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PRELIMINARY REPORT

ON

DOLLIER-CHARRON AREA

ABITIBI-EAST AND ROBerval COUNTIES

BY

E. R. W. NEALE



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I N T R O D U C T I O N

The Dollier-Charron map-area, which was mapped geologically during the 1953 field season, is bounded by latitudes $49^{\circ}30'$ and $49^{\circ}45'$ and longitudes $74^{\circ}00'$ and $74^{\circ}15'$. It includes Dollier township, almost all of Charron Township, narrow strips of Queylus, La Dauversière, Lemoine, Vimont, and Mance townships, and very small parts of Obalski and Rinfret. In all, it covers about 200 square miles.

The adjacent area to the west has been mapped by Imbault.*

The St. Félicien-Chibougamau highway crosses the southwest corner of the map-area and makes it easily accessible by truck, car, or autobus from all points in the Lake St. John region. The highway crosses the southern boundary of the area at mile 112, measured from St. Félicien. Travel in the eastern and central parts of the area is facilitated by Boisvert river, which offers an excellent canoe-route from the highway bridge at La Blanche lake to the northeast corner of the area. Good portage systems connect this river with the large lakes of the region. The chain of lakes extending northeast of Dufresne lake, used in conjunction with the Old Winter Road, affords a canoe-and-portage route from the highway to the northwest corner of the area. This locality is also accessible from the southeastermost bay of Chibougamau Lake, the end of the Old Winter Road, in the extreme northwest corner of the area. In addition, access is easy by aircraft from nearby bases.

Except in its swampy northwest quarter, the area is heavily wooded. Black spruce is the dominant growth but white spruce, balsam, and jackpine are also common. Birch, tamarack, and poplar are relatively rare, although stands of birch are found on drumlinoid ridges northwest of Stella lake.

The line between Abitibi-East and Roberval counties is the divide between the St. Lawrence and James Bay drainage basins. East of the county line, Boisvert river takes most of the drainage. This river enters the map-area at an elevation of 1300 feet and flows south to La Blanche lake, elevation 1190

* IMBAULT, P.E., Preliminary report on the Queylus area, Abitibi-East and Roberval counties: Quebec Dept. Mines, P.R. 250, 1951.

feet. From here, the flow is southeastward to lake St. John and St. Lawrence river. The land west of the county line drains westward and northward, by devious routes, to James bay.

The area has low relief. The highest point in the region is on a bedrock ridge immediately west of Poisson Blanc lake. It has an elevation of about 1700 feet, 500 feet above that of the lake. Rock ridges east of Boisvert and Coquille lakes have almost as high elevations.

Striations, chatter marks, and friction cracks show that the line of flow of the Pleistocene ice-sheet varied from about S. 15°W. in the northern part of the area to nearly south in the southern part of the area.

Drumlinoid ridges and hummocky ground moraine occur throughout the area. Small eskers occur near Poisson Blanc and Coquille lakes in the south and near Pillow lake in the north-central part of the area. Kettles, and small, conical, kame mounds are associated with the eskers. The Pillow Lake esker terminates southward in a delta deposit. Varved clays and silts, exposed along the banks of Boisvert river near the Dollier-Charron township line, represent deposition in a former, apparently small, glacial lake.

GENERAL GEOLOGY

Outcrops of bedrock are relatively rare in the swampy northwest corner but abundant elsewhere in the area.

All the bedrock exposed in the area is Precambrian. Altered volcanic rocks of the Keewatin-type and altered sedimentary rocks of Timiskaming-type crop out as a broad band trending northeasterly across the area. Gabbro and anorthosite which crop out in the northwest corner of the area are cut by altered granitic rocks. The southeastern part of the map-area is underlain mainly by mixed gneisses and orthogneisses.

Table of Formations

CENOZOIC	Recent and Pleistocene	Peat, beach sand, silt and clay, sandy and bouldery till.
Great unconformity		
PRECAMBRIAN	<u>Intrusive Rocks</u>	
	Gabbro dykes Orthogneisses and mixed gneisses, pink muscovite granite gneiss Granite Anorthosite and gabbro	
	<u>Sedimentary and Volcanic Rocks</u>	
	Deformed conglomerate Altered sedimentary rocks; their more metamorphosed equivalents, including muscovite and hornblende schists and gneisses, some with garnet. Altered andesites and basalts, some pyroclastics; their more metamorphosed equivalents, including hornblende schists and garnetiferous amphibolite	

Metavolcanic Rocks

Altered lavas of a Keewatin-type are andesitic and basaltic, and, in places, they have pillow and amygdaloidal structures showing their original flow nature. Andesite breccias are restricted in occurrence, as are also tuff beds. Many of these rocks, particularly in the northwestern part of the central band, are typical greenstones, being fine-grained and schistose, with hornblende, chlorite, and epidote.

The greenstones grade into rocks that are also characterized by hornblende, but are coarser grained than the greenstones and in some varieties have garnet. The hornblende schists and garnetiferous amphibolites are abundant west of Poisson Blanc lake and in a narrow belt that extends northeastward from the western boundary near Dufresne lake to Boisvert river. These rocks are the result of an alteration of greater intensity than that which affected the greenstones. The distribution of the alteration suggests that the heat derived from the orthogneisses of the southeastern part of the area was responsible for the alteration.

Metasedimentary Rocks

Altered sedimentary rocks of a Timiskaming-type are in places interbedded with the greenstones, but at some localities, notably near Stella lake, somewhat metamorphosed, cross-bedded, impure sandstones are found.

A band of altered rocks extending northeastward from the northwest corner of Charron township is believed to be the more altered representatives of the metasedimentary rocks such as are exposed near Stella lake. They are medium-grained muscovite and hornblende schists and gneisses. Some varieties have pale-red garnet crystals.

At least some of the medium-grey, hornblendic varieties of these schists and gneisses derived from volcanic rocks, for transitional relationships exist in the region east of Pillow lake. Further evidence on this point is an outcrop of pillowed andesite at the northeast corner post of Dollier township, deep within the outcrop area of schists and gneisses.

Deformed Conglomerate

Exposures of a deformed conglomerate are found at two localities along the line between Dollier and Lemoine townships and also on the south-east shore of Conglomerate lake. The conglomerate outcrop is within that of the metamorphosed sedimentary rocks. The metamorphism of the conglomerate and the strikes and dips of bedding are similar to that of the adjacent beds.

Boulders as much as two feet long have been "stretched" and are elongated down dip of the schistosity. Boulders of granite, syenite, diorite, anorthosite, and biotite and hornblende schists can be recognized. Although the rock has many of the characteristics of Timiskaming conglomerates, the presence of boulders of anorthosite, apparently derived from a gabbro-anorthosite massif in the northwestern corner of the area, suggests that the conglomerate is younger than the sedimentary rocks.

Anorthosite and Gabbro

About seven square miles in the northwest corner of the area is underlain by altered anorthositic and gabbroic rocks, with which are associated granitic rocks, also much altered.

Gabbro, anorthosite, and gradational rocks are the dominant types. These rocks pass into each other in single exposures so that it is difficult to estimate the relative abundance of each. The anorthosite is white to light-brown on freshly stripped weathered surfaces. On fresh fractures, it is pale-green and has a waxy luster. It is medium- to coarse-grained, commonly massive, and consists of 90 to 95 per cent altered plagioclase and 5 to 10 per cent chlorite. The chlorite, an alteration of original hornblende or pyroxene, is interstitial to the plagioclase. The gabbro is mottled green and light-brown on weathered surfaces and greyish-olive on fresh fractures. It is commonly coarse-grained and massive but locally gneissic.

Granite

The anorthosite and gabbro are cut by dykes of a much altered quartz-bearing plutonic rock. The extensive alteration of the feldspar makes the precise name to be attached to the rock difficult to ascertain, but the 30 per cent of quartz seen on unweathered surfaces makes "granite" suitable.

for it. An area of granite large enough to be indicated on the accompanying map occurs on the southeast side of the gabbro-anorthosite massif.

Orthogneisses and Mixed Gneisses

Gneisses, resembling some found in the Grenville sub-province, underlie about 60 per cent of the map-area including most of Charron and the southeast quarter of Dollier township. The bulk of these gneisses, which are mapped as one unit, are grey orthogneisses and mixed gneisses. A small body of pink, muscovite granite gneiss lies along the northwestern border of the mass.

The orthogneisses are light-grey, medium-grained rocks that average 30 to 40 per cent clear quartz, 40 to 50 per cent white to light-grey plagioclase, 5 to 10 per cent grey to pink potassic feldspar, and 5 to 10 per cent biotite.

Light-red, weakly-sheared, granite gneiss, consisting of 30 per cent clear quartz, 40 to 50 per cent pink potassic feldspar, 20 to 30 per cent white plagioclase and minor biotite, is exposed at several localities in Charron township. This granite is interpreted as a late differentiate of the same magma from which the grey orthogneisses derived. At some localities it is gradational to the grey orthogneisses, at others, it intrudes both orthogneisses and mixed gneisses.

The mixed gneisses were formed, in part or entirely, by intrusion of the orthogneisses into the metasedimentary and metavolcanic rocks described previously. They are medium-grained, strongly-layered rocks that vary greatly in composition and appearance. Light-grey layers, consisting chiefly of quartz, plagioclase, and minor biotite, alternate with medium- to dark-grey layers that consist of plagioclase and 20 to 50 per cent biotite. Hornblendic varieties of the mixed gneisses are common around Coquille lake and close to the northwest margin of the outcrop area. In the latter locality, they consist of alternate layers of grey biotite orthogneiss and black hornblende schist ~~of~~ garnetiferous hornblende schist.

Concordant sills and stringers of coarse, granitic pegmatite occur within the orthogneisses and mixed gneisses at many localities.

Strongly-sheared, muscovite granite gneiss forms a lenticular body that extends from Tippecanoe lake southwestward to Dufresne lake and beyond into the adjacent map-area to the west. This rock-type consists of 30 per cent clear quartz, 60 per cent feldspar (with pink potassic feldspar slightly in excess of white plagioclase), 10 per cent muscovite, and minor biotite.

The muscovite granite gneiss contains inclusions of the adjacent sedimentary and volcanic rocks, and grades eastward into grey orthogneisses and mixed gneisses. It is interpreted as the mechanically deformed equivalent of the light-red granite gneiss associated with the grey orthogneisses.

Gabbroic Dykes

Five thin dykes of rusty-weathering, massive gabbro were mapped in the southeastern part of the area. They are interpreted as being intrusive into the surrounding orthogneisses and mixed gneisses. The intrusive relationship is exposed at only one locality, half a mile north of the western arm of Coquille lake.

STRUCTURAL GEOLOGY

Bedding, Schistosity, and Gneissic Structure

Near the western boundary of the map-area, bedding and schistosity in the sedimentary and volcanic rocks strike northeast and north-northeast and dip steeply southeast. This, together with the northeasterly trend of the mappable units, is different from the easterly strikes recorded by Imbault* in the adjacent area to the west. To the northeast, around Couteau lake, strikes of schistosity and compositional layers swing around to the east, that is parallel to the contact with the orthogneisses and mixed gneisses. In the extreme northeast corner of the area, the northeast strikes resume and continue into the adjacent map-area to the northeast.

Gneissic structures in the peripheral portions of the gneisses of the southeastern part of the area strike parallel to the contacts with sedimentary and volcanic rocks. Elsewhere, the strike of the gneisses varies considerably but broad general trends can be distinguished. Dips are from vertical to horizontal. Locally, the gneissic structure is irregular and no consistent pattern of strikes or dips is seen.

F o l d s

Top determinations on the sedimentary and volcanic rocks in the northwest quarter of Dollier township indicate a north-northeast-striking syncline, in the region between Stella lake and Pillow lake. The southeast-dipping beds and flows around Stella lake face southeast, whereas the southeast-dipping beds and flows at Pillow lake face northwest. This suggests that the syncline is overturned toward the northwest and that its axial plane dips southeast. This synclinal axis may be the northeastward extension of an east-striking synclinal axis mapped by Imbault* in the Queylus area to the west. However, top determinations on flows in the northwest corner of Charron township suggest that the axis extends south-southwestward to Dufresne lake and that the overturned, southeastern limb of the fold has been cut off by igneous intrusion or faulting, or both, in this locality.

Shear Zones and Faults

Shear zones and minor faults are common within the volcanic rocks in the northwestern part of the area. Most trend north-northeast, parallel to the strike of the schistosity. Minor, east-striking, cross-shears were mapped

* IMBAULT, P.E., op. cit.

on Wynne creek, near the north boundary of the map-area, and two miles east of the north end of André lake. Quartz veins and carbonate zones have been localized by the shearing.

Southeastward, where the sedimentary and volcanic rocks are more highly metamorphosed, shearing parallel to the contact with the gneisses of the southeastern part of the area has produced carbonatized muscovite and sericite schists.

There are many small, sinuous shears and faults in the grey orthogneisses and mixed gneisses, particularly where they grade westward into pink muscovite granite gneiss. The muscovite granite gneiss is itself conspicuously the product of shearing. Granulation, and even the emplacement, of this rock may be related to faulting along northeast-southwest lines.

ECONOMIC GEOLOGY

Most of the western part of this area has been staked in the past, but all claims, except a few in the vicinity of Poisson Blanc lake, had expired by the summer of 1953.

At the northeast corner of Stella lake is a mineral showing where six trenches have been opened across the strike of a northeast-trending shear zone which is apparently along a contact between pillowed andesite and chloritized granite. Albitization and silicification of the andesite were followed by the introduction of rusty-weathering iron carbonate, pyrite, and chalcopyrite. Assays of samples showed no gold and only traces of copper.

A northeast-trending, carbonatized, shear zone near the southeast shore of Pillow lake contains small amounts of pyrite and molybdenite. An east-striking shear that cuts medium-grained andesite, two miles east of André lake, is shot through with pyrite-bearing quartz veins. Quartz stringers and pyrite mineralization are associated with zones of sericite-carbonate schist that are common within the rocks mapped as muscovite and hornblende schists and gneisses.

On the west shore of Wynne creek, 200 feet from the north boundary of the area, an east-striking shear in gabbro-anorthosite is accompanied by pyrite mineralization. The gabbroic rocks east of Wynne creek contain up to 10 per cent disseminated magnetite. Half a mile north of the map-area, where Wynne creek empties into Cinq Milles lake, an outcrop of gabbro-anorthosite contains numerous thin lenses and stringers of magnetite.