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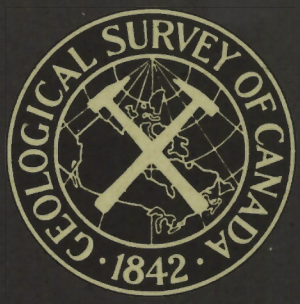

GEOLOGICAL SURVEY OF CANADA

DEPARTMENT OF MINES AND TECHNICAL SURVEYS

PAPER 64-25

REVISED STRATIGRAPHIC NOMENCLATURE FOR THE CENTRAL PART OF THE LABRADOR TROUGH

(Report and 1 figure)

M. J. Frarey and S. Duffell

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CONTENTS

ABSTRACT

As a result of work by the Geological Survey of Canada in the central part of Labrador Trough the following nomenclature changes are proposed: the Kaniapiskau System, often referred to in the literature as a group, to be given the status of supergroup; the Knob Lake Group to include the 'Seward Grits' and the Purdy Dolomite; the term "Howse Group" to be dropped, as its components are correlative with those of the Knob Lake Group; the Murdoch Group to be relegated to formational rank and included in the Doublet Group together with two new formations — the Thompson Lake and Willbob; the Montagnais Intrusives to become the Montagnais Group, consisting of Wakuach Gabbro and Retty Peridotite; the Sims Quartzite to become the Sims Formation; and finally the establishment of a new formation, the Shabogamo Gabbro, which is distinctive in the southern part of the area.

The revisions proposed here will be followed in the final reports of the Geological Survey covering this area.

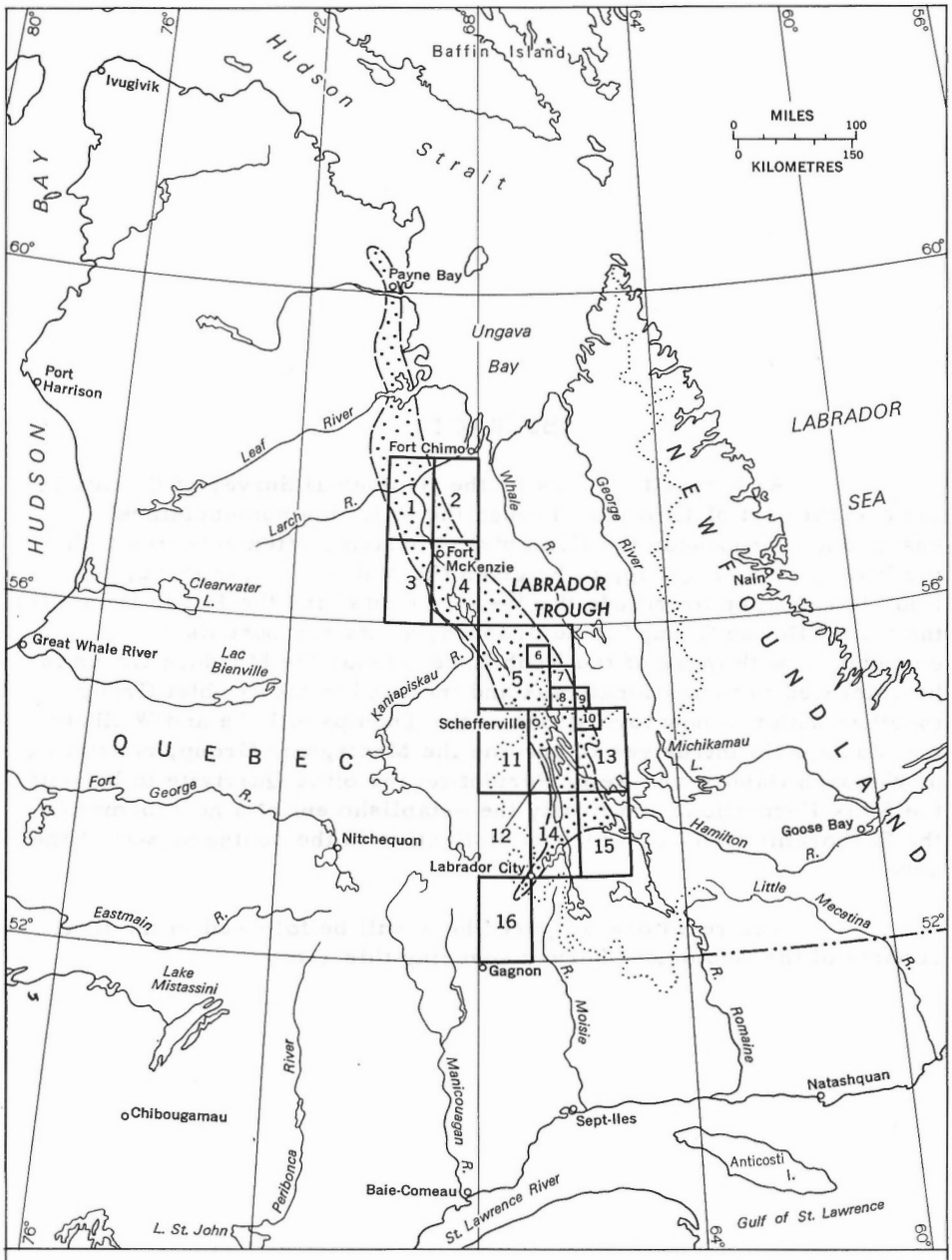

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Figure 1. Areas mapped by the Geological Survey of Canada in the Labrador Trough

REVISED STRATIGRAPHIC NOMENCLATURE FOR THE CENTRAL PART OF THE LABRADOR TROUGH

INTRODUCTION

The Geological Survey of Canada began systematic mapping of the Labrador Trough in 1950. Since then, Survey investigations have extended north and south from the latitude of Schefferville, so that about three quarters of the trough has now been covered, i.e. from latitude 52° north to 58° (Fig. 1).

Geological Survey publications describing this work have to date been only of a preliminary nature but final reports in memoir form for a number of projects are now being prepared. During this preparation there appeared a need for a systematic rock-stratigraphic term for the sedimentary and volcanic rocks of the Labrador Geosyncline, commonly referred to as "Trough Rocks". It was also apparent that a revision of the nomenclature of rock units along the northeastern flank of the geosyncline was warranted.

The revisions suggested result from mapping by the Geological Survey in this region but apply more specifically to that part of the geosynclinal belt lying between latitudes 53° and 56°. Their publication at this time provides a common basis for the nomenclature to be used in the memoirs now in preparation, which cover this particular part of the 'trough'.

Acknowledgments

The writers are grateful to the staff of the Labrador Mining and Exploration Company, the Quebec Department of Mines, and H.R. Wynne-Edwards of Queen's University for helpful suggestions and criticism during preparation of this paper.

HISTORY OF NOMENCLATURE

Heretofore, the nomenclature of all formations and groups of formations in this part of the geosyncline originated with geologists of the Labrador Mining and Exploration Company, who were the first to explore the territory systematically. Their early nomenclature appears in Table I (16)*. The terms and units in Table I which are discussed here are "Kaniapiskau", "Howes Series", "Murdoch Series", "Doublet Series", "Montagnais

*Numbers in parentheses refer to references listed at the end of this report.

Intrusives", "Seward Grits", and "Sims Quartzite". The three series are parallel northwesterly trending units underlying the east side of the geosyncline and occur successively northeastward in the order named. In early work by the company the age relations of these three "series" were uncertain.

In early Survey publications (9, 13) the three "series" were classified as groups and placed stratigraphically above the Knob Lake Group of Harrison (13). The Knob Lake Group as defined by Harrison comprised the sedimentary components of the Hamilton River, Ferriman, and Point series of Table I, except for the Seward Grits of the Hamilton River series.

The term "Kaniapiskau" in Table I was used as a system name or as an overall rock-stratigraphic name for all of the Hamilton River, Ferriman, Point, Howse and Doublet series. In Geological Survey usage it also included the Murdoch Group which was placed stratigraphically above the Knob Lake Group. Baragar (3, 4) subsequently relegated the Murdoch Group to formational rank.

To achieve conformity with usage recommended by the American Commission on Stratigraphic Nomenclature and to apply the pertinent information gathered to date by Geological Survey geologists, further revisions should formally be made to the stratigraphic nomenclature pertaining to the part of the Labrador Trough considered here.

It is not intended that these revisions necessarily be applied to other parts of the trough where it may be more appropriate to establish other groups or formations. Where possible however, such other units should, together with those here discussed, be included in the single overall rock-stratigraphic term proposed.

REVISED NOMENCLATURE

KANIAPISKAU SUPERGROUP

The term "Kaniapiskau Supergroup" is proposed as a replacement for "Kaniapiskau System" of Table I.

The American Commission on Stratigraphic Nomenclature (1) refers to the term "supergroup" in sections (e) and (f) of Article 9 of its "Code of Stratigraphic Nomenclature" as follows:

> (e) Supergroup. In certain areas stratigraphers need a supergroup; that is, a formal assemblage of related groups or of formations and groups.

(f) Misuse of "series" for groups or supergroup. The term "series" has been employed for an assemblage of formations or an assemblage of formations and groups, especially in the Precambrian, but should no longer be so used. These are groups or supergroups .....

Use of the term "Supergroup" to refer to the Kaniapiskau rocks is appropriate as it adheres to the principles of the Code and still serves the original purpose as an overall term of reference for the sedimentary and volcanic rocks that extend the length of the Labrador Trough. A group significance only no longer applies, as the rocks originally included under the name Kaniapiskau, in the central part of the trough, have been divided into at least two well-defined groups. Groups established in these rocks elsewhere in the trough in the future would also be included in the term Kaniapiskau Supergroup. Where no doubt exists as to their original relationship, metamorphic equivalents should also be included.

Knob Lake Group

In addition to the formations originally included in this group by Harrison (13) it is proposed to include also the Seward Formation (Seward Grits of Table I) and the Purdy Formation (5, 15).

Since its original definition, the Knob Lake Group has been extended geographically far beyond the type area. In Michikamau Lake area (17), arenaceous rocks (Seward Grits) underlie the Attikamagen Formation and form the base of the Knob Lake Group as defined (13). Farther south, conglomerate, greywacke and silicic volcanic rocks form the base of the group (18). Similarly north of the type area (5), red beds have been observed below the Attikamagen Formation. It is proposed that the Knob Lake Group be redefined to include those lowermost strata that would logically take the name of "Seward Formation", from the type area near Seward Lake, Michikamau Lake map-area.

In the northwestern part of Wakuach Lake map-area, the Sokoman Iron-formation and the Menihek Formation of the Knob Lake Group are separated by a formation consisting mainly of dolomite with minor argillaceous beds. These beds are termed "Purdy Formation" (5, 15) from prominent exposures near Purdy Lake about 10 miles west of Wakuach Lake. The name was applied by the Labrador Mining and Exploration Company in its detailed mapping in this area. The formation is known to extend for 25 miles and continues northwestward beyond the boundaries of the Wakuach Lake area. Near Ritchie Lake it has a minimum thickness of 1,500 feet, and is composed of thin to massive, black, grey, or pink beds.

Table I

Table of Formations

Labrador Mining and Exploration Company, 1949

UNCONSOLIDATED MATERIAL		Glacial till, gravel, sands, minor clay, eskers and drumlins, terraces Gossans, bog iron and manganese ore		
CAMBRIAN (?)	SANDGIRT SERIES	SIMS QUARTZITE Quartzite, grit and conglomerate (flat lying?)		
MONTAGNAIS INTRUSIVES (Keweenawan?)		Diorite, gabbro, pyroxenite and related types — diabase, diorite porphyry, syenite dykes	Diorite, gabbro, pyroxenite and related types — sulphide mineralization — "feldspathic" diorite	Diorite and related types; serpentinite — sulphide mineralization
KANIAPISKAU (Huronian)	POINT SERIES (Upper Huronian, possibly Keweenawan)	MENIHEK SLATES Grey and black slates, shale, conglomerate, minor narrow arenaceous and calcareous beds, dolomite	HOWSE SERIES Slate, carbonaceous shale, greywacke, quartzite, conglomerate, iron-formation, volcanics	DOUBLET SERIES Pillowed and massive lavas, greenstones, tuffs, greywacke, quartzite and slate
		SAWYER-NIMISH GROUP Jasper conglomerate, banded jasper iron-formation, grey quartzite, shale and greywacke with Nimish Volcanics		
	Unconformity(?)			
	FERRIMAN SERIES (Middle Huronian?)	SOKOMAN IRON-FORMATION Iron Ore - Manganese Ore Sokoman Chert Hematite quartzite Slaty iron-formation Conglomeratic iron-formation Banded jasper and chert iron-formation Cherty iron carbonate Magnetite greywacke Greenalite greywacke	Relative age of Howse and Doublet Series is unknown both may be Nachikopi (below)		
		NIMISH VOLCANICS		
		RUTH SLATE Ferruginous slate, slaty iron-formation, black and brown slate, carbonaceous slate, shale; locally enriched to ore		
		WISHART QUARTZITE Chert, quartzite, sandstone, greywacke, calcareous grit, conglomerate		
		FLEMING CHERT BRECCIA Chert breccia with minor lenses of chert, shale and slate		
	Unconformity(?)			
	HAMILTON RIVER SERIES (Lower Huronian?)	DENAULT DOLOMITE Dolomite, limestone and cherty facies, fragmental dolomite, N.B.; locally interbedded with Attikamagen shales near contact, in part probably contemporaneous		
		NIMISH VOLCANICS		
		ATTIKAMAGEN SHALES Green, grey, red and black shales, slates, graphitic slates, phyllites, argillite; some relatively narrow arenaceous and calcareous beds		
		SEWARD GRITS Grits, arkose, conglomerate, white or pink quartzite, greywacke		
WALSH INTRUSIVES (Algoman?)			Syenite, granite, diorite, felsite porphyry-intrusives show foliation	Intrusives not observed cutting these rocks
NACHIKOPI (Keewatin?)	Kaniapiskau-Nachikopi contact not observed		MURDOCH SERIES Chloritized pyroclastics and clastics, lavas	LAPORTE SERIES Biotite-rich and chloritized sediments
ASHUANIPI SERIES (Grenville type)			ANCIENT BASEMENT COMPLEX Ortho- and paragneiss intruded by a wide range of acidic and basic rock of unknown age Granite, pegmatite, syenite, diorite, gabbro, anorthosite, pyroxenite	

Table II
Revised Table of Formations

Era	Supergroup	Group	Formation	Lithology and Remarks
PROTEROZOIC			Shabogamo Gabbro	Diabasic olivine gabbro, coarse-grained norite, anorthositic gabbro, hypersthene-augite-plagioclase gneiss.
			Sims	Quartzite, grit, conglomerate (flat lying).
		Unconformity		
		MONTAGNAIS	Retty Peridotite	Serpentinized peridotite; pyroxenite sills may be older than Wakuach Gabbro.
			Wakuach Gabbro	Gabbro, metagabbro, glomeroporphyritic gabbro ("leopard rock"), diorite.
		Intrusive Contact		
	KANIAPISKAU		Willbob	Basalt, metabasalt, flow breccia, minor sediments.
		DOUBLET	Thompson Lake	Quartzite, greywacke, shale, argillite, conglomerate, intercalated basalt.
			Murdoch	Agglomerate, breccia, tuff, basalt, minor sediments.
		KNOB LAKE	Menihek	Carbonaceous slate and shale, quartzite, greywacke; basic volcanic rocks; minor dolomite and chert.
			Purdy	Dolomite, minor argillaceous beds.
			Sokoman	Iron-formation; intercalated basic volcanic rocks.
			Ruth	Ferruginous slate, slaty iron-formation, black and brown slate, carbonaceous shale.
			Wishart	Feldspathic quartzite, arkose, minor chert, greywacke and slate, intercalated basic volcanic rocks.
			Fleming	Chert breccia, minor lenses of shale and slate.
			Denault	Dolomite, limestone and cherty facies, fragmental dolomite.
			Attikamagen	Green, red, grey and black shales, slate, graphitic slates, phyllites and argillites, intercalated basic flows.
			Seward	Grit, arkose, conglomerate, white or pink quartzite, greywacke, acidic flows.

Variegated sequences of wavy dolomite laminae less than an inch thick are common. Algal structures and soft sediment deformation features are numerous. The beds bevel the underlying Sokoman Iron-formation and in part directly overlie the pre-Kaniapiskau basement, indicating a post-Sokoman erosional unconformity in that area. The Purdy Formation is apparently overlain conformably by the Menihek Formation. Though the Purdy Formation has not been identified south of Wakuach Lake area it may be significant in correlating the stratigraphy of the southern part of the trough with northern areas, particularly north of Larch River where a dolomite unit everywhere occurs above the iron-formation (11).

In Marion Lake map-area, directly east of Schefferville, two stratigraphic units have been delineated that have not been generally distinguished elsewhere (6, 7). These are the Marion Lake Formation, estimated at 4,000 feet thick, composed mainly of rhythmically-bedded siltstone with subordinate sandstone, minor conglomerate and slate, and an unnamed volcanic unit some 2,500 feet thick immediately above the Marion Lake Formation.

The sedimentary formation has not been distinguished elsewhere and may be restricted in extent. In the Michikamau Lake (west half) and Ossokmanuan Lake areas, mapped subsequently, similar rocks have been correlated with the Seward Formation (17, 18). The Marion Lake Formation has therefore not been formally included with the Knob Lake Group at this time. The name, however, is available for any correlatives identified in the future.

The volcanic unit is one of a number of important extrusive intercalations present in the Knob Lake Group at various stratigraphic levels (5, 10) and probably corresponds to the "Nimish Volcanics" of Table I. When more detailed work is done on these volcanic rocks over a wider area, they may be classified as members of formations or as separate formations. The unit at Marion Lake is well defined for a considerable distance northwestward (10) and may in future prove to be a valuable regional horizon marker. In Table II the stratigraphic levels at which these rocks appear are indicated in the lithological descriptions of the formations concerned.

Howse Group

It is proposed to drop the term "Howse Group" ("Howse Series" of Table I) as its components are now considered correlative with strata of the Knob Lake Group.

The type area for the Howse Group was where a 7-mile-wide belt of these rocks passes through Howse Lake (9). The unit included a varied assemblage, dominantly sedimentary but including intercalated rocks of volcanic and mixed origin whose relationship to one another and to other units is obscured, mainly by profuse intrusions of gabbroic sills. Although the sediments include quartzite, iron-formation, and shale, similar to those of the Knob Lake Group, they were formerly thought to be younger. However work to the northwest of Howse Lake indicated that so-called Howse strata there were correlative with the Knob Lake Group (3). In the Menihek Lakes area (10) to the south and in the Marion Lake area (6) to the southeast, strata of the Howse Group likewise appear to be correlative with strata of the Knob Lake Group. From all the evidence it is therefore concluded that the term "Howse Group" may be dropped as its components can be correlated with the Denault, Wishart, Sokoman, and Menihek Formations of the Knob Lake Group. Thus in the Howse Lake area the Menihek Formation consists of grey, black, and variegated shale, argillite and slate, subgreywacke, greywacke, quartzite, and minor conglomerate, with intercalated flows and pyroclastic rocks.

Murdoch Formation

This unit, formerly considered as a group, is relegated to formation status and included with the Doublet Group.

The original spelling for the name of this unit was "Murdoch" (Table I) and this is followed in this paper although it has appeared as "Murdock" in some publications. The unit was once thought to be of possible pre-Proterozoic age, but latterly has been considered by most workers to be younger than the Howse Group or its equivalent (Knob Lake Group), with which it is in fault contact. An erosional unconformity below the Murdoch strata, in at least part of this general area, is strongly suggested by outcrops of polymictic conglomerate that appear to form the base of the unit near Walsh Lake (9) and also occur along the fault lineament some 15 miles to the southeast (15). This conglomerate contains fragments of Knob Lake strata. Wherever found the Murdoch Formation is composed predominantly of basic pyroclastic debris forming a poorly exposed, irregular, interlayered sequence of agglomerate and tuff, mingled with some sediments and massive flows. Except for the local separation of sedimentary rocks, this assemblage is not amenable to subdivision and is better classified as a formation, following Baragar (3, 4), and incorporated into the succeeding Doublet Group.

This brings into one group the bulk of the post-Knob Lake volcanic deposits which, together with the vast volumes of intrusive equivalents, represent the igneous culmination of geosynclinal deposition.

Doublet Group

This unit, derived from the Doublet Series of Table I, is considered by Geological Survey workers to be the uppermost known division of the Kaniapiskau Supergroup in this part of the trough. In addition to expanding the group to include the Murdoch Formation, it is proposed that the original components, previously undivided formally, be separated into a lower sedimentary and an upper volcanic formation. These sub-units though differentiated on various published maps have not been specifically named. The lower sedimentary unit overlying the Murdoch Formation logically takes the name Thompson Lake Formation from prominent occurrences on and near Thompson Lake. It consists of an intercalated succession of shallow-water impure quartzite, greywacke and argillaceous beds and minor oligomictic conglomerate and intercalated basalt. The thickness of this formation varies up to an estimated maximum of 1,500 or 2,000 feet.

The overlying volcanic unit is named the "Willbob Formation", from prominent exposures north and east of Willbob Lake. It is composed dominantly of pillowed basic lavas with intercalated massive flows, flow breccia and a few thin sedimentary interbeds. In total thickness this formation may exceed 15,000 feet in Thompson Lake map-area.

POST-KANIAPISKAU ROCKS

Certain igneous and sedimentary units in the Labrador Trough have unconformable relations with, and are younger than, rocks of the Kaniapiskau Supergroup and are accordingly excluded from it. These units are the Montagnais Group adapted from the Montagnais Intrusives of Table I, the Sims Formation adapted from the Sims Quartzite of Table I, and a new unit, the Shabogamo Gabbro, which is present in the vicinity of the Grenville Front.

Montagnais Group

The term "Montagnais Group" is useful for all pre- or syn-kinematic intrusions into the Kaniapiskau Supergroup. This conforms with the original usage, except that the term now includes the "Walsh Intrusives" of Table I which are regarded as differentiates

or equivalents of the Montagnais rocks (9, 14). Of the "Walsh Intrusives" only diorite and more basic rocks were recognized in the field.

Forming a distinctive sub-unit of the Montagnais Group is a set of prominent ultrabasic sills restricted in number and stratigraphic position but of great lateral extent. It is proposed to name these sills the "Retty Peridotite" from their prominent occurrence near Retty Lake. The name also commemorates the pioneer role of J.A. Retty in the systematic geological investigation of this part of the Labrador Trough by the Labrador Mining and Exploration Company.

Comprising the bulk of the intrusive belt are sills of gabbro, meta-gabbro, glomeroporphyritic gabbro ("leopard rock"), and varieties thereof. These have been described in detail by Baragar (4) following study of occurrences east of Wakuach Lake, a prominent feature some 50 miles northwest of Schefferville. For this reason and because regionally the gabbro belt is broadest and the intrusions probably most numerous east and southeast of Wakuach Lake, the name "Wakuach Gabbro" is proposed for this group of basic intrusions (sills) which occur along most of the Labrador Trough north of the Grenville Front.

Sims Formation

The Sims Formation ("Sims Quartzite" of Table I) comprises flat-lying quartzite, grit, and jasper conglomerate, present on both sides of Sims Lake in the Ossokmanuan Lake (18) and Shabogamo Lake (8) areas. These rocks overlie the Kaniapiskau Supergroup unconformably and represent a post-deformation period of deposition. Rocks of this formation are well exposed on both sides of Sims Lake. Most of the unit is a pure, massive, pink to yellow quartzite with minor thinly bedded strata. Conglomerate and grit beds containing jasper pebbles are present throughout the sequence. The quartzite is composed almost entirely of well rounded and sorted quartz grains set in a microcrystalline matrix of quartz and sericite. Seven hundred feet of quartzite was measured on the east side of Sims Lake. East of Sims Lake, the underlying Menihek Formation is not exposed, but the conglomerate beds and jasper pebbles suggest an unconformity, and the northwest cleavage, prominent in the underlying rocks, is absent from the quartzite of this area. Similar quartzites are exposed west of Colville Lake (18) and near Evening Lake (8), but these show some deformation by the Grenville orogeny. If these quartzites are correlatives of the Sims Formation then the latter must have been deposited in the period between the deformation of the Kaniapiskau rocks and the Grenville orogeny.

Shabogamo Gabbro

In the vicinity of Shabogamo (8) and Ossokmanuan (18) Lakes at the southern end of the trough, large areas are underlain by diabasic gabbro, meta-gabbro, norite and anorthosite. These basic rocks are abundant on both sides of the zone representing the Grenville Front. At present, only their northern limit near Graham Lake in Michikamau Lake area (17) has been determined.

In contrast to the Wakuach Gabbro the Shabogamo Gabbro forms large discordant masses and exhibits different textural and compositional characteristics. Also, in part at least, it post-dates the Sims Formation as it cuts this unit northwest of Rose Bay on McLean Lake (18). Thus the Shabogamo Gabbro is distinctly younger than the Wakuach Gabbro and should be separated from it.

The most northerly occurrences of the gabbro have not been affected by the latest Grenville metamorphism. They contain fresh olivine, augite hypersthene and labradorite and possess a medium-grained ophitic texture. To the south, near the Grenville Front the gabbro increases in grain size, and on the north and south shores of Ossokmanuan Lake, coarse-grained hypersthene and olivine-bearing anorthosite gabbro form large bodies. South of Ossokmanuan Lake the gabbro is altered but the principal alteration is cataclastic. Any gabbroic texture has been largely destroyed so that the rock has become a coarsely granular, augite-hypersthene gneiss containing about 50 per cent labradorite-andesite as bent and fractured grains. Throughout the southern part of the area (18), however, these rocks are unaffected by shearing and consist of fresh norite with a hypidiomorphic granular texture.

SUMMARY

Table I sets out the basic stratigraphy and nomenclature of the central part of the Labrador Trough derived from the work of geologists of the Labrador Mining and Exploration Company, who were the first to investigate the region in detail. This was a most important contribution to the geological knowledge and understanding of the region and formed a sound base for most subsequent work. Since then systematic geological mapping and investigation on a regional scale by the Geological Survey of Canada has covered most of this part of the trough and the adjacent terrain. During the course of the work the Survey benefited greatly from the cooperation of the mining companies working in the area as well as the provincial mines departments of Quebec and Newfoundland. The results of the work suggest that

certain revisions to the stratigraphy and nomenclature of Table I should be made. Table II presents a revised version, based on Geological Survey investigations and applicable specifically to that part of the trough under consideration.

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