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PRELIMINARY REPORT ON SHIGAMI MOUNTAINS AREA, MISTASSINI TERRITORY

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PRELIMINARY REPORT

ON

SHIGAMI MOUNTAINS AREA

MISTASSINI TERRITORY

BY

E. H. CHOWN

QUEBEC
1960

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NOTICE

The name "Shigami", which appears in the title of the present report and in many places throughout the text, as well as on our map, is spelled as it appears on the Federal Government map. However, the Geographical Commission of the Quebec Department of Lands and Forests has notified us, after the printing of the report, that the word should be spelled "Tichégami".

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INTRODUCTION

The Shigami Mountains area is bounded by latitudes 51°45' and 52°00' and by longitudes 72°30' and 73°00' and comprises approximately 375 square miles. It was mapped during the 1960 field season.

The centre of the area is 35 miles north of the north end of Mistassini lake, or about 160 miles northeast of Chibougamau. Recent mapping in the region includes that of Heywood et al. (1958) to the north, Chown (1960) to the south, Bérard (1960) to the southeast, and Hashimoto (1960) to the east.

Access:

The easiest means of access is by air, and the nearest float-plane base is at Chibougamau. Most of the larger lakes are suitable for landings. Shigami river, which flows through the north and west parts of the region, connects with a well-traveled canoe route to Mistassini lake and is used by the Mistassini Cree Indians as an access route to winter trapping grounds. Canoe travel elsewhere in the area is virtually impossible as most of the rivers are small and rapid. Relatively sparse forest cover permits fairly easy foot travel. This is further facilitated by several large burns, some of them very recent.

Topography:

The dominant topographic feature of the area is the Shigami Mountain block. This forms a tableland standing about 1,200 feet above the Shigami River plain to the north and northwest. Over the tableland proper the relief rarely exceeds 200 feet, but along its north and west flanks it has been deeply dissected, and hills with bare bedrock peaks are prominent.

Drainage:

All the area except a small portion in the southeast drains to Shigami river and via the Eastmain to James bay. Mantoushish lake and the small drainage basin around it drain by the

Papachouésati river to Mistassini lake and thence to James bay via Rupert river.

Streams in the mountain areas are controlled by the joint pattern of the granitic rocks. In the southeast, the stream pattern follows the low, parallel glacial ridges. Shigami river meanders through a sand plain over much of its course, but, in its upper reaches, it has cut a straight gorge up to 100 feet deep in the bedrock.

All the streams are subject to extreme fluctuations as their headwaters lie in a mountainous region of considerable rainfall and high runoff.

GENERAL GEOLOGY

The consolidated rocks are all Precambrian in age. The oldest rocks are a steeply-dipping series of amphibolite and quartzo-feldspathic gneisses. These rocks have been intruded by many small granite dykes. Extensive areas of migmatite have been formed by the injection of granitic material into gneiss and amphibolite. Massive and gneissic pink granites underlie a large part the Shigami mountains, or more than half of the area. The gneiss and amphibolite are restricted to the lowlands, and are not so well exposed as the granite.

Flat-lying red arkose and pebble conglomerate of the Late Precambrian Papaskwasati formation underlie two small areas in the vicinity of Mantoushish lake. Diabase and gabbro dykes are the youngest rocks and, although not abundant, are widespread.

Table of Formations

Cenozoic	Recent and Pleistocene	Talus, and beach deposits. Till, sand, and gravel
Late Precambrian	Unconformity Post Mistassini	Basic intrusive rocks: diabase, gabbro
	Mistassini Group (Otish Mountain Group) Unconformity	Papaskwasati formation arkose, pebble conglomerate, subarkose, shale.
Early Precambrian		Granite, pegmatite Injected gneiss Injected amphibolite Quartz-feldspar-biotite gneiss Amphibolite

Early Precambrian

Amphibolite

Amphibolite crops out along both limbs of a small anticline in the northwest corner of the area and in a narrow belt near the north-central border. It also occurs in two small belts south of Shigami river and west of the Shigami mountains. Exposures are, in general, poor. Most are found in the valleys of small creeks crossing the strike of the formations. Both massive and laminated amphibolites are common.

Massive amphibolite is the dominant rock type on the limbs of the anticline. It is a fine- to medium-grained rock with a good alignment of hornblende crystals. Hornblende (40-80%) and plagioclase (20-60%) are the essential minerals. Minor minerals, which are prominent in some varieties of the rock, are biotite, quartz, magnetite, and several sulphides. Epidote is widely distributed in the amphibolite and occurs as an alteration product after hornblende and plagioclase.

Laminated amphibolite occurs in the two areas south of Shigami river. It is composed of alternating light and dark, fine- to medium-grained layers 0.5 to 5 cm. thick. The dark layers are commonly about 60 per cent hornblende, but some are almost entirely composed of hornblende. The light layers are made up of quartz and plagioclase with very little hornblende. Contacts between the layers are gradational for the most part, but some are sharp. Epidote alteration is present, in some degree, throughout. Small lenses and veins of clear, coarse-grained quartz, commonly less than 1 cm. thick, both transect and parallel the foliation.

Thin layers of amphibolite, too small to be mapped separately, occur within the quartzo-feldspathic gneiss, and several thin layers of gneiss are found within the amphibolite.

Quartz-feldspar-biotite gneiss

Most of the lowland north and west of the Shigami mountains is underlain by east-striking, steeply-dipping, quartz-feldspar-biotite gneiss. Good exposures are found on the banks of the river, particularly in the northeast. Elsewhere, outcrops are small and scattered.

Much of the gneiss is a dark grey, medium- to coarse-grained, slightly foliated rock, composed of quartz (25%), plagioclase (50%), microcline (15%), and mafic minerals — chiefly biotite with some hornblende. The rock has a broad compositional layering as well as concentrations of oriented mafic minerals in foliation planes. A second variety of gneiss, which occurs as one- to two-foot layers in the sequence, is a fine-grained, massive, quartz-feldspar-biotite rock. The biotite in this variety has no preferred orientation.

A third variety of gneiss was noted only along the south shore of Jus lake, although it is the most common variety in the map-area to the south (Chown, 1960). It is a coarse-grained, quartz-plagioclase-hornblende rock with minor biotite. A slight foliation only is given by the elongate amphibole aggregates and, as a result, the rock has a quasi-igneous appearance.

All the gneissic rocks are seamed by dykes generally less than 6 inches thick of coarse-grained pink granite and pegmatite. Although most of the dykes parallel the foliation of the gneiss, some transect it. Commonly the former have gradational contacts with the gneiss, whereas the latter have sharp contacts. The transecting and parallel dykes are the same age. Most of the pegmatite dykes are zoned, having a slightly finer-grained border phase.

Alteration is slight in the gneiss in general, and the feldspar, particularly the plagioclase, has a waxy lustre indicative of slight alteration. Some epidote has been formed by alteration of biotite and hornblende.

Injected amphibolite:

Injected or migmatized amphibolite occurs in several narrow belts within the injected gneiss complex, and within the granite. The largest belt is 12 miles long and lies just north of the centre of the area. The second largest, 3 miles long, is near the southwest corner.

These rocks are generally composed of normal amphibolite intruded by grey granite in small dykes parallel and transverse to the foliation. Both types of dykes have sharp contacts. The granite content ranges from 10 to 70 per cent, and the foliation remains constant up to the point where granite constitutes about 60 per cent of the rock. With increase in the granite content, the rock becomes a mixture of blocks and schlieren of amphibolite set in a matrix of foliated grey and pink granite. Rotation of many of the amphibolite blocks renders the foliation less constant.

The amphibolite has obviously resisted intrusion and assimilation by the granite more than the gneiss. Amphibolitic bands interbedded with gneiss extend into massive granite, giving the contact between granite and gneiss a deeply indented outline.

Injected gneiss:

Injected gneiss crops out along the north front of the Shigami mountains, and in the northeast and west-central parts of the area. It does not form prominent outcrop areas except along the mountain fronts.

A complete gradation exists between quartz-feldspar-biotite gneiss and slightly foliated pink granite. The injected gneisses are the transitional rocks and, as mapped, contain more than 20 per cent and less than 70 per cent of granitic material. These rocks are well banded, with their foliation and compositional layering being emphasized by many parallel dykes of pink granite and pegmatite. Each of these dykes has a zone of pink feldspar grading outward from it into the surrounding gneiss. As the granite content increases, the injected gneiss becomes dominantly pink in colour, dyke-gneiss contacts become completely gradational, and the foliation ceases to be constant. Some isolated remnants of unadulterated gneiss remain, as well as thin, contorted septa of amphibolite. Rocks of this higher grade of migmatite are especially abundant along the north flank of the Shigami mountains.

Granite:

Granite is composed on the south border, in the east-central part of the area, and along the west and north fronts of the Shigami mountains. It is a resistant rock and forms the main support of the mountain block.

The granite is pink, coarse-grained, and massive for the most part although some of the border phases are faintly foliated. Quartz constitutes 25 to 30 per cent; microcline, 50 to 60 per cent; and plagioclase, 10 per cent of the rock. Other minerals, principally biotite and muscovite with some hornblende, make up as much as 15 per cent of the granite. The more mafic and local varieties of granite are probably partly digested inclusions of amphibolite.

Most of the minerals are fresh. Plagioclase is clouded with clay-mineral alteration, and the hornblende and biotite commonly have a slight coating of chlorite.

Coarse, pink and grey pegmatite, apparently correlative with the granite, occurs as minor dykes, between 1 foot and 4 feet thick, cutting the quartz-feldspar-biotite gneiss.

Mistassini Group

Two outliers of flat-lying Late Precambrian sedimentary rocks are present in the area. One forms a prominent butte just north of Mantoushish lake, and the other, a series of low outcrops on the shores of the lake.

The position of the two outliers with respect to other rocks leaves little doubt that they overlie the early Precambrian rocks unconformably, although the actual contact is not exposed. The butte stands out abruptly on top of steeply dipping gneisses. Gently dipping beds of the second outlier occur in a depression in the rugged granite hills.

The dominant rock in the outlier near the lake is a well-indurated, quartz pebble conglomerate. Rounded, glassy, quartz pebbles, one inch in diameter, and angular pink potassium feldspar fragments constitute 20 to 30 per cent of the rock. The remainder or matrix, is a coarse-grained, grey to greenish-grey, arkosic sandstone.

A 200-foot section is exposed north of the lake on the flanks of the butte. The lower 100 feet is largely interbedded, coarse-grained, red arkose and red, arkosic, pebble conglomerate in massive beds 1 foot to 10 feet thick. Minor beds of red shale are also present. About 60 per cent of the upper 100 feet is red arkose and conglomerate, with some red shale, as in the lower section. The remaining 40 per cent is laminated and cross-bedded, grey, medium-grained subarkose.

Precise correlation is, of course, lacking, but the lithological similarities between these rocks and those of the Papaskwasati formation to the south (Chown 1960) leave little doubt that the formation once covered most of the area. These outliers, together with several smaller ones in the area to the south, bridge the gap between the Papaskwasati formation, in the Mistassini basin, and similar flat-lying sedimentary rocks cropping out to the northeast (Hashimoto 1960).

Post-Mistassini

Diabase; Gabbro:

Diabase dykes are fairly common in the area, but only five are big enough to show on the map. The trend of the dyke near the northwest of the area has been established by three outcrops. The other diabase dykes shown have been given a trend parallel to this one because they all have the same well-developed, blocky, joint pattern. The diabase is fine-grained, dark, ophitic, and composed of plagioclase, uralitic amphibole, and magnetite.

An east-striking gabbro dyke is found north and west of Jus lake. The finer-grained portions of this dyke are identical with the diabase. In the coarser phases the chief minerals, plagioclase and uralitic amphibole, may be easily distinguished in spite of intense alteration. A dense, black, chilled contact phase of the dyke is highly magnetic.

The diabase dykes cut granite and older rocks. They are presumably later than the Mistassini group, on the basis of Wahl's (1953) observations on the Coom Lake gabbro, which is a similar basic intrusion.

Cenozoic

Glacial cover is especially heavy in the southeastern part of the area. Elliptical drumlinoid ridges, 50 to 100 feet high and up to a mile long, trend S.35° W. Corrugate ridges

of the same dimensions are also present. Southwest of the Mantoushish Lake outlier, these ridges are littered with large joint blocks of sandstone. Elsewhere, somewhat smaller and better rounded granite blocks are the chief erratic. Ridges of glacial till form streamlined tails in the lee of some of the mountains. Glacial striae on bedrock surfaces corroborate the S. 35° W. direction of ice movement indicated by the drumlinoid ridges.

Remnants of two north-south eskers, 20 to 30 feet high are preserved in the upper reaches of the Mamaskwasati River valley.

Extensive stratified outwash deposits of sand and gravel underlie much of the Shigami River plain, and at least two terrace levels were noted.

STRUCTURAL GEOLOGY

Foliation:

The foliation in the granitic gneiss, amphibolites and injected gneiss is fairly constant in trend but varies somewhat in dip. The strike is east-northeast for the most part. A major exception is in the vicinity of Mantoushish lake where it is southeast. Foliation trends are quite confused in the migmatite zone along the north edge of the mountains.

Lineation:

Lineations, principally the axes of small folds in the gneiss and aligned hornblende prisms in the amphibolite, may be seen at several localities. Most plunge gently to the west.

Folds:

The only apparent large-scale fold is in the northwest corner of the area, where a narrow belt of amphibolite outlines the steep north and south limbs of an anticline that plunges to the west and is overturned to the south.

Faults:

The occurrence of numerous chlorite-filled shears in the gneiss of the Shigami River canyon suggests that the river here follows a nearly vertical fault. However, as the shears lie parallel to the foliation at this point, the canyon may have resulted from erosion along a zone of weakness rather than a definite fault.

Joints:

The granite, gneiss, and amphibolite all have a well-developed, blocky, joint system. Measurement of more than 400 joints

indicates that one major system prevails through all the rock units. This system consists of two vertical or near-vertical joints, one striking at N. 50° - 60° E. and the other, at N. 20° - 30° W., and a third, near-horizontal joint.

ECONOMIC GEOLOGY

Rough terrain and the relative inaccessibility of the region have hindered prospecting. To date there have been no claims staked within the area.

The amphibolite appears to be the most promising rock unit from an economic standpoint. A small amount of sulphide minerals is present almost throughout, and chalcopyrite was noted in some widely separated outcrops. The sulphide minerals occur as discrete grains and small aggregates scattered through the rock.

Minor scattered sulphides, chiefly pyrite and pyrrhotite, also occur in the gabbro and diabase dykes, mainly along small joint surfaces. The contacts of these dykes contain enough magnetite to deflect compasses markedly. The one contact exposed did not contain enough magnetite to be commercially significant, but other concentrations may exist.

The eskers and river plain deposits contain sand and gravel for construction projects.

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