



PROVINCE DE QUEBEC  
MINISTÈRE DES RICHESSES NATURELLES  
SERVICE D'EXPLORATION GÉOLOGIQUE

Preliminary Report

Stratigraphy of parts of the Gaspé Limestones in the  
Forillon Peninsula area, Gaspé East County

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## INTRODUCTION

The stratigraphy of parts of the Gaspé Limestones in the Forillon Peninsula area, Gaspé East County, was surveyed during ten weeks of the summer of 1973. The area surveyed is wholly within Forillon National Park, an area completely withdrawn from prospecting for metallic, non-metallic and petroleum minerals or resources. The area actually covered is shown on the accompanying map.

The aims sought in surveying anew parts of the strata of the Gaspé Limestones were to document as precisely as possible the lithology and the variations in thickness and facies of strata with type areas or sections which are all within the Forillon Peninsula. These data are preliminary to additional work to be done on sections farther west which will document on a regional scale the variations of these strata within the Gaspé. Furthermore, such surveys are necessary for setting up of biostratigraphic zonations, outside the scope of these surveys.

The strata herein investigated in detail are those commonly referred to as the "Cap Bon Ami" and "Grande Grève" Formations. The base of the "Cap Bon Ami" Formation can be drawn only with full knowledge of the underlying Quay Rock and Cape Road Members, and mapping of these two members was mandatory. However, the latter member was given only cursory examination and the former only summarily examined. No attempt will be made herein to reconcile the stratigraphic terminology

"Cap Bon Ami-Grande Grève" of inland Gaspé and the one previously used on the Forillon Peninsula; this subject will be investigated fully later.

#### GENERAL GEOLOGY

The Gaspé Limestones, as understood by Logan et al. (1863), comprised all those strata between the Lower Ordovician Cape Rosier Formation, in Anse-du-Cap-des-Rosiers and the Gaspé Sandstones (whose lower part is now referred to as the York River Formation). The basal strata of the Gaspé Limestones have been given many different names, the latest of which is Lefrançois "Formation". The stratigraphic nomenclature of the strata in and around the Forillon Peninsula is far from settled, and many compromises will be necessary. Nonetheless, Table 1 gives a stratigraphic classification, which can be gathered from the more recent literature and unpublished data (Russell, 1946; L.S. Russell in Cumming, 1959; Douglas, 1970; Skidmore, 1972; Bourque, 1973; Russell in press; and P.-A. Bourque and P.J. Lespérance, in preparation).

As the term Gaspé Limestones implies, these strata are composed predominantly of limestones. Nonetheless, fine grained terrigenous units are prominent within the Gaspé Limestones; these are the Rosebush Cove, Petit Portage, Cape Road Members, and the Roncelles Formation to the west of the area under discussion. For purposes of the present report the terminology in Table 2 will be used, rather than the terms "Cap Bon Ami" and "Grande Grève" which previously have not been applied consistently.

Table 1. Stratigraphy of the strata in and around Forillon Peninsula

CARBONIFEROUS	Upper		Intrusive dykes	
DEVONIAN	Lower and/or Middle	Gaspé Sand- stones	Battery Point Formation	
			York River Formation	
	Lower	Gaspé Limestones	Grande Grève Formation	Indian Cove Member
				Shiphead Member
			Cap Bon Ami Formation	Forillon Member
			St. Léon Formation	Cape Road Member
				Quay Rock Member
				Petit Portage Member
				Rosebush Cove Member
				Roncelles Formation
	Lefrançois "Formation"			
DEVONIAN and/or SILURIAN	Lower  Upper		St. Léon Formation and Griffon Cove River Formation (only recognized away from sea-shore)	
ORDOVICIAN	Lower		Cape Rosier Formation	
CAMBRIAN and/or ORDOVICIAN			Undifferentiated strata (away from the sea-shore)	

Table 2. Stratigraphy of the strata described

Upper CARBONIFEROUS	Intrusives		Aplite and basic dykes	
Lower DEVONIAN	York River Formation		-- Terrigenous strata; sandstones abundant	
	Gaspe Limestones	Indian Cove Member	> 120 m	206 m Limestones and impure limestones in irregular beds, many with chert nodules; some dolomite and silicified strata
		Shiphead Member	101 m	
		Forillon Member	290 m	Grey limy mudstones ranging to calcilutites and calcisiltites, thin bedded to laminated; locally silty, completely silicified and/or dolomitized
		Cape Road Member	134 m	Varicoloured shales, siltstones and mudstones; some sandstone
		Quay Rock Member	approx. 74 m to > 93 m	Grey calcilutites and calci- siltites with thin interbeds of very limy mudstones; some fine grained terrigenous strata locally
SILURIAN and/or DEVONIAN	St. Léon Formation (undifferentiated)		-- Terrigenous strata	

The Siluro-Devonian strata underlying the Forillon Member were studied by Bourque (1971 and 1973), and strata adjacent to the contact between the Indian Cove Member and the York River Formation were studied on a regional scale by Mason (1971).

Sea-shore exposures locally exhibit abundant steep-angled faults, all of which are shown on the accompanying map. Sequences of distinctive beds permitted, in most cases, the determination of the stratigraphic displacements. This allowed the compilation of an essentially complete section of the Indian Cove Member measured directly from the outcrops.

#### DESCRIPTION OF STRATIGRAPHIC UNITS

##### St. Léon Formation (undifferentiated).

These strata are composed of varicoloured shales, mudstones, siltstones and fine grained sandstones. Descriptions of these strata will be found in Russell (1946) and Bourque (1971 and 1973).

##### Quay Rock Member.

The type section is at Quay Rock in Anse-du-Cap-des-Rosiers. There Russell (1946) measured approximately 74 m of strata; this approximate figure is due to the inaccessible nature of the sea-cliffs surrounding Quay Rock. This member is at least 93 m thick in a branch of ruisseau du Cap-des-Rosiers, near route 6; here the base of the Quay Rock is cut off by a fault and its upper contact with the overlying Cape Road Member is not exposed.

The lower contact of the member is drawn at the appearance of a continuous sequence of laminated very limy mudstones-very impure limestones; its upper contact is drawn at the disappearance of limestones. The majority of the strata of this member are thin bedded grey calcisiltites or calcilutites with thin interbeds of very limy mudstones; some limestone beds are well laminated, argillaceous, silty or dolomitic. Fine grained terrigenous strata are important in the upper third of this member along the sea-shore (see Fig. 22, St-Julien et al., 1972), and these siltstones and sandstones are either completely absent farther westward, replaced by 3 m of green claystones, or occur above the 93 meters of measured strata near route 6. Chert is absent from this unit (except in the outcrop along the road in contact with the fault 300 m northwest of Quay Rock), and fossils are very scarce. On top of Quay Rock meandering trace fossils can be seen, and careful examination will reveal a few small gastropods.

Penecontemporaneous slumping (i.e., during sedimentation) of some of the beds is well known from both Quay Rock and cap Bon-Ami, but it is absent from the same strata exposed near route 6. This last-mentioned area is far more accessible than the others and constitutes the best reference section for this member. Additional data on this member will be found in the works of L.S. Russell:

#### Cape Road Member

These strata have been described by Russell (1946, in press), and their description need not be repeated here. The

strata of this member are identical to the St. Léon Formation (undifferentiated).

Forillon Member.

The lithology of the basal strata of this member is exactly as the base of the Quay Rock Member, and its lower contact is drawn in the same manner. The upper contact of the Forillon Member is drawn immediately below the appearance of significantly different lithologies succeeding the monotonous sequences of upper Forillon Member strata. As herein conceived this contact falls between the contacts advocated by Logan et al. (1863) and Russell (1946), and is in fact 18 m below Russell's and 15 m above Logan's et al. The reasons for changing the level of this contact again are purely pragmatic and other criteria than the one used here are inapplicable on a regional scale. On Dolbel brook, the irregularly bedded, essentially "pelletoidal" limestones with local chert nodules of the upper Forillon Member disappear progressively by the introduction of calcarenites and increasingly terrigenous material. At cap Gaspé, the interbedded, argillaceous, silty limestones and calcisiltites with local chert nodules also disappear progressively by the introduction of brown lithographic limestones (calcilutites), calcarenites, very limy mudstones and increasingly terrigenous material. On Dolbel brook the top of the Forillon Member is drawn at the base of the first calcarenite bed and at cap Gaspé at the base of the first brown lithographic limestone, which is thick here and contains Pleiolepturina pleioleptura (Conrad). No



continuous section of this member is accessible, the best partial sections being the following: a) the uppermost 66 m at cap Gaspé, b) the uppermost 29 m on Dolbel brook (east of the bridge), and, c) 100 m on the flanks of Mount St. Alban, 925 m northwest of Quay Rock. Consequently, the whole of the Forillon Peninsula must be considered as the type area for this member. A structural section in the vicinity of Dolbel brook gives a total thickness of 290 m for the Forillon Member.

The lowermost 100 m is composed of a heterogeneous assemblage of finely bedded and laminated grey argillaceous strata; these strata range from limy mudstones to argillaceous spiculites (composed of calcite sponge spicules only seen in thin sections) and, rarely, include silty dolomites. Many of these strata, except for the end members previously noted, are silty or highly silty, some are partly silicified (by microquartz, that is "chert"), and others are slightly to highly dolomitic. The upper 35 m of these strata can be examined on the flanks of Mount St. Alban.

The middle third of this member is composed of thin bedded to laminated strata which have been replaced almost completely by brown to black chert, as well as having been somewhat dolomitized. Locally calcilutites or calcisiltites can be recognized. This part of the member forms the highest topographic elevations of the region surveyed.

The upper third of the member resembles the middle third except that it is less silicified and it possesses greater local

abundance of argillaceous dolomitic microquartz-bearing interbeds of limestone within the main resistant beds of calcilutites and calcisiltites. Laminated beds in the upper third of the member are also very rare, and the bedding is undulating.

Although a few fossils are present in slumped blocks of the Forillon Member along the shore 3 km southeast of cap Bon-Ami, fossils are known only from the upper 25 m of this member. Synphoroides biardi (Clarke) (a trilobite only known previously from the Murailles Limestone in Percé), as well as numerous brachiopods (also known from the Murailles Limestone) are present in Dolbel brook. The greater part of the fauna of division 1 of the Grande Grève Formation of Clarke (1908, p. 39) comes from the upper Forillon Member at cap Gaspé.

#### Shiphead Member.

The Shiphead Member is characterized by its heretogeneity of rock types and, in general, by the planar nature of its bedding. Undulating, irregular bedding (as present in the Forillon and Indian Cove Members) is also present in this member, but is restricted to the same rock type as in the overlying and underlying members. Undulating bedding forms one seventh of the strata of the Shiphead Member at cap Gaspé.

The type section of the Shiphead Member is at cap Gaspé where 101 m of strata were measured. On Dolbel brook, 47 m were measured, and it may be no thicker than 66 m; clearly then the Shiphead varies significantly in thickness along its strike (see also below).

At cap Gaspé the upper 16 m of the Shiphead is composed of fine to coarse grained calcarenites, with varying amounts of glauconite; consequently these strata range from green to light grey. At Anse aux Sauvages, within the uppermost 13 m of this member, less than one meter of calcarenite can be recognized, the remaining strata being composed of 2 m of calcilutite and 10 m of argillaceous chertified very fine grained sandstones, and mudstones-siltstones. Fourteen meters of mudstones underlie the calcarenites at cap Gaspé; these have not been unequivocally identified farther west. Underlying these uppermost 30 m at cap Gaspé are the following rock types which are all grey, but some beds are also brownish: nodular calcilutite-calcisiltite, limy and/or microscopically silicified dolomite, partly silicified (with chert nodules) limestone with interbeds of argillaceous limestone, argillaceous calcilutite, thick bedded (near 1 m thick) calcilutite-calcisiltite, a few beds of calcarenite and very limy mudstone, and thin interbeds of bentonitic shale and bentonite (these last two rock types are well described by Russell (in press) as well as by Smith, 1967). Most of the limestones have calcite sponge spicules and varying amounts of dolomite and/or microquartz ("chert").

Some of the strata in the middle third of the Shiphead Member at cap Gaspé are composed of a mixture of up to two thirds microquartz, much dolomite and minor calcite, thus superficially resembling sandstones.

The strata at cap Gaspé cannot be easily correlated with those in Dolbel brook, but are easily correlated with those at Anse aux Sauvages, where even bentonitic shale can be recognized.

Fossils are present throughout the Shiphead Member, but nowhere are they abundant.

Indian Cove Member.

This member is characterized by the undulating irregular nature of its bedding and the monotonous succession of its strata. Its lower contact is drawn at the change from the planar bedding of the Shiphead Member to the undulating bedding of the Indian Cove Member. The upper contact of the Indian Cove Member is drawn below the appearance of fine to very coarse grained non-calcareous sandstones of the York River Formation.

Two thin (7 cm and 10 cm thick) medium to coarse grained calcarenite beds 50.2 and 12.5 m respectively below the top of this member are present between the York River-Indian Cove contact near cap Little Gaspé and anse St-Georges. They were a great help in deciphering the stratigraphic displacements of faults in this area.

The most accessible section of this member is the one exposed in Dolbel brook, continuing to cap Little Gaspé. There, 70 m are continuously exposed in Fruing cove and along the sea-shore, and 50 m are discontinuously and poorly exposed in Dolbel brook, for a total thickness of 120 m. Unfortunately the contact with the underlying Shiphead Member is not exposed in

Dolbel brook. In any event, the combined thickness of the Indian Cove and Shiphead Members in this area is 206 m. One hundred and twenty meters must be considered a minimum figure for the thickness of the Indian Cove, and 140 m are actually assigned to it on the accompanying map, leaving only 66 m for the Shiphead Member.

As the strata between anse St-Georges and cap Gaspé were not all surveyed, because of the inaccessibility of the sea-cliffs, it is impossible to compare the 140 m thickness of the Indian Cove with any other measurement. Consequently, no single section of the Indian Cove Member is complete, and here again the whole of the Forillon Peninsula must be considered as the type area for this member.

The more resistant beds of this member very commonly have grey to dark grey chert nodules within grey to locally brownish calcilutites-calcisiltites; the less resistant interbeds are more commonly light grey, argillaceous, silty and more or less dolomitic and microquartz-bearing, although locally these interbeds also have chert nodules. Both the resistant and non-resistant interbeds are variable in thickness, one dominating over the other locally, but the resistant beds tend to be 30 cm thick and the interbeds 10 cm thick. Locally a few meters of grey strata are either a) nearly or completely dolomitized, b) nearly or completely silicified, c) a mixture of a) and b) above, or d) in nodular beds. In thin section, many of the resistant beds are somewhat recrystallized, dolomitic, silty,

microquartz-bearing limestone with a great abundance of calcite sponge spicules. The interbeds in thin section also have sponge spicules.

The uppermost 14 m of this member differ from the lower strata in that the beds are more argillaceous, have fewer chert nodules, are in beds 5 to 15 cm thick, are locally laminated (but this varies along strike), and in general have planar bedding. Part of the uppermost meter of the member is composed of dolomites. Very fine grained sandstones, which are very limy, dolomitic and microquartz-bearing were found only in a 4 m thick zone 18 to 14 m below the top of the member; here the sandstone forms approximately half of this thickness.

The lower half of this member is very poorly fossiliferous, and its upper<sup>\*</sup>half on the whole is quite fossiliferous, and locally very fossiliferous (as between Fruing and Lehuquet coves where Costellirostra peculiaris (Eaton) is particularly abundant).

#### Intrusive rocks.

A basic dyke, approximately 3 m thick, cuts the uppermost undifferentiated St. Léon Formation just north of Quay Rock, adjacent to, but not touching, the fault in that area; this dyke is present only along the sea-shore.

A second dyke, 1.5 m thick, is exposed for 10 m along its length and cuts the Indian Cove Member southeast of anse St-Georges. This light gray, crystalline, dyke is an aplite and is composed essentially of orthoclase; it occurs only along the sea-shore. The central 10 cm of this dyke have been brecciated and calcite cemented.

ECONOMIC GEOLOGY

Traces of galena were found in and around the brecciated zones in one of the faults between anse St-Georges and Lehuquet cove.

Traces of ?copper mineral (?bornite) occur in the wall rock adjacent to the aplite dyke southeast of anse St-Georges.

An adit, near the York River-Indian Cove contact, near cap Little Gaspé, has been driven in for exploitation of galena. This occurrence has, apparently, been known since the seventeenth century, and a vein, no thicker than 10 cm, very near this adit to the southeast, contains pure galena locally and elsewhere a mixture of sphalerite and galena.

All the above occurrences are in strata very near the York River-Indian Cove contact, which would thus appear to be very favourable for prospecting to the west of Forillon National Park.

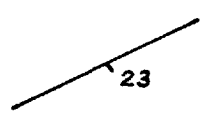
REFERENCES

- Bourque, P.-A., 1971, Rapport préliminaire subséquent à l'étude de la stratigraphie du Silurien et du Dévonien basal du nord-est de la Gaspésie. Prov. Québec, Min. Rich. Nat. public report GM 26641, 26 p.
- Bourque, P.-A., 1973, Stratigraphie du Silurien et du Dévonien basal du nord-est de la Gaspésie. Université de Montréal, unpubl. Ph.D. thesis, 291 p.
- Clarke, J.M., 1908, Early Devonian history of New York and eastern North America. New York State Mus., Mem. 9, Pt. 1, 366 p.
- Cumming, L.M., 1959, Silurian and Lower Devonian Formations in the eastern part of Gaspé Peninsula, Quebec. Canada Geol. Surv., Mem. 304, 45 p.
- Douglas, R.J.W. (Sci. Ed.), 1970, Geology and economic minerals of Canada. Canada, Geol. Surv., Econ. Geol. Rept. 1, 838 p.
- Logan, Sir W.E., Murray, A., Hunt, T.S., and Billings, E., 1863, Report of Progress from its commencement to 1863 (Geology of Canada). Canada, Geol. Surv., 983 p.
- Mason, G.D., 1971, A stratigraphic and paleoenvironmental study of the Upper Gaspe Limestone and lower Gaspe Sandstone Groups (Lower Devonian) of eastern Gaspe Peninsula, Québec. Carleton Univ. (Ottawa), unpubl. Ph.D. thesis, 191 p.

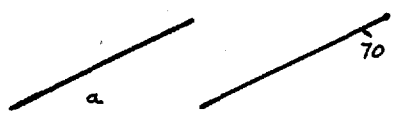


- Russell, L.S., Preliminary report on the stratigraphy of the Gaspe Limestone Series Forillon Peninsula, Cap des Rosiers township County of Gaspé South. Prov. Québec, Dept. Mines, Prel. Rept. 195, 14 p.
- Russell, L.S., in press, Stratigraphy of the Gaspe Limestone Series, Forillon Peninsula, Cap des Rosiers Township, County of Gaspé South. Prov. Québec, Min. Rich. Nat., Geol. Rept.
- Smith, D.G.W., 1967, The petrology and mineralogy of some Lower Devonian bentonites from Gaspé, P.Q. Can. Mineralogist, 9(2):141-165.
- St-Julien, P., Hubert, C., Skidmore, W.B., and Béland, J., 1972, Appalachian structure and stratigraphy in Quebec. XXIV Int. Geol. Cong., Montreal. Guidebook excursion A56-C56, 99 p.
- Skidmore, W.B., 1972, Post-Taconian platform carbonate of Grande Grève Formation (Siegenian and Emsian) of Gaspé Limestone, Gaspé synclinerium of New Brunswick-Gaspé zone, p. 154-156, in Poole, W.H., and Rodgers, J., Appalachian geotectonic elements of the Atlantic provinces and southern Quebec. XXIV Int. Geol. Cong., Montreal. Guidebook excursion A63-C63.

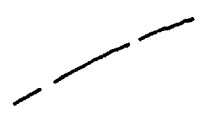
MAP SYMBOLS



Strike and dip of bedding



Strike and dip (unknown in a) of faults and shear zones



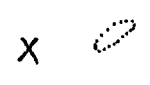
Geological contact



Adit

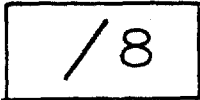
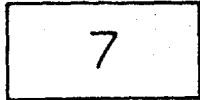

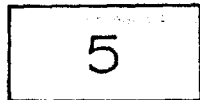
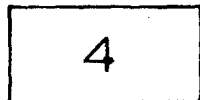
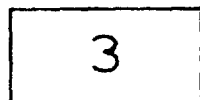
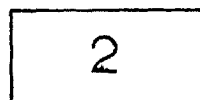
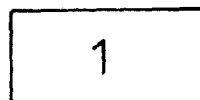


Mineralized outcrop



Outcrops (those along the sea shore from Quay Rock to Cap Gaspé and thence to the York River Formation-Indian Cove Member contact near cap Little Gaspé not shown as it is a continuous outcrop)

MAP LEGEND

Carboniferous		Intrusive dykes	
Lower Devonian	 943	York River Formation	Gaspe Limestones
	 919	Indian Cove Member	
	 918	Shiphead Member	
	 934	Forillon Member	
	 910	Cape Road Member	
	 922	Quay Rock Member	
Silurian and/or Devonian	 916	St. Leon Formation undifferentiated	