

# GEOLOGY OF THE WESLEYVILLE MAP AREA (2F/4) AND THE EAST HALF OF THE MUSGRAVE HARBOUR MAP AREA (2F/5) NEWFOUNDLAND

by N.R. Jayasinghe

## INTRODUCTION

1:50,000 scale geological mapping of the Wesleyville map area (2F/4) and the east half of the Musgrave Harbour map area (2F/5) was completed in the 1977 field season. Parts of this area were mapped by the author during the summers of 1975 and 1976, for post graduate studies at Memorial University of Newfoundland.

The area was previously mapped on a 1:250,000 scale by Williams (1968). Gale, in 1967, assessed the economic potential of the pegmatites in the area.

## GENERAL GEOLOGY

Paragneisses and migmatites of the Bonavista Bay Gneiss Complex (Blackwood and Kennedy, 1975) and granitoids are the principal lithologies in the area. Some of the granitoids are locally foliated; others are posttectonic.

### Paragneisses

The paragneisses (Unit 1) occur in the southwestern part of the map area. They are truncated in the north and northeast by granitic plutons and are bordered by migmatites to the east. These rocks form part of a larger paragneiss terrain, the Square Pond Gneiss (Blackwood, 1977), which outcrops to the southwest.

The paragneisses are predominantly psammitic but locally contain semipelitic and pelite zones. A fine to coarse gneissic banding is commonly developed in the psammitic rocks; a composite schistosity is the main

fabric in the more pelitic zones. The metamorphic grade of the paragneisses increases eastwards from greenschist to amphibolite facies.

### Migmatites

The migmatites (Unit 2) in the map area are a northerly extension of the Hare-Bay Gneiss (Blackwood, 1977). They outcrop in three northeast trending bands separated by granitic intrusives. The first of these occurs adjacent to the paragneisses. The transition from paragneisses to migmatites occurs over a distance of less than 1 km and is accompanied by K-feldspar porphyroblast growth and an increase of granitic material. A similar migmatite front separates the Square Pond and Hare Bay gneisses to the south (Blackwood, 1977). The second band of migmatites extends southward from about the center of the map area. The third lies in the northeastern part.

The migmatites have a crude to moderately developed banding which at places is complexly folded. Inclusions of paragneisses are common. The banding in the host forms augen around the paragneiss inclusions.

### Intrusive Rocks

Granitoid intrusives underlie approximately 75 percent of the map area. Most of them are within the migmatitic terrain and include both foliated and unfoliated bodies.

#### Wareham pluton (unit 3)

The Wareham Pluton occupies a northeast-southwest trending belt across the centre of the map area. It continues to the south of the study area as Unit 5 of Blackwood (1977). This granite is characterized by

abundant microcline megacrysts in a coarse groundmass of quartz, microcline, plagioclase and biotite. The megacrysts range from 2-4 cm in length. Close to its eastern margin the granite has irregular areas with only a few scattered megacrysts. Towards the western margin the pluton has a strong northeast trending, moderate to steeply dipping foliation. The foliation, which is cataclastic in places, is defined by mica and elongated quartz that form augen around flattened megacrysts. In other parts of the granite the megacrysts are euhedral and show a weak east-northeast alignment. Mica is randomly oriented. The Wareham pluton intrudes the migmatites and postdates the banding in the latter.

#### **North Pond pluton (unit 4)**

The North Pond pluton outcrops to the west of the Wareham granite. It intrudes the paragneisses, migmatites and the Wareham pluton. The southern part of the North Pond granite (4a) contains 1 to 2 cm long microclines in a medium to coarse grained groundmass of quartz, microcline, plagioclase, biotite and muscovite. In the northern half of the pluton (4b) a more biotite rich phase with smaller microclines (less than 1 cm) is predominant. Minor garnets occur in both phases. The pluton is overprinted by a north-northeast to south-southwest trending, 1 to 2 km wide, zone of cataclasis that runs close to its centre. Here, mica and elongated quartz form augen around the broken microcline crystals. Elsewhere only a weak to moderate alignment of undeformed microclines can be seen.

#### **Business Cove pluton (unit 5)**

The Business Cove pluton occurs in the northeastern part of the map area. It intrudes the migmatites and the northern extremity of the Wareham granite. This pluton is a muscovite biotite granite that resembles the biotite rich phase of the North Pond granite in lithology. The pluton contains numerous xenoliths of both migmatites and megacrystic granite. The Business Cove granite has a weak to moderate NE to ENE trending alignment of minerals.

**NOTE:** The Business Cove and North Pond granites were called the Powder Hill pluton by Jayasinghe and Berger (1976).

#### **Cape Freels granite (unit 6)**

The Cape Freels granite (Strong *et al.*, 1974) outcrops along the eastern margin of the map area. It intrudes the migmatites, which show a profuse development of microcline porphyroblasts around the contact of the granite. Microcline megacrysts, ranging from 4 to 8 cm in length make up more than 50 percent of the pluton. Along the western contact the granite is intensely

deformed, producing mylonites. This deformation gradually decreases in intensity towards the interior part of the pluton. Up to 1 to 2 km away from the contact the granite has a good cataclastic fabric produced by mica and elongated quartz that form augen around broken and stretched megacrysts. Further eastward (Cape Freels - Newtown area), megacrysts are euhedral and the micas are randomly oriented. In the undeformed parts, the megacrysts often show an alignment which varies in direction from place to place.

#### **Deadman's Bay granite (unit 7)**

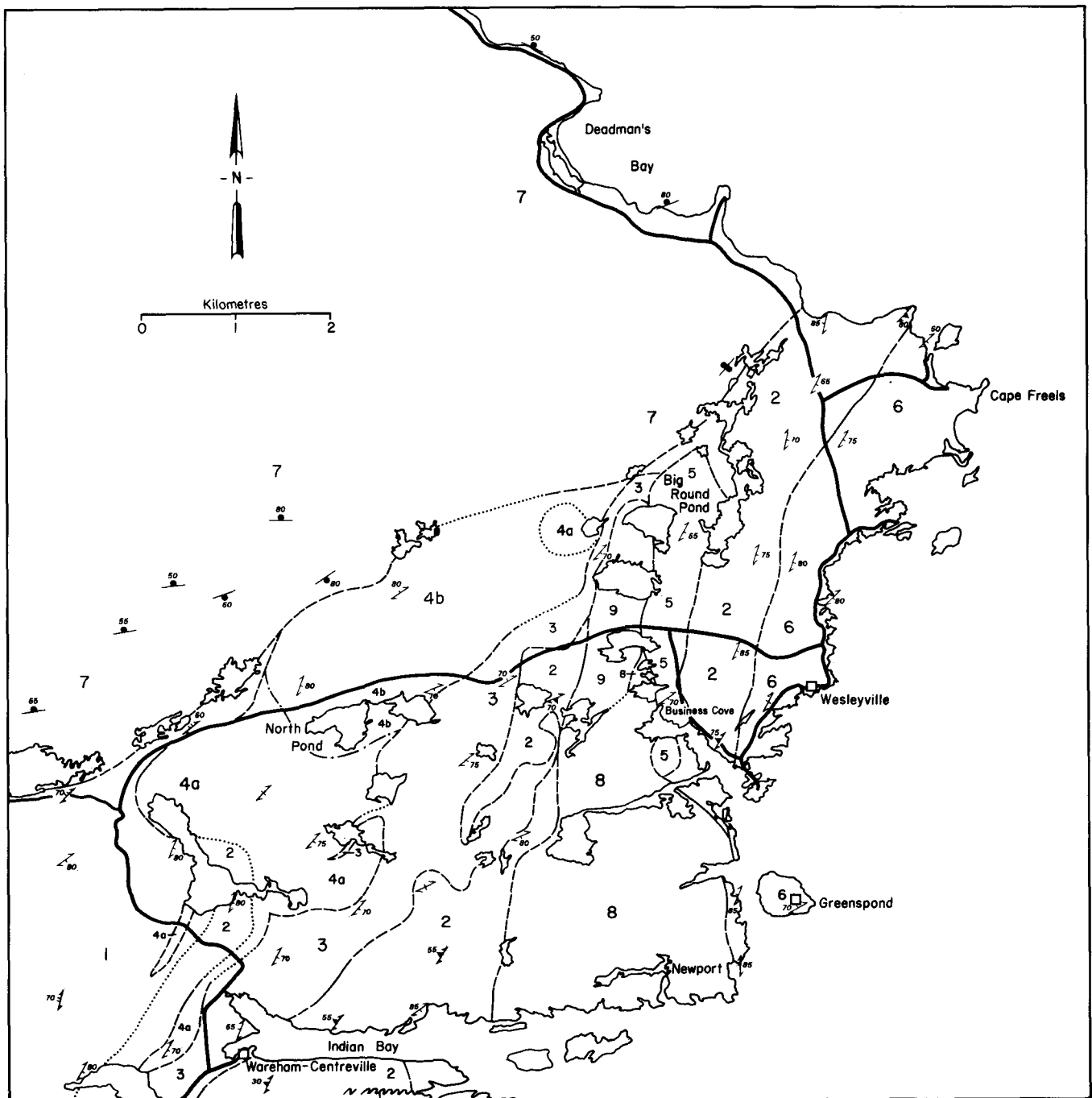
The eastern and southeastern parts of this large pluton (Strong *et al.*, 1974) occupies a major portion of the northwestern half of the map area. The Deadman's Bay granite intrudes the paragneisses, migmatites and the North Pond granite posttectonically. Apophyses of this pluton also cut sheets of the Wareham pluton in the extreme northern part of the latter. The Deadman's Bay granite is characterized by ubiquitous microcline megacrysts which range from 4 to 10 cm in length. The pluton is very homogeneous except for a slight variation in the size of the megacrysts. In a few outcrops along its contact with the North Pond granite, the pluton has blocks of a chilled rock with 2 to 4 cm long microcline crystals. Similar blocks were also found within the pluton in a small area about 4 km away from this contact. These may be fragments of a marginal phase of the pluton that it engulfed later. The pluton shows no evidence of being cataclastically deformed. An alignment of euhedral megacrysts paralleling the contact of the pluton occurs at several locations.

#### **Newport granite (unit 8)**

The Newport granite (Strong *et al.*, 1974) forms a bell shaped outcrop in the southeastern part of the map area. It continues to the south as unit 12 of Blackwood (1977). The granite intrudes the migmatites and the Cape Freels, Business Cove and Wareham plutons posttectonically. Microcline megacrysts ranging from 2 to 3 cm in length make up more than 50 percent of the granite. In places the rectangular megacrysts define a northeast to east-northeast trending S-fabric dipping gently to the north.

#### **Big Round Pond Pluton (Unit 9)**

The Big Round Pond pluton is a small granitoid that occurs immediately to the north of the Newport granite. It cuts the migmatites and the Wareham, Business Cove and the Newport plutons. The pluton contains 0.5 to 1 cm long microcline crystals distributed in a medium grained groundmass. No mineral alignment can be seen within the pluton in the field.



## LEGEND

### DEVONIAN OR EARLIER(?)

- 9

**BIG ROUND POND PLUTON:** *Massive, medium grained, biotite granite.*
- 8

**NEWPORT GRANITE:** *Megacrystic, biotite granite.*
- 7

**DEADMAN'S BAY GRANITE:** *Massive, megacrystic biotite granite.*
- 6

**CAPE FREELS GRANITE:** *Foliated to massive megacrystic, biotite granite.*
- 5

**BUSINESS COVE PLUTON:** *Foliated, medium grained, muscovite - biotite granite.*
- 4

**NORTH POND PLUTON:** *4a, Foliated, porphyritic, muscovite - biotite granite; 4b, foliated medium grained, muscovite - biotite granite.*
- 3

**WAREHAM PLUTON:** *Foliated, megacrystic, biotite granite.*

### PRECAMBRIAN (?)

- 2

**MIGMATITE:** *Tonalitic gneiss containing inclusions of paragneiss.*
- 1

**PARAGNEISS:** *Psammitic and semipelitic paragneiss.*

## SYMBOLS

Geological boundary (defined, approximate, assumed and gradational).....	
First banding in paragneiss (inclined, vertical) .....	
Second banding in paragneiss (inclined, vertical).....	
Banding in migmatite (inclined, vertical).....	
Foliation with a local cataclastic component (inclined, vertical).....	
Fault (defined, approximate) .....	
Alignment of microcline megacrysts.....	

## STRUCTURAL GEOLOGY

A fine to coarse banding is the characteristic structure of the paragneisses, the oldest rocks in the map area. Locally, it can be seen that this banding is formed by the transposition of an earlier banding, which is referred to as the first gneissosity. The second banding is axial planar to minor folds of the first and to numerous folded quartz veins. A northeast trending, moderately to steeply dipping foliation overprints the paragneisses and is axial planar to minor folds of the second banding. This foliation is more prominent in the eastern part of the paragneiss than in the west.

The structures in the migmatites are less well defined. A crude to well developed banding is the predominant structure. At places this banding is transposed by a northeast trending foliation. There are small shear zones parallel to this later fabric. In more granitic parts of the migmatites, there is a northeast trending alignment of biotite segregations. Also, the pegmatites and the granitic veins (commonly garnetiferous) in the migmatites show an alignment of mica in the same direction.

As previously described, some parts of the granitoids in the map area have a northeast trending cataclastic foliation. The deformed parts of these plutons define two northeast trending cataclastic zones. One zone overprints the central part of the North Pond pluton and the northwestern part of the Wareham pluton. The other overprints the western marginal part of the Cape Freels granite and the migmatites adjacent to that granite. The foliation is axial planar to folded granitic veins and pegmatites in the migmatites. Thus, there is an ubiquitous northeast trending foliation that is locally cataclastic and that overprints units 1 to 7. But the foliation may not have been imposed on all the units during one deformation event.

A north to north-northeast trending strain-slip fabric cuts the main northeasterly foliation in the map area. Folding and kinking of both the foliation and the strain-slip fabric have occurred at places.

## MINERALIZATION

Minor mineralization occurs in the map area. Pegmatites, particularly those intruding the Cape Freels, Business Cove and the North Pond granites, contain the beryllium minerals beryl and chrysoberyl. Molybdenite was found in an aplitic vein cutting the paragneisses near North West Pond.

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