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MINISTÈRE
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MESGOIUEZ LAKE AREA

J.H. Bourne

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Gouvernement du Québec
DEPARTMENT OF NATURAL RESOURCES
Mines Branch
Geological Exploration Service

Geology of the
MESGOUEZ LAKE AREA
Abitibi, Mistassini and New Quebec Territories

Preliminary Report

by

James H. Bourne

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Abitibi, Mistassini and New Quebec Territoires

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INTRODUCTION

The map-area is bounded by latitudes 51°00' and 52°00' and longitudes 74°00' and 75°15', and covers approximately 3725 square miles. It includes all of National Topographic System map-sheets 32 0/1, 32 0/2, 32 0/7, 32 0/8, 32 0/9, 32 0/10, 32 0/15, and 32 0/16, as well as the east halves of 32 0/3, 32 0/6, 32 0/11 and 32 0/14. Moreover, it is covered by aeromagnetic map-sheets 5703-06, 5719-22 and 5687-90 - all of the Québec - Ottawa "G" series.

The centre of the area is approximately 110 miles north of Chibougamau, 80 miles northwest of Baie-du-Poste (Mistassini Post), and 180 miles northeast of Matagami. Aircraft based near Chibougamau provide the easiest access to the area. As the area has many lakes, landings can be made almost anywhere. The area can also be entered by canoe from Baie-du-Poste, the trip taking about 2 days with 5 portages. Following this route about half the area, particularly the central part, is accessible by canoe.

The topography of the central part of the area is quite rugged, with local relief of 500 feet being common. Elsewhere, the terrain is fairly flat.

GENERAL GEOLOGY

All consolidated rocks in the Mesgouez lake area are believed to be of Precambrian age and belong to the Superior geological province. Four main rock units were recognized during the course of the mapping:

4) intrusive rocks of various compositions and ages;
3) Migmatite Complex;
2) metavolcanic and metasedimentary rocks;
1) Gneiss Complex.

Of these, unit #3 is the most widespread, underlying approximately 45% of the area, followed by unit #4 (30%), unit #1 (20%), and lastly unit #2 (5%).

Unit #1 - Gneiss Complex

The Gneiss Complex occurs sporadically throughout the area but is concentrated in two main zones:

1) in the area covered by N.T.S. map-sheets 32/0/6 and 32/0/7, along the shores of Bardelière and Mesgouez lakes;
2) in the area covered by N.T.S. map-sheets 32/0/14, 32/0/15 and 32/0/16, forming a belt across the northern boundary of the map sheet.

Five main lithologic types were distinguished in the field. However, they are intimately associated and impossible to separate meaningfully at the present scale of mapping. The textures and structures observed in the outcrop suggest that most of the gneisses are either of metasedimentary or metavolcanic origin. They bear a textural resemblance to the rocks of the Grenville Supergroup (Bourne, 1970) which are thought to be paragneisses.

The different types of gneisses are subdivided according to their mafic mineral content. The quartzofeldspathic gneiss is defined as one which contains 10% or less biotite with little or no hornblende. In these rocks the plagioclase is greyish to white, and little to no potash feldspar is present. In the biotite gneiss, the biotite content varies between 10% and 25% and the plagioclase is generally buff coloured. In

the biotite schists the biotite content exceeds 40%. In the hornblende gneiss, hornblende rather than biotite is the dominant mafic mineral. The granitic gneisses are defined as rocks of approximately granitic composition. As such they are the only one of the 5 lithologic types to contain appreciable amounts of potash feldspar. The last 3 lithologic types described above account for only 10% of the outcrop of this unit. The first two, making up the remaining 90% of the gneiss complex, occur in roughly equal amounts although as a rule one type predominates over the other in any particular area.

Unit #2 - Metavolcanic and Metasedimentary Rocks

These rocks crop out in two different zones which trend roughly east-west. One lies in the southeastern corner of the area N.T.S. map-sheet (32/O/1) and represents the northeastern continuation of the belt mapped by Murphy (1966). The other crops out in the northern part of the area forming a long, discontinuous belt and represents the eastward continuation of the belt mapped by Valiquette (1964, 1965), and by Hashimoto (in Eakins et al., 1966).

The two belts differ noticeably in the types of rocks which they contain. The southern belt contains abundant

exposures of metabasalts and meta-andesites as well as a significant amount of welded tuff and welded tuff breccia. Acidic volcanic rocks and interbedded sedimentary rocks are rare. Rhyolite was recognized at one locality in the extreme southeastern portion of the outcrop area of the belt, immediately north of the 51st parallel. Two outcrops of metasedimentary rocks lie in the centre of the belt and are on strike with each other. They may form a mappable unit. Several small bodies of metagabbro and two larger acidic intrusions cut the predominantly volcanic sequence described above.

By way of contrast, the metavolcanic rocks of the northern belt are predominantly of intermediate composition. They are dark grey on the fresh surface, but weather white. Lenses of agglomerate are common, and appear to be scattered throughout the sequence.

A very distinctive paragneiss is associated with the metavolcanic rocks between Cabot lake and du Glas lake. It is characteristically dark brown in colour, both on the fresh and weathered surfaces, and contains approximately 25% biotite. They appear very similar to the metagreywackes of the Yellowknife Supergroup (Tella, pers. comm., 1972) and also bear a certain resemblance to the Pontiac Schist (Tang, pers. comm.,

1972). Because of the close association of the paragneiss to the metavolcanics in this area, it is believed that together they form a metasedimentary and metavolcanic belt in which the metasedimentary rocks are by far the more important quantitatively. However, because of the similarity of many of the metasedimentary rocks to the members of the Gneiss Complex, it was impossible to separate them with certainty in the field. All the metasedimentary rocks, including those believed to be associated with the metavolcanics of the northern belt, have been included with the Gneiss Complex.

In the west, the belt is believed to lie between Némiscau river and the south shore of Cabot lake. Farther east the distinctive paragneisses are not present, and the width of the belt is not known.

Unit #3 - Migmatite Complex

The Migmatite Complex, like the Gneiss Complex, occurs sporadically throughout the area mapped, but is concentrated mainly in a large area along the east and southeast portions of the map-area. It is a very complex unit both lithologically and structurally and consists of a number of different rock types which are too intimately associated to be separable on any scale of mapping.

From a structural point of view, the outcrops are commonly very complicated. Following Mehnert (1968, page 11) numerous varieties of migmatite may be recognized, but the most common types are characterized by schollen, schlieren, nebulitic and agmatic structures in roughly that order of predominance. The unifying factor to the unit is the composition of the groundmass of the migmatite (the mobilizate). It is granodioritic in composition, white on the weathered surface and buff on the fresh surface, contains biotite as the dominant mafic mineral (generally in quantities of less than 20%), has readily visible quartz (about 25%) and is coarse-grained with respect to the restite contained in it. The average grain size is about 3 mm in diameter. Although the composition of the mobilizate varies from place to place, the textural and structural peculiarities of this unit make is relatively easy to identify. However, it grades into the Gneiss Complex, and the dividing line between them is arbitrary.

Unit #4 - Later Intrusive Rocks

This unit incorporates a wide variety of intrusive rocks of different composition and of different ages. A brief summary of the most important types, arranged in order from the oldest first to the youngest last, is presented below:

1) Quartz Diorite: A well foliated rock which is homogeneous on the outcrop scale. Medium-grained, and with the dominant mafic mineral being hornblende, its occurrence is restricted chiefly to those zones mapped as migmatite where it occurs sporadically as small intrusive bodies. Occasionally these masses are sufficiently large to render them mappable, and these are shown on the accompanying geological map. Significantly, only a very small percentage of these rocks intrude the Gneiss Complex.

2) Metagabbro: Outcrops of metagabbro are restricted to the southern metavolcanic belt, which they intrude.

3) Pyroxenite: Only three or four outcrops of pyroxenite were located during the mapping. Of these, one was located north of the southern metavolcanic belt just east of Miskittenau lake, while the others were restricted to a number of small outcrops along the East-main river near the abandoned Indian village of Neoskweskau.

4) Acidic intrusions: The acidic intrusions are quantitatively the most important members of this unit.

They are weakly foliated to non-foliated and are predominantly of granodioritic composition although quartz monzonites and granites are also common. The fact that the different lithologies grade into one another and that all lithologies share common textures and structures suggests that they should be considered as representing a single period of igneous activity.

5) Pegmatites: occur sporadically throughout the area; the majority are too small to be mapped.

6) Diabase dykes: are the youngest consolidated rocks in the region, occurring mainly as northwest-trending dykes several hundred feet in width. A few northeast-trending dykes were also found. All dykes show up as strong linear aeromagnetic anomalies and may easily be traced on the various aeromagnetic maps.

Structural Geology

Two periods of deformation, resulting in two generations of mineral orientation can be demonstrated in the area at widely scattered localities. The first of these affected the Gneiss Complex and in the northern metavolcanic belt is considered to be

responsible for the development of northeast-trending overturned synclines and anticlines. The second, which developed after the period of quartz diorite emplacement, folded the previously developed fold system and imparted a foliation to the intrusive rocks. A weak, third period of deformation may have followed the intrusion of the acidic rocks, thereby accounting for the non-pervasive foliation observed within them, a foliation so weak as to pass unnoticed in the more strongly foliated surrounding rocks.

Two large fault systems cut across the area, the earlier of the two being northeast-trending and the later one northwest-trending. The diabase dykes are believed to have been emplaced along these older faults.

ECONOMIC GEOLOGY

As far as the writer is aware, the southern metavolcanic belt has not been prospected thoroughly, and although no important mineralized outcrops were encountered during the course of the mapping of this belt, several outcrops did contain some pyrite. The more important of these are shown on the accompanying map.

In the northern metavolcanic belt, some preliminary exploration has been carried out on the metavolcanics. One

rusty zone was noted in the metavolcanics just north of Cabot lake, and minor quantities of pyrite appear to be quite widespread not only in the volcanics but also in the associated metasedimentary rocks.

The rest of the area is of less interest for mineral exploration. One small showing of molybdenite was discovered on an island in Bardelière lake. It occurs in the quartzofeldspathic member of the Gneiss Complex, immediately adjacent to a pegmatite vein. In the same area many pink pegmatites contain an abnormally high percentage of magnetite, which occurs as large crystals up to 1 inch across.

The Indians of the area maintain that there is an important concentration of copper in the vicinity of the southern extension of Mesgouez lake near the western boundary of the area mapped, but could not be persuaded to reveal the location.

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