

GEOLOGICAL MAPPING IN THE EVENING LAKE - WIGHTMAN LAKE AREA, WESTERN LABRADOR

by

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INTRODUCTION

1:100,000 scale mapping of the Evening Lake (23G/9), Molson Lake (23G/8), Wightman Lake (23G/1) and the northern part of Lac Petite - Hermine (23B/16) N.T.S. areas was completed during the summer. The Molson Lake and Wightman Lake map areas are due east of the area mapped in 1978.

Exposure varies from poor in many of the low lying parts of the area, to good on the tops of many of the hills which area capped with gabbro. Critical contact relationships are rarely exposed, however, and most of the unit boundaries have to be interpreted with the use of air photographs and aeromagnetic maps.

General Geology

Rocks in the Knob Lake Group of the Labrador Trough (Churchill Province) continue south of the Grenville Front into the Grenville Province where they are known as the Gagnon Group. In the Churchill Province the grade of metamorphism in the Knob Lake Group is typically low (subgreenschist facies) and the rocks possess a single tectonic fabric; in the Grenville Province the prevailing grade of metamorphism is higher (amphibolite facies) and the rocks exhibit the effects of polyphase deformation. The two tectonic provinces are separated by the Grenville Front, a region which is defined by east-west tectonic fabrics and by a series of thrust faults, and south of which there is an abrupt rise in metamorphic grade. The Grenville Front therefore marks the northerly limit of structures developed during the Grenvillian orogeny - it is a tectonic feature unrelated to the age or

metamorphic grade of the rocks included within the Grenville Province.

Previous Work

One inch to 1/2 mile mapping by Iron Ore Company of Canada (Baird, 1950) covers part of the Evening Lake sheet, as does a thesis by Goodwin (1951). This was followed by detailed mapping in areas of iron formation outcrop, including the work of Beemer (1952) and Frazer (1952). Mapping by the Newfoundland and Labrador Corporation (Magnusson, 1953) covers much of the southern half of the map area. The Sims Formation was mapped by the Newfoundland Department of Mines and Energy (Ware, 1979), and the whole area is covered by the Geological Survey of Canada maps of Fahrig (1967) and Jackson (1976). In this work the Sims Formation is compiled directly from Ware (1979).

Objectives

The objectives of the mapping project were:-

- (1) To trace out the iron formation and associated units of the Gagnon Group in the Grenville Front region.
- (2) To investigate the nature of the Grenville Front.
- (3) To map the extent of the Gagnon Group in the southern part of the map area, and in particular to investigate the possibility of basement - cover relationships in that area.
- (4) To assess the mineral potential of the area.

LEGEND

Helikian

- 9 Shabogamo Gabbro: Metagabbro and amphibolite
- 8 Sims Formation: Quartzite

Aphebian

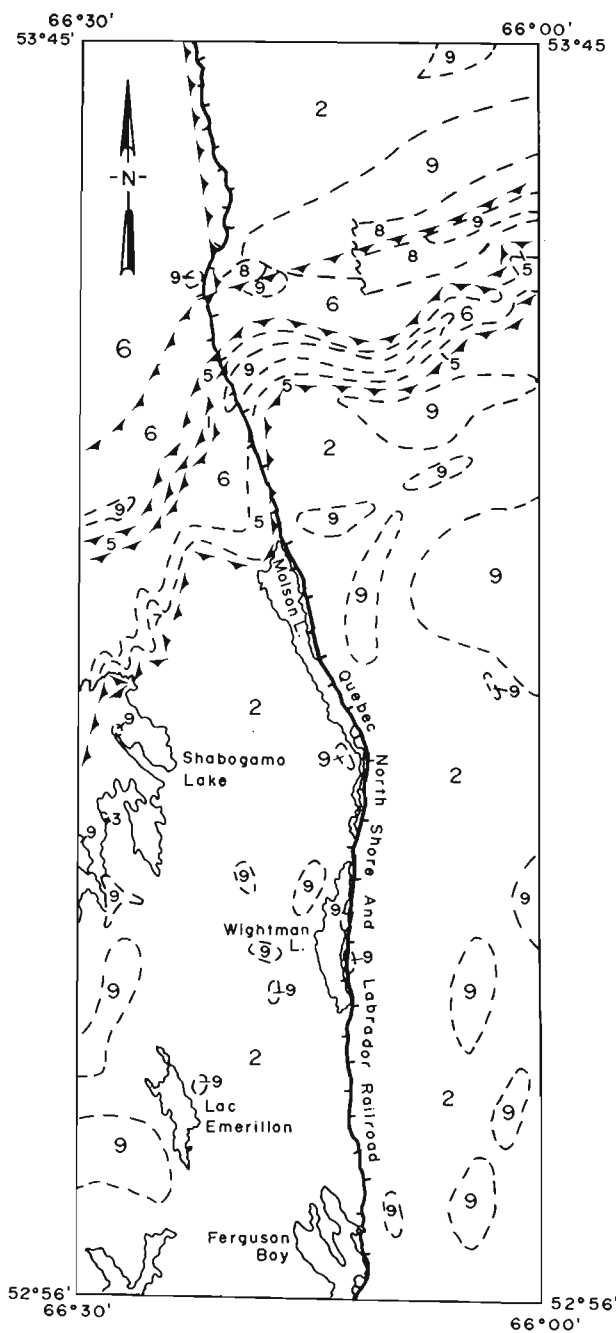
Gagnon Group

- 7 amphibolite - metatuff?
- 6 Nault Formation: Gray phyllite and schist
- 5 Wabush Formation: Iron formation
- 3 Duley Formation: Dolomitic marble
- 2 Katsao Formation: Metagraywacke/slate
(north of Grenville Front)
quartzofeldspathic schist
(south of Grenville Front)

Archean

- 1 Ashuanipi Complex: Banded migmatitic gneisses.

NOTE: Unit 8 is compiled from Ware (1978).



DESCRIPTION OF UNITS

Ashuanipi Complex - Unit 1

Gneisses of the Ashuanipi Complex outcrop in a small area in the Grenville Front region, where they are interpreted to be in fault contact with the adjacent rocks of the Gagnon Group. The gneisses appear similar to those mapped in the main body of the Ashuanipi Complex to the west (Rivers and Massey, 1979), being predominantly composed of coarse grained rocks of granodioritic composition, with an irregularly developed, coarse fracture cleavage of presumed Grenvillian age superimposed on the gneissosity. The most common mafic minerals in the gneisses are biotite and actinolite, the latter probably pseudomorphous after pyroxene.

Katsao Formation - Unit 2

The Katsao Formation in the Grenville Province and the equivalent Attikamagen Formation of the Churchill Province outcrop extensively in the map area. In the Churchill Province the Attikamagen Formation is a banded graywacke/shale sequence with sedimentary structures such as crossbedding, load structures and graded bedding (poorly developed) seen in a few places.

In the Grenville Province all evidence of primary structures is generally obliterated, and the rock is a quartz-feldspar-biotite schist/gneiss \pm garnet \pm hornblende \pm muscovite \pm K. feldspar \pm kyanite \pm sillimanite. The texture of the rock varies from coarse to fine grained, and feldspar augen are common in the Grenville Front region. Some of the finer grained specimens are almost mylonitic in aspect and may have undergone high strains.

In the southern part of the map area, a massive, fine grained rock of similar composition to the Katsao Formation, but which may be igneous in origin, was mapped. This has been

provisionally included within the Katsao Formation pending the results of further work.

Duley Formation - Unit 3

The Duley Formation (Unit 3), was observed at only one location, on the shore of Shabogamo Lake in the western part of the map area. There, a small band of dolomitic marble about 2 m wide occurs within schists of the Katsao Formation. Although the lithology is typical of the Duley Formation to the west (Rivers, 1978; Rivers and Massey, 1979), it is uncertain whether this outcrop represents an infolded keel of Duley Formation proper, or a small lens of similar lithology within the Katsao Formation.

In the Wabush area, quartzite overlies the marble, but this unit was not observed in the Evening Lake - Wightman Lake area.

Wabush Formation - Unit 5

The Wabush Formation consists of iron formation and associated lithologies. Silicate carbonate facies iron formation is predominant, being composed of quartz, grunerite, and iron carbonate (siderite \pm Fe dolomite \pm ankerite). Locally a two amphibole (grunerite and hornblende/actinolite), garnet iron formation also occurs, with the green amphibole and garnet possibly being due to tuffaceous input into the unit (see Noel and Rivers, this volume).

Nault Formation - Unit 6

The Nault Formation in the Grenville Province, and its unmetamorphosed equivalent, the Menihek Formation in the Churchill Province, outcrops in the northern part of the map area. The typical lithology is a gray to black phyllite, slate or shale depending upon metamorphic grade, which is generally devoid of sedimentary structures. In the Grenville Front region this rock is well foliated, and may show evidence of more

than one phase of tectonic structures.

Amphibolite - Unit 7

Amphibolite, which may represent tuffaceous or reworked tuffaceous rocks, occurs in the Grenville Front region in two localities, in association with the Wabush and Nault Formations. The predominant mineralogy is actinolite, with chlorite and hornblende? also being present. Disseminated sulphides (mainly pyrite) are common.

Sims Formation - Unit 8

White-pink massive orthoquartzite and fine grained conglomerate compose this unit, which lies unconformably on the rocks of the Gagnon Group in the Grenville Front region. Detailed descriptions of the Sims Formation may be found in Ware (1979).

Shabogamo Gabbro - Unit 9

This unit, which includes gabbro and leucogabbro and their metamorphosed equivalents, amphibolite and actinolite schist, intrudes members of the Gagnon Group and the Sims Formation. Relict igneous textures are common in the gabbro, generally with signs of metamorphic overgrowth or replacement superposed on them. In the northern part of the map area the mafic minerals of the gabbro are typically replaced by actinolite, whereas to the south they are commonly surrounded or replaced by composite coronas of actinolite, garnet, biotite and hornblende.

The large body of gabbro in the eastern part of the map area is part of an intrusive complex containing several magma types including megacrystic leucogabbro, fine grained gabbro and the more normal leucogabbro described above. With the exception of this complex around which the country rocks are warped, most of the intrusions are concordant sill-like structures which were deformed with the surrounding metasedimentary envelope.

STRUCTURAL GEOLOGY

The thrust fault zone of the Grenville Front region divides the area naturally into two parts. North of the thrust faults the rocks possess a single tectonic fabric (slaty cleavage), typically with east-northeast trends. This fabric is interpreted to be of Grenvillian age, so the northerly limit of the Grenville Front region, and thus the southern boundary of the Churchill Province, may lie in the extreme north of the map area. Exposure is poor and the exact location is speculative.

South of the thrust zone, most rocks display evidence of at least two phases of deformation, and it is likely that the area as a whole has been affected by three deformation episodes. East-northeast trending structures in the Grenville Front region predate northwest trending structures in the southerly part of the map area.

METAMORPHISM

North of the thrust fault zone, metamorphic grade is in the sub-greenschist facies; south of the thrust fault zone mineralogies characteristic of the amphibolite facies predominate. There appears to be a significant telescoping of the metamorphic gradient at the most southerly thrust fault. Kyanite occurs in the schists in the central part of the map area, whereas sillimanite is present in the southeast, suggesting a transition from middle to upper amphibolite facies assemblages in that region.

ECONOMIC GEOLOGY

No showings of economic significance were seen in the area. Iron formation is predominantly of the silicate carbonate facies, which is not of commercial interest. Disseminated pyrite in the amphibolite unit and disseminated magnetite in gabbro typically occur in small showings with little potential for enlargement.

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