GAULTOIS MAP-AREA

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Introduction

During the 1975 field season that part of the Gaultois map area southeast of Hermitage Bay was mapped at a scale of 1:50,000. Limited reconnaissance work was carried out in the area northwest of Hermitage Bay; mapping in that area will be completed in 1976.

The authors wish to thank R.F. Blackwood, who spent two weeks with us in the field, mapping the area adjacent to the Hermitage Fault. Those parts of this paper dealing with the Hermitage Fault and its environs are based largely on his report (Blackwood, 1975).

General Geology

The Gaultois map-area is divided into two contrasting geological terranes by the Hermitage Fault, which strikes northeastward from the head of Hermitage Bay. According to the tectonic-stratigraphic subdivision of the Newfoundland Appalachians recently proposed (Williams et al., 1974), the area northwest of the fault lies in the Gander Zone, while the area southeast of the fault lies in the Avalon Zone.

Avalon Zone

The oldest rocks in the Avalon Zone are late Precambrian volcanic and sedimentary rocks, referred to the Long Harbour Group in the eastern part of the map-area and to the Connaigre Bay Group in the west. The Long Harbour Group (Fig. 1, units 1, 2) is made up of two units within the map area; a lower volcanic assemblage (1), which consists mainly of dense, gray hornfels, within the contact aureole of the Belleoram Granite, and an upper unit, the Rencontre Formation (2), of red, coarse-grained, crossbedded arkosic sandstone and pebble conglomerate, with interbedded red, micaceous sandstone and siltstone. The Long Harbour Group is conformably overlain by Eocambrian sedimentary rocks.

The Connaigre Bay Group (3-6) does not come into contact with other units in the stratigraphic succession; it is assumed to be late Precambrian in age because of general lithological similarity to the Long Harbour Group (Widmer, 1950). Within the map area the group forms a conformable sequence which is subdivided into four units. The lowest unit (3) consists predominantly of pink to purple silicic flows and pyroclastic rocks with minor interbedded basic volcanics. It is overlain by purple to red, pebble and boulder conglomerate, with purple sandstone and siltstone, which forms the base of unit 4; most of unit 4 is made up of green to gray, laminated argillite and tuffaceous siltstone,

with interbedded basic tuffs and minor limestone lenses. Unit 5 is composed mainly of dark green to gray basic flows, commonly with augite phenocrysts, and fine to coarse agglomerates and tuffs. The uppermost unit (6) of the Connaigre Bay Group consists of red to purple, graded and crossbedded, sandstone and pebble conglomerate, with interlayers of red laminated siltstone and argillite; also occurring within this unit are pink, silicic, crystal-lithic tuffs and fine agglomerates (6a).

The Chapel Island Formation (7) overlies the Long Harbour Group conformably and consists of micaceous gray argillite, fine-grained gray sandstone and interbedded, thinly bedded, gray sandstone and shale. The formation outcrops in a belt extending northeastward from Great Bay de l'Eau, between the Harbour Breton and Belleoram Granites; much of it is now a dense, gray hornfels. In the Harbour Breton map-area to the south, the Chapel Island Formation is conformably overlain by redbeds and quartzites correlated with the Random Formation, which is in turn overlain by fossiliferous Middle Cambrian shales (Greene, 1975). Neither the Random nor the Middle Cambrian shales are known to be present in the Gaultois map-area, although some of the hornfelsed slates in the vicinity of Red Cove may represent the Middle Cambrian. The earliest fossiliferous rocks in Gaultois map-area are black shales and gray sandstones of the Salmonier Cove Formation (8). These shales and sandstones occur in a small, fault-bounded block within the outcrop area of the Devonian(?) Cinq Isles Formation, north of Wreck Cove.

The Connaigre Bay Group is intruded by two igneous complexes of probable pre-Devonian age: an unnamed gabbro-granodiorite-granite assemblage (9-11) in the east, and the Hermitage Complex (12-13) in the southwest. Gabbro and diorite (9) of the eastern complex occur as small bodies intruding the volcanics and as large xenoliths within the Simmons Brook Batholith, which forms the main body of the complex. The Simmons Brook Batholith (10) consists mainly of hornblende-biotite granodiorite, with local areas of hornblende-biotite granite and pink feldspar granite; the granodiorite is faintly foliated locally, and contains many basic xenoliths and dykes. Latest phases of the complex consist of pink to gray alaskitic ahd hornblende-biotite granite (11) which outcrops in the Winter Hill area and near the head of Hermitage Bay. The granite intrudes, hornfelses and locally pyrophyllitizes acidic volcanics of the Connaigre Bay Group. A similar granite occurs across the Hermitage Fault in the Gander Zone (unit C) and the two bodies in fact probably form part of a single pluton, which straddles the fault. Both granites (units 11 and C) have been cataclastically deformed and brecciated along the Hermitage Fault. Granite of unit 11 has given a whole rock Rb/Sr age of 500 m.y. (Bell, pers. comm., 1975).

The Hermitage Complex (12-13) (O'Driscoll, in prep.) occupies the southwestern half of the Hermitage Peninsula, and ranges in composition from gabbro to granite. The more basic parts of the complex (12) are composed of medium- to coarse-grained, black, hornblende-pyroxene gabbro, and fine- to medium-grained, gray, hornblende-biotite diorite and quartz diorite. The gabbro and diorite are intruded by medium-grained, pink, hornblende-biotite granite (13). Zones of agmatite and migmatite were produced at the contact between the Hermitage Complex and the Connaigre Bay Group.

LEGEND

GANDER ZONE

DEVONIAN

18 BELLEORAM GRANITE: medium to coarse grained, gray to pink granite, with numerous small dark inclusions

16 HARBOUR BRETON GRANITE: medium to coarse grained, pink, alaskitic granite; 16a - medium to coarse grained, pink, porphyritic, biotite granite

DEVONIAN OR EARLIER

15 POOLS COVE FORMATION: red arkose, red shale, red to gray pebble to boulder conglomerate

14 CINQ ISLES FORMATION: red, micaceous, cross-bedded sandstone, red argillite, quartz pebble conglomerate, red and gray micritic limestone

ORDOVICIAN OR EARLIER

C Medium grained, equigranular, pink feldspar granite, with local development of minor muscovite; probably equivalent to Unit 11 in Avalon Zone

ORDOVICIAN OR EARLIER

11 Medium grained, pink to gray, alaskitic granite, altered hornblende-biotite granite and granodiorite; may include some Harbour Breton Granite; probably equivalent to Unit C in Gander Zone

10 SIMMONS BROOK BATHOLITH: medium grained, equigranular, altered hornblende-biotite granodiorite; includes some porphyritic, pink to red, alaskitic and hornblende-biotite granite

9 Fine to medium grained, dark gray to green diorite, medium to coarse grained hornblende-pyroxene gabbro

CAMBRIAN

8 SALMONIER COVE FORMATION: black, fissile shales, minor fine-grained grey sandstone

CAMBRIAN OR EARLIER

7 CHAPEL ISLAND FORMATION: interbedded gray, micaceous argillite and fine-grained gray sandstone; mainly hornfelsed

PRECAMBRIAN

PRECAMBRIAN (?)

B Foliated fine to medium grained muscovite granite; contains undivided zones of biotite-muscovite granite

A GAULTOIS GRANITE: foliated, porphyritic granite and granodiorite. Possible equivalents are: Aa - foliated, porphyritic quartz diorite with local pink feldspar megacrysts; Ab - foliated porphyritic, pink feldspar, biotite-chlorite granite

LONG HARBOUR GROUP (1-2)

2 RENCONTRE FORMATION: medium to coarse grained, pink to purple, crossbedded sandstone and pebble conglomerate, with interbedded red micaceous sandstone and siltstone; 2a - hornfelsed dark gray, thinly bedded gray argillite and sandstone, minor quartz pebble conglomerate

1 Pink, flow banded, autobrecciated rhyolite, gray to green basic tuffs, red agglomerate; 1a - fine grained, dense, gray hornfels, probably derived largely from basic volcanics

AVALON ZONE

17 PASS ISLAND GRANITE: medium to coarse grained, pink, hornblende-biotite granite

HERMITAGE COMPLEX (12-13) (may be in part or entirely equivalent to Units 9-11)

13 Medium grained, pink, hornblende-biotite granite

12 Dark gray quartz diorite to diorite with hornfelsed volcanic inclusions, medium to coarse grained, black, hornblende-pyroxene gabbro, numerous basic and silicic dykes

CONNAIGRE BAY GROUP (3-6) (may be in part or entirely equivalent to Units 1-2)

6 Red to purple, graded and cross-bedded sandstone and pebble to cobble conglomerate, red, thinly laminated argillite; 6a - pink to purple, massive rhyolite and silicic tuffs

5 Gray to green, massive andesite and basalt, green, fine to coarse, basic tuffs and agglomerates, minor interbedded silicic flows and tuffs

4 laminated, gray and green argillite, with purple conglomerate and shale at the base, occasional limestone lenses; 4a - interbedded basic tuffs and thinly bedded tuffaceous sediments

3 Purple to pink, massive flow banded and autobrecciated rhyloite; interbedded massive green andesite and basalt

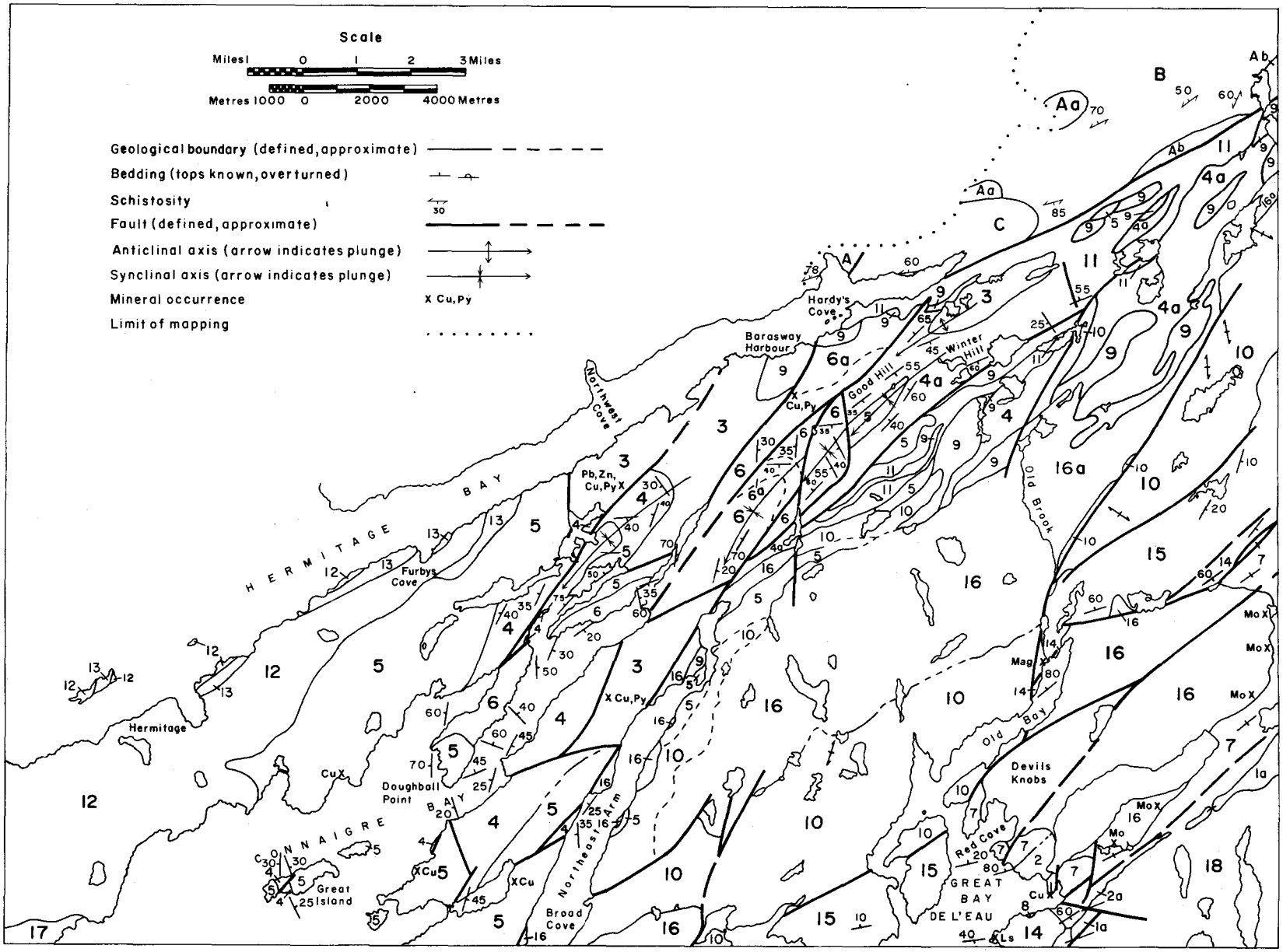

Fig. 1 - Geological Map, Gaultois Area

The Simmons Brook granodiorite is unconformably overlain by the Cinq Isles Formation in Belleoram map area to the east (Williams, 1971); the two units do not come into contact in the Gaultois map sheet. The Cinq Isles Formation (14) outcrops near Wreck Cove, along the Pools Cove - Belleoram road, and in Old Bay. It consists of red, micaceous sandstone and shale, quartz pebble conglomerate, and red and gray micritic limestone. In Harbour Breton map area to the south (Greene, 1975) and in Belleoram map area to the east (Williams, 1971) the Cinq Isles Formation is disconformably overlain by the Pools Cove Formation, which oversteps the Cinq Isles to rest unconformably on the Simmons Brook granodiorite in the northeastern part of the Gaultois map sheet. The Pools Cove Formation (15) consists of red to gray pebble to boulder conglomerate. The conglomerates are hornfelsed where they come into contact with the Harbour Breton granite. The Pools Cove Formation is unfossiliferous, but is lithologically similar to the Great Bay de l'Eau Formation, which contains Upper Devonian plant fossils in Harbour Breton map area (Widmer, 1950).

The Pools Cove Formation is intruded near the head of Old Bay by medium- to coarse-grained, pink, alaskitic granite belonging to Old Womans Stock of the Harbour Breton Granite (16). Another large body of Harbour Breton Granite intrudes the Simmons Brook granodiorite and the Connaigre Bay Group west of Old Bay, and smaller bodies occur elsewhere throughout the map area. The granite of Old Womans Stock has given a whole rock Rb/Sr date of 340 ± 20 m.y. (Bell, pers. comm., 1975).

The Pass Island Granite (17) is a homogeneous, medium- to coarse-grained, pink, hornblende-biotite granite, lithologically and chemically similar to the Harbour Breton Granite (O'Driscoll, in prep.). The main mass of the Pass Island Granite occurs outside the map area, on the southwestern tip of Hermitage Peninsula. There it clearly intrudes rocks of the Hermitage Complex, producing intrusive breccias along its margin.

The southeastern corner of the Gaultois map-area is occupied by the Belleoram Granite (18), a medium-grained, equigranular, pink to gray granite with numerous small dark inclusions. The Belleoram Granite intrudes and hornfelses conglomerates of the Upper Devonian Great Bay de l'Eau Formation, south of the map area.

Gander Zone

The Gander Zone is underlain largely by regionally deformed granitic rocks. Only a small part of the zone has been mapped as yet, and age relations between some of the units are uncertain. The oldest unit appears to be the Gaultois Granite (A), a porphyritic, pink and white feldspar-biotite granite. Large rafts of porphyritic, pink and white feldspar, biotite-rich quartz diorite (Aa), occurring in the equigranular granite of unit B, and discontinuous lenticular bodies of porphyritic, microcline-biotite granite (Ab), occurring along the Hermitage Fault, may be related to the Gaultois Granite. Units Aa and Ab are intruded by fine- to medium-grained, equigranular muscovite and biotite granite (B). Both the Gaultois Granite and the equigranular granite are overprinted

by a northeast-trending, northwest-dipping foliation of varying intensity. This regional foliation appears to be lacking in unit C, an equigranular, medium grained, alaskitic granite outcropping near the head of Hermitage Bay. Similar granite (11) outcrops immediately east of the Hermitage Fault, in the Avalon Zone, as noted earlier in this paper.

Structural Geology

The Hermitage Fault, marking the boundary between the Avalon and Gander Zones, separates two areas of contrasting structural style. To the northwest of this fault, in the Gander Zone, are deformed granitic rocks, which contrast sharply with the relatively undeformed volcanic, sedimentary and intrusive rocks southeast of the fault.

The granitic rocks northwest of the Hermitage Fault, with the exception of Unit C, are overprinted by a pervasive northeast trending, northwest dipping tectonic fabric. The intensity of this fabric varies considerably and without apparent pattern, but is generally well defined by flattened and elongated quartz as well as by mica alignment. Unit C, which presumably intrudes the deformed granites post-tectonically, is in fault contact with the Gaultois Granite on the north shore of Hermitage Bay. The fault zone dips steeply to the west, and contains a zone of mylonitized and crushed granite several meters wide affecting both units. Unit C has a mylonitic fabric for approximately 1.5 km. along the shore of Hermitage Bay; this fabric decreases in intensity away from the fault zone and disappears near the head of the bay.

Rocks of the Avalon Zone are not deformed with a regional penetrative fabric, and deformation is restricted to the development of numerous fault zones and to open folding. Most of the shear zones and faults are northeast trending. Some of these are high angle reverse faults, dipping steeply to the northwest; for example, the fault along the northwest face of the Devils Knobs, which has brought rocks of the Simmons Brook granodiorite upward and southeastward to overlie the Harbour Breton Granite and the Pools Cove Formation. Although fault planes cannot always be seen, shear zones dipping steeply northwestward are also evidenced in other areas. Normal faults with steep to moderate dips occur at Good Hill. Many of the faults appear to be deflected by the large body of Harbour Breton granite between Old Bay and Northeast Arm.

Most of the rocks within the Avalon Zone are involved in upright open folds, with northeast trending, gently-plunging axes. These axes generally plunge to the southwest, as on the Hermitage Peninsula, Good Hill and Great Island, but northeast plunging folds were observed on the Doughball Point peninsula, and in the belt of Cambrian-Eocambrian rocks northeast of Great Bay de l'Eau. The Cinq Isles and Pools Cove Formations are very little deformed, exhibiting only gentle folding.

The Hermitage Fault, separating the Avalon and Gander Zones within the map area, is a relatively straight feature extending northeastward from the head of Hermitage Bay. It is marked by a 50-100 meter-wide

breccia zone containing sub-angular to rounded fragments of both Gander Zone and Avalon Zone rocks; Gander Zone granite fragments can be distinguished by their pre-brecciation fabric, which becomes disoriented within the fault zone.

Economic Geology

The map area contains a number of mineral showings. The Connaigre Bay Group hosts occurrences of copper-lead-zinc sulphides and magnetite. Chalcopyrite, pyrite, galena and sphalerite occur as disseminations in rhyolite and andesite of the group near Furby's Cove; this showing was investigated by NALCO in 1964-1965. Massive pyrite, with some associated chalcopyrite, occurs in narrow discontinuous zones in rhyolites of Unit 3 at two localities on the Harbour Breton Peninsula. Copper sulphides occur in calcite-epidote veins, in shear planes, and disseminated in the matrix of agglomerates in Unit 5 on the Harbour Breton and Hermitage Peninsulas. Magnetite occurs within basic flows of Unit 5 near Good Hill, as veins and disseminations associated with quartz and epidote. Magnetite, probably derived from the underlying basic flows, also occurs as laminae and thin lenses in gray sandstone of Unit 6.

Covellite, magnetite, hematite and fluorite occur in quartz veins and as coatings along fracture surfaces in basic tuffs and flow-banded rhyolite of the Long Harbour Group at the head of Great Bay de l'Eau. Many small quartz veins containing molybdenite, and occasionally chalcopyrite and fluorite, occur around the contact of the body of Harbour Breton granite which outcrops east of Old Bay; most of these veins occur within the granite, at its eastern and southern contact, where it intrudes Eocambrian sedimentary rocks. Magnetite and hematite occur as disseminations in a basic dyke near the head of Old Bay.

Limestone possibly suitable for agricultural use occurs within the Cinq Isles Formation near Wreck Cove. The Harbour Breton granite near the Head of Old Bay was quarried for use as a building stone in the period 1910-1914 (Widmer, 1950).

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