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PRELIMINARY REPORT ON CUOQ - LANGIS AREA, MATAPEDIA AND MATANE COUNTIES

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PRELIMINARY REPORT

ON

CUOQ - LANGIS AREA

MATAPÉDIA AND MATANE COUNTIES

BY

N. C. OLLERENSHAW



QUEBEC  
1961

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### INTRODUCTION

The Cuoq - Langis area includes approximately 425 square miles, and extends from Matapédia lake eastwards almost as far as Matane lake. As the Matapédia valley defines the westernmost boundary of Gaspé peninsula, the area lies at the western edge of Gaspé, in the northern half. Latitudes  $48^{\circ}30'$  and  $48^{\circ}45'$  and longitudes  $67^{\circ}00'$  and  $67^{\circ}30'$  delimit the main area. A small annex extends westwards at Matapédia lake.

Practically the whole of Cuoq township and parts of St-Denis, Tessier, Leclercq, Lagrange and Matane townships in Matane county, and parts of Blais, Casault, Langis and Lepage townships, as well as a section of Seigneurie du Lac Matapédia, all in Matapédia county, lie within the area mapped. Field work was completed during the summers of 1959 and 1960.

Amqui, located about three miles south of the southwest corner of the area, is the nearest town and is easily reached by the Montreal-Halifax line of the Canadian National Railways or by Provincial Highway 6. From Amqui a paved road extends northwards through the western half of the area, linking Amqui with Matane via the villages of St-Tharsicius, St-Vianney, Rivière-Matane and St-René-Goupil.

Settlement and agriculture are almost entirely restricted to the western half of the area (St-Vianney topographic sheet). This region is well served by gravel roads. The more rugged, forested eastern half (Cuoq topographic sheet) has more restricted but conveniently spaced access as follows:

- (a) Northeast - Hammermill road from St-Jean-de-Cherbourg passes Leclercq lake;
- (b) North centre - road system along the upper Matane River valley entered via Rivière-Matane at Dépôt-Jean;

- (c) South centre - road from St-Tharcisius to Martel lake;
- (d) South - International Paper Company - road from Causapscal to Casault lake.

Further access is limited to footpaths or rough truck roads.

The land surface is essentially a dissected upland, into which the rugged Shickshock mountains project southwestwards from the northeast corner of the area, ending fairly abruptly near the centre. Rocks similar to those in the western Shickshocks form lesser prominences which slope to extinction at Matapédia lake in the southwest corner. The Shickshock mountains slope southwestwards from maximum elevations of 2,900 feet to less than 1,600 feet. They are bounded by a small scarp slope on the north and by a large escarpment on the south with a maximum height of some 2,000 feet. Another small scarp parallels the major one four miles to the south. All the scarps diminish and die out westwards.

The upland suggests a rejuvenated peneplain with youthful valleys cut to depths of 400 to 500 feet below the general 1,200- to 1,600-foot level.

The main Gaspé watershed transects the area, curving to separate the Matane river on the north from the Causapscal river on the south, both of which flow from east to west across the area before curving, respectively, north to the St. Lawrence and south, via the Matapédia river, to Chaleurs bay. All lesser streams flow into one or other of these two rivers or into Matapédia lake.

In common with much of Gaspé, the drainage is complex, seldom consistent in its trend, and probably largely controlled by structure and lithology.

#### GENERAL GEOLOGY

The area lies towards the northeast end of the Appalachian mountain system. It has been affected by two general periods of deformation, namely, the Taconian (late Ordovician) and the Acadian (middle to late Devonian).

The area is neatly divided from northeast to southwest into two distinct units of Ordovician and Silurian-Devonian rocks, respectively, by a major fault. This fault is probably normal and downthrown to the southeast, and is of Acadian or later age.

The northerly unit consists of Ordovician or older strata including shales with quartzite and limestone conglomerate lenses, with a huge wedge of interlayered and interlensed sandstone (arkose and greywacke) and basic volcanics. This wedge exhibits interbedded contacts with the shale. All the units trend northeast. Three small outliers of Silurian sandstone rest with assumed unconformity on the Ordovician near the fault at the centre of the area.

The southerly unit comprises Silurian and Devonian siltstones, sandstones, limestones and minor shales, all relatively gently deformed and cut by at least one probably normal fault.

The Ordovician strata suggest an unstable environment, while the Silurian and Devonian reflect relative stability.

### ORDOVICIAN

#### Quebec Group

Strata attributed to the Quebec group form the bedrock over the centre and entire northwestern half of the area.

The predominant rock is a medium to dark grey phyllitic slate locally slightly calcareous and commonly possessing laminae or thin layers of light-coloured silt or sand. Thin beds or lenses of impure sandstone or limestone appear locally. Lesser quantities of red and green slates form scattered outcrops, usually without stratigraphic or structural significance, with the important exception of the wide belt (1a on map) which passes just south of St-René-Goupil. This unit contains little grey slate and displays remarkable persistence whilst conforming with the regional trend. These coloured slates have much in common with the Queenston shale of southern Ontario.

Thin-bedded, grey, impure limestones with slate layers form units up to 100 feet or more in thickness. The best exposure of this type occurs in a road cut on Highway 6, one-half mile northwest of Rivière-Matane. Minor calcarenitic beds occur in this outcrop. Here again, no continuity could be established along the strike.

In the northwest corner of the area, the slates are generally more coherent, and many are olive-green and colour-banded.

TABLE OF FORMATIONS

Time unit	Rock unit (thickness in feet)	Description
Pleistocene and Recent	-----	Gravel, till, boulders (erratics), sand and minor clay.
Lower Devonian	York River	Grey and greenish grey, impure sandstone and siltstone, with minor shale.
	Grande Grève (3,000 + ) ?	Grey, calcareous siltstone, silty or siliceous impure limestone.
	Cape Bon Ami	Grey, argillaceous limestone and calcareous siltstone.
Upper Silurian	St. Leon (5,000 + )	Greenish grey (rarely reddish), calcareous siltstones and sandstone; whitish sandstone; grey shale; limestone conglomerate; minor limestone and calcarenite.
	Sayabec (500 + )	Grey, fossiliferous limestone.
Ordovician- Silurian (?)	Val Brillant	White (red spotted) sandstone; minor dolomitic sandstone.
	Basal Conglomerate (?)	Fragments of Shickshock series in fossiliferous limestone matrix.
	UNCONFORMITY	
Ordovician	Shickshock Group (14,000 ± at Matapédia lake)	Greenish grey, rarely purplish sandstone (arkose); greenish grey impure sandstone (greywacke); minor grey and red slate; minor muscovite schist; rare cherty layers. Purplish and greenish grey basic volcanics, grading to greenish grey basic meta-volcanics.
	Quebec Group	Grey, red and green phyllitic slates; white quartzite and grey limestone conglomerate (Kamouraska facies); minor impure sandstone, impure limestone and calcarenite.

The Kamouraska facies, consisting of white quartzites and light grey limestone conglomerates, forms ribs and ridges within the slates. Although both quartzite and conglomerate are almost invariably associated, one or the other may predominate. At the village of Goupil, limestone conglomerate forms the bulk of the outcrop, whereas along Sableux brook there are only traces within the quartzite. At the latter locality the quartzite is bedded, which is unusual.

The Kamouraska occurs in lenses varying in size from a few feet in any direction to masses thousands of feet wide and many miles long. The existence within grey slate of large pebbles or cobbles identical to those occurring in the limestone conglomerate, and also thin interbeds of quartzite, confirm the stratigraphic position of the Kamouraska within the Quebec group, although field relationships suggest some tectonic detachment and gliding of the lenses.

In the present area the typical conglomerate consists of fragments of limestone and sandy limestone or calcareous sandstone set in a matrix of calcareous sandstone, sandy limestone or, rarely, calcarenite. The conglomerates contain variable proportions of rounded material and tabular fragments, and are possibly related to the Cowhead breccias of Newfoundland (Baird, 1960).

#### Shickshock Group

The Shickshock group trends southwest. The main, northeastern, mass underlying the Shickshock mountains is separated from a lesser wedge at Matapédia lake by a 9-mile strike interruption of Quebec group.

In the vicinity of Matapédia lake, the Shickshock group consists essentially of relatively unmetamorphosed volcanic rocks, and arkose, with the latter somewhat in excess.

The volcanics comprise purplish or greenish-grey basic flows, with locally conspicuous pillow structures (especially at Matapédia lake) and minor amounts of breccia. Epidote patches and veins are ubiquitous. Calcite and jasper occur in places between the pillows. Scattered laths of plagioclase may be seen on some weathered surfaces. Vesicles are abundant in many places. Commonly the volcanic zones are 200 to 300 feet thick, with some of 60 feet or less and one of 750 feet. Individual flows were not differentiated.

The arkose is light to medium greenish grey, occasionally purplish, and weathers pale. It is composed of angular, coarse, poorly sorted quartz, and pink and white feldspar with scattered pebbles and, locally, pebble conglomerate layers. Cross-bedding is rare. Red silty slate forms rare interbeds, several

inches thick, and small tabular fragments of this slate are common in the arkose. A few thin-bedded mudstones and sandstones also occur. The whole sequence interfingers and interlenses with the Quebec group.

In the Shickshock mountains, similar rocks occur at the western end and along the north front, thinning out towards Leclercq lake. Eastwards and southwards the sedimentaries change, becoming more variable in grain size, more impure, and darker green. They commonly include medium to dark greenish grey fine sandstones and siltstones of greywacke type, locally studded with coarse pink feldspar. Towards the east centre of the Shickshocks, schistose muscovite-bearing rocks occur, especially in the vicinity of Duvivier brook.

Correspondingly, the volcanics increase in proportion and grade of metamorphism eastwards and southwards in the Shickshock range. The transition occurs approximately from the vicinity of Mius lake eastwards and from south of Leclercq lake. The change is from the Matapédia lake types into medium to dark greenish grey types in which the epidote content increases, original texture is obliterated, and orientation and recrystallization are progressively increased until, in the southeast, the rocks have a pronounced, if imperfect, schistosity. Metamorphism is low, and the rocks essentially belong to the greenschist facies.

The thickness of the Shickshock Group at Matapédia lake is estimated to be about 14,000 feet; it is probably much more in the Shickshock mountains.

### SILURIAN

#### Basal Conglomerate ?

The possibility of a local basal conglomerate was first suggested by J. Béland\* after the discovery of several large boulders on the southern shores of Matapédia lake and on one of the islands. No outcrops of this conglomerate have been seen.

Essentially, the conglomerate consists of well rounded pebbles to small boulders of Shickshock series' rocks, closely set in a fossiliferous limestone matrix.

#### Val Brillant Formation

Several outliers of Val Brillant occur south of Matane river, both east and west of the Tamagodi river. Lesser exposures occur in the faulted centre of the anticline a mile or so north-east of St-Tharsicius. Differences in inclination suggest that the Val Brillant is unconformable on the Ordovician, although the actual unconformity was not seen.

\* Personal communication.

The Val Brilliant in this area is a white sandstone, commonly with red spots or streaks. It is composed almost entirely of quartz, more or less cemented by silica. Locally, it is slightly calcareous and there are traces of hematite. Some pale brown dolomitic beds were noted. Grain size varies from fine to very coarse with, in places, scattered pebbles. Bedding is marked by separation rather than differentiation and by variations in grain size. Layers range in thickness from several inches to thin laminae. The latter, in some places, show rhythmic recurrence over intervals of several feet. There is considerable evidence of penecontemporaneous deformation. Fossils found in several outcrops include gastropods, brachiopods, corals, stromatoporoids (*S. Constellata*) and worm tracks and burrows.

#### Sayabec Formation

The Sayabec formation is restricted in this area to a few outcrops on Tamagodi river, just northeast of St-Tharsicius. It consists of a medium grey, fossiliferous, impure limestone, with thin, generally wavy bedding, and silty layers that increase in number upwards. Fragments of fossils and scattered, coarse crystals of calcite stand out against the finer background. Fossils include corals, brachiopods, gastropods and crinoids.

#### St-Léon Formation

The St-Leon formation extends from the centre of the St-Tharsicius anticline northeastwards, passing along the south side of the Shickshock mountains and thinning eastwards from a maximum of about two miles near Cajettan brook to half a mile at La Truite river.

Another small area of St-Leon occurs south of Matapédia lake<sup>x</sup>.

The bulk of the St-Leon formation consists of light to medium greenish grey or grey (rarely reddish), calcareous siltstones and sandstones. Shales, minor limestone, and a little intraformational limestone conglomerate are also included.

In general, the beds are only a few inches thick, with thicker beds (a few feet at most) at irregular intervals. Shale layers may be only a fraction of an inch thick. Rhythmic alternation of shale and siltstone is common. Siltstone and sandstone beds are frequently laminated. Fine flakes of muscovite are commonly scattered on surfaces of separation. Slumping, small scale crossbedding, ripple marks, load casts and the repetition of coarser and finer beds suggest the possibility of turbidity current deposition. This is supported by the graptolite fauna of several flaggy or fissile beds, indicating relatively deep water deposition.

<sup>x</sup> Considered to be Cape Bon Ami by Béland (1960).

Along Matane river, south of the Shickshock mountains, the St-Leon formation has been converted into a fault breccia, visible in a number of outcrops on the south side of the river. Fragments are generally angular, but may be rounded and consist of the competent St-Leon siltstone and sandstone set in a shale matrix. The breccia weathers readily to loose soil giving the appearance of a loose surface deposit from a distance.

The St-Leon is estimated to be more than 5,000 feet thick in the section on Tamagodi river.

### LOWER DEVONIAN

#### Cape Bon Ami Formation

The Cape Bon Ami formation occupies a band from half a mile to 3 miles wide trending northeast across the southern part of the area. The band is narrowed by faults north of Amélie lake and widened by folds along La Truite river.

The formation is usually a medium to dark grey, pale yellowish brown weathering, very fine, argillaceous limestone, more or less silty and generally well cleaved. Bedding is not conspicuous and appears to be restricted to laminae, frequently visible on the weathered surfaces, or to fossil distribution.

Fossils are common, but seldom occur in any abundance. They are mainly brachiopods, with a few pelecypods and cephalopods.

The lower contact appears to be a conformable and probably gradational one with beds similar to the Cape Bon Ami appearing in the upper St-Leon. The best exposure of the contact zone is on La Truite river, a half mile upstream from Matane river, although the critical hundred feet of actual contact are absent.

The upper contact with the Grande Grève formation cannot be accurately defined and is probably mainly a fault. However, the two formations are very similar in the Cuoq - Langis area, the Grande Grève being only generally more silty and siliceous than the Cape Bon Ami. Deposition was almost certainly continuous between the two.

The 100 feet of dark grey, non-calcareous siltstone, near the top of the formation in the Causapschal area to the south (Stearn, 1959), appears to be absent.

### Grande Grève Formation

This formation forms a belt south of, and mainly parallel to, the Cape Bon Ami.

In this area, the Grande Grève is usually a medium grey, hard, often flinty, calcareous siltstone, with no clear bedding other than occasional lamination. Cleavage is conspicuous but less pronounced than in the Cape Bon Ami. The only fossils noted were rare, imperfect brachiopod shells.

Differentiation from the Cape Bon Ami is often difficult, as some horizons are silty, argillaceous limestone of the latter type, or intermediate varieties. This is especially true around Matapédia lake.

It is interesting to note the concentration of small lakes over the Grande Grève and their scarcity over the Cape Bon Ami.

The Grande Grève grades into the York River through a zone in which numerous thin, lighter coloured lenses of fine sand appear. This zone is probably several hundred feet thick. The actual contact between the two formations is drawn at the first appearance of the sandstone proper, although there are horizons of Grande Grève type above this contact. A major interbed is shown on the accompanying map as "7". These interbeds are subtly different from the Grande Grève proper, notably in an increased fossil content.

### York River Formation

A broad zone of York River extends westward into the area in the large syncline centred on Casault lake, in the southeast. The best exposures are along Causapscal river, where there are frequent cliff-like sections of up to 130 feet of strata. A smaller occurrence is represented by outcrops along the Soucy Company road just east of the south end of Matapédia lake.

The York River consists of interbedded light medium to medium grey or greenish grey, fine- to very fine-grained impure sandstones and siltstones with some shale. Most of these rocks are at least slightly calcareous. Muscovite flakes are common on surfaces of separation. The coarser sandstones are commonly feldspathic.

The beds are variable in thickness. Cleavage is pronounced in the finer, more impure material but absent in the massive beds, where closely spaced joints commonly take its place.

Shallow water deposition is indicated by fossils, ripple marks and occasional crossbedding. Ripple marks suggest currents from the southeast.

Marine fossils occur as individuals scattered through several feet of strata or as layers several inches thick. Brachiopods, trilobites, pelecypods, corals, cephalopods and crinoids are represented. Carbonized, lath-shaped organic remains, probably of plant origin, occur as mats on some bedding surfaces or thinly scattered through parts of the rock.

Important quantities of siltstone of Grande Grève affinity occur in a belt passing northeast to southwest through the vicinity of Frenette lake.

Only a few thousand feet of York River are found in the Cuoq - Langis area, although 10,000 to 14,000 feet have been estimated in this region by other workers (Stearn, 1959, and Béland, 1960).

#### PLEISTOCENE AND RECENT

Minor evidences indicate movement of ice across the Cuoq - Langis area and light deposition. Erratics from the Precambrian north of the St. Lawrence are abundant. There is little evidence of erosion.

Glacial striae are common only on the volcanics of Matapédia lake. In general, these indicate movement of ice from northwest to southeast. In one outcrop, however, small amygdules display a crag-and-tail effect that indicates movement of ice towards the northwest.

Till deposits are common along the valley of Matane river; they also occur along several of its tributaries.

Glaciofluvial gravels are common along the Matane River valley and at other scattered localities. Gravelly deposits form gently undulating kame to drumlinoid features at the southeast end of Matapédia lake.

Thinly bedded, light grey clays with fine sand partings, form sections several feet thick at one or two places along tributaries of Matane river.

Flood plain sands and gravels are widespread along the valley floor of Matane river.

Several mudflow avalanches have produced conspicuous scars on the steep slopes of the Shickshocks from Duvivier brook eastward.

## STRUCTURAL GEOLOGY

### Faults

A major fault of unknown displacement trends with some sinuosity at about N. 60° - 70° E. across the area, dividing it into two unequal halves of different age and lithology, essentially Ordovician to the northwest and Silurian-Devonian to the southeast. This fault continues many miles eastwards along the south front of the Shickshock mountains (Mattinson, MS.) and southwestwards along the north front of the "Notre Dame" mountains (Béland, 1960). The attitude of the fault is obscure but it probably dips steeply to the south and downthrows normally in that direction. The fault is here named the "Shickshock Fault". In the vicinity of Matapédia lake, juxtaposition and attitude of the strata suggest that subsidiary faults, possibly splays of the major fracture, exist. Two minor normal faults, trending north, are introduced to explain the offset of Val Brillant outcrops northeast of St-Tharsicius. It is possible that another branch of the main fault extends westwards along Matane river, across the end of the Shickshock range.

A lesser fault, sub-parallel to the major one above, is inferred from the scarp and drainage pattern through Chandler lake, about three miles south of the Shickshocks, and from the thinning of the Cape Bon Ami formation north of Amélie lake.

Similarly, a strong linear on the northwest front of the western end of the Shickshock mountains is interpreted as a fault.

Finally, in the Quebec group, a fault zone trending northeast has produced shear, displacement and many calcite veins from Petite Matane river across to Johnson brook, where it truncates a wide zone of Kamouraska facies.

### Folds

Quebec Group: Lack of good marker horizons, the variability and inconsistency of beds, and the abundance of small faults, make it difficult to assess major fold structures within this group. Small folds appear to be common, judging from changes in dip, but they cannot be traced far along the strike.

The Kamouraska facies, although distinctive and competent, does not facilitate interpretation of structure. It appears to have been deposited as lenses of variable lateral and vertical distribution and size, which have been detached somewhat from their original stratigraphic positions during deformation.

Cleavage is commonly parallel to bedding and is usually steeply inclined and closely spaced. Random deviations from the northeasterly regional trend were noted in many places.

Shickshock Group: The overall structure of the group or formation in this area is interpreted as a large lens within the Quebec group. Where exposed, it dips at medium to high angles towards the southeast. It is depressed out of view by a broad, shallow, cross-fold trending northwest across the centre of the area. At Matapédia lake, the rocks of this group apparently interfinger with rocks of the Quebec group and, since the sedimentary and volcanic rocks of the Shickshock group are themselves interlensed, lithological contacts bear no necessary or obvious relationship to fold axes.

Only two important subsidiary structures were remarked in the Shickshock group, both in the northeastern part and consisting of a syncline in the north and an anticline in the south. Both of these structures seem to die out to the southwest.

The slate zone penetrating the western end of the Shickshock range is attributed to interfingering, not to folding.

The plunge of a variety of lineations at the western end of the Shickshock range averages about  $18^{\circ}$  in a direction S.  $40^{\circ}$  W., whereas corresponding lineation at Matapédia lake averages  $26^{\circ}$  towards N.  $70^{\circ}$  E., indicating the downwarp between.

Silurian-Devonian: The main structure in the Silurian-Devonian block is the broad, shallow syncline at the southeastern corner of the area. In the absence of adequate control, the axis of this syncline has not been shown on the map, but from evidence in the Causapsal area to the south, it can be inferred to enter the present area approximately at Casault lake and to extend across the flat-lying, swampy areas in the southeast corner at about N.  $75^{\circ}$  E. The topography is probably the expression of nearly horizontal beds.

Westwards, the Casault Lake syncline passes into smaller folds on a different trend. An anticlinal axis runs through St-Tharsicius towards N.  $36^{\circ}$  E. to be cut off abruptly by the Shickshock fault. This anticline plunges towards the southwest.

Westwards the anticline is followed by a small, shallow syncline. Preservation of some York River strata in the core of this syncline on the northeast side of the Matapédia valley is attributed to the same cross-flexure which disturbs the continuity of the Amqui - St-Tharsicius anticlinal trend.

#### Cleavage

Cleavage in the Ordovician is generally parallel to the bedding and mainly inclined at medium to high angles. Except for the schistosity in the southeastern part of the Shickshock range, cleavage is not clearly developed in most of the Shickshock group.

A near-vertical fracture cleavage, with a regional rather than a local allegiance, cuts the Silurian-Devonian sequence and strikes N. 35°-60° E.

### Gravity and Structure

Gravity measurements in the Gaspé by Tanner and Uffen (1960) show a positive gravity anomaly over the Shickshock mountains. Isostatic relationships, according to these authors, suggest that the Shickshocks have no roots. They invoke a horst structure as a possibility.

## ECONOMIC GEOLOGY

### Metals

No evidence of significant metallic mineralization was found in the area. A few shallow prospect pits at the western end of the Shickshock mountains show some pyrite. This is in an undivided part of Cuoq township, about 9,000 feet by road east of Dépôt-Jean.

### Petroleum

A fragment of St-Leon siltstone from the fault breccia and a dark grey sandstone of the same formation, both occurring along the Matane river, south of the Shickshocks, revealed one or two globules of a light, yellowish oil. Also, many freshly broken surfaces of Cape Bon Ami limestone give off a petroliferous odour.

### Silica

Some of the Kamouraska quartzite exposed along Sableux brook (Langis township: ranges IV and V: lots 5-10); Bastien brook (Matane township: ranges XII and XIII; and some Val Brillant sandstone (Blais township: range IV: lots 45-47) may be suitable for silica extraction.

### Gravel

Gravel deposits suitable for road ballast are common along the Matane River valley and east of Matapédia lake, and many of them are being exploited.

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