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PRELIMINARY REPORT ON GRANDE-RIVIERE AREA, GASPE-SOUTH COUNTY

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PRELIMINARY REPORT

ON

GRANDE-RIVIÈRE AREA

GASPÉ-SOUTH COUNTY

BY

R. SANSCHAGRIN, O.M.I.

QUÉBEC
1963

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Introduction

The Grande-Rivière area, which was mapped in the summer of 1961, is bounded by Chaleurs bay and latitude 48°34', and by longitudes 64°25' and 64°40'. It covers about 140 square miles of Gaspé-South county, including Grande-Rivière seigniory, Rameau township, western parts of Percé and Malbaie townships, and eastern parts of Grand Pabos seigniory and Pellegrin township.

The Gaspé highway (route 6) and a Canadian National Railways line follow the Chaleurs Bay coast, and serve the villages of Grande-Rivière and Sainte-Adélaïde-de-Pabos, where the bulk of the population of the area is concentrated. A secondary road gives easy access to the village of Pabos-Nord, 7 miles north of Sainte-Adélaïde. The underlying rocks here are limestones of the Matapedia group.

Several other secondary roads, in the east part of the area, link the farming villages of Sainte-Thérèse-de-Gaspé, Saint-Isidore-de-Gaspé, and Val-d'Espoir, where soil overlying the Bonaventure formation is successfully cultivated. A multitude of private roads, many of them temporary, give access to the timber limits of Grande-Rivière and Grand Pabos seigniories and of Rameau township. Nearly two-thirds of the timber on these limits was, unfortunately, destroyed by forest fires in the summer of 1960.

Physiography

Along most of the shore of Chaleurs bay are cliffs, 20 to 50 feet high, which are attacked by the waves at high tide. From here, the ground surface rises gradually to the north, to a maximum of 1,200 feet above sea-level. The land within one to two miles of

the shore and that in the east part of the area, where the nearly flat-lying sandstones and conglomerates of the Bonaventure formation are found, rises by 50-60 feet per mile. This land is fairly good for farming; a fact demonstrated at the Val-d'Espoir experimental farm, two miles beyond the east boundary of the area. In the west part of the area, beginning a mile or two from the shore, the land rises steadily by about 100 feet per mile. It is marked, however, by a series of ridges, 25 to 50 feet high, trending as the substrata and caused by the variation in argillaceous content of the Matapedia group limestones, the pure limestone beds standing in relief and the argillaceous limestones and calcareous shales forming depressions. This topography is very noticeable along the Pabos-Nord road.

Except for Blanc brook and Murphy creek, in the northeast, which empty into Malbaie bay north of Coin-du-Banc, all the streams of the area flow into Chaleurs bay. More than half the area is drained by the three main branches and numerous tributaries of Grande river, which rises farther northwest, in Joncas and Power townships. The southwest part is drained by Petit Pabos river and Castignan brook, and the southeast, by Brèche-à-Manon river.

The rivers contain rapids, and flow over solid rock or gravel. They are entrenched progressively more deeply upstream, and some valleys reach a depth of 700 feet. Grande river, 14 miles from its mouth, at the Rameau-Pellegrin township boundary, flows at an altitude of 250 feet, whereas the upland surface here is at 1,000 feet. Petit Pabos river has entrenched meanders 400 to 500 feet deep. It seems, therefore, that the streams are in process of rejuvenation. In general, outcrops are found only in the stream valleys, the upland being covered by several tens of feet of mantle and by very dense vegetation. There are no sizeable lakes, and only a few ponds and swamps.

General Geology

Except for a layer of igneous rock in the Bonaventure formation, all the rocks of the area are sedimentary. The oldest belong to the Maquereau group, which is believed to be Cambrian or Precambrian because of its fairly pronounced metamorphism. Following them in the stratigraphic sequence are the rocks of the Matapedia group, which occupy about half the area, including most of its western part. They are only slightly metamorphosed, and are assigned an Ordovician age.

Upon these two groups the nearly horizontal beds of the unmetamorphosed Bonaventure formation lie in angular unconformity, seeming to have filled the depressions of an ancient erosion surface. The unconformity between the Maquereau and Bonaventure can be very clearly seen on the shore east of the quay at Chandler, and the same unconformity, but here between the Matapedia and the Bonaventure, is exposed along the shore for more than a mile east from Brèche-à-Manon river.

The Bonaventure formation is confined mainly to the east part of the area, though it also occupies most of the Chaleurs Bay coast and some small patches southwest of Saint-Gabriel-de-Gaspé.

Stratigraphic Table

Paleozoic	Carboniferous	Bonaventure Formation	Calcareous conglomerate, and calcareous sandstone; basaltic lava or sill
		UNCONFORMITY	
	Ordovician	Matapedia Group	Pure limestone interbedded with shale and sandstone Well stratified, slaty argillaceous limestone Argillite and slate
		UNCONFORMITY	
Precambrian or Cambrian		Maquereau Group	Chlorite schist; arkosic quartzite, in places conglomeratic

Maquereau Group

The Maquereau group occupies less than one square mile of the area, in the southwest corner, and can be seen along the shore and the highway near Chandler. The outcrops are of sericite and chlorite schists, and of arkosic quartzites, which are here and there conglomeratic. Some bands are rich in hematite. For a more detailed description of this group the reader is referred to Alcock (1935).

Matapedia Group

Three facies were recognized in the Matapedia group. Firstly, about 2 miles north of Saint-Gabriel-de-Gaspé and Val-d'Espoir, bordering the conglomerates and sandstones of the Bonaventure, is an assemblage characterized by very pure, grey, light-bluish-grey-weathering limestone, with finely crystalline to sub-lithographic texture. This is in one- to two-inch beds with thin interbeds of grey, brownish-weathered, argillaceous limestone. There are also a few beds of intraformational limestone conglomerate, and several of greenish, brown-weathered shale, and a few lenses of bioclastic limestone containing more than 50% crinoid fragments. The assemblage much resembles that which crops out at White Head cape. Four new fossil localities were

discovered in it. A sequence that is somewhat similar, but is slightly metamorphosed, and that contains beds of sandstone and shale crops out at the mouth of Grande river and also along the Chaleurs Bay shore for ½ mile west and 2 miles east from Brèche-à-Manon river.

The second facies, which forms the greater part of the group, is mainly dark grey, slaty argillaceous limestone, generally in well defined beds 6 to 8 inches thick. It weathers light brown, in places alternating with dark brown. There are also beds of pure limestone and of limestone conglomerate, and 2 or 3 zones of sandy limestone and sandstone. In general the strength of the cleavage increases with the clay content. Its dip is almost everywhere more then 60°. Veins of white or pink calcite are very common. There are few fossils, and these are poorly preserved.

The third facies is composed of argillite and slate which form irregular patches here and there within the other two facies. The bedding is commonly not preserved, or is shown only by colour banding.

Structure

The major structures of the Matapedia group consist in a series of tight, east-west trending folds. There are also small folds with a wave length of 50 to 150 feet and a northeast-southwest trend, and several minor faults with vertical dips, and strikes between N.20°E. and S.30°E. The cleavage has a general strike of N.60°-70°E. and a steep dip.

Bonaventure Formation

The Bonaventure formation in this area is two-thirds conglomerate, whose pebbles range in diameter from 1/8 inch to 6 inches, though most are between 2 and 4 inches. Between 90% and 95% of them are of limestone, derived from the Matapedia group or from other units farther north. The others are of sedimentary and igneous rocks from the Maquereau group, except for common pebbles of brown calcite, which are reminiscent of the veins in the Matapedia group limestones.

The conglomerate is in general poorly sorted. The fragments are much longer than they are wide, but are well rounded. The matrix, which generally forms 10-20% of the rock, is a calcareous quartzose sandstone containing hematite, which gives the rock the dark red colour characteristic of the formation.

The remaining third of the formation is calcareous, medium- to coarse-grained sandstone. The grains are poorly sorted, and mostly of quartz, though there are also many fragments of limestone, chert, and fresh and altered feldspar. The cement is mostly calcite, mixed with hematite, though there is also some dolomite. Generally the cement forms about 50% of the rock, and in some places the calcareous sandstone passes to a more or less pure limestone.

Here and there one finds a few interbeds of red or green shale. In some places, green patches in the red sandstones and conglomerates indicate a local reduction of ferric oxide.

The following table shows the proportions of sandstone and various grades of conglomerate at different places in the area. The first twelve localities are at intervals of one mile along the Chaleurs Bay shore, from west of Chaloupe point to east of Sainte-Thérèse-de-Gaspé church (outside the area). The thirteenth is at the falls of Brèche-à-Manon river, where it is crossed by the road from Saint-Isidore-de-Gaspé to Val-d'Espoir Ouest. The fourteenth is one mile south of Saint-Gabriel-de-Gaspé church, and the fifteenth is the cutting on the road north from the same church.

Section number	Thickness of section (feet)	Thickness of sandstone (feet)	Thickness of conglomerate with pebbles smaller than 2" (feet)	Thickness of conglomerate with pebbles between 2" and 4" (feet)	Thickness of conglomerate with pebbles between 4" and 6" (feet)
1	21	1	16	4	0
2	20	1	0	19	0
3	30	30	0	0	0
4	23	23	0	0	0
5	50	50	0	0	0
6	19	7	0	12	0
7	46	9	37	0	0
8	9	0	0	9	0
9	24	3	0	21	0
10	44	15	10	19	0
11	65	0	15	50	0
12	43	10	0	29	4
13	30	18	4	3	5
14	91	18	0	67	6
15	55	7	0	39	9
TOTAL	570	192	82	272	24

From this table it can be seen that the sediments vary a great deal from place to place, except between sections 3, 4, and 5, which are entirely sandstone. The conglomerate is more abundant and coarser in the north, which seems to indicate that the source of material was to the north.

Along the sea shore the conglomerates are lenticular, or grade laterally into sandstones. The sandstones are also in lenticular bodies, or in beds of varying thickness. West of the mouth of Grande river, conglomerate fills an ancient channel, 15 feet wide and 10 feet deep, in the sandstone, and other, smaller channels occur at several places along the shore. Cross-bedding and ripplemark are seen

at several places, as for example west of the mouth of Petit Pabos river.

The greatest measured thickness in the Bonaventure was 91 feet. However, west of Saint-Gabriel-de-Gaspé the base of the formation, in crossing Grande-Est and Grande rivers, ranges in elevation between 650 and 200 feet, which indicates a thickness of more than 450 feet, if one supposes that the nearly flat-lying Bonaventure here fills a valley of an ancient erosion surface.

The Bonaventure formation seems to be, in this area, a deltaic deposit, accumulated partly in a terrestrial environment, partly in a shallow sea, and subject to intense oxidation. It appears also that the detrital material was brought in from the north.

Igneous Rock

Starting about 4,500 feet east of the mouth of Brèche-à-Manon river and extending along the cliffs for 3,900 feet, is a body of igneous rock 25-30 feet thick, interstratified in the Bonaventure formation 25 or 30 feet above its base. Alcock (1935) believed it to be a lava flow, but it might be a sill. The rock is massive, dark green to black, and ophitic or intergranular in texture, in places porphyritic. It contains 50% zoned plagioclase (bytownite-labradorite), 45-47% augite, partly replaced by a mixture of carbonate and leucoxene, and about 3% iddingsite and limonite replacing original olivine. Towards the top of the layer the rock contains abundant amygdules of quartz, of carbonate, and of thomsonite. .

The same layer is exposed at low tide in the beach near the Grande-Rivière Provincial Biologic Station. It has here a columnar structure. Three other outcrops occur in road-side ditches about 2 miles north of the principal outcrop.

Economic Geology

Iron

McGerrigle (1942) reported the presence of several lenses and bands of silicious hematite in the Maquereau group around Chandler, just west of the present area. The largest outcrop, 320 feet northeast of the quay, and partly of the race-course, measures 62 feet by 20 feet. An analysis of this material gave the following percentages.

Fe	30.89%
SiO_2	53.49%
P	0.06%
S	0.01%
Ti	0.00%

Outcrops of the same rock occur on the shore, near the quay and again 1,200-2,200 feet farther east. The analysis of a sample from this second group of outcrops gave the following percentages.

Fe	29.01%
SiO_2	53.58%
P	0.29%
S	0.01%
Ti	0.10%

Petroleum

Certain limestones of the Matapedia group have a strong bituminous odour, but the degree of deformation and metamorphism seems too advanced for any deposits of petroleum to have been retained.

Marl

Along the road between Grande-Rivière and Saint-Gabriel-de-Gaspé are a few small lakes containing deposits of greyish white, shelly marl. One of these deposits, 5½ miles from Grande-Rivière, is worked from time to time by Calcaire et Marne Limitée (proprietors: the brothers Claude and Justin Trottier of Saint-Casimir-de-Portneuf). The marl is used untreated for the improvement of land deficient in lime. Extraction is accomplished by a powerful pump, which transfers the marl into a settling basin of about 13,000-cubic-yard capacity. When it is dry, the marl is transported to farms within a radius of 20-25 miles.

Sand and Gravel

Sand and gravel deposits are not common in the area. The biggest is near the mouth of Brèche-à-Manon river. This deposit is poorly stratified, and, although there are some beds of sand, it is mainly a mixture of sand and 2- to 8-inch pebbles. Most of these are well rounded pebbles of Matapedia rocks, though there are also many small pebbles of red Bonaventure sandstone and conglomerate. The few boulders, 3 to 5 feet in diameter, are of distant origin.

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