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CARIBOU RIVER MAP-AREA, MANITOBA

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W. L. Davison

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Abstract

Caribou River area lies northwest of Churchill, on the west side of Hudson Bay. Mapping was done by helicopter, with flight-lines spaced at 4-mile intervals. Bedrock is entirely Precambrian, and is characteristic of the Churchill Structural Province of the Canadian Shield. The oldest rocks are granitic and metasedimentary hypersthene-bearing granulites. These are overlain by metamorphosed stratified rocks, which include paragneiss, quartzite, schist, basalt, and greenstone. The stratified rocks are intruded by quartz diorite and by later porphyritic granite. A younger sedimentary sequence is assigned to the Great Island Group. Glacial deposits include eskers and washboard moraines. Raised beaches and wave-formed terraces are present throughout the area.

CARIBOU RIVER AREA, MANITOBA

INTRODUCTION

Late in the summer of 1964, two Bell helicopters that had been employed in operations farther north became available for use in Caribou River and Nejanilini Lake map-areas. A base camp was set up at Caribou Lake, a few miles west of the present area, and about 90 miles northwest of Churchill. Mapping of the Caribou River area was accomplished in approximately 25 hours of flying time; 1,110 line miles were flown, and 171 landings made in the area; additional observations were made from a hovering position or by passing over outcrops at low speed. As had been anticipated, the area proved well suited to rapid reconnaissance by helicopter; low relief and scarcity of trees generally permitted an unbroken view of terrain on either side of the flight line, and landings could be made, for the most part, on or beside outcrops to be examined.

East-west flight lines were laid out with a nominal spacing of four miles. Air photographs were used for navigation and for fixing positions of ground stations. The field work was carried out by two staff members, W.W. Heywood and the writer, and two seasonal assistants, A.S. Ruffman and J.A. Reid.

Previous work had been confined to reconnaissance along the Seal and Caribou Rivers (Johnston, 1935, 1936a, b; Russell, 1953).

PHYSICAL FEATURES

Relief is subdued for the most part. A low-lying coastal strip, 10 to 20 miles wide, consists largely of marshy plains dotted with numerous shallow lakes and ponds. Inland, the surface rises gradually to broad drift-covered hills in the west. Interspersed with these are lake basins, stretches of muskeg, and small drift ridges. A few eskers are present, but tend to be discontinuous and rarely rise more than 15 or 20 feet above the adjacent terrain. Streams are generally shallow and marked by numerous rapids; only Caribou River has cut gorges through the thick drift. The Seal River, where it loops across the southern boundary of the area, lies in a broad apparently mature valley, and may follow a preglacial drainage system as suggested by Taylor (1958).

Washboard moraine, made up of alternate sinuous ridges and depressions, presents a distinctive appearance from the air, especially where the depressions contain bodies of water. Individual corrugations

trend across the direction of late ice-movement, which was south-southeasterly, and probably reflect local activity in the marginal zone of the ice-sheet during general recession.

Most if not all of the area lies below the limit of post-glacial marine overlap. This is shown by numerous raised beaches, wave-formed terraces, and scattered patches of marine clay. Eskers show signs of modification by the action of waves and currents, whereas washboard moraine appears to have been relatively unaffected by such agents.

In general, outcrops are sparse and of limited extent, except in the northwest part of the area where hills of well-exposed bedrock are present. Outcrops typically occur in the form of knobs or shelving platforms standing above surrounding drift and muskeg, or as remnants in felsenmeer. They are sparse along streams, although the Caribou River flows over bedrock in several places, and are almost entirely absent from strips of washboard moraine.

GENERAL GEOLOGY

Highly metamorphosed rocks of map-unit 1 are considered to be the oldest exposed in the area, although direct evidence of relative ages is lacking. The predominant buff-brown to dark brown quartzo-feldspathic granulite is characterized by a faint but distinctive olive tint on unweathered surfaces. Weathered surfaces of banded metasedimentary granulite show a range of colours from pale grey to rusty red-brown, whereas the more massive granitoid variety generally weathers uniformly dull brown or reddish brown. Metasedimentary granulites are, for the most part, granular and medium grained, but much variation in texture may be found. Quartz, perthite, plagioclase, hypersthene, diopside, and hornblende are the most common constituents; biotite and garnet are present locally, but are rarely conspicuous. Quartz-rich bands alternate with bands poor in quartz. Thin to thick isolated bands and small masses of dark, even-grained pyroxene granulite, consisting chiefly of hypersthene, plagioclase, and clinopyroxene, in various proportions, make up a small part of the exposed rocks. Foliated to massive, coarse-grained, granitoid granulite occurs in small bodies associated with metasedimentary granulite, but these have not been mapped separately. A distinctive granulite (1a) resembles other granitoid varieties in appearance and mineral composition, except for the presence of well formed, commonly twinned, metacrysts of orthoclase, up to an inch or more in length. The orthoclase crystals are evenly spaced through the granulite, generally lack pronounced parallel alignment, and are similar in colour to the perthite and plagioclase in the surrounding rock. In specimens examined, the mafic minerals have been mostly altered to chlorite and sphene, but sparse remnants of diopside have been found,

together with dull brown biotite. Microcline and garnet are also present in some parts. In a few localities, metacrysts make up a large part of the granulite and patches of deeply tarnished rock contain cleavable masses of orthoclase. It would appear that the porphyroblastic granulite (1a) has been subjected to re-metamorphism at an elevated temperature, the chief result of which was growth of orthoclase crystals either by rearrangement of constituents already present or by metasomatic introduction of potash.

Moderately to highly metamorphosed, fine- to coarse-grained stratified rocks (2) are mainly metasediments, although some may be of volcanic origin. They are intruded by, and hence older than, quartz diorite (5) and granite (6). Pebbles of granulite in metasediments (2c) near the outlet of Long Lake indicate that granulite (1) existed before at least some of the sediments were deposited. Quartzite and quartzose gneiss or schist are characteristic and widely distributed; these, with biotite-quartz-feldspar gneiss and biotite-hornblende-quartz-feldspar gneiss make up most of unit (2). In the southwest, a finely banded series of quartzite, gneiss, and schist (2a) consists, for the most part, of quartz-rich members. In addition to quartz, the gneissic layers contain orthoclase and biotite. The schist is distinguished by laminae, lenticles, and elongate aggregates of biotite, with sporadic hornblende and plagioclase. A higher grade of metamorphism is shown by sillimanite schist and associated quartzite and gneiss (2b) in the vicinity of granite southwest of Mink Rapids. Close to the contact, quartzose gneiss contains microcline, sillimanite, minor plagioclase and cordierite, and accessory pyrite and zircon. Garnetiferous sillimanite schist is prominent in exposures near Long Lake. Dull brown, fissile, mainly fine-grained metasediments (2c) include finely laminated biotite-quartz-feldspar paragneiss, thinly interlayered micaceous schist, and brown-black quartzite. Paragneiss contains sparse pebbles and fragments of unaltered granulite, and the general appearance suggests that granulite (1) has been the source of most of the material. Well formed garnets are sparsely sprinkled through some schistose layers.

Well banded, possibly metavolcanic, dark grey gneiss, with minor schist, is exposed near Little Seal River, and in rare exposures elsewhere, but only a small part is included with map-unit 2 as most is mixed with granitic and other gneisses (4). It consists largely of quartz, plagioclase, biotite, epidote, and sphene. Subhedral insets of pale grey plagioclase in parallel alignment are prominent in many layers. This gneiss is similar in mineral composition to the quartz diorite (5), but no evidence of a genetic relationship was obtained.

Known volcanic rocks (3), in part pillowed, are restricted to a narrow belt near the mouth of Seal River. Epidote amphibolite on the southeast side is intruded by granite (6). The volcanic rocks have been folded and slightly sheared in places. West of the river, massive to faintly

layered, greenish black basaltic rock is exposed in small knobs. It is very fine grained, and a considerable part consists of indeterminate fibrous to granular alteration products. To the east and southeast, metamorphic effects become pronounced, and fine-grained greenstone grades into medium-grained to coarse epidote amphibolite in places intruded by granite (6). Greenish grey to dark grey layers are more or less schistose, and are cut in many places by thin seams and networks of both carbonate and quartz veins, with occasional lenticles of red granite. These layers represent flows with an inferred range from dacite to basalt.

All gradations exist between metasediments (2) with minor granite to granite (6). An intermediate group (4) contains mixed rock consisting of 40 per cent or more granite, as interlayers, dykes, and irregular masses. In the southeast, mixed gneiss includes dark grey rocks with abundant plagioclase, in part volcanic(?), that appear to have been invaded by diorite (5) and, later, by granite (6). In the northeast and southwest, small areas are underlain mainly by granite-gneiss. This is a granitic, inhomogeneous rock, commonly holding streaks, clots, and discontinuous bands rich in biotite and hornblende. Migmatite is characterized by intimately mingled granite and metasedimentary gneiss. Granitic components are typically pink or red, and consist essentially of potash feldspar, quartz, and one or more of biotite, hornblende, and chlorite. Plagioclase amphibolite occurs in several outcrops near the margin of porphyritic granite (6) north and south of Sac Rapids. It is coarse grained, possesses slight foliation, and comprises plagioclase and hornblende in approximately equal amounts. In places, it appears to have the form of a sill, but widths and extent are unknown. Minor outcrops of grey, fine-grained quartzite occur here and there; several are close to relatively broad exposures of mixed gneiss, but relationships could not be ascertained.

Quartz diorite and allied rocks (5) are grey to dark grey, medium to coarse grained, and porphyritic in part. With slight variations in mineral content quartz diorite grades into granodiorite and, less commonly, diorite; boundaries with mixed gneiss (4) to the north are gradational. The general appearance is massive in many parts, but a faint layering, due to small variations in abundance and grain-size of plagioclase, is common. The chief constituent is oligoclase-andesine; subordinate biotite, accessory epidote and sphene, and variable amounts of interstitial quartz, make up the remainder of the rock. A pale grey variety at The Knoll is low in biotite and epidote, but contains scattered flakes of chlorite and muscovite.

Porphyritic granite (6) is characterized by abundant pink to red potash feldspar, both as twinned phenocrysts up to two inches long, and as part of the gneissic to granitoid base of grey quartz, feldspar, and biotite. In places, the phenocrysts form two-thirds or more of the rock. Plagioclase with myrmekitic borders is a common though relatively minor constituent.

Accessory minerals include magnetite, zircon, apatite, sphene, and pyrite. Two major bodies of porphyritic granite near the coast are gradational, through extensive gneissic margins, into migmatites and mixed gneiss (4); feldspar phenocrysts are prominent throughout. Porphyritic granite west of Long Lake has somewhat smaller phenocrysts for the most part, and near the contact with metasediments (2b) passes through a granular, more even-grained phase, which is in part garnetiferous. In the southwest, non-porphyritic, gneissic to massive, pink to red granite (6a), is gradational through granite-gneiss and mixed gneiss (4) to metasediments (2) with some granite. One mile west of Sac Rapids, grey, coarse-grained, quartz monzonite (6b) is exposed along Caribou River. In the exposure are inclusions and a disconnected thin band of granular mafic material. The quartz monzonite holds up to 30 per cent hornblende, the remainder consisting of approximately equal amounts of quartz, plagioclase, and microcline, together with a little biotite derived from hornblende. Relationships between this and other rocks are unknown.

Interbedded grey to grey-black shale, siltstone, sandstone, and quartzite (7), poorly exposed at the bend of Seal River, are considered equivalent to similar rocks of the Great Island Group, as described by Taylor (1958). At Great Island, some 30 miles upstream from the present occurrence, associated rocks include slate, greywacke, and dolomite. These have not been observed in the Caribou River area, but scarcity of outcrops may account for their apparent absence. The magnetic properties of sequences at the two localities, as reflected in patterns on aeromagnetic maps, are strikingly similar. Presence of minor quartz veins, and absence of granitic intrusions from the group are other points of similarity. Siltstone and shale are thinly bedded and fine grained. Sandstone and quartzite are fine to medium grained, the chief difference between them being the degree of induration.

Large-scale structures are everywhere obscured by drift, but minor folds and lineations suggest that east to northeasterly trends predominate. Near granitic bodies, structures appear to be parallel with the outlines of the granite, as well as with gneissic trends within the granite itself.

ECONOMIC GEOLOGY

Considerable prospecting has been done along Seal River and presumably over much of the adjacent area. Johnston (1935) reported that claims were staked at Great Island in 1930, but these and other claims along or near the river have since lapsed. Mineralized veins in the volcanic and sedimentary rocks do not appear to have economic importance. In general,

scarcity of outcrops, and the nature of the terrain in the Caribou River area, are a hindrance to prospecting.

Several unexplained anomalies are revealed by aeromagnetic maps recently published by the Geological Survey of Canada. The highest anomaly parallels volcanic rocks (3) along Seal River. Others, near the periphery of porphyritic granite (6) north of Caribou River, may represent concentrations of magnetite or sulphides, both of which are to be found as accessories in the granite. In places where outcrops are insufficient to determine causes of anomalies, examination of drift may provide some evidence as to their nature.

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