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PRELIMINARY REPORT ON ROSAIRE - ST-PAMPHILE AREA, MONTMAGNY AND L'ISLET COUNTIES

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GEOLOGICAL SURVEYS BRANCH

PRELIMINARY REPORT

ON

ROSAIRE - ST. PAMPHILE AREA

MONTMAGNY AND L'ISLET COUNTIES

BY

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PRELIMINARY REPORT

on

ROSAIRE-ST. PAMPHILE AREA

MONTMAGNY AND L'ISLET COUNTIES

by J. Béland

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

The Rosaire-St. Pamphile map-area, which lies about 50 miles east of Quebec City, was geologically examined in the summer of 1953. Comprising about 350 square miles, it extends from latitudes 46°45' to 47°00' and from longitude 70°15' eastward to the State of Maine. The southwestern part of the area is in Montmagny county, but the greater part is in L'Islet county. The area includes the townships of Arago, Leverrier and Casgrain and part of the townships of Lessard, Beaubien, Bourdages, Patton, Talon, Garneau, and Dionne. The principal settlements are Ste. Apolline, St. Marcel, St. Adalbert, and St. Pamphile. The area is covered by a network of good gravel roads, and all parts of it are, therefore, easily accessible. A branch line of the Canadian National Railways crosses the northwest corner of the area.

Geologically the are is in the Appalachian uplands and includes a segment of the serpentine belt, which in Quebec extends from the Eastern Townships to L'Islet county. Renewed interest has been shown in this belt since the discovery in 1951 of nickel and copper deposits near St. Fabien-de-Panet in Montmagny county, seven miles south of the present area.

The relief in most of the area is not very great. For the most part low, northeasterly trending hills, with their flanks mantled by thick morainic deposits, are separated by broad valleys partially filled with glacial drift. Bedrock is poorly exposed in much of the area. The topography is somewhat more rugged in a belt of volcanic rocks in the southeastern part of the area, where many ridges rise with steep flanks 300 to 400 feet above lower ground.

GENERAL GEOLOGY

The consolidated sedimentary and volcanic rocks in the Rosaire-St. Pamphile area are divided into four parallel and northeasterly trending belts, each belt containing a characteristic group of rocks. From northwest to southeast the groups are: Armagh, Rosaire, Caldwell, and Beauceville.

The rocks of the Armagh, Rosaire and Caldwell groups are possibly Cambrian, while those of the Beauceville group may be Ordovician. A complex of rocks known as the "Bennett Schists formation" was mapped in the adjoining St. Magloire area. The continuation of this complex northeastward into the present area shows that the complex is the metamorphic facies of rocks of the Rosaire, Armagh, and Caldwell groups.

The only intrusive rock observed in the Rosaire-St. Pamphile area is a small exposure of ultrabasic rock largely altered to serpentine and emplaced in rocks of the Beauceville group. It is therefore presumably post-Ordovician.

Recent stream deposits and glacial drift, including moraines, kames, eskers and thick stratified deposits, are abundant in the area particularly in the valleys.

The succession of formations and groups is summarized in the following table of formations:

Table of Formations

Recent and Pleistocene		Stream deposits. Moraines, eskers, kames, glacial stream deposits.
Post-Ordovician	Intrusive	Serpentine rock.
Ordocivian(?)	Beauceville Group	Green, black, and grey slates; green and grey impure sandstones; black and green chert and cherty slates; grey limestone; basic volcanic rock; basal conglomerate.
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Cambrian(?)	Caldwell Group	Green, red, and grey impure sandstones; green, red, and grey slates; white pure quartzites; basic volcanic rocks.
	Armagh Group	Green, red, and grey impure sandstones; green, red, and grey slates.
	Rosaire Group	White and grey pure quartzites; grey siltstones; black and grey slates; calcareous quartzites, siltstones, and slates.
	Bennett Schists Formation	Metamorphosed Rosaire, Armagh and Caldwell rocks; white and grey, pure quartzites; black, green and red phyllites; green, phyllitic, impure quartzites.

Sedimentary and Volcanic Rocks

Bennett Schists Formation

The Bennett Schists formation is, in the Rosaire-St. Pamphile area, an assemblage of schistose, white and grey, pure quartzites in which are intercalated thin layers of black phyllitic slates. There also are some recrystallized impure quartzites and green and red phyllites. It is believed that the pure quartzites and black phyllites which make up most of the Bennett Schists formation in this area belong to the Rosaire group, and that the impure quartzites and green and red phyllites were derived from rocks of the Armagh and Caldwell groups.

Rosaire Group

The Rosaire group is made up of white and grey, pure quartzites, dark grey, thin-bedded siltstones, and black and grey slates. It also includes grey calcareous quartzites, siltstones, and slates. At places, thin beds of limestone alternate with thin beds of slate.

The slates are commonly phyllitic, and the black slate is, in places, graphitic. The quartzites are very hard, generally fine-grained, and slightly schistose. Massive, glassy facies are also encountered. The grains in some medium-grained beds of quartzite are well rounded. The siltstones and slates generally are in beds two to three feet thick, and are intercalated with beds of quartzite ten to fifty feet thick. The quartzites are the predominant rocks of the group.

The bedding and schistosity in rocks of the Rosaire group are generally parallel and dip steeply (50-80°) northwest. Their attitude suggests a series of tight folds overturned to the southeast. The folding involved the Armagh group as is suggested by isolated lenses of Armagh found in the belt of Rosaire rocks.

Armagh Group

The Armagh group is made up of green, red and grey, impure sandstones and green, red and grey slates. Some white, quartzose siltstones are also found in the slates.

Some beds of green, red or grey sandstones are homogeneous, whereas others show a gradation in grain size within each bed. The bottom part of the graded bed is conglomeratic (small pebbles), and the bed grades upward into a siltstone or a shale.

The siltstones and slates are interbedded with the sandstones, which are in beds three to fifteen feet thick and which are by far the predominant rock type of the group. The green, red, and grey slates commonly alternate.

Top determinations and bedding-cleavage relationships on exposures along the railway and near the northern boundary of the area indicate that the rocks of the Armagh group are in isoclinal folds, overturned to the northwest. As previously noted, the same folding may have involved the rocks of both the Rosaire and the Armagh groups.

Caldwell Group

The Caldwell group is in some respects similar to the Armagh group. It is largely made up of green, red, and grey, impure sandstones, and green, red, and grey slates. The sandstones are in homogeneous or in graded beds. There are also some white, fine-grained, pure quartzites which are not found in the Armagh group. Other distinctive rocks are black, green, and rarely purplish or reddish basic volcanic rocks. These generally are schistose greenstones. The greenstones show pillowed, brecciated, and amygdaloidal structures.

The volcanic rocks are much veined by quartz, epidote, carbonate, and hematite. Some exposures show small irregular patches rich in hematite. Hematite is particularly noteworthy in the mass of brecciated volcanic rock in the southwestern part of range II, Leverrier township.

Dragfolds and the generally vertical attitude of the bedding in the rocks of the Caldwell group suggest that these rocks are in vertical isoclinal folds.

Beauceville Group

The Beauceville group is made up of green and grey impure sandstones, black, grey, green and rarely red slates, and black and green chert and cherty slates and also includes a small amount of basic volcanic rock and limestone. Abundant and thick layers of conglomerate are found near the contact of the Caldwell and Beauceville groups. Also, deformation of interbedded slates and sandstones near this contact has produced some pseudo-conglomeratic layers. The truly conglomeratic layers possibly represent a basal conglomerate of the Beauceville group.

The conglomerate is very poorly sorted. Boulders five to ten feet in diameter are found with pebbles of all sizes. The boulders and pebbles are such as could be derived from the Rosaire, Armagh and Caldwell groups.

The sandstones and slates of the Beauceville group southeast of the conglomerate are found in alternating beds with the slates predominant. Some beds of sandstone contain small fragments of chert and slate and coarse grains of quartz and feldspar. At places, these beds show a well-marked graded bedding. Some beds of slate are calcareous and others contain thin lenses of limestone.

The chert and cherty slates grade into each other or occur in well defined beds. Some beds of pure chert attain thicknesses of 100 to 200 feet. Disseminated pyrite was noted in some beds of chert and cherty slates.

The volcanic rock, found two miles southwest of St. Pamphile, is dark grey, massive and amygdaloidal.

The limestone on St. Roch river, northeast of St. Pamphile, is in beds, one to three feet thick, interstratified with calcareous shales. The limestone is generally sandy with fragments of slates and siltstones.

Intrusive Rock

A small mass presumably of peridotite, but now largely altered to serpentine and carbonate, intrudes rusty slates and impure sandstones of the Beauceville group three miles southwest of St. Adalbert, on lot 35, range VI, Leverrier township. The rock is rusty and grey on weathered surface, green or black on fresh surfaces, and much veined by carbonate.

Recent and Pleistocene

The surface deposits are stream accumulations, partly recent and partly of glacial origin, moraines, eskers and kames. Thick moraines made up of boulders, pebbles, gravel, sand and clay cover large parts of the area. Kames and thick, stratified gravel deposits partially fill the valleys. In some of the valleys are also found long sinuous eskers made up of gravel and closely-packed, rounded boulders and pebbles.

The boulders and pebbles in the area are largely derived from the local bedrock. Some varieties are found both north and south of their probable outcrops, and this fact suggests two ice movements. The glacial striae over most of the area trend north-south. In the southwest corner of the area a second set of east-west striae is found. This second set probably indicates local eastward flow of ice from the high ground west of the area.

STRUCTURAL GEOLOGY

Folding

The sedimentary and volcanic rocks of the Rosaire-St. Pamphile area appear to have been all tightly folded. There is definite indication of isoclinal folding in the belt made up of the Armagh group. Folding is also strongly suggested in the belt of the Rosaire group. The folds in the Armagh belt are overturned to the northwest and those of the Rosaire belt are overturned to the southeast. The axial planes of the tight folds in the Caldwell and Beauceville belts are nearly vertical.

Faulting

Shear zones within the Caldwell rocks, near the southern boundary of the area, west and southwest of Leverrier lake in ranges V of Talon and Leverrier townships, are parallel to the nearby contact of rocks of the Caldwell and Beauceville groups. These shear zones and similar ones southwestward in the adjoining St. Magloire area indicate the possibility of the contact between these two groups being, at least in part, a northeasterly trending fault.

Anothe r fault, with an east-west trend and an apparent horizontal displacement of about half a mile, is indicated in the northeast part of the area, about 1¼ miles northeast of St. Pamphile.

ECONOMIC GEOLOGY

Magnetic Anomaly

The aeromagnetic map, "St. Pamphile" (Geol. Surv. Can., Geophysics Paper 116, 1953), shows a large, nearly circular anomaly between the villages of Ste. Apolline and St. Marcel. Although special attention was directed to the area of this anomaly during the present investigation, its cause could not be ascertained. All exposures examined within the area of anomaly are similar to those surrounding it. The structural observations made indicate no particular mechanical disturbance as would be expected if a large mass of igneous rock were there at shallow depth. No boulders of basic or ultra basic intrusive rock were found in the drift. These observations, however, do not preclude the possibility of a concealed intrusive mass.

Base Metals

Metallic minerals were observed on lot 39, Range V, Talon township, in a shear zone near the contact of the Beauceville and Caldwell groups in the southern part of the area. The mineralized rock is an altered sandstone intercalated with the Caldwell volcanics. It is rusty, highly sheared and seemingly brecciated. The metallic minerals are pyrite, pyrrhotite, and some chalcopyrite. Assays of two grab samples reveal very low tenors of zinc, nickel, copper, and traces of tin.

On lot 35, Range VI, Leverrier township, near the small mass of serpentine rock described above, rusty phyllitic slates have pyrite, pyrrhotite, and a small amount of chalcopyrite. Assays of two grab samples show very low tenors of copper and lead.

Limestone

The limestone on St. Roch river, in the northeastern corner of the area, if in sufficient quantities, could possibly be used for soil conditioning. Pure limestone, however, is rare. Most of the limestone exposed on the river is sandy with fragments of slate and siltstones.

Recommendation

It is recommended that, in search of base metal deposits in this area, special attention be paid to the zone of sheared rocks in the southern part of the area and to the rusty slates in the vicinity of the small mass of serpentine rock. It is to be noted that the nickel and copper deposit near St. Fabien, 7 miles south of the southwest corner of the present area, is near a mass of serpentine rock emplaced along a shear zone which, as in part of the Rosaire-St. Pamphile area, marks the contact of the Caldwell and Beauceville groups.

In the southern part of the Rosaire-St. Pamphile area and in the northern part of the adjacent St. Magloire area much of this zone of sheared rock unfortunately is in a swampy depression. Such terrane may be prospected by geochemical methods such as ones involving tests of soil or vegetation.