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MAP 30-1962

GEOLOGY

TADOULE LAKE

MANITOBA

Scale: One Inch to Four Miles = $\frac{1}{253,440}$

Miles

4 2 0 4 8 12

LEGEND

PRECAMBRIAN

8	Gabbro, may be older than 7
7	Granite, gneissic granite, may be of more than one age; 7a, grey porphyritic granite; 7b, granite-pegmatite
6	Biotite granite-gneiss; migmatite
5	Metasedimentary gneiss: quartzose gneiss, biotite-quartz-feldspar gneiss; minor cordierite gneiss, garnet-biotite gneiss, migmatite
4	Biotite schist, commonly nodular; quartzite, biotite-quartz schist; conglomeratic biotite schist; minor hornblende-biotite schist
3	Dolomite, marble, calc-silicate rock, and hornfels
2	Quartzite, greywacke, siltstone, conglomerate; minor impure limestone, mudstone, sandstone; 2a, quartz-sericite schist, micaceous greywacke, sericite schist, conglomeratic sericite schist; minor phyllite
1	Granular quartz-feldspar gneiss, hornblende-quartz gneiss, and intimately associated granular granite; minor amphibolite
A	Aa, plagioclase amphibolite; Ab, hornblende pyroxenite

Drift-covered area

Geological boundary (approximate or assumed)

Limit of geological mapping

Bedding, top not determined (inclined, vertical)

Schistosity, gneissosity, foliation (horizontal, inclined) vertical, dip unknown)

Lineation (arrow indicates plunge)

Fault (approximate)

Esker

Glacial striae (direction of ice-movement known)

Mineral occurrence (copper, Cu; molybdenum, Mo; nickel, Ni) . . . Cu x

Geology by W. L. Davison, 1961

Cabin

Intermittent stream

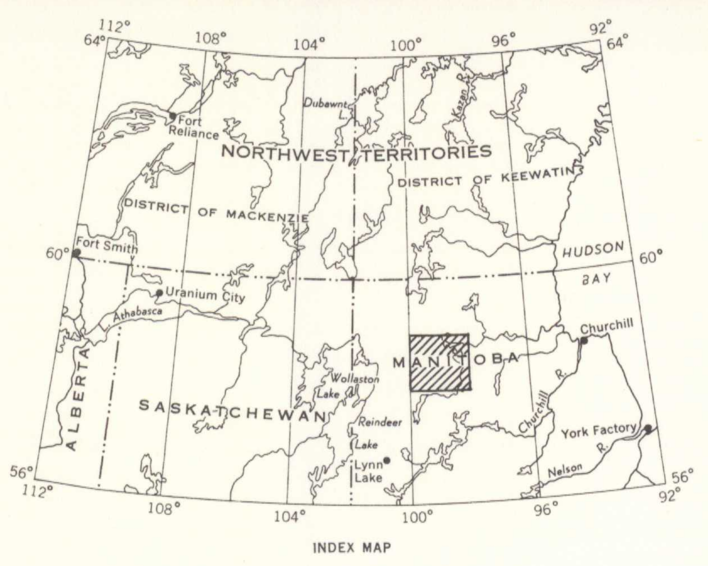
Rapids

Marsh

Height in feet above mean sea-level . . . 825

Cartography by the Geological Survey of Canada, 1962

Mean magnetic declination, 13° 00' East, decreasing 3.7' annually. Readings vary from 10° 53'E in the SE corner to 14° 55'E in the NW corner of the map-area



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DESCRIPTIVE NOTES

Much of the drift-covered area is characterized by swampy ground and low boulder ridges. In the west, hills of stony clay and deposits of hummocky moraine alternate with swamps and small stream valleys. Several prominent eskers stand 50 to 80 feet above the surrounding country. West of Kinsman Lake, strand lines at elevations above 1,100 feet suggest that part of the area was once covered by a glacial lake. Ice-shove ridges are common along banks of South Seal River and shores of larger lakes. Bedrock exposures are most common on shorelines and slopes that face northeasterly, the direction from which glacial ice advanced.

Granular metasedimentary gneiss and associated granite (1) appear to be the oldest rocks in the area. A possible unconformity may separate these from gneisses (5) northwest of Overby Lake, but the contact is not well exposed. The gneiss (1) is typically well banded, dull brown or reddish, and medium grained. In general, the granite is dull red, massive or faintly layered, and has a medium-grained, equigranular texture. Hornblende is the most common mafic constituent of map-unit 1. Discontinuous layers and lenses of amphibolite occur here and there throughout the group.

Unmetamorphosed and slightly metamorphosed sedimentary rocks (2) are generally poorly exposed. Grey to grey-black, fine- to medium-grained, faintly bedded quartzite, nearly massive greywacke, and finely bedded siltstone predominate; conglomerate is less common; and thin beds of mudstone, limestone, and sandstone occur locally. The position of conglomerate in the sequence is unknown. In several exposures, conglomerate grades into greywacke with sparse cobbles of quartzite. East of Tadoule Lake, a breccia-conglomerate contains assorted angular and rounded fragments of gneiss, quartzite, micaceous sandstone, and other rocks, together with quartz pebbles, in a silty to gritty matrix. Limestone is typically impure, and poorly defined beds of argillaceous limestone grade into mudstone and shale. Sandstone and siltstone south of Stony Lake are similarly intermingled. Sericite-rich rocks (2a) are found in localized zones of strong deformation. Quartzite appears unaffected whereas the other main rock types are partly or entirely converted to typically finely divided, silvery sericite-schist. Superimposed cleavages, which may be planar or corrugated, obscure sedimentary structures but, in part at least, are oblique to bedding.

The few mappable carbonate-bearing rocks (3) consist mainly of metamorphosed impure limestone and cherty dolomite, but clean white marble outcrops on North Seal River, and pure white dolomite occurs near the east end of Wilkie Lake. The more common silicate-bearing rocks are well banded, with colours ranging from grey to dark green. They contain amphiboles, pyroxenes, and calcite as major constituents.

Biotite schist and associated metasediments (4) are well exposed in many places. The least metamorphosed rocks closely resemble those of unit 2, to which they are considered to be equivalent, but are distinguished by their biotite content. Metamorphic grade increases towards contacts with granite (7) and granite-gneiss (6). Black biotite schist, commonly nodular, and grey, rarely pink, quartzite, alternate in broad bands to comprise most of unit 4. Nodules, lenticles, and drawn-out streaks of pale micaceous material in schists may represent altered andalusite, although a core of tourmaline was found in one lenticle. Near granite contacts, eyes of feldspar and quartz replace the nodules, and hornblende is locally present with biotite in the matrix. At Clisby Lake, dark grey, even-grained biotite-quartz schist contains knots of fibrous sillimanite, together with sparse small garnets; other nearby schists locally contain cordierite.

Schist and quartzite (4) grade into biotite-gneiss and quartzose gneiss (5), the transition being marked by increasing prominence of felsic constituents, which in schist are finer grained and masked by biotite. Field relationships and lithological similarities point to the equivalence, at least in part, of units 4 and 5. Quartzose gneiss (5) consists essentially of coarse-grained, glassy, colourless or smoky quartz; individual layers may contain more or less red, pink, or white feldspar, and scattered laminae of biotite are commonly present. Biotite-quartz-feldspar gneiss is typically made up of well-banded quartzofeldspathic layers, interspersed with schistose biotitic layers. The feldspars are commonly oligoclase, orthoclase and/or microcline, and locally perthite. Garnetiferous gneiss occurs here and there, and cordierite is an inconspicuous constituent in a few places. Tourmaline has been found as rare individuals in schist (4) and gneiss (5), and abundantly at contacts with pegmatite (7b).

Granite-gneiss (6) consists mainly of grey to reddish granitoid material, characteristically holding an abundance of small biotite-rich clots, lenses, and streaks. Granite-gneiss differs from gneissic granite (7) in its greater inhomogeneity, its unevenly developed gneissosity, its content of numerous minor pegmatites, and its generally rough weathered surfaces. Migmatite is not abundant; it consists of interlayered metasediments (4,5) and granite, and represents a transition from the metasediments to gneissic granite (7) or granite-gneiss (6). Sporadic occurrences of migmatite among metasedimentary gneisses (5), and a narrow zone against porphyritic granite (7a) are too small to be shown separately on the map.

With few exceptions, granite (7) is pink or reddish, coarse grained, and massive to slightly foliated or lineated. Where the relationships have been determined, granite has intruded rocks of units 2-6. In a few places, a medium-grained marginal phase is granular and low in quartz, and resembles some rocks of unit 1. A typical pink granite contains approximately equal amounts of quartz, microcline, orthoclase, and plagioclase, with less than 10 per cent combined biotite, chlorite, and accessory minerals. Phenocrysts of white microcline, up to 3/4 inch long, comprise one quarter to one third of grey porphyritic granite (7a); the remainder consists of grey quartz, microcline, orthoclase, biotite, oligoclase, and accessory sphene, apatite, and zircon. Grey lineated granite, in a ridge south of Nicklin Lake, has major constituents comparable to those of porphyritic granite, but contains garnet in addition. Age relationships of the lineated granite are unknown.

Scattered dykes and sills of pegmatite (7b), up to 200 feet thick, intrude sedimentary rocks (2), and numerous thinner bodies cut the more highly metamorphosed rocks (1,4,5,6). In general, pegmatite is indicated on the map only where unaccompanied by other rock-types. Typical pegmatite is white or red, and may be graphic in part. Microcline and sodic plagioclase are the main feldspars.. Tourmaline and muscovite, especially prominent in pegmatites at Tadoule Lake, are accompanied by garnet in several dykes east of the lake. Muscovite and biotite occur together or separately in different parts of an outcrop. Magnetite, in pods up to 3 inches in diameter, is present in several pegmatites west of Wilkie Lake.

Medium- to coarse-grained grey leucogabbro (8), more or less altered and rusty weathering in part, outcrops in several places across an island in Tadoule Lake. No contacts are exposed but the body is thought to be in the form of a dyke, intrusive into metagreywacke (4). Labradorite is the chief constituent; in more altered parts, the feldspar is accompanied by fibrous to acicular amphibole, sparse biotite, and disseminated sulphides that include pyrite, pyrrhotite, and a little chalcopyrite. Chemical tests show the presence of nickel. The gabbro may be a slightly metamorphosed equivalent of amphibolite (Aa).

Amphibolite (Aa) is medium to coarse grained, dark or speckled, and strongly foliated to nearly massive. Structural features in mappable bodies of amphibolite and the nature of the rock itself suggest that it represents intrusive gabbro that has been metamorphosed by later granite (7), but the evidence is inconclusive. Brown-weathering, greenish grey, massive hornblende-pyroxenite (Ab), in an isolated outcrop south of Shethanei Lake, is tentatively separated from from calc-silicate rocks (3) because of its lack of carbonate and its apparently anomalous position near slightly metamorphosed sediments (2).

The general scarcity of outcrops makes structural interpretations questionable. Easterly- to northeast-trending folds seem to be prominent locally, particularly in the east. Elsewhere, tight isoclinal folds, evidently related to granite emplacement, conform to the outlines of granitic bodies. Along the northern boundary of the map-area, greater complexity is suggested by alternating northwest and northeast trends of formations, and two or more stages of deformation may be indicated. Faults, accompanied by strongly sheared rocks, have been observed only in the west, but may be more abundant under heavy drift in other parts.

Numerous small quartz veins are found in all rocks of units 1-6. Veins of magnetite, near granite contacts in one or two places, are apparently the cause of strong local variations of the compass.

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