NIPPERS HARBOUR MAP SHEET (2E/13)

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Introduction

During the 1975 field season mapping was completed for all of the Baie Verte Peninsula east of west longitude 56°00'. In addition to the Nippers Harbour sheet, an area of the Horse Islands sheet (2L/4) between Ming's Bight and Pacquet Harbour was mapped, and numerous small revisions were made to the preliminary map of the area (DeGrace, Kean, Hsu and Besaw, 1975). The geology of much of the area has been discussed in detail elsewhere (DeGrace *et al*., 1975a,b) and the reader is referred to those reports since only the main contributions made during the 1975 field season are outlined below.

I am grateful to Mr. Tim Greene for capably mapping much of the Cape Brule Porphyry and the Pacquet Harbour Group west of North and South Yak Lakes. The two of us were assisted in the field by Thomas Matthews Jr. and Malcolm MacIsaac. L.M. Riccio, W.R. Church, R. Strickland and R.K. Stevens all contributed helpful ideas for which the writer expresses his thanks.

Principal Results

Setting of the Ming's Bight Group

The Ming's Bight Group (Fig. 1) consists predominantly of psammitic rocks with lesser amounts of semi-pelitic, metaconglomeratic and mafic metavolcanic rocks. Within the map area, the Ming's Bight has an intrusive relationship with the Dunamagon Granite everywhere except on the north side of Pacquet Harbour. There, the rocks are apparently conformably overlain to the south by mafic metavolcanic rocks assigned to the Pacquet Harbour Group. This relationship is inferred, despite the intense deformation of the rocks, from the absence of metaconglomerate beds and volcanic detritus in the Ming's Bight Group at the contact.

The Ming's Bight Group is tentatively correlated with the Fleur de Lys Group to the west because of its close lithological similarity to it, and because field relationships do not preclude the two units being of the same age (Baird, 1951; Kennedy and Phillips, 1971).

Pacquet Harbour Group

West of South Yak Lake the Pacquet Harbour Group consists of pillow lavas and pillow breccia, overlain in the east by water-lain volcanogenic sediments. West of North Yak Lake the Group consists predominantly of andesitic tuff and quartz-feldspar crystal tuff which bears a strong resemblance to crystal tuffs in the Cape St. John Group. Southwest of Woodstock the Pacquet Harbour is made up of a basal pillow lava unit which is overlain successively by felsic and mafic tuffs which may be,

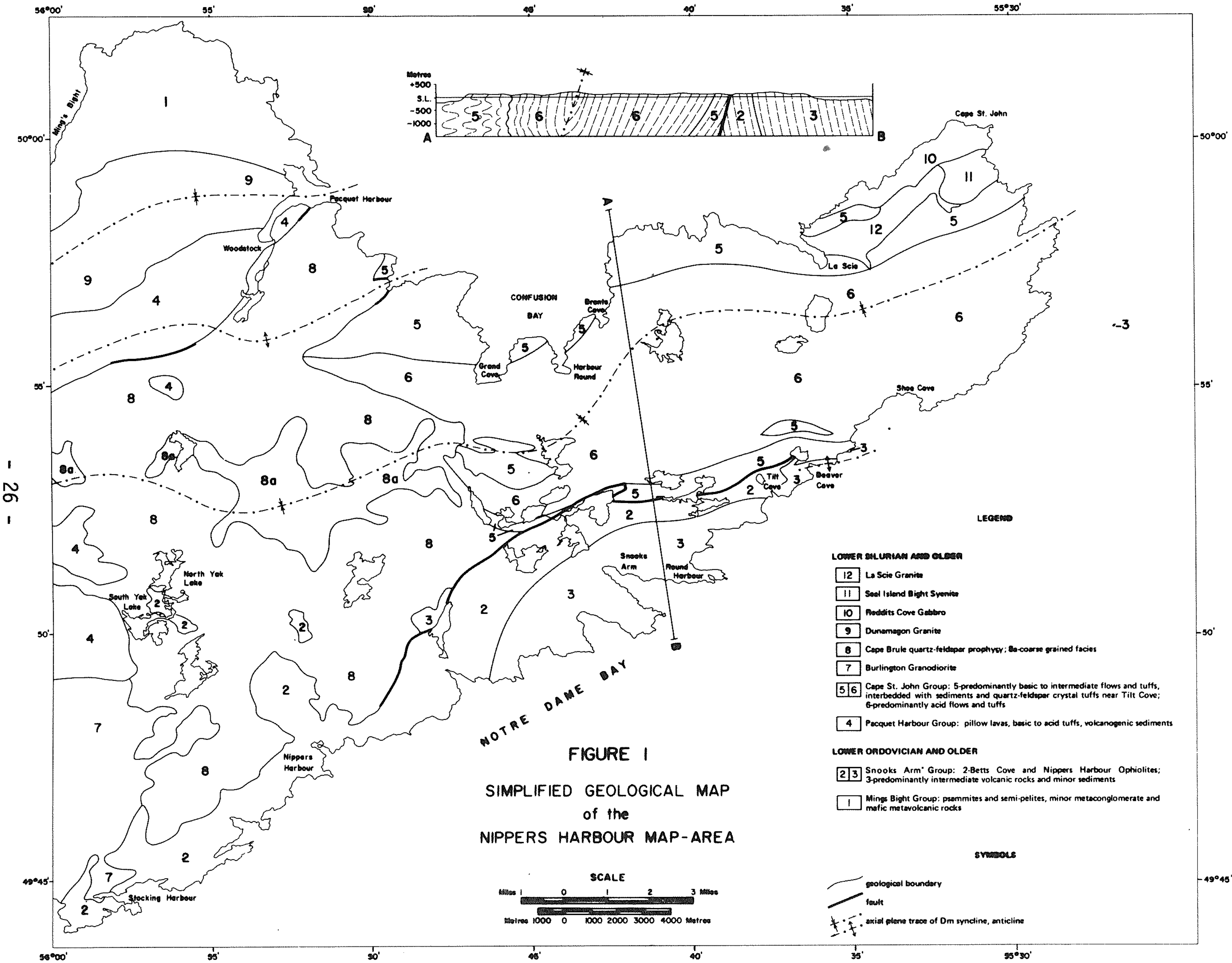

FIGURE 1

SIMPLIFIED GEOLOGICAL MAP of the NIPPERS HARBOUR MAP-AREA in part, subaerial. The Group is intruded by numerous gabbroic dykes which probably fed higher parts of the volcanic pile. The Pacquet Harbour overlies the Ming's Bight Group (see above) and is intruded by the Cape Brule Porphyry, Burlington Granodiorite and Dunamagon Granite. It is probably in part correlative with the Cape St. John Group on the basis of a close lithological similarity between parts of the two Groups, and in part older, because the main structures in the area plunge gently to the east, presumably exposing older rocks in the west. It is thus tentatively assigned a Middle to Upper Ordovician age to be consistent with the age postulated for the Cape St. John Group (see below).

Setting and Age of the Cape St. John Group

The Cape St. John Group consists predominantly of subaerial calc-alkaline mafic to felsic volcanic rocks, and minor sedimentary rocks. The Group is intruded by the Cape Brule Porphyry to the west, and by the Reddits Cove Gabbro, Seal Island Bight Syenite and La Scie Granite near Cape St. John. To the south it is in fault contact with the Snooks Arm Group except at Beaver Cove where it unconformably overlies the Snooks (DeGrace et al., 1975a,b; Neale et al., 1975). Fossil graptolites date the Snooks Arm Group as Lower Ordovician (Snelgrove, 1931) so that the Cape St. John Group is certainly post-Lower Ordovician in age. It is thought to be Upper Ordovician to Lower Silurian in age on the basis of radiometric age dates by Bell and Blenkinsop (in DeGrace et al., 1975b) and on regional considerations.

Cape Brule Porphyry

Detailed mapping by T. Green showed that the Cape Brule can be resolved into two map-units. The porphyry is extremely heterogeneous with respect to colour, groundmass composition and phenocryst composition, but a relatively coarse-grained porphyry (Unit 8a of Fig. 1) was mapped which in places intrudes and is in places in gradational contact with a finer-grained porphyry. In general the coarser-grained porphyry has a groundmass particularly rich in mafic minerals. The coarser porphyry unit is located on the axial plane trace of a Dm syncline and it is thus reasonable to suppose that the Cape Brule, when unfolded, may consist of more than one sheet-like intrusion.

Structure and Metamorphism

Continued mapping has further elucidated the structural geology of the map-area, which was described in a general way by DeGrace et al. (1975a,b). In the description which follows Dm refers to the "main deformation" in the map-area with which is associated an ubiquitous tectonic fabric. The earlier deformation is referred to as Dm-1 and the later as Dm+1, Dm+2, etc. Superscripts S and F refer to Schistosity and Folding related to the deformations identified by their accompanying subscripts. Similarly, the superscripts MS and MP refer to metamorphic mineral growth syntectonic and posttectonic with respect to the deformations identified by the accompanying subscripts.

The earliest structure (Sm-1) is a bedding plane schistosity which is transposed by Sm. It was noted in a few places south and southwest of Brents Cove, and is widespread southwest of Woodstock.

Following the emplacement of the intrusive rocks in the La Scie area, the Cape St. John Group and the rocks intruding it were deformed into a set of tight upright to overturned folds with axes plunging very gently to the northeast, and having a penetrative axial planar mineral-orientation schistosity (Sm). Asymmetrical Fm minor folds, stratigraphic tops determinations, cleavage-bedding intersections and regional considerations all served to define the axial plane traces of the major folds (see Figure 1).

These structures were inhomogeneously deformed by vertical shortening with an associated mineral-orientation and strain-slip fabric (Sm+1). Thus, in the Confusion Bay area the beds are deformed into south-facing recumbent folds (Fm+1). These, however, are simply the deformed northern limb of the earlier upward-facing syncline. Sm+1 gradually dies out to the south and is generally not seen south of the La Scie Highway. The related southward facing folds (Fm+1) have amplitudes of up to 600 m. near Brents Cove Head and perhaps a meter near Brents Cove. Fm+1 is a flat-lying crenulation of Sm in places farther south. On the east side of Confusion Bay and along the coast to La Scie, and in the Ming's Bight Group, asymmetry of Dm+1 minor folds indicates that the rocks are on the upper limb of a southward facing fold. On the west side of Confusion Bay, however, the sense of the asymmetry is commonly reversed. The relationship of Dm and Dm+1 is illustrated in a cross-section presented in Figure 1.

Sm+1 and earlier structures are openly folded on steep east-west trending axial planes. Dm+2 is best developed in the Pacquet Harbour area where Neale (1958) and Church (1969) mapped a Fm+2 anticline.

North of Pacquet Harbour, where Sm+1 was folded by Fm+2 so that it dips to the north at more than about 60°, the rocks have been affected by a later (Dm+3) vertical shortening deformation which resulted in open to locally close folds with east-west trending axes and approximately flat axial planes.

Throughout the map area, and particularly to the west of South Yak Lake and on the western boundary of the map sheet near Pacquet Harbour the rocks are weakly deformed by large scale open flexures (Fm+4) on steeply dipping axial planes with axes plunging steeply to the north-northeast.

In many areas around Confusion Bay, MSm, and MSm+1 acicular hornblende crystals define a LS fabric with the L-component aligned roughly perpendicular to Fm and Fm+1 fold axes. In places on the west side of Confusion Bay, both MSm and MSm+1 hornblendes were noted in individual Fm+1 fold hinges, but elsewhere they could not be separated because both hornblende generations are identical in physical appearance.

All of the rocks in the map-area are metamorphosed. Basic volcanic rocks are generally altered to greenschist or subgreenschist facies in the south, with the grade increasing to amphibolite facies to the north where Sm+1 is more evident. Acid pyroclastic rocks of the Cape St. John Group are generally slightly altered to calcite-sericite-quartz schists. South of Confusion Bay recrystallization has been slight in most places, and original features in the rocks are readily discernable.

It is emphasized that no major tectonic junction was discovered within the Cape St. John Group, and the variations in structure and metamorphism in the map-area appear to be gradational and wholly the result of inhomogeneous deformation.

Economic Geology

In the 1975 field season only minor contributions were made to the economic geology of the map-area. The discovery that significant amounts of the Pacquet Harbour Group are subaerial might discourage economic interest in those rocks. If further mapping to the west can define those parts of the Pacquet Harbour which are submarine, however, it will undoubtedly be of assistance to exploration companies working in the area. Minor disseminated chalcopyrite was discovered in Pacquet Harbour pillow lavas west of South Yak Lake.

Future Plans

No further mapping is planned for the Nippers Harbour Map-sheet. A final report and map of the area will be published sometime in 1976.

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