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GEOLOGICAL SURVEY OF CANADA

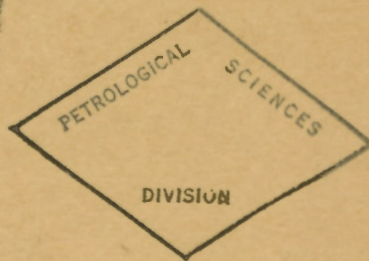
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RANJI LAKE MAP-AREA, NORTHWEST TERRITORIES

(REPORT AND MAP)

BY

L. P. TREMBLAY



OTTAWA

1948

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NORTHWEST TERRITORIES
(Preliminary Account)

By

L.P. Tremblay

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Illustration

Preliminary map -- Ranji Lake, N.W.T.	In envelope
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RANJI LAKE MAP-AREA, N.W.T.

INTRODUCTION

This report presents a preliminary account of field work by the writer, with the assistance of M.L. Miller and G. M. Wright, during the season of 1947, in Ranji Lake map-area (longitude, 115° 00' to 115° 30'; latitude, 64° 00' to 64° 15'), a part of the southeast corner of the Ingray Lake area¹. Ranji Lake lies about 115 miles north of

¹Geol. Surv., Canada, Map 697A, Ingray Lake, District of Mackenzie, Northwest Territories (1942).

Yellowknife, and can be reached easily by aircraft, or by tractor train during the winter months.

The area is relatively well provided with canoe routes. A major stream, Snare River, traverses it on the west in a southerly direction, and apart from one series of rapids can be navigated for its entire length. Several good-sized lakes lie within the map-area, and connections between them are generally possible by means of short portages. The topography is quite rugged in detail, the degree of ruggedness, however, varying with the types of rocks encountered. Areas of volcanic rocks are more rugged than those of sedimentary formations, and, similarly, those of metamorphosed sedimentary rocks than other areas underlain by relatively unaltered formations. The maximum relief is at least 450 feet above the level of Indian Lake, which lies 1,025 feet above sea-level.

GENERAL GEOLOGY

The general distribution of the formations and their relative ages are shown on the accompanying preliminary map.

Basic to intermediate volcanic rocks (1)² constitute

²Numbers, in parentheses, are those of the map-units used on accompanying map.

the oldest rocks of the map-area. They commonly weather greenish brown to dark green, are very much altered or have been entirely recrystallized, and show in places malformed pillow structures that can rarely be used for top determination. Two main, northerly trending belts (the eastern and western) and several smaller bands have been traced and mapped. The rocks of some of the smaller bands and of part of the main eastern belt may possibly be of later age than those of the others. The western belt, now entirely recrystallized to schists and gneisses, is characterized along its western border by a continuous band, $\frac{1}{2}$ to 1 mile wide, of amphibolite, hornblende schist, and hornblende-feldspar gneiss. The remaining part of the belt, roughly the eastern half, consists of rocks that show banding (1c) as a general feature, contain much secondary biotite, are fragmental in places, and appear to be more acidic than the rocks of the western part. They are probably, in part, altered tuffs and agglomerates. The belt also includes lens-like masses of porphyritic or amygdaloidal andesitic lava (1d), and one such mass has been

outlined on the map. The eastern belt is more typical of the volcanic rocks commonly described as greenstone, which have been altered to chlorite, and epidote (1a). The rocks of the southern part of this belt have, however, been recrystallized to hornblende schists and hornblende-feldspar gneisses (1b). A few interbeds of tuff and agglomerate, and small lenses of acidic lava and quartz porphyry are found intermixed with the rocks of the eastern belt.

Rhyolite, tuff, and agglomerate (2), including some associated quartz porphyry, are not abundant in either of the two main belts of volcanic rocks in the map-area. Within the western belt and along the eastern border of the eastern belt, they form continuous bands of irregular width composed mainly of tuff and agglomerate. Along the western border of the eastern belt, they occur as lenses and irregular masses, and consist mainly of lava and agglomerate, with a few small bodies of quartz porphyry (2b). The latter are considered to be the feeders of the acidic flow. Some small masses of acidic rocks much resembling rhyolitic lavas have been mapped as such. They may, however, be intrusive, as dykes of similar material occur in the surrounding argillite.

The sedimentary rocks are predominantly argillite and quartzose greywacke (3). Argillite is commonly very fine grained, grey-black, and well bedded, the beds averaging about $\frac{1}{2}$ inch in thickness. The greywacke is rather sandy in appearance, dark grey, and generally contains many conspicuous quartz grains in a fine, black, quartzose groundmass. It is definitely more coarsely bedded than the argillite, but in places the beds show good grain gradation from sandy at the bottom to argillaceous at the top. Crossbedding and ripple-marks are rare. Chlorite and micas are the main dark minerals. Locally, these rocks have been sheared and altered to slate or quartz-graphite schist.

Near large granitic masses, the sedimentary rocks (3) have been subjected to stress, heat, and igneous emanations, and have been partly to entirely metamorphosed, the degree of recrystallization decreasing with increasing distance from the granitic bodies. Two wide belts of metamorphosed sedimentary rocks, each divided into two zones, a biotite zone and a nodular zone, are shown on the map. The position of the contact of the biotite zone (4) with the unaltered sedimentary rocks is based on the appearance of biotite in grains distinguishable to the naked eye, and can be mapped fairly closely. As the development of biotite is accentuated more in the argillite than in the greywacke, more attention was paid to the argillaceous beds to define the outer contact of the biotite zone. The contact of this zone with the nodular zone (5) is gradational over a few hundred feet. The rocks of the biotite zone are generally similar in appearance to the less altered sedimentary strata, being distinguished only by the presence of larger flakes, or book-like masses, of biotite.

The nodular sedimentary rocks (5) are dark grey to brownish grey and have a sandy appearance. They could be referred to as quartz-biotite schists or gneisses with a pronounced nodular structure. Nodules are generally oval or rounded, but porphyroblasts of garnet and chiastolite, some reaching a length of 6 inches, were observed in places. In the field

most of the nodules appear to be a mixture of quartz and biotite, but seen under the microscope they are skeletal growths of one or more of the minerals andalusite, cordierite, and staurolite, carrying abundant inclusions of biotite and quartz. In areas adjoining the biotite zone, a remnant of bedding structure is still visible, particularly in the argillaceous beds, due to a pronounced development of nodules. Near the large granitic masses, the bedding seems to have been entirely destroyed and the nodules are less apparent. Garnet, or garnet and sillimanite, has formed in abundance, and the rock has been entirely recrystallized to resemble a gneiss. In the rocks of the nodular zone as a whole, the following mineral associations were noted under the microscope: quartz-biotite, quartz-biotite-staurolite, quartz-biotite-staurolite-andalusite, quartz-biotite-staurolite-andalusite-cordierite-muscovite-plagioclase, quartz-biotite-andalusite, quartz-biotite-andalusite-sillimanite-plagioclase, quartz-biotite-andalusite-cordierite-plagioclase-muscovite-tourmaline, quartz-biotite-plagioclase-garnet, quartz-biotite-garnet-cordierite-tourmaline, quartz-biotite-garnet-cordierite-plagioclase-sillimanite, quartz-biotite-andalusite-muscovite, quartz-biotite-andalusite-staurolite-cordierite, quartz-biotite-tremolite-plagioclase, quartz-biotite-muscovite-plagioclase-cordierite, and quartz-biotite-staurolite-cordierite. In thin sections, staurolite is seen to have changed to andalusite, and the latter subsequently to what appears to be a sericitic aggregate. The presence of staurolite and its transformation to andalusite suggest regional metamorphism followed by thermal metamorphism. The alteration to sericite is probably a renewal of low-grade regional metamorphism or the result of much hydrothermal action.

Between the large intrusive masses along the western and eastern boundaries of the map-area and the nodular zones are rocks (6) that comprise a mixed assemblage of paragneisses and irregular small granitic bodies, lit-par-lit injection gneisses, small areas of granitized sedimentary rocks, and areas of paragneisses cut by many pegmatite dykes. As a whole, the amount of granitic material in this assemblage varies from 25 to 75 per cent, and contacts with the sedimentary formations may be either sharp or gradational, and their positions, as mapped, quite arbitrary. Granitic gneisses have not been considered as part of this assemblage (6) and are mapped with the intrusive bodies (7). The paragneisses are very similar to the rocks of the nodular zone, but in general are not nodular, although they contain garnet and sillimanite. The intrusive rocks are of the same type found in the large masses, but are finer grained and gneissic.

Intrusive rocks (7,8) are quite common but not abundant. Two main groups have been recognized, an older group (7) of dioritic and granitic rocks with pegmatites, and younger dykes and irregular masses of gabbroic rocks (8). The older intrusive rocks are characterized by a persistent and relatively high amount of quartz. They all weather white to greyish white, are massive and fine to coarse grained, and are classified as granodiorite, quartz-diorite, and granite. Their main occurrences are at the eastern and western boundaries of the map-area, where they appear to be parts of large masses lying outside the area. They are also found as sills, dykes, and small, irregular masses scattered throughout the map-area either in the volcanic or sedimentary rocks. It is possible that several of the small masses, plugs, and sills are older than the intrusive rocks at the boundaries of the map-area; their relative age, however, is not known. Most of them seem to be free of potash feldspar, and their plagioclase appears to be more calcic than that of the larger intrusive bodies. A few Rosiwal analyses

have given the following average composition for these small masses, dykes, and sills; andesine, 56 per cent; quartz, 29 per cent; mafic minerals (mainly biotite, hornblende, and epidote), 13 per cent; and potash feldspar (observed in only two thin sections out of eight), 2 per cent. The mineral composition of the large mass at the western boundary of the map-area is not very different from this, whereas the mass at the eastern boundary has the following approximate mineral content: oligoclase-andesine, 42.4 per cent; quartz, 18.5 per cent; potash feldspar, 13.6 per cent; and mafic minerals, 25.6 per cent. Pegmatite dykes occur in large numbers in the zones adjoining the intrusive masses at the eastern and western boundaries of the map-area. Only a few of them have been mapped. Many are tourmaline-bearing, but no other unusual rock-forming minerals were noted.

The area includes numerous dykes, sills, and small masses of gabbro, diabase, and amphibolitic rocks (8). They are most abundant in the southwestern half of the map-area, where they are mainly dykes and sills. The dykes vary in width from a few inches to 500 feet, are persistent in width for long distances, and can be traced for scores of miles. Their dip is commonly vertical, but may be as low as 65 degrees in either direction. Most of the dykes strike northwesterly parallel with the main set of faults, but some strike northeasterly, and are probably younger, and still others strike northerly and are probably the oldest. Three main types of gabbro and diabase have been recognized: one type carries olivine; another contains quartz in micrographic intergrowth with feldspar; and the third type contains neither olivine nor quartz, and appears to be the most common. A Rosiwal analysis of four thin sections of olivine gabbro yielded the following mineral composition: plagioclase, 59 per cent; augite, 28 per cent; olivine, 9 per cent; and black metallic mineral, 4 per cent. Some of the more altered dykes and sills of this group may be older than the others, but their observed field relations did not provide information sufficient to enable them to be mapped separately.

STRUCTURAL GEOLOGY

FOLDS

Structural features are rarely well preserved in the more highly metamorphosed sedimentary rocks, but are abundantly noticeable in the less altered formations. From the data on hand, it is evident that the sedimentary rocks have undergone isoclinal folding. The axes of these folds appear to strike parallel with the trend of the volcanic rocks in the northeast quarter of the map-area, whereas in the south-central part of the area their axes appear to strike more irregularly, and the folding seems to be, in general, more intricate. The axial planes dip from vertical to 70 degrees, and in some places are not more than a few hundred feet apart. Drag-folds and cleavage are seen on the limbs of the isoclinal folds. Some of the traces of the axial planes are shown on the map, but their positions should be regarded as only approximate.

The volcanic rocks, in general, rarely show good structural features. It appears, however, that the western belt is a large anticline whose axial position could not be determined due to the scarcity of structural criteria. The eastern belt may be isoclinally folded in about the same way as the adjacent sedimentary formations, but probably not as closely.

FAULTS

The area is intersected by several faults of large displacement. Those mapped strike northwesterly across the trend of the formations, but others of small throw, or that strike parallel with the trend of the formations, were probably not recognized.

The main set of faults strikes northwesterly, and several of these faults are now the loci for large diabase dykes. In the western half of the map-area, the direction of movement along the fault plane is left-hand, the northeast side moving northwesterly with respect to the southwest side, whereas in the eastern half of the map-area, the direction of movement is less certainly right-hand, as suggested by apparent movements affecting the rocks of the biotite zone and a narrow band of basic volcanic rocks. A few faults strike northerly and are marked by sharp escarpments, but the direction of movement along them is not known.

ECONOMIC GEOLOGY

known Economic interest in Ranji map-area has so far been limited to a few gold prospects. At the time the area was mapped geologically, only one occurrence appeared to be of economic significance, namely the showing of Snowden Yellowknife Mines, Limited. Several other showings had, however, some work done on them, and are included in the following descriptions. All the gold occurrences of the area consist of black to milky white quartz veins or stringers carrying variable amounts of native gold, pyrite, and chalcopyrite, and occurring either in carbonatized sheared zones or in open fractures such as joints in basic volcanic rocks.

SNOWDEN YELLOWKNIFE MINES, LIMITED

Snowden Yellowknife Mines, Limited own the Ott and Tig groups of six claims each, thirteen claims of the Doins group, and a few others in the vicinity. All these claims are located in the area of volcanic and sedimentary rocks between Damoti and Indin Lakes, and most of them cover areas adjoining Damoti Lake.

Exploratory work has been concentrated on the Doins group, and consists of surface stripping, trenching, and diamond drilling. Five different mineral zones have been examined, and are known, from west to east, as the Hill-top showing, the Chuck vein, the Wally vein, the Pond vein, and the G-Zone 'splash'. In addition, several other, apparently barren, quartz veins are known on the property, but have not been explored.

Hill-top Showing (Doins No. 2 Claim)

The Hill-top showing, lying about 4,200 feet northwest of the Snowden Camp on Damoti Lake, is a strong shear zone, traced for 250 feet and examined by trenching. The shear zone occurs in carbonatized, mineralized, basic volcanic rocks, strikes north 35 degrees east, and appears to swing in a northwesterly direction in the most northern trench. Four trenches, varying from 20 to 60 feet in length and reaching in places a depth of 10 feet, have been excavated across this shear zone. These trenches show that the shear zone is mineralized with pyrite and chalcopyrite, is much carbonatized where most sheared, and is cut by a few quartz-carbonate-rich stringers. No visible gold was noted by the writer.

Chuck Vein

The Chuck vein, about 2,700 feet northwest of Snowden Camp, is a lenticular body of milky white quartz occurring in slightly carbonatized, mineralized, basic volcanic rocks. The vein averages 8 feet in width, strikes north 37 degrees east, and appears to be vertical. Apart from a few small

clusters of sulphide minerals scattered throughout, this body of quartz appears to be barren. The intruded rocks, however, along the eastern contact of the vein are heavily mineralized with pyrite and chalcopyrite, and free gold has been reported.

Wally Vein

The Wally vein, located a few feet west of a pond about 2,400 feet northwest of Snowden camp, has been trenched and examined for gold. It strikes north 30 degrees east, dips 60 degrees west, and averages 3 feet in width. This vein, of apparent lenticular shape, consists of milky white quartz carrying some pyrite and chalcopyrite. A little free gold has been reported.

Pond Vein

The Pond vein is adjacent to and east of the pond, strikes north 35 degrees east, and appears to be a succession of several small lenticular bodies of quartz in slightly carbonatized basic volcanic rocks. The quartz carries some pyrite and chalcopyrite, and although free gold has been reported, none was seen.

G-Zone

The G-zone lies about 250 feet east of the pond, and has been explored by drilling and trenching. When visited, at least 1,000 feet of drilling had been done to explore the area east of the pond in general and the G-Zone in particular, across which four trenches had been excavated. The zone is, apparently, about 30 feet wide, strikes north 35 degrees east, and contains an irregular succession of small quartz veins that strike about south 55 degrees east and dip about 30 degrees northeast. As these veins strike and dip parallel with the joints in the intruded volcanic rocks, it appears that they occupy joint fissures. The wall-rocks in the vicinity of the veins are slightly carbonatized and mineralized. The veins themselves consist of milky white quartz and carry a little pyrite, chalcopyrite, and free gold.

RUSS-RAE YELLOWKNIFE MINES, LIMITED

Russ-Rae Yellowknife Mines, Limited owns the Linda group of twelve claims and the Que group of six claims, and is located about $2\frac{1}{2}$ miles north of the Snowden camp. On the Linda No. 11 claim two exploratory trenches were cut in August 1946 to test a few quartz stringers reported to contain visible gold. The veins occur in slightly mineralized basic volcanic rocks.

CANADIAN GOLD AND METALS MINES, LIMITED

Canadian Gold and Metals Mines, Limited owns the P.B. group of twelve claims that adjoins to the east the property of Russ-Rae Yellowknife Mines, Limited. During the summer of 1946 trenching and drilling were done on the P.B. Nos. 3, 4, and 5 claims. This exploratory work was designed to explore quartz stringers reported to carry visible gold. Diamond drilling comprised eight holes varying in length from 64 to 85 feet and totalling 564 feet. The results of the drilling are not known. The quartz veins are slightly mineralized, and occur in basic volcanic rocks.

ART GROUP

The Art group of twelve claims lies at the southwestern end of Damoti Lake. On the Art No. 2 claim a few quartz stringers cut pillowed basic volcanic rocks slightly recrystallized to an amphibolite or hornblende schist. The stringers appear to be concentrated along three bands about 2 feet apart. The zones are apparently vertical, strike north 30 degrees east, and average only a few inches in width. They consist mainly of black quartz, cut by veinlets of milky white quartz and carrying some pyrite and chalcopyrite. The wall-rocks have been intensely carbonatized and are slightly mineralized with pyrite. No

free gold was seen although its occurrence has been reported. Five trenches have been excavated across these bands of quartz stringers, but no reports on this exploratory work have been seen.

A few hundred feet north of the above showing, on the Chuck No. 6 claim, probably several hundred feet of diamond drilling have been done.

ANNA GROUP

The Anna group of eighteen claims is on the south shore of the central part of Indin Lake. Some surface stripping has been done on the Anna No. 16 claim, and some diamond drilling was reported on the Anna No. 2 claim. Surface stripping has uncovered a few quartz veins and a few dykes, about 5 feet wide, of a porphyritic granitic rock. Gold has been reported from the area where the drilling was done.