intensely silicified and locally incorporated in fault gouge. The mafic volcanic rocks include mafic flows and/or dikes, and mafic tuffs. Although the mafic flows are highly sheared in most places, carbonate and chlorite filled vesicles were recognized locally. Mafic and felsic tuffs(?) are finely interbanded to the southwest of the map area. Chlorite schists exposed along the south side of the belt contain abundant carbonate and are believed to represent mafic volcaniclastic rocks. The sedimentary rocks consist of conglomerates which contain fragments of volcanic rock, fine grained granite (Windowglass Hill Granite?), and sedimentary rock. A conglomerate in the southwest corner of the area contains abundant angular fragments of felsic mylonite and pink felsite. The siltstone associated with ash-flow tuff is highly siliceous and thickly bedded. Graphitic slate occurs as interbeds in the conglomerate and volcanic rocks.

The Windsor Point Group is highly deformed within the Cape Ray Fault. The mafic volcanic rocks and associated chloritic schists are strongly foliated, and may be difficult to distinguish from older, mylonitized amphibolite with which they are locally in fault contact. A weak to strong planar fabric developed in most of the rocks is commonly chevron or kink folded, and an associated crenulation cleavage appears in some exposures. Rhyolite in closest contact with the fault contact to the south is brecciated.

Diorite and porphyritic granite and quartz monzonite (7)

Unit 7 refers to a body of diorite, porphyritic granite and porphyritic quartz monzonite which intrudes the foliated tonalite-metabasite terrain in the northeast corner of the map area. It extends into the adjacent corner of the La Poile River area (Chorlton, in press). Many screens of the tonalite and metagabbro/amphibolite complex are enclosed in the body, and patches of the intrusive diorite are exposed in the host terrain away from the main pluton, making the precise boundary hard to define.

Two main phases in this area, diorite and coarse porphyritic granite and porphyritic quartz monzonite, apparently grade into one another through a zone of increasing feldspar phenocryst or porphyroblast content, locally within several metres. The granite is mafic rich and contains large euhedral alkali feldspar laths with tiny altered plagioclase inclusions. The quartz monzonite contains zoned plagioclase phenocrysts in addition to the above assemblage. The diorite consists of a generally medium grained intergrowth of plagioclase, black hornblende, and up to 10 percent biotite. A weakly subophitic texture is developed in the finest grained phases. In many areas, sugary, pink aplite is associated with the intrusion and locally cuts the older rocks.

Pink, perthite-rich, biotite granite (8)

These granites form three plugs which truncate the main penetrative fabrics of their hosts north of the Cape Ray Fault. They are considered related in origin to several other granite plugs on either side of the Cape Ray Fault in adjacent map areas, being similar in lithology and timing of emplacement, *i.e.*, Petites Granite and Isles aux Morts Brook Granite to the south (Brown, 1976b), Chetwynd Granite (Cooper, 1954; Chorlton, 1978, 1980b), and several plugs on the north side of the fault in the La Poile River area to the east (Chorlton, in press). These granites are locally sheared and may be accompanied by minor pegmatite and aplite where they transect major late shear zones. Elsewhere, they are unfoliated and associated only with very fine grained quartz and sanidine porphyry dikes which may extend for over 5 km from the main body along planes of weakness.

In general, the granites are characterized by subequal to high modal ratios of perthitic alkali feldspar to plagioclase and by less than 5 percent biotite, the main ferromagnesian constituent. The bodies may range in texture from a medium grained, equigranular granite in which quartz tends to form relatively large, rhombic domains to a coarse grained, subequigranular granite in which the perthite laths tend to be subhedral and slightly larger than other grains, imparting a weakly feldspar-phyric aspect.

In the Chetwynd and Petites Granites, the medium grained phase grades into the more abundant coarse grained phase. The two bodies in the southwestern part of this map area, as well as the nearby Isle aux Morts Brook Granite, are both composed only of the medium grained phase; the larger ovoid plug to the north is composed of the coarse grained variety with a few small marginal patches of medium grained granite. The latter plug is also affected by a wide shear zone traversing its northwestern margin; this is probably related to a late stage of activity along the "Little Codroy" shear zone, along which apophyses of the porphyritic granite have been deformed. Shear zones related to the adjacent Cape Ray Fault also affect one of the southwestern plugs.

Late dikes (not shown)

Several slightly altered mafic and felsic dikes cut across the preceding units, following late northeast and east-southeast fracture trends. The mafic dikes are diabasic and have chilled margins. One atypical, north-trending mafic dike exposed along Northwest Brook contains highly reddened feldspars and substantial magmatic biotite. All of the dikes are altered, but are noticeably rich in sphene. The rhyolite dikes contain small twinned phenocrysts of plagioclase in a biotite-bearing microgranitic matrix, with or without fluidal textures. A lens of brecciated and kaolinitized rhyolite in Northwest Brook may represent a brecciated rhyolite dike, a volcanic breccia related to the Windsor Point Group, or a fault gouge related to the intrusion of the late, pink, carbonate-rich leucograntie (5).

STRUCTURAL AND METAMORPHIC EVENTS

It is probable that the timing of structural and metamorphic events is at least diachronous across a belt as wide as that between the Long Range and the south coast in the La Poile area. However, the sequence of events suggested by data from the neighboring areas (*e.g.* Brown, 1976b, 1977; Chorlton, in press) seems compatible so far with the field geology of the present map area. The order of structural and metamorphic events, with local age restraints, is summarized as follows:

1) The metavolcanic pile in the La Poile and La Poile River areas has been interpreted as part of a calc-alkaline island arc (Chorlton, in press) and corresponds to subduction (probably from the northwest) and accompanying deformation. Ages of 449 ± 20 Ma using the U/Pb zircon technique (Dallmeyer, 1979) and 459 + 18 Ma using the Rb/Sr whole rock technique (Wanless, personal communication) have been derived for different facies of the pile.

2) The metabasic and metasedimentary rocks (and nearby metavolcanic rocks) were deformed once and brought to their metamorphic peak(s) before the final emplacement of the voluminous synkinematic granitoid magmas. At least some of these granites were emplaced near their source (Dingwell, 1980), *i.e.*, derived from a little deeper in the metamorphic pile. The most common record of the earlier deformation is in the inclusion trails found in amphibolite facies porphyroblasts south of the Cape Ray Fault (Brown, 1975,1976a; Chorlton, in press). Those north of the fault have not yet been examined. The early

deformation affected the dated Middle(?) Ordovician rocks in the southeast, and must be Middle(?) Ordovician or later in that particular area.

3) The granitoid terrain was deformed and recrystallized under the prevailing medium to high grade metamorphic conditions, and developed a penetrative schistosity to gneissosity parallel to the strong S_2 schistosity of its hosts. This fabric strikes north to northwest in many areas. Block and/or strike-slip faulting probably accompanied the eruption and deposition of the Lower to Middle Devonian Windsor Point Group along the Cape Ray Fault, and postdated the second regional deformation. This suggests that the early multiple deformation and granitoid emplacement occurred before the Early or Middle Devonian.

4) The main effects of the third deformation are the deformation of the Windsor Point Group within the Cape Ray Fault, the folding of the strong regional fabric south of the fault and in the 'Little Codroy' shear zone, the locally intense transposition, or 'reworking', of earlier fabrics in the Rose Blanche (Brown, 1975, 1976b) and La Poile River (Chorlton, in press) areas, and the reactivation of major shear zones and faults. The metamorphic grade was maintained in the pre-Devonian rocks south of the Cape Ray Fault until this event. The Windsor Point Group was juxtaposed against the metamorphic terrain to the south, probably by a combination of left lateral strike-slip and reverse dip-slip fault movement. The Isles aux Morts Brook Granite, one of the late, pink, biotite leucogranite plugs (8), apparently postdated the refolding (Brown, 1976b), but all of the other plugs were affected by the shearing and/or faulting (Brown, 1976b, 1975; Chorlton, 1978, 1980b, in press). It is possible that the northernmost plug in the present area was actually synchronous with some of the late activity in the 'Little Codroy' shear zone. The Chetwynd Granite gives a U/Pb zircon date of 377±20 Ma in the La Poile - La Poile River area (Dallmeyer, 1979). Dates for the other granites may provide information about the timing of the third deformation event and the possibly diachronous geological history across the Cape Ray Fault.

5) Late north and east-northeast striking block faults and warping about north-south axes affected the rocks in this area (Brown, 1976b, 1977; Chorlton, in press). The late dikes appear to have been emplaced along a conjugate fault or fracture system. Folding and faulting of the Carboniferous strata to the west of the Long Range Fault (Knight, 1975, 1976) and subsequent thrusting of the rocks east of the Long Range Fault over warped Carboniferous rocks (Mook, 1926) indicate that the late activity must be Carboniferous or younger.

MINERALIZATION

Assessment of the Isle aux Morts Brook gold prospect along the Cape Ray Fault by Riocanex continued during 1980. This prospect occurs on a Brinex concession area, and is jointly optioned by Riocanex, Phillips Management, and Brinex. Sulphide showings in chlorite schists, which led to the exploration, first by Phillips Management, then by Amex Exploration, and finally by Riocanex, were found in the fault gulch near the high angle bend in Isle aux Morts Brook by George Bayly (prospector). The mineralization of current interest consists of gold-bearing quartz sulphide veins within the main shear zone of the fault (present area) and in the Windowglass Hill granite (Rose Blanche area to the south) (Bucknell *et al.*, 1980). According to Bucknell *et al.* (1980), metalliferous solutions originating from the granite migrated through the shear zone and encountered graphite bearing chlorite schists, an environment which is believed to have favored precipitation.

We did not find any significant new mineralization during the 1980 season. A blastomylonitic felsite (granite?) band with considerable disseminated pyrite occurs at the falls on Grandys Brook to the east of the main Riocanex showings, and numerous, extremely weathered, rusty mounds of pyritiferous, foliated granitoid rock are present in the north-central part of the area. Carbonate-hosted breccias and the alteration zones in the late granite intrusion zone along Northwest Brook may merit attention. Taylor (1970) investigated the bedrock source for stream sediment uranium anomalies located over the granitoid terrain near Brinex Lake (informal name). He concluded that biotite-rich lenses in the metasedimentary schists and the contact zone with the granodiorite were responsible for anomalously high uranium concentrations up to 85 ppm which were too low to be of economic interest.

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