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GODS RIVER MAP-AREA, MANITOBA

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(Report, figure, and Map 17-1962)

R. R. Potter

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GODS RIVER MAP-AREA, MANITOBA

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By

R.R. Potter

D E P A R T M E N T O F

M I N E S A N D T E C H N I C A L S U R V E Y S

C A N A D A

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Map 17-1962. Gods River, Manitoba ..... in pocket

Figure 1. Pleistocene features ..... frontispiece

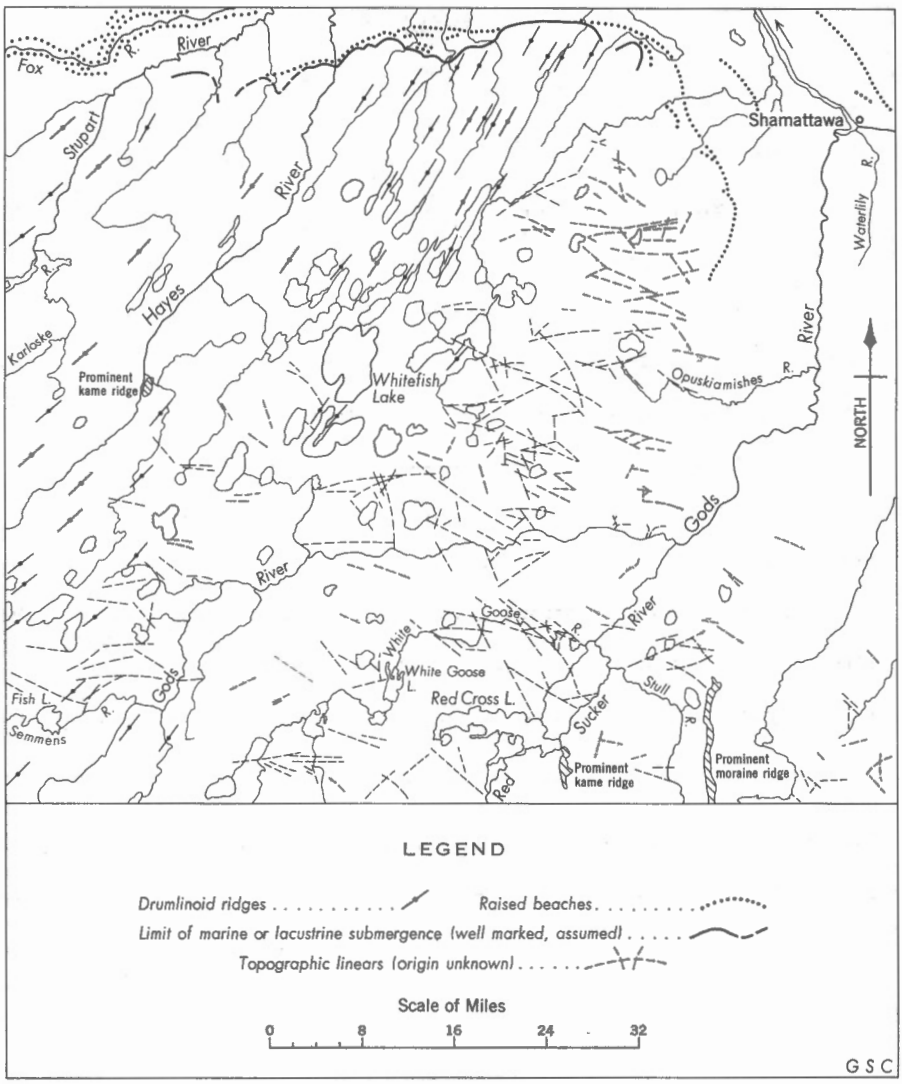

Figure 1. Pleistocene features of Gods Lake map-area

GODS RIVER MAP-AREA, MANITOBA

INTRODUCTION

Gods River map-area is in northeastern Manitoba close to the Ontario-Manitoba Boundary and due south of York Factory on Hudson Bay. It lies between 55 and 56° latitude and 92 and 94° longitude, and comprises nearly 5,500 square miles.

The investigation was carried out during the summer of 1961. Because of the scarcity of outcrop, almost all traverses were on rivers, brooks and lakes, nonetheless, the whole map-area was traversed by Cessna 180 float aircraft. Outcrops were examined on several small lakes in the southern part of the map-area, but none was found on any of the lakes in the northern half.

Previous Work

Published information on Gods River map-area is mainly confined to early reports of the Geological Survey of Canada. Many geologists traversed Hayes River, such as Bell (1879)[1], Brock (1911), and Tyrrell (1912). In 1908 O'Sullivan examined the lower parts of Gods River, including the section between the settlement of Shamattawa and Hayes River; his data is compiled on a map by Tyrrell (1912). Dobbs (1906) followed Gods River down from Gods Lake. After reaching Shamattawa, he traversed up the Pekano, a branch of Echoing River, and back to Gods Lake. Savage and van Tuyl (1919) collected numerous fossils on Shamattawa (Gods) River and elsewhere in the Hudson Bay region. Merritt (1926) made a reconnaissance survey that included the lower parts of Fox River, and since then no government geologists have worked in the area.

Gold has been mined at Gods Lake to the southwest, and at Knee Lake to the west of Gods River map-area and some prospecting has undoubtedly been done in the map-area in conjunction with the discovery of these deposits. In recent years aeromagnetic surveys[2] have been made over most of the area and many of the anomalies have been checked by ground geophysical methods and diamond-drilling.

Accessibility

The most convenient way of entering Gods River area is by aircraft from Ilford, at mile 286 on the Canadian National Railway

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[1]Names and/or dates in parentheses refer to publications listed in the References.

[2]Aeromagnetic maps of much of northeastern Manitoba are available at the Mines Branch, Department of Mines and Natural Resources, Winnipeg.

line to Hudson Bay. It may also be reached by canoe from Lake Winnipeg via Nelson, Echimamish, and Hayes Rivers, or by ascending Hayes and Gods Rivers from York Factory on Hudson Bay.

Shamattawa, the only settlement in the map-area, is situated on Gods River at its junction with Echoing River. Supplies may be obtained there and at Ilford.

Because of the many rapids and falls, the upper parts of Gods, Hayes, Fox, and Red Sucker Rivers are most difficult to travel by canoe. Their lower parts, however, are wide and shallow and can be navigated easily. Stupart, Semmens, White Goose, and Stull Rivers are also navigable.

The above-mentioned large rivers are the only ones satisfactory for canoe travel; elsewhere the shallow slow-moving streams that connect many of the small lakes are impassable, and cannot be used for access to most of the map-area.

Acknowledgments

The writer is indebted to G.E. Cooper, J.D. Langille, D.A. Murray, J.A. Niedermaier, and J.A. Sauerbrei for capable assistance during the field season, and to Mike Hatley, John Hatley, Ralph Birch, and Warren Engstrom of Ilford Airways for excellent charter air service. Assistance and information provided by Oliver Lindal of Ilford is also greatly appreciated. Thanks are due to Ken Duthy of the Hudson's Bay Company at Shamattawa for many courtesies shown to members of the field party, and to Bob Cunningham and Dennis Watson of the Phelps Dodge Corporation and Cullen MacLeod and Arthur Beecham of New Jersey Zinc Explorations Ltd., for their willing cooperation.

PLEISTOCENE GEOLOGY

Attitudes on glacial striae, grooves, and drumlinoid ridges indicate that the most recent direction of ice-movement has been southwesterly. Older sets of southeasterly trending striae have, however, been observed.

The extent of marine or lacustrine submergence is indicated on Figure 1. It has been established from aerial photographs, and is based on truncated drumlinoid ridges and changes of drainage pattern. Several sets of raised beaches have been located, but no attempt has been made to establish their relative ages. They may mark the edge of a very large meltwater channel.

Long narrow drumlinoid ridges are abundant in the northern and western parts of the map-area. A gradual change in direction from north-northeasterly in the north, to northwest in the southwestern part is indicated by these ridges.

The northern extension of the Sachigo moraine (Elson, 1961), which may be interlobate, is near the southern boundary of the map-area, just west of Stull River.

Two other prominent ridges, which may be kames, occur at the eastern end of Red Cross Lake and on the eastern side of Hayes River (Brassey Hill).

Straight and broadly curving topographic linears, apparently unrelated to bedrock structures, are abundant in many parts of the map-area (Fig. 1). Many exceed 5 miles in length and have been observed to cross other topographic features, including drumlinoid ridges, swamps, and shallow lakes. Their origin is not known.

Thick drift blankets almost all the map-area. Banks of till and alluvium up to 100 feet high were noted in the lower parts of Hayes River. Hayes, Fox, and Stupart Rivers cut deeply into the tills, providing the only bedrock exposure in the northern part of the map-area. The drift in the southern part is thinner, and bedrock exposures are more numerous.

Pleistocene sections were recorded at two localities: (1) on Gods River, 2,000 feet northeast of Sturgeon Falls; and (2), on Hayes River, 1,000 feet southwest of its junction with Gods River.

Gods River Section			Hayes River Section		
Approximate Height Above Bedrock (feet)		Material	Approximate Height Above River (feet)		Material
29-31	—	Peat and loam	55-70	—	Mixed sand and gravel
28-29	—	Brown silt	0-55	—	Dark chocolate-brown, very hard, jointed sandy till (similar to 8-23 on Gods River)
26-28	—	Brown fine sand		—	River - bedrock not observed
23-26	—	Light brown sandy till			
8-23	—	Dark chocolate-brown, very hard, jointed sandy till			
0-8	—	Light grey, hard, compact clay till			
	—	Bedrock			

Pleistocene fossils from the brown silt of the Gods River Section (height 28-29') have been identified by F.J.E. Wagner of the Geological Survey. They include Discus cronkhitei (Newcomb) and Succinea avara Say, both terrestrial gastropods. Their presence in the upper silts indicates that the central part of the map-area was not affected by marine transgression.

GENERAL GEOLOGY

Basic volcanic, sedimentary, and gneissic rocks of Precambrian age trend in a west-northwesterly direction across the map-area. Large bodies of granitic and dioritic rocks occur in the southwestern part. Dykes and sills of pegmatite, aplite, and diabase are locally abundant, and ultrabasic rocks occur on Stupart River. Flat-lying Ordovician shales and limestones occupy the northeastern part.

Precambrian (Map-units 1-9)

Hayes River Group (?) (Map-units 1, 2)

Basic volcanic and sedimentary rocks (1-2) are present in several parts of the map-area. One belt has been examined on Semmens and Gods Rivers, and in the vicinity of Red Cross Lake. A second belt outcrops on Stupart River in the northern part of the map-area. The rocks that constitute units 1 and 2 resemble rocks of the Hayes River Group as described by Wright (1928, 1932a, 1932b), and are tentatively correlated with them.

Dark grey-green, fine-grained, basic volcanic rocks, with interbedded siltstones, sandstones, quartzites, greywackes, and tuffs, and their metamorphosed equivalents, have been traced intermittently across the southern part of the map-area. Near Semmens River, thick pillowed flows of basaltic rocks (2a) overlie pale grey-green, fine-grained, thinly-bedded quartzites, siltstones, and sandstones (1a). Primary features, such as crossbedding and graded bedding are well preserved locally. Pillows are well developed at Fish Lake, and commonly exceed several feet in length. Irregular masses of brown-weathering carbonate were noted on a small island near the western side of the lake. A similar succession was noted near Marshall Falls on Gods River, but pillows there are generally smaller and are not as abundant as at Fish Lake.

Dark grey-green massive flows are common west of White Goose Lake, whereas sedimentary rocks predominate in the succession at Red Cross Lake. Beds of buff-grey-weathering, medium- to coarse-grained arkose (1b), which commonly exceed 100 feet thick, are intercalated with light to dark, grey-green, fine-grained tuffs and flows. These arkoses possess some features common to igneous rocks, and may be thick rhyolite flows or welded tuffs. Thin beds of greywacke, quartzite, and conglomerate, with interbedded basic and rhyolitic volcanic rocks (1c), occur in the southwestern end of Red Cross Lake.

Sheared equivalents of map-units 1 and 2 occur in the southeastern part of the map-area, in the vicinity of Stull River. Locally they are metamorphosed to chloritic and amphibolitic schists. Foliation is developed parallel with the bedding. Massive, dark grey-green, coarse-grained amphibolites (2c) were noted on the northeastern side of Fish Lake, at the narrows of White Goose Lake, and on the western shore of Red Cross Lake. A dark grey to black hornblendic rock, which may be a large inclusion, was noted to the south of White Goose Lake.

Grey-green, fine-grained basic volcanic and sedimentary rocks were noted on Stupart River in the northwestern part of the map-area. Lavas, including massive and pillowed flows, are common. Pillows up to 10 feet long were observed.

Map-unit 3

Black, fine-grained ultrabasic rocks (3) on Stupart River appears to be the eastern extension of those described by Quinn (1955 a) on Fox River. Their continuation to the east is suggested from aeromagnetic data.

Oxford Group (?) (Map-units 4-6)

A sequence of conglomerates, grits, and argillites (4), which may be lithologically similar to parts of the Oxford Group (Wright, 1928, 1932a, 1932b), was observed on Gods River and near Red Cross Lake. Wright (1932b) reported that the Oxford strata overlie the Hayes River Group at Gods Lake. However, similar rocks in Gods River map-area are separated by a large fault, and exact age relationships can only be inferred.

Coarse-grained lithic greywacke, and granite boulder conglomerate are the predominant rock types of map-unit 4. Well-rounded detrital boulders of light buff-grey granitic material are abundant constituents of the conglomerate beds. The remainder of the detrital fragments consists of dark grey, fine-grained sedimentary and volcanic rocks.

In the conglomerate on a small island in a lake that drains into the northwestern side of Red Cross Lake, the granitic boulders average about 6 inches in diameter. The matrix is a grey, fine- to coarse-grained calcareous grit, which weathers more rapidly than the boulders. These granitic boulders are commonly stretched into rod-like masses several feet long.

Conglomerate occurs as beds, approximately a foot thick, in a large bay on the north side of Red Cross Lake. Granitic detrital fragments in this rock are commonly less than a few inches in diameter.

At Shorty Rapids on Gods River, granite-cobble conglomerate is interbedded with light green-grey laminated grit and argillite. The granitic cobbles constitute more than 70 per cent of the detrital fraction and have an average diameter of about 6 inches.

Lithic greywacke, grit, and argillite were noted near Sturgeon Falls on Gods River. Buff-grey, medium-grained, sugary-textured quartzo-feldspathic detrital fragments are abundant in the greywacke beds. They average less than an inch in diameter, and in some cases are stretched to rod-like shapes more than 5 inches long. The beds are graded, and top determinations were easily obtained. Individual beds of light grey grit and argillite occur between the greywacke beds. Parts of the greywacke-and-grit sequence are calcareous.

The conglomerates at Red Cross Lake are overlain by light- to dark-grey argillite. Black, pyrite- and arsenopyrite-bearing

beds were noted. The total thickness of this sequence, including the conglomerates and argillites, is about 5,000 feet.

Dark grey to black, fine-grained basic volcanic rocks (5) occur near the top of, and above, the dark argillites. Black and blue-black volcanic rocks, commonly pillowed, outcrop at the northeastern end of Red Cross Lake. Pyroclastic rocks are also present. A similar assemblage occurs on Gods River, between Muskeg and Big Bear Falls. A large irregular fragment of grit (4) was found within the flows and sedimentary rocks. On the basis of this fragment and the top determinations at Red Cross Lake, the volcanic rocks of map-unit 5 occur above the Oxford-type sediments, a sequence which has not been recognized by other workers in this area.

The sedimentary and volcanic rocks of units 4 and 5 are generally less metamorphosed than similar rocks of units 1 and 2. Chloritic and biotitic schists (4a) occur near the contact with the granitic gneisses (7). The rocks included with unit 7 on White Goose Lake are probably the metamorphosed equivalents of map-unit 4.

The rusty-weathering skarn-type rocks with magnetite (4b) to the east of White Goose Lake may also be metamorphosed equivalents of map-unit 4.

Granite-boulder conglomerate (6) was observed on two islands in the northeastern part of Red Cross Lake. This conglomerate is poorly sorted and stratified—characteristics that are uncommon in the conglomerates of map-unit 4. They are assumed to be younger than the basic volcanic rocks of map-unit 5.

Map-units 7-9

A large part of Gods River map-area is underlain by granitic, dioritic, and granodioritic gneisses (7). Their composition and texture are extremely variable, and rocks of several ages may be present.

On the south side of Red Cross Lake, sedimentary and volcanic rocks (1b, c) are partly assimilated to granitic gneisses. The more basic rocks have resisted assimilation and a highly irregular contact has been produced. Biotitic, granitic gneisses have been traced in outcrops southward to the boundary of the map-area.

The granitic and granodioritic gneisses north of Red Cross Lake are commonly banded; lit-par-lit injection phenomena are present in many localities. Amphibolitic sections occur in a few places. The contact between these granitic gneisses and the sedimentary rocks (4) appears to be sharp, particularly to the northeast on Red Cross Lake.

Field evidence therefore suggests that parts of the granite-gneiss (7) are younger than the sedimentary and volcanic rocks of map-units 1 and 2, and older than the sedimentary and volcanic rocks of map-units 4, 5 and 6. Parts may even be younger than map-units 4 and 5.

A large area of quartz-garnet-biotite schist and gneiss (7 a) occurs in the northwestern part of the map-area. Outcrops were found on the lower Stupart and Fox Rivers. The origin and age relationships of these rocks are unknown, but Merritt (1926) suggested they are of sedimentary origin and overlie basic volcanic rocks.

Parts of map-unit 7 contain granitic rocks resembling those of map-unit 8. Although lithological differences between these rocks and the bulk of the granite-gneiss (7) could be recognized in the field, their limited areal extent and the general lack of outcrops prevented them from being mapped as unit 8.

Rocks that range in composition from granite to diorite, and their gneissic equivalents, comprise map-unit 8. They occur mainly in the southwestern part of the map-area. Most typical is a grey-green, medium-grained, chloritized biotite rock. Orthoclase feldspars are commonly stained with hematite. Pyrite is a common accessory mineral. Outcrops of gneissic biotite granite with orthoclase phenocrysts were noted, particularly near the contact with the basic volcanic rocks of map-unit 2. Hornblende diorites and their gneissic equivalents were also noted near these contacts.

Granitic rocks of this map-unit intrude basic volcanic and sedimentary rocks of map-units 1 and 2, but a gradational contact of several hundred feet was observed on the south side of Red Cross Lake. Many amphibolitic inclusions (8 b) occur in the granite near this contact. On the other hand, a very sharp contact between the granite (8) and the sedimentary rocks (4) was noted at Shorty Rapids on Gods River.

The granitic rocks of map-unit 8 are thus younger than the flows and sedimentary rocks of map-units 1 and 2, and may be in part younger than map-units 4, 5 and 6. They may in part be synchronous with, or younger than, the gneisses of map-unit 7.

Small stocks, dykes, or sills of pink-buff to white aplite and leucocratic granite (8 b) were noted on Fox River, on a small lake 8 miles south of White Goose Lake, and on Gods River near Muskeg and Big Bear Falls. The age relationships of these rocks are not fully understood.

A diabase dyke (9 a), approximately 100 feet wide, was observed on Red Sucker River, south of Red Cross Lake. A smaller dyke was observed on the south shore of Red Cross Lake.

Quartz-feldspar-tourmaline-garnet pegmatites (9 b) occur at several places within the map-area. Single outcrops commonly exceed 100 feet in diameter, but because of lack of outcrops their exact width and strike could not be determined.

Buff-grey-weathering, quartz-feldspar, rare-element pegmatites (9 c) outcrop near Red Cross Lake. They occur within the sedimentary and basic volcanic rocks of map-units 4 and 5. The relationships between these dykes and those of map-unit 9 b are not known.

Palaeozoic (Map-unit 10)

Flat-lying Upper Ordovician sedimentary rocks (10) occur in the northeastern part of the map-area. Parts of this map-unit belong to the Shamattawa Formation, described by Savage and van Tuyl (1919) and Foerste and Savage (1927). Buff-white, fine-grained limestones occur as fragments in the banks, and as large outcrops in the bottom of, Gods River. The following fossils have been identified by G.W. Sinclair of the Geological Survey.

From Shamattawa (Limestone Rapids) GSC Loc. 46549—
- Stromatocerium sp.
- Streptelasma sp.
- Favistina sp.
- Rhynchotrema cf. Capax
- Sowerbyella sp.

From Pishu Rapids (24 miles south of Shamattawa) GSC Loc. 46550—
- Maclurites cf. manitobensis
- Alumettoceras sp.
- Illaenus cf. americanus

Many other fossils, probably found at Limestone Rapids, were given to members of the party by residents of Shamattawa.

Fragments of this unit are abundant in the southern parts of the map-area, but no outliers were encountered. The approximate position of the contact was obtained by Foerste and Savage (1927) on Echoing River, to the east of Gods River map-area. There is no apparent difference in vegetation or topography between areas underlain by Precambrian and Palaeozoic rocks, hence the position of the contact as drawn on the map is uncertain.

STRUCTURAL GEOLOGY

Gods River map-area is within the Superior structural province (Stockwell, 1961), and is approximately 120 miles southeast of its contact with the younger Churchill structural province. The effect of Churchill-age deformation in Gods River map-area is not known, but an absolute age of 1,830 million years (Lowdon, 1961) to the southeast of the map-area suggests that Churchill-age metamorphism and intrusion had some effect within this part of the Superior craton.

The overall trend of the Precambrian rocks is west-northwest. Dips are extremely variable, but are close to vertical in most places. Planar features such as jointing and cleavage are poorly developed. Top determinations could be obtained locally, but because of limited outcrops, could not be properly interpreted. The general distribution of map-units may give some indication of the regional structural setting, but more data is required to make any accurate interpretations.

A large fault has been traced in a west-northwesterly direction for more than 50 miles. It extends through Red Cross Lake in the southern part of the map-area. Lithological dissimilarities north and south of this fault, and intense shearing and contortion, are

evidence for this structure. Its exact position in the southeastern part of the map-area is not known. Minor structures suggest that movement was partly transcurrent.

Related faults striking north-northwest have been recognized. One such fault has been assumed to explain the lithological discontinuity in the northeastern part of Red Cross Lake. A westerly plunging syncline has been postulated east of this fault, and minor structures suggest a plunge of approximately 30 degrees.

AEROMAGNETIC INTERPRETATIONS

Because of the lack of outcrops in many parts of the map-area, aeromagnetic data were used to complete the geological picture. The limit of mapping and the areas of no outcrop are indicated on the accompanying map.

In the southern part of the map-area, sedimentary and basic volcanic rocks are generally non-magnetic and consequently do not produce a diagnostic aeromagnetic pattern. In the northwestern part of the map-area, similar rocks have been traced in an easterly direction using data from Knee Lake map-area (Quinn, 1955 a), from outcrops on Stupart River, and from diamond-drill chips obtained near a small lake about 4 miles west of Whitefish Lake. These chips consisted of dark green, fine-grained, contorted sedimentary rocks, and dark green magnetic iron-formation. Aeromagnetic anomalies, similar to those produced by this iron-formation were noted elsewhere in the map-area, and have been marked "I.F.". Long, parallel, elliptical anomalies appear to be characteristic of the basic volcanic and sedimentary rocks (1, 2) in this part of the map-area. Unfortunately the same characteristics apply to the ultrabasic rocks (3) and the two could not be distinguished on the basis of aeromagnetic data, although a small anomaly north of Whitefish Lake may be caused by ultrabasic rocks. Aeromagnetic coverage is not available for most of the area between Whitefish Lake and the assumed Palaeozoic contact, and geological contacts in this region are entirely speculative.

Sedimentary and volcanic rocks of map-units 4, 5 and 6 produce large aeromagnetic anomalies, particularly where the conglomerates, grits and argillites (4) are in contact with the granite and granite-gneiss (7, 8). These anomalies are caused by the presence of rusty-weathering skarn-like rocks with magnetite.

The aeromagnetic patterns produced by the granitic gneisses and the granites (7, 8) are alike and two cannot be separated by this means. The Palaeozoic rocks produce no diagnostic aeromagnetic pattern.

MINERAL OCCURRENCES

Pyrite occurs as disseminations and as small fracture fillings in sheared basic volcanic and tuffaceous rocks just north of the ultrabasic body on Stupart River. Some development work has been done on these occurrences.

A small, irregular-shaped quartz-molybdenite vein, with minor pyrite and chalcopyrite, was noted at Marshall Falls on Gods River. The country rocks are predominantly chloritic schists. Numerous grey-weathering quartz-feldspar porphyry dykes occur nearby. The vein has a maximum width of 3 feet and has been traced in outcrops and blocks for about 30 feet. Chemical analyses by L. Lutes indicated 0.005 oz/ton gold, and 0.01 oz/ton silver. This occurrence is therefore not of economic interest.

A swarm of a dozen or more quartz-feldspar rare-element dykes was discovered on the shore at the northeastern end of Red Cross Lake. The dykes occur in a large outcrop of jointed and sheared basic volcanic and tuffaceous rocks, about 7,500 feet west northwest of where Red Sucker River drains Red Cross Lake. Soft, purple lithium-mica occurs as bands and disseminations in several dykes. One, approximately 13 inches wide, contains more than 30 per cent of the purple mica. Another dyke, about 12 feet wide, contains about 5 per cent purple mica. The rubidium content of this purple mica is unusually high; one specimen yielded about 15 per cent Rb (analysis by G. Lachance). A few dykes have been traced for approximately 50 feet from the shore, where they disappear under glacial drift.

Three similar dykes, each about 2 feet wide, occur on the southeastern shore of a small lake 1/2 mile north of a long sandy point at the northwestern end of Red Cross Lake. Spodumene has been identified in one of these dykes by X-ray analysis.

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