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Preliminary report on Bones lake area, New Quebec

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PRELIMINARY REPORT

ON

BONES LAKE AREA

NEW QUEBEC

BY

JEAN BÉRARD

QUEBEC
1957

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INTRODUCTION

Bones Lake area, mapped during the summer of 1956, is in New Quebec, approximately 62 miles west of the hydroplane base on Stewart lake and 65 miles west of Fort Chimo village. The area encompasses approximately 160 square miles and is bounded by longitudes 70°00' and 70°15', and latitudes 58°00' and 58°15'. It adjoins the Gerido Lake area on the west (1).

During the summer, the area is normally reached by plane although some prospectors have entered the area by canoe from Leaf bay and Kaniapiskau river.

Geologically, Bones Lake area straddles the contact between the Archaean granitic gneisses and an assemblage of Proterozoic sedimentary and volcanic rocks intruded by gabbro sills. These Upper Precambrian rocks rest unconformably on the older granitic gneisses.

The topography of the area is an almost direct reflection of the underlying structure, particularly in the eastern part where the lavas, gabbros, and sedimentary rocks dip steeply to the east and produce north-south-trending hills and valleys. The horizontal sedimentary rocks west of Bones Lake valley form elevated plateaus; hills more than 300 feet above the surrounding area have developed in some of the conglomerates and dolomites.

Two prominent valleys separate the area. One of these, Bones Lake valley, lies at a much lower elevation than the neighbouring valleys and probably represents a pre-glacial depression. It divides the area into two equal parts and merges to the north, with Finger Lake valley, which extends all the way to Leaf bay.

The other valley, situated in the west part of the area, straddles the contact between the Archaean rocks and the Proterozoic sediments and with Bones Lake valley forms a large "Y" in the centre of the sheet.

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(1) BERGERON, Robert; (1956) Preliminary Report on Harveng Lake Area (West Half), New Quebec; Que. Dept. Mines, P.R. 320.

GENERAL GEOLOGY

Table of Formations

RECENT and PLEISTOCENE	Basal moraines, terminal moraines, kames, esker, alluvial deposits, lacustrine terrace, etc.	
PROTEROZOIC ROCKS	Intrusive Rocks:	Mottled gabbro Quartz-gabbro Massive gabbro
	Volcanic Rocks:	Massive lavas Pillow lavas Tuff
	Sedimantary Rocks:	Phyllites Shales, slates Dolomite Argillite Conglomerate Arkose, greywacke Iron formations, chert Sandstone, quartzite Breccia
ARCHEOZOIC ROCKS	Amphibolites, biotite schists, biotite-hornblende schists, granodiorite, granites, granite gneisses, syenites, metagabbros, monzonites, etc.	

Relations between the Archaean and Proterozoic Rocks

The Archaean and Proterozoic rocks were seen to be in unconformable relationship at several localities west of Bones Lake valley. Is some localities basal conglomerates that contain pebbles of the older gneisses rest directly on the basement, and elsewhere the basal rocks are represented by quartzite or cherts or even by greywackes and breccias with a dolomitic cement.

In certain localities, dolomite and sandstones were seen to occupy the original joints of the gneiss. Some of the gorges that cut across the contact have exposed the Archaean surface of erosion now protected by a thin layer of sediments in process of being eroded.

Despite the fact that the sedimentary rocks near the contact have been only slightly deformed, they have, in some cases, overthrust the granite, but the horizontal displacement is negligible.

Archeozoic Rocks

Granite Gneisses and Associated Rocks

The rocks of the Archeozoic basement upon which the Proterozoic sedimentary rocks rest unconformably form a complicated assemblage of many different gneisses, granites, varied schists, metagabbros, etc. It was, however, possible to observe several different ages of rocks and it seems that the oldest are represented by the biotite schists and the amphibolites cut by granodiorite.

These are followed, in chronological order, by a pink hornblende-rich granite and a pink granite rich in a red or deep pink feldspar and poor in ferromagnesians. This last granite is exposed mainly in the south part of the area and seems to be the youngest rock of the Archaean complex. It is present as dykes cutting across the gneissosity or, more frequently, it is intruded lit-par-lit into the pre-existing gneisses.

The other common rocks are related to granodiorites, monzonites, syenites, and dioritic gabbros.

It is difficult to subdivide effectively the rocks of the gneissic complex on the present scale of mapping because of the extreme diversity in rock types and also because of the limited distribution of these rocks in the map-area.

Proterozoic Rocks

Sedimentary Rocks

The sedimentary rocks near the contact with the Archeozoic gneisses show fairly sharp facies changes and their composition invariably reflects that of the neighbouring rocks from which they were devired.

In general, the stratigraphic succession, from bottom to top, is as follows: quartzites, iron formations, clastic sedimentary rocks, and dolomite containing layers of quartzite and argillite.

Black or grey quartzites are normally the oldest rocks in the group. On the other hand, in a few localities, a breccia with a dolomitic cement, a dolomite, or shales are found to underlie the quartzite.

Iron formations of variable nature and thickness everywhere overlie the quartzites. Chert-hematite, granular silica, ferriferous conglomerate, massive hematite bands, and shales containing magnetite are among the principal members of the iron formations.

The iron formations are followed by a thick formation of clastic sedimentary rocks of variable composition. Going eastward and, consequently, moving upward in the stratigraphic succession, black conglomerates with bands of greywacke give way to arkoses and arkosic conglomerates and, finally, to ferriferous conglomerates. The greywacke, more abundant in the northwest part of the area, is composed of black chert and monor hornblende and dark plagioclases. It is, however, rich in quartz.

The arkoses and the arkosic conglomerates are composed of fragments of pink granite and hornblende gneiss. The normal colour is pink, but in some localities it is brick red. Unaltered orthoclase is the main constituent of the pink-coloured variety; the red sandstones are generally arkosic in composition, but they owe their colour to a hematitic cement.

West of Strain lake, a red conglomerate is composed mainly of fragments of jasper, banded jaspilite, pink gneiss, grey quartzite, black chert, white quartz, etc., and supports some prominent hills. It is believed that this merely represents a facies of the black conglomerates observed further to the north. The facies would have formed as a result of a fault contemporaneous with, or penecontemporaneous with, the deposition.

Dolomite, known as "Abner" dolomite, overlies the clastic sedimentary rocks. In general, the rock is massive and grey, salmon, white, chamois, or pale green in colour. It is cut in all directions by thin veinlets of chert, locally containing opal. In some localities, the dolomite grades into dolomitic sandstones. Stromatoliths were observed in the dolomite west of Abner lake.

East of Bones Lake valley, the rocks and the topography undergo a complete change. This is partly due to the structure but mainly to the lithology. Very few granular sediments were seen on the east side of the valley which is composed of a thick series of rocks that included slates, argillite, dolomite, and tuff. This sequence probably contains some volcanic rocks which were not recognized because of the intense crushing.

Volcanic Rocks

Volcanic rocks are exposed in the eastern part of the area and they outcrop along an immense arc concave toward the east. They produce clearly defined topographic undulations as a result of the intercalation of various types of lavas with fine-grained sediments and gabbro sills.

West of Couteau lake, thin cryptocrystalline lava sheets alternate with fine-grained detrital sedimentary rocks, a few rocks of chemical origin, and tuffs.

This sequence of rocks marks the transition between the sedimentary rocks and the succeeding lava flows. These latter are greenish, massive rocks. Fluidal structures and vesicles are present. These lavas have a cryptocrystalline texture and it was impossible to identify any of the constituent minerals with any certainty, with the exception of zeolites and secondary quartz.

The fluidal structure is represented by the alignment of black microcrystalline aggregates measuring 1 millimeter in diameter and set in a green matrix, or else as green aggregates set in a black groundmass.

East of Couteau lake, the topographic expression changes entirely, becoming suddenly very rugged. Lavas, of probable basic composition, are exposed in this locality and more than 50 per cent of them are pillowed, the remainder consisting of massive lavas with rarer porphyritic varieties.

The pillow lavas are aphanitic and dark green in colour. The pillows range from one foot to six feet or more in length, but they generally are between two and four feet long. Their chilled borders, composed mainly of chlorite, form a layer from one to two centimeters thick.

The massive lavas of this group are generally greenish-grey to bottle-green in colour. The grain size rarely exceeds one millimeter although in certain cases the lavas do resemble gabbros. The central portions of some thick, massive flows are crystalline and it is very difficult to distinguish these rocks from gabbros. Prismatic joints were observed in the massive lavas.

Two types of porphyritic flows are present within the massive lavas. One of these is a green rock with white feldspar nodules that are oval in shape; these nodules are one to two centimeters long and three to five wide. This rock was observed in only one place and is represented by an exposure covering approximately 500 square feet. The other porphyritic lava, of more widespread occurrence than the first, contains angular phenocrysts of white feldspar. These phenocrysts are from 0.5 to 2.0 millimeters long, but the grains generally do not greatly exceed one to two millimeters.

Gabbros

Numerous gabbro sills occupy the interfaces between the lavas and sedimentary rocks that are exposed near the eastern border of the map-area. These intrusive rocks faithfully follow the arcuate structure of the lavas and antedate the folding that produced the arc. It would appear that the thickness of the gabbro sills is persistent over great distances.

The composition of the gabbros is very variable and is dependant, in large part, on the thickness of the particular sill. In the northeast corner of the area, at the contact with the sedimentary rocks, an enrichment in blue quartz was observed in the upper part of the sill, whereas the base is enriched in ferromagnesians and the centre appears to have been enriched in calcic plagioclase, thus explaining the gradual variation in colour from the base to the top of the sill.

Most of the numerous sills are separated by sedimentary rocks of slaty nature. These rocks occupy the bottoms of valleys that have been scoured out by glaciers and are thus exposed only in a few localities where they have been protected by gabbro walls.

The gabbros in contact with the sediments where the cooling was rapid are very fine grained and pass gradually into well crystallized gabbros away from the contact.

Pegmatitic gabbro stringers similar to granite pegmatites are present in the centre of some of the gabbro masses. A bottle-green fibrous mineral was observed at the top of a sheared gabbro sill. This mineral is relatively abundant and occurs in stringers, it has the same appearance as fibrous serpentine.

Mottled Gabbro

A few exposures of a mottled gabbro were recorded which may be considered as facies of the other gabbros. This type of gabbro consists of approximately 50 per cent altered deep bluish-grey feldspar. The spots vary from two to four centimeters in diameter, although some feldspar aggregates are much larger.

PLEISTOCENE

The area is, in large part, covered by a thin layer of till. Only erratics of known origin are present on the peaks formed of gneiss, volcanic rocks, and gabbros.

Bones Lake valley is especially well supplied with glacial deposits of all kinds. In addition to an immense esker that occupies the bottom of the valley, there are numerous kames, kame terraces, kettles, alluvial plains, etc.

A study of the boulder trains and of the orientation of the glacial striae proves that the continental glacier crossed the area in a direction that varies between N.40° and N.50°E. This glaciation seems to have been followed by a northerly outflow of valley glaciers.

Some torrential outwash plains were observed at the entrance to narrow gorges where torrents flowed out into Bones Lake valley, and the valley straddling the contact between the sedimentary rocks and the gneisses. Also observed were mud flows, numerous scree slopes, and, in the dolomite, a cave more than 60 feet long.

STRUCTURE

Faults and Shear Zones

A large number of faults were observed in the field, and, in addition, from a study of the aerial photographs, it was suspected that several others were present. The most important fault lies in the west central part of the map-area; this fault cuts across the Archaean granite as well as the Proterozoic rocks.

A multitude of small faults, a few of them of some importance, cut the dolomite in many directions. It is believed that the dolomite near the contact behaved like a resistant mass during the folding, thus producing fragmentation of the dolomite. Chert and quartz subsequently filled all fissures.

Shear zones are present in the lavas and these trend parallel to the strike of the flows and of the regional schistosity. These zones contain abundant sulphides.

On the east shore of Couteau lake, the lavas form a sharp cliff, which faces an extensive level plain underlain by argillite, slate, and tuff. It is possible that an overthrust fault separates the lavas from the sedimentary rocks of the plain, and the presence of such a fault would explain the topographic differences between these two groups of rocks. Sheared slates are present at the base of this cliff.

Joints

One system of joints is especially remarkable because of its strong development and its regularity. It consists of vertical fissures striking N.60°E. In many places these joints produce vertical scarps with very smooth surfaces, even in the conglomerate.

Folds

The rocks near the contact are virtually horizontal and the dips increase in amount gradually to the east. The maximum dip is probably about 70°east.

ECONOMIC GEOLOGY

Base Metals

Massive sulphide mineralization was observed at a number of localities. The main sulphides are pyrite, chalcopyrite, and pyrrhotite. One of these zones occurs in the sheared lavas east of Couteau lake. It measures several hundreds of feet in length and a few feet wide.

Iron

Iron formations are present west of Bones lake, near the contact with the gneiss. These iron formations were studied in some detail by Fenimore Iron Mines Limited. They consist mainly of chert-hematite, magnetite, and massive hematite; ferriferous conglomerates locally form fairly thick masses.