GEOLOGY OF THE HARBOUR BUFFETT MAP AREA (1M/9 WEST HALF)

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INTRODUCTION

The western half of the Harbour Buffett (1M/9) map area, situated on the northwestern side of Placentia Bay, was mapped at a scale of 1:50,000 during the 1977 field season. Previously, the area was part of 1:250,000 mapping of Anderson (1965) and reconnaissance map of McKillop (1953) and Schrijver (1972).

GENERAL GEOLOGY

A northeast trending fault divides the Harbour Buffett map area into two contrasting geological terranes. This fault extends from Paradise Sound to the northeast extremity of the map area. The area northwest of the fault is underlain by chlorite-sericite schists derived from volcanic, sedimentary and intrusive rocks of the Love Cove Group (Jenness, 1963) and intrusive rocks of the Swift Current Granite (Strong *et al.*, 1974). The area to the southeast is largely underlain by sedimentary rocks of the Bonavista (Van Ingen, 1914) and Random (Walcott, 1900) Formations and the Musgravetown Group (Hayes, 1948) which have been openly to tightly folded but do not portray a regional penetrative schistosity. The Musgravetown Group is assumed to overlie the Love Cove Group with angular unconformity based on relationships in Bonavista Bay (Jenness, 1963).

The Love Cove Group (figure 1, units 1-2) has been extended from the belt defined by Jenness (1963) and Anderson (1965) into the present map area. It is divisible into two units in the Harbour Buffett map area. The lower unit (1) is composed of steeply dipping massive to schistose mafic and silicic flows and pyroclastics including crystal, lithic and crystal-lithic tuffs, agglomerates and breccias. Quartz and/or feldspar porphyries are common and may be in part intrusive. This unit can be traced into and is correlative with the Deer Park Pond Formation in the adjoining map area (Bradley, 1962). Unit 2 conformably overlies unit 1 and consists of steeply dipping, massive to schistose, graywacke, graywacke conglomerate, arkosic sandstone, siltstone and slate. This unit can be traced into and is correlative with the sedimentary portions of the Southern Hills Formation (Bradley, 1962). The stratigraphy of the Love Cove group as presently defined within the map area is similar to that of nearby map areas (Hussey, this volume; O'Brien, this volume), but is the reverse of the stratigraphy of correlative units in the Terrenceville map area (Bradley, 1962).

The Swift Current Granite (3) is composed of foliated, pink to gray, equigranular, medium grained granite, syenite and granodiorite. It outcrops in the north-central part of the map area and is intrusive into rocks of unit 1. The granite extends northwards into and across the Sound Island map area. Samples from that area have yielded a whole rock Rb-Sr age of 500±30 Ma using a decay constant of 1.47 $x10^{-11}$ yr^{-1} for ^{87}Rb (Bell *et al.*, 1977). However, the mean square of weighted deviates (MSWD) is 12.8, indicating that the isochron model is not a valid interpretation of the data.

The Musgravetown Group (Units 4 and 5) is well exposed along the eastern coastal sections of the map area. Unit 4 consists of dark green to gray, epidote rich mafic flows, rarely with pyroxene phenocrysts, and fine to coarse grained agglomerates and tuffs. Unit 5 overlies unit 4 conformably; it is a sedimentary assemblage with some interbedded volcanic rocks and it has been subdivided into four units. Unit 5a is the most extensive;

it consists of green to gray laminated siltstone and sandstone, well bedded graded and cross-bedded sandstone with interbedded dark gray shale, pebbly green sandstone with black shaly laminae, gray conglomerate with a sandy and shaly matrix and interbedded sandstone. In some areas scattered subangular to rounded pebbles and cobbles are embedded in a dark gray shaly matrix indicating possible down-slope slumping or a glaciomarine environment. Conglomerates contain clasts of intrusive, extrusive and sedimentary rocks. Limestone clasts, nodules, and breccia beds are common throughout the sequence. Unit 5b is interbedded with unit 5a; it consists of purple and green basalt and basaltic agglomerate and tuff with hematite phenocrysts and abundant vesicles and amygdules filled with calcite and quartz. At Prowseton, limestone beds interbedded with the volcanics contain possible skeletal remains (D. Kobluk, personal communication). These fossils are presently being studied to establish their significance. Unit 5c also overlies unit 5a conformably; it is composed of red to purple, graded and cross-bedded arkosic sandstone,shale and minor conglomerate. Unit 5d consists of flattened red to purple, coarse grained, pebble to boulder conglomerate. The nature of its contacts could not be determined except where faulted, but it is thought to overlie or be interbedded with unit 5a. This unit is similar to rocks at North Harbour (O'Driscoll, 1977) which are believed to be part of the Love Cove Group.

The Musgravetown Group is overlain conformably by the Precambrian to Eocambrian Random Formation (Unit 6), which consists of white orthoquartzite and quartz sandstone with interbedded gray to green micaceous siltstone and fine grained sandstone. The siltstone members contain trace fossils, in particular, worm trails and burrows. Rocks of the Bonavista Formation (Unit 7) conformably overlie the Random Formation. They are characterized by reddish brown and green shale and slate with nodules and nodular beds of pink algal limestone. The limestones contain fossils, mainly of the shelly fauna hyolithids. Black shales and siltstones with minor quartz sandstones and limestones are exposed on Bar Haven Island (not shown on map); these rocks contain trilobite fragments which indicate a probable early Middle Cambrian age (D. Boyce, personal communication). They are presently being studied to obtain a definite age.

Intrusive rocks (units 8, 9) of possible Devonian age are exposed only on Bar Haven Island, where they intrude rocks of the Musgravetown Group and Random Formation. They consist of medium to fine grained diorite and gabbro associated with fine grained massive to feldspar-phyric diabase and medium grained granodiorite to granite. The diorite and gabbro seem to be marginal phases of the granitic intrusion.

STRUCTURAL GEOLOGY

A fault extending northeastward from Paradise Sound separates the map area into two regions of contrasting structural styles. To the northwest lies a belt of deformed and metamorphosed intrusive, volcanic and sedimentary rocks which contrast sharply with mildly metamorphosed and folded sedimentary and volcanic rocks to the southeast.

The rocks of the northwestern belt have been isoclinally folded and regionally overprinted by a strong, penetrative north to northeast trending, steeply dipping schistosity defined by chlorite, sericite and epidote. The schistosity in the intrusive rocks is well defined by elongated quartz, feldspar and aligned chloritized mafic minerals. The regional foliation is folded and crenulated in places and is locally overprinted by a strain-slip fabric.

Rocks of the southeastern belt are gently to steeply dipping and have been folded into open to tight upright to overturned folds with northeast trending axes. A steeply to moderately dipping phyllitic cleavage has been developed in most units. The conglomerate of unit 5d is atypical of the southeastern belt in that it has a well defined foliation and clasts have been flattened into the plane of the fabric.

Northeast trending faults are prominent throughout the map area. Some of these are reverse faults which dip steeply to moderately to the northwest. On Bar Haven Island rocks of the Musgravetown Group overthrust the Random Formation which in turn has been thrust over the Cambrian rocks of the Bonavista Formation. Strata of the Random Formation and possibly the Bonavista Formation are overturned in this area. The major fault which extends northeastward from Paradise Sound possibly has a reverse component of movement. Although the fault plane was not observed, associated shear zones dipping steeply northwestwards were noted. Rocks of the Musgravetown Group and the Random Formation are tightly folded close to the fault.

MINERALIZATION

There are few mineral showings in the Harbour Buffett map area. Some minor malachite staining was noted along joint surfaces and cleavage planes in unit 4 of the Musgravetown Group. Specular hematite occurs along the eastern margin of the Swift Current Granite.

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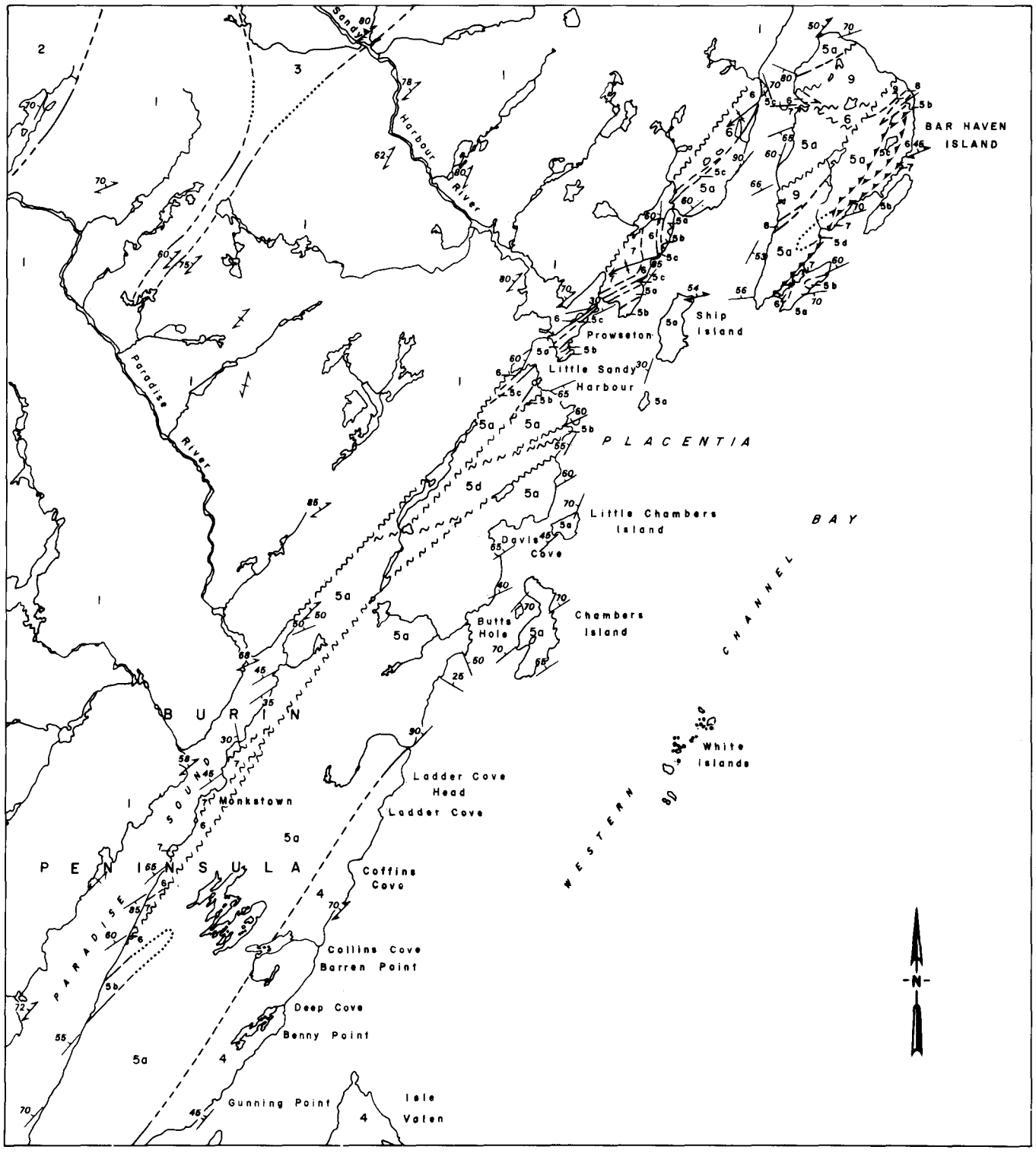

LEGEND

DEVONIAN (?)

9 *Pink, buff and gray, medium grained granite and granodiorite.*

8 *Gray-green, medium to fine grained diorite and diabase.*

CAMBRIAN AND EARLIER

7 **BONAVISTA FORMATION:** *Reddish brown and pale green slate with nodules and nodular beds of pink limestone.*

6 **RANDOM FORMATION:** *White orthoquartzite with interbeds of green and gray micaceous siltstone and sandy shale.*

MUSGRAVETOWN GROUP

5 **5a,** *Laminated green siltstone and sandstone, well bedded green sandstone with interbedded black shale, pebbly green sandstone with wisps and laminae of black shale, black to gray conglomerate with interbedded sandstone; abundant limestone clasts, breccia and, in places, beds;* **5b,** *green to purple basalt, basaltic agglomerate and tuff with interbedded fossiliferous limestone; some hematite phenocrysts;* **5c,** *red to purple, graded and cross-bedded sandstone, shale and conglomerate;* **5d,** *coarse grained, red, flattened, pebble to boulder conglomerate.*

4 *Green, epidote rich, pyroxene basalt, agglomerate and tuff; oxidized red color in places.*

CAMBRIAN OR EARLIER

3 **SWIFT CURRENT GRANITE:** *Medium grained, foliated to massive, hornblende-biotite granite, granodiorite, and syenite.*

HADRYNIAN OR EARLIER

LOVE COVE GROUP

2 *Green graywacke to arkosic sandstone and conglomerate.*

1 *Green mafic and pink to purple felsic volcanic pyroclastics and flows, altered to chlorite and sericite schist.*

SYMBOLS

Geological boundary (defined, approximate, assumed) .....

Bedding; tops known (inclined, vertical, overturned) 90

Bedding; tops unknown (inclined) .....

Cleavage (inclined) .....

Schistosity (inclined, vertical) .....

Strain-slip cleavage (inclined) .....

Fault (defined, approximate, assumed) .....

Thrust fault (defined, assumed) .....

Synclinal axis (arrow indicates plunge) .....

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