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DEPARTMENT OF MINES
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BAIE COMEAU AREA, QUEBEC

22 F/SE and part of 22 F/NE

(Report and map 35-1962)

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An extension of the aerial reconnaissance mapping techniques that proved successful in the barren lands and in the moderately wooded areas of northern Quebec was attempted in partly mapped Grenville areas. About three weeks were spent in the Killaloe area of Ontario in 1960 (Tremblay, M., map and report in preparation), and about the same amount of time in the Baie Comeau area. These two areas represent differing types of geology, topography, and forest cover and may serve as control areas for future reconnaissance mapping.

The Baie Comeau area comprises about 1,700 square miles on the north shore of the St. Lawrence River. The towns of Baie Comeau and Hauterive are the major settlements. A modern highway parallels the St. Lawrence River along the southern border of the area and timber-access roads extend a few miles inland from the coastal region. Two construction and timber-access roads traverse the area from south to north.

Field work was completed during the first three weeks of September, 1961, using two Bell model 47 G2A helicopters and a station wagon. Two staff geologists, C.K. Bell and the writer, and two seasonal assistants, R. Gregoire and T. Roach, were employed in the field mapping.

Thirteen helicopter traverses were made, during which 1,000 line miles were flown in about 35 flying hours. A radial pattern of traverses was flown in the western part of the area and a parallel pattern in the eastern part. The spacing of the flight lines on the parallel pattern was 2 to 3 miles. The base leg on the radial pattern ranged from 3 to 4 miles.

About 90 landings and as many low-level or hovering observations were made. In addition, continuous aerial observations were made throughout each flight. The flights ranged from 200 to 500 feet above ground level, averaging about 350 feet.

Possible landing areas include sand bars and low outcrops in the larger rivers; low outcrops, swampy shores, and areas of low brush around lakes and ponds; swamps and muskegs containing few or scattered trees; and bare ridges and hilltops. The frequency with which landings could be made on any flight line varied, but in most of the area they were possible at 2- to 3-mile intervals, and not uncommonly at 1-mile intervals. Some sections are essentially devoid of landing sites. It was not always possible to land on or adjacent to an outcrop, but landings were commonly made within 200 to 300 yards of one. In areas where outcrops are rare, a search was first made for them from the air and then landings made as near as possible.

Most of the construction and forest-access roads were mapped by car from the base at Hauterive.

GENERAL GEOLOGY

The oldest rocks in the area (1) are a heterogeneous group of paragneisses. Textures and structures in these rocks suggest that they are in part derived from sedimentary rocks, and to a lesser extent, from volcanic rocks. Many of the units are thinly layered although thick layers, possibly derived from more uniformly bedded sediments, are numerous. The paragneisses consist of alternating thin layers of quartz, plagioclase, and minor biotite and/or hornblende with contrasting layers of biotite and hornblende with minor quartz and feldspar. These form more or less continuous bands that die out along and across strike as they become coarser grained and more massive in appearance. Massive to foliated granite intrusions form sills, lenses, and irregularly shaped masses in the paragneisses. Leucocratic gneissic layers, as much as several feet wide, consist essentially of quartz and plagioclase with variable amounts of orthoclase (and/or microcline), garnet, biotite, and hornblende. The plagioclase forms up to 20% of the rock although locally it may form more than 50%; the rock there becomes an impure anorthosite. Locally, remnants of quartzite (1a) retain clearly recognizable bedding and textural features. These grade into bodies of massive greyish white quartz that is like vein quartz. In places, lenses of similar quartz with no definitive features are more truly silexite. Lime-silicate gneisses are present but are not common.

Gneiss and granite-gneiss (2) form the largest group of rocks in the area. They range widely in composition, texture, and structure, although in general they have a granitoid appearance. This group has many characteristics that are common to both the massive granite rocks (3, 4, and 5) and the paragneiss (1). In part they probably represent a higher grade of metamorphism than the paragneiss. Most of the gneisses weather in shades of grey and pink. The composition varies widely, with quartz, plagioclase, orthoclase, biotite, and hornblende the major constituents. Minor constituents include garnet, epidote, and pyroxene. In a few layers the pyroxene is a major constituent; some of these pyroxene gneisses appear to grade into massive pyroxene granites. Interlayered with the granitic gneisses are basic layers that contain abundant hornblende and/or biotite. Hornblende is locally dominant and some of these rocks are amphibolites.

The granitic rocks (3, 4, and 5) are distinguished from one another by textural and compositional differences, and from the granite-gneiss (2) on both structural and compositional characteristics. In general the contact relations are not clearly defined and it is possible that a close genetic relationship exists among most of these rocks.

The generally massive rocks of unit 3, which outcrop in the northwestern and northeastern parts of the area, include granite, granodiorite, and lesser amounts of quartz diorite and syenite. Foliation developed by the parallel orientation of mafic minerals moderately well developed over rather wide areas. These granitic rocks are shades of pink and grey on both fresh and weathered surfaces. The major constituents—quartz, plagioclase, orthoclase, biotite, and hornblende—are present in all rocks, but their relative abundance varies considerably. Pyroxene is present as a minor constituent in several specimens.

Pink-weathering porphyritic granite (4) forms a distinctive unit adjacent to the St. Lawrence River. Although this rock has weathered in rounded outcrops and has a generally massive appearance, it is commonly gneissic and in places is a well-foliated augen gneiss. Medium-grained massive to gneissic phases are present. A typical specimen of this rock is composed of pink orthoclase phenocrysts as much as 2 inches long in a medium-grained matrix of quartz, orthoclase, plagioclase, hornblende, and biotite.

Pyroxene granites (5) outcrop in the northeast corner of the area and on the west side of Manicouagan River. Other occurrences of pyroxene-bearing rocks were observed but did not form mappable units. Although most of the pyroxene granites are massive, they are locally foliated or layered. These rocks weather a characteristic green to brownish green and are medium to dark green on fresh surfaces. They are medium-grained, more or less equigranular rocks composed of quartz, plagioclase, orthoclase, pyroxene, and biotite or hornblende. Included in this unit is a small amount of pyroxene-free granite.

The anorthosite (6) in the northeastern corner of the map-area is part of a larger body that extends to the northwest, north, and southeast. Most of this anorthosite is a hybrid variety that locally contains as much as 50% impurities which include hornblende, biotite, augite, and quartz. Ilmenite and augite are present in small but variable quantities.

On both fresh and weathered surfaces this rock ranges from greyish white to dark greenish grey. It is fine to coarse grained and equigranular to porphyritic. Most of the medium-grained light grey varieties have a granular texture.

Buff to brown-weathering gabbro (7) has intruded the schist and gneiss near the northern boundary of the area. These rocks are massive, medium- to coarse-grained gabbros composed of plagioclase and augite. The weathered surface is brown and the outcrops have a characteristic knobby appearance. The boundaries of this unit are not well defined, as observations are too widely spaced in the heavily timbered parts of the area.

PLEISTOCENE AND RECENT

Glacial striae, grooves, and rock polish are evidence of the intense action of ice during the Pleistocene glaciation. A ground moraine consisting of boulders in a sand and gravel matrix mantles much of the area. The boulders are composed predominantly of rock types common to the area, but numerous pink and white quartzite and pebble-conglomerate cobbles and boulders are probably derived from the Otish Mountains to the north.

Marine clays, containing Pleistocene fossils, and outwash sands form terraces along the St. Lawrence River and along the lower reaches of the larger rivers that drain into the St. Lawrence. Terraced outwash sands form discontinuous deposits along most of the river valleys.

CONCLUSIONS

The reconnaissance mapping of the Baie Comeau area has provided information on the structural trends and on the distribution of the major lithologic units. The occurrence of complex structures in the gneisses and paragneisses is recognized, but more information will be required to describe them fully. Further subdivision will be possible in the gneiss and paragneiss of the eastern half of the area.

The principal objective of this project was to produce an acceptable reconnaissance map on a scale of 1 inch to 4 miles. The overall results of the aerial mapping are probably as good as those obtained by ground reconnaissance; although ground methods permit the mapping of more detailed information in local areas, the overall coverage is less complete.

The major advantages of helicopter mapping methods are rapid and uniform coverage, a small geological staff, and a unit area cost comparable to that of standard ground-reconnaissance methods.