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PREFACE

Le Comité de Nomenclature géologique du Québec a décidé de rendre disponible une première liste provisoire des noms stratigraphiques du Québec.

Cette liste provient essentiellement d'un travail exécuté, en 1970, par le Dr. F.F. Osborne, à la demande du Ministère des Richesses naturelles du Québec. Elle ne représente qu'une ébauche qui servira de document de base pour l'établissement de listes subséquentes, plus complètes, qui seront mises annuellement à la disposition du public.

De récents tableaux de formations ont été ajoutés au travail original afin d'en faciliter sa compréhension et son utilisation.

Cette liste provisoire est présentée dans la langue de l'auteur mais à l'avenir un lexique bilingue sera distribué aussitôt qu'il sera disponible.

Février, 1975

Yvon Globensky
Comité de Nomenclature Géologique
du Québec.

A geological lexicon of proper names in Quebec

F. Fitz Osborne

The purpose of this work is to provide a lexicon of the proper names used to designate rock units and some other geological features in Quebec. Some of the names are here described in terms similar to or identical with those of the original proposer of the name. For others, however, a more critical discussion is presented, and several usages are compared. It is suggested that some names are not useful and should be abandoned. No effort has been made to cite all references to a name, but the compiler has made an effort to give representative mentions with a choice of places of citation in order that a reference may be available although the collection of material on Quebec geology be incomplete.

Unlike many such compilations, the references belonging to an entry are here given completely to include the title of an article. This has made it possible to use direct quotations or slight modifications of them to refer to a feature. "This area" or similar phrase should be understood to refer to the area mentioned in the title of the citation. Two exceptions are to be noted. "Geology of Canada (1863)" is used as an abbreviated reference to the 1000 page compendium of the geology of Quebec and Ontario. Similarly, "Geology of Quebec (1944)" refers to vol. II, of G.R. 20 of the Quebec Department of Mines.

Most of the entries concern folds, faults, or formations in Quebec, but a few names were first applied in nearby provinces or states. For example, the names used for the principal divisions of the rocks of St. Lawrence Lowlands, derive from localities in New York and are listed here, but for a critical discussion of them the reader must look in other publications such as U.S.G.S. Bulletin 896 or in the correlation charts of the Geological Society of America. Names belonging to standard sections in Europe are mentioned in references to some Phanerozoic units, but such names do not appear as headings for separate entries.

During the research for the preparation of the lexicon, it was found that the same name had been used for different features in adjacent map areas or regions, but more commonly different names have been used by different authors for one features in the same or nearby areas. Folds and faults pose a problem particularly where an area has sparse exposure. How is an "inferred fault" correlated with an "assumed fault"? It is obvious that many such names have only nonce status, but this is not obvious in many references.

It has not proved possible to recognize all nonce names even for stratigraphic units, and it is probable that some such names have been given the status of formations. Some names are indicated as "nonce names", and others of somewhat similar status are recommended "only for local use".

Many of the names in this lexicon are those of stratigraphic units, and some of these are a century or more old. Old names were not subject to the restrictions that have been more recently recommended. Logan, for example, was able to refer to the same rocks as a formation, group, series, and system. It is logical to believe that the first three terms were used informally and in their standard and dictionary meaning rather than as technical designations. In 1901, following the principles of 1881, a committee of the International Congress suggested a scheme involving, for rocks, zone, stage, series, system but with series reserved for rocks belonging to an epoch. Since 1901, many variants of the scheme have been proposed both at several times and in various countries, where standing committees report periodically. The suggestions usually formulated as a code are inconsistent and contradictory if several codes be compared, however, bed, lentil, member, formation, group, supergroup, system are commonly recognized as lithostratigraphic units in English speaking countries with in some codes series or sub-series included. If usage in some other countries including France be compared with the foregoing even wider diversities can be seen. A charge of misuse of a term such as "series" for "group" implies only a departure from an arbitrary usage.

The codes have been strongly influenced by their architects, who in many instances have been palaeontologists, despite the fact that stratigraphy can be independent of palaeontology. The experience with well defined rock units with indentifiable fossils has determined to a considerable extent the framework or philosophy of classification.

Thus biostratigraphy has been given unmerited weight in stratigraphic classification. A paper, which was published in U.S.A. in 1956 had the title "Paleontology, basis of practical geochronology," deplores the use of the term "biostratigraphy" and states "so-called stratigraphical nomenclature now in vogue is confused and over-refined". The workers in Pleistocene geology were particularly incensed with some proposed rules in the American code, and, after discussions, some modifications of the code were to be allowed for Pleistocene stratigraphy.

The application of the code to Precambrian rocks has been suggested, but this application is beset by some difficulties despite the fact that biostratigraphy is not a complication. The principal difficulty arises because of the great duration of Precambrian as compared with Phanerozoic time. It is not impossible that a Precambrian epoch, if such were recognized, would exceed a Phanerozoic era in duration. Most stratigraphers have but little interest in metamorphic and pyrogenic rocks, and hence most codes dismiss such rocks summarily with a statement that the same principles should be applied in Phanerozoic and Precambrian rocks.

Taking into account the factors involved in Quebec geology including the predominance of Precambrian rocks, the difference in use of terms in France and in English speaking countries, and the long use of some names, it is reasonable to conclude that the provisions of the code are of restricted usefulness and some of them can be disregarded. Consideration of the geology of Quebec lead to the conclusion that some system is desirable, but the over refinements of the code make its application unrealistic.

The literature of Quebec shows examples of unhappy use of proper names. Various causes can be assigned. One of the most common errors is a result of disregarding names used earlier for a unit, another is the failure to determine the limits of an earlier name. Finally for Phanerozoic rocks there is confusion between time and rock terms.

With the preponderance of Precambrian and other metamorphic rocks, in Quebec, it is essential that most mapped units be lithological, that is the rock stratigraphic units are of paramount significance. The basic unit is the formation which is defined stratigraphically as a mappable and distinctive lithologic unit. Unfortunately what is meant by lithology or at least the standards of precision in the use of names are not specified. One can cite a formation bearing the name grit, but the rocks are siltstones, some limestones are calcareous siltstones. Even more obvious errors are formations which are referred to as sandstones and are found to be tuff. However, such an error in no way invalidates the formation name of the unit.

In a measure some confusion can be avoided by using a proper name together with a term denoting a textural peculiarity or the geological mode of occurrence. Thus one could use names such as; plutonites, stock, boss, batholith, massif, gneiss, pluton, or as a last resort rock or rocks. Such a practice can be applied to higher stratigraphic units. Series, for example, is used fairly commonly in igneous petrology, and the name cannot logically be eliminated despite a dictum in any code.

It is suggested that in Quebec, rock stratigraphic names are the serviceable ones and that bed, lentil, member, formation, group, super-group, series, system be used. In some codes the rocks belonging to an epoch are defined as a series. There is no reason why the converse should be accepted especially for Precambrian rocks.

Some mappable units do not fit into the above category. "Sequence" is one such unit for which various formal uses have been proposed but not accepted. It is a term that should be used sparingly if at all. "Complex" is another term. It can be used for a unit with such diversity of bedded units that interpretation is difficult. It can be used for a mappable unit consisting of sedimentary or metamorphic rocks with in-truded rocks or for a unit of great structural complexity. Some units can be referred to as olistostrome, mélange, or chaos depending on their origin. Like "sequence" and "complex" these names should be used only with adequate explanation of the user's meaning.

The rise since 1950 of methods of using isotope ratios in minerals and rocks has led to several changes in the philosophy of correlation particularly for Precambrian rocks. Unfortunately the "numbers", a term used half disparagingly to designate the age in years, are subject to adjustment and diverse interpretations. However, time.stratigraphic or chronostratigraphic schemes have been evolved. Such schemes suffer from the weakness that the dates are likely to be of "an event" whose nature is not certainly known but is in many instances assumed to be an orogeny. Using these dates as a framework a classification of lithologic, _viz_. lithostratigraphic units is built up. As a result a scheme is arrived at that is essentially similar to the schemes in use, in Canada for half a century. It is difficult to see how "Aphebian" is preferable to "Early Proterozoic" as a time term.

Geological Survey of Canada Map 4, 1965, bears the title "Tectonic Map of the Canadian Shield" but has the time stratigraphic table of 64-17 report by Stockwell which he uses to classify some lithostratigraphic units. The principal emphasis on the map is on rocks affected by different orogenies. The map is based on principles very similar to those used by A. Holmes, and Allen and Reedman have proposed "Orogenic belts" and "orogenic assemblages" for the rock units involved. These terms are part of a tectonostratigraphic classification. The introduction of these terms can cause confusion, and until the interpretation is clarified their use should be avoided.

Stratigraphic classification in Pre-Cambrian rocks

P. M. Allen & A. J. Reedman

SUMMARY. The system of stratigraphic classification used by field geologists working in Africa is briefly reviewed and a hierarchy of terms is suggested, taking into account the requirements of those interested in local field problems and those concerned with the tectonics and composition of the African continent as a whole. On the local scale, rock units are best named according to the lithostratigraphic classification. On a regional scale, the criteria for defining rock units are essentially tectonostratigraphic and two new terms for them, in ascending order of magnitude, *Orogenic Assemblage* and *Orogenic Complex*, are proposed. The two schemes are united through the *Sequence*, which can contain any number of lithostratigraphic units of any order of magnitude.

1. Introduction

In recent years stratigraphic nomenclature has been considerably revised, culminating in the adoption of a new stratigraphic code at the 21st International Geological Congress, Copenhagen, 1960, which was accepted by members of the Sub-commission from all the participating countries except the Soviet Union, Germany and South Africa. The code defines three hierarchies of rock units ; lithostratigraphic, biostratigraphic and chronostratigraphic and a hierarchy of time units (see Table I.)

TABLE I.

Stratigraphic Scheme	Formal Units
Chronostratigraphic Classification	Erathem System Series Stage Substage
Lithostratigraphic Classification	Supergroup Group Formation Member Bed
Biostratigraphic Classification	Assemblage zone Range zone

Most of the principles upon which the code is based evolved from studies by geologists concerned with the stratigraphy of Phanerozoic strata, and it is pertinent to consider how far the code is applicable to the subdivision of Pre-Cambrian strata, which are frequently highly deformed and metamorphosed and, furthermore, are generally unfossiliferous. In this paper the development of ideas and techniques in the stratigraphic subdivision of African Pre-Cambrian

[Geol. Mag. Vol. 105, No. 3, 1968, pp. 290–297.]

terrains and the relevance of the stratigraphic code to such problems is examined. Some proposals are made for a revised terminology.

2. Stratigraphic terminology currently in use for the Pre-Cambrian of Africa and its relation to the stratigraphic code

Cahen & Snelling (1966) recently discussed the methods used in the stratigraphic classification of Pre-Cambrian strata and the problem of stratigraphic terminology. They pointed out that the paucity of organic remains in Pre-Cambrian rocks usually excludes the possibility of dividing the rocks into biostratigraphic units or of tracing time-parallel surfaces by palaeontological correlation—the principal method for establishing the inter-regional identity of chronostratigraphic units in Phanerozoic strata. Eventually, they suggested, age determinations using radio-active isotopes may form the basis for a chronostratigraphic classification of the Pre-Cambrian, but to the field geologist in Africa the most useful scheme for classification is a naturalistic one, using lithostratigraphic criteria on a local scale and tectonostratigraphic criteria on a regional and international scale.

The stratigraphic terminology adopted by early workers in the subdivision of Pre-Cambrian rocks over much of Africa has become, since the acceptance of the Stratigraphic Code of 1961, inappropriate to the stratigraphic units it describes. The pioneer workers on many of the African Geological Surveys found that the territories with which they were concerned were underlain by high-grade metamorphic rocks, intrusive rocks and areas of less highly metamorphosed and deformed sedimentary and volcanic rocks. The high-grade metamorphic rocks were assumed to be " Archaean " and were often named the Basement Complex (e.g. Somalia, Nigeria, Rhodesia, Uganda), Basement System (Kenya) or Primitive System (Southern Africa). The less metamorphosed strata were subdivided on the basis of their unconformable relationship with the " Basement Complex ", their contrasting lithologies, their degree of metamorphism and discontinuity of outcrop. In most places the units recognized were named according to the nomenclature proposed at the International Geological Congress at Bologna (1881), the terms System, Series and Stage being adopted. With systematic mapping, areas of structural and metamorphic contrast within the high grade metamorphic terrains were recognized, and the Basement Complexes were subdivided. For example, the Basement Complex of Tanzania was renamed, in part, the Dodoma System, and in Sierra Leone the Kasila System was identified. In French-speaking territories a similar hierarchy of terms was applied.

The chronostratographic terms System, Series and Stage have often been used in Africa for heterogeneous, and sometimes diachronous groups of strata. Series and Stages were usually erected using lithological criteria and should, therefore, be renamed according to the lithostratigraphic hierarchy of terms, Supergroup, Group, Formation, Member and Bed. Larger units, however, have been recognized using criteria which are not strictly lithostratigraphic, but according to Cahen & Snelling (1966) are more correctly defined at tectono-stratigraphic. These units, which include most of the " Systems " in the African Pre-Cambrian, are usually bounded by major unconformities. Cahen & Snelling (1966) find it convenient to drop the term " System " for these tectonostratigraphic units and to add the suffix " an " to a local name. For example, they refer to the Karagwe Ankole System of Uganda as the Karagwe-Ankolean.

Unconformities have always been regarded as important boundaries of rock strata. In Britain and western Europe, Phanerozoic rocks were divided initially into Systems bounded by unconformities, but when the Catastrophists' theory that unconformities were world-wide was shown, by means of the correlation of fossiliferous strata, to be incorrect, these internationally accepted Systems ceased to be natural groupings of strata except in their type areas, but were retained as fundamental chronostratigraphic units. The role of the unconformity in the definition of formal stratigraphic units then became somewhat uncertain, but subsequent work by Sloss, Krumbein & Dapples (1949), Wheeler (1958, 1959), Sloss (1963) and others has served to clarify its position and it was due to Wheeler (1958) that the body of strata bounded above and below by unconformities was defined as a *Sequence*. Wheeler's (1959) thesis is that the *Sequence* is a natural rock unit independent of the lithostratigraphic, chronostratigraphic or biostratigraphic classifications, though it is generally divisible into a number of lithostratigraphic units which may consist of anything from a single Formation to a number of Groups. In Pre-Cambrian rocks it is the most widely mapped unit, for in Africa most " Systems " that have been defined conform to this definition of a *Sequence*, and according to Sloss (1963) so also do the " Series " in the Pre-Cambrian of North America.

3. Regional subdivision of Pre-Cambrian terrains

The most successful schemes used in the large-scale subdivision of African Pre-Cambrian terrains are those based on the work of Holmes (1951), who outlined and applied a two-part method for attacking the problems of Pre-Cambrian sequence and correlation in southern and central Africa. His method consisted of :—

(i) Subdivision of the Pre-Cambrian terrain into a number of orogenic belts, each the product of an orogenic cycle. The sequence of the cycles was determined at intersections of belts.

(ii) Dating of these cycles by age determinations using radioactive isotopes.

Holmes took his inspiration from Sederholm, who believed that mountain-building in Archaean times was a cyclic phenomenon restricted on each occasion to long, relatively narrow zones of the crust. Thus, all Pre-Cambrian terrains have an ingrained pattern of successive orogenic belts, and each continent appears to be an integration of many such belts. Holmes was able to divide the Pre-Cambrian outcrops of southern and central Africa into a large number of orogenic belts (Fig. 1), each of which is characterized by its internal structural conformity. Subsequent work by many geologists including Quennell & Haldemann (1961), Harpum (1961), Nicolaysen (1962) and Cahen & Snelling (1966), has proved the utility of Holmes' method and provided more detailed information on the extent of many of the orogenic belts defined.

In applying the concept of the orogenic belt as the product of an orogenic cycle to the subdivision of Pre-Cambrian terrains it is suggested that two new stratigraphical terms are required. The suggested terms are the *Orogenic Complex* and the *Orogenic Assemblage*, defined as follows :—

> The *Orogenic Complex* consists, with the exception of the post-orogenic intrusive rocks, of the complete suite of rocks of the orogenic belt.
>
> The *Orogenic Assemblage* consists of the pre-orogenic, syn-orogenic and post-orogenic sedimentary and volcanic rocks produced during a single orogenic cycle.

Ideally the orogenic belt contains the variously metamorphosed and folded sedimentary and volcanic rocks which filled the geosyncline, the syn-orogenic intrusive and granitized rocks, the post-orogenic sediments derived from the rising mountain chain and the refoliated basement of the geosyncline. All of these units grouped together constitute the *Orogenic Complex*. In areas of deep erosion the only element of the belt remaining may be the refoliated basement, which itself may be part of an *Orogenic Complex* formed during an earlier orogenic cycle.

All the sedimentary and volcanic rocks formed during a single orogenic cycle are assigned to the *Orogenic Assemblage* which is, therefore, a part of the *Orogenic Complex*. Both the debris which accumulated in the geosyncline prior to orogenesis, and the fluvial molasse formed at the end of orogenesis by the erosion and weathering of the folded and metamorphosed geosynclinal rocks, are included in *Orogenic Assemblage*.

The terms " Assemblage " and " Complex " in ascending order of magnitude were proposed first as lithostratigraphic units greater than Group by Rodgers & McConnell (1959), but they were accepted by neither the American Commission of Stratigraphic Nomenclature nor the International Subcommittee on Stratigraphic Terminology. Instead, the term Supergroup was accepted as the only lithostratigraphic unit larger than Group by the American Commission, and later gained international favour (e.g. Stratigraphical Code Sub-Committee, Geological Society of London, 1967, p. 80). Complex, however, was accepted in another sense by the American Commission of Stratigraphic Nomenclature of 1961 and defined as a " mass of rock . . . composed of diverse types of any class or classes or . . . characterized by highly complicated structure . . .". The term can be used for groups of volcanic rocks and intrusive igneous rocks as well

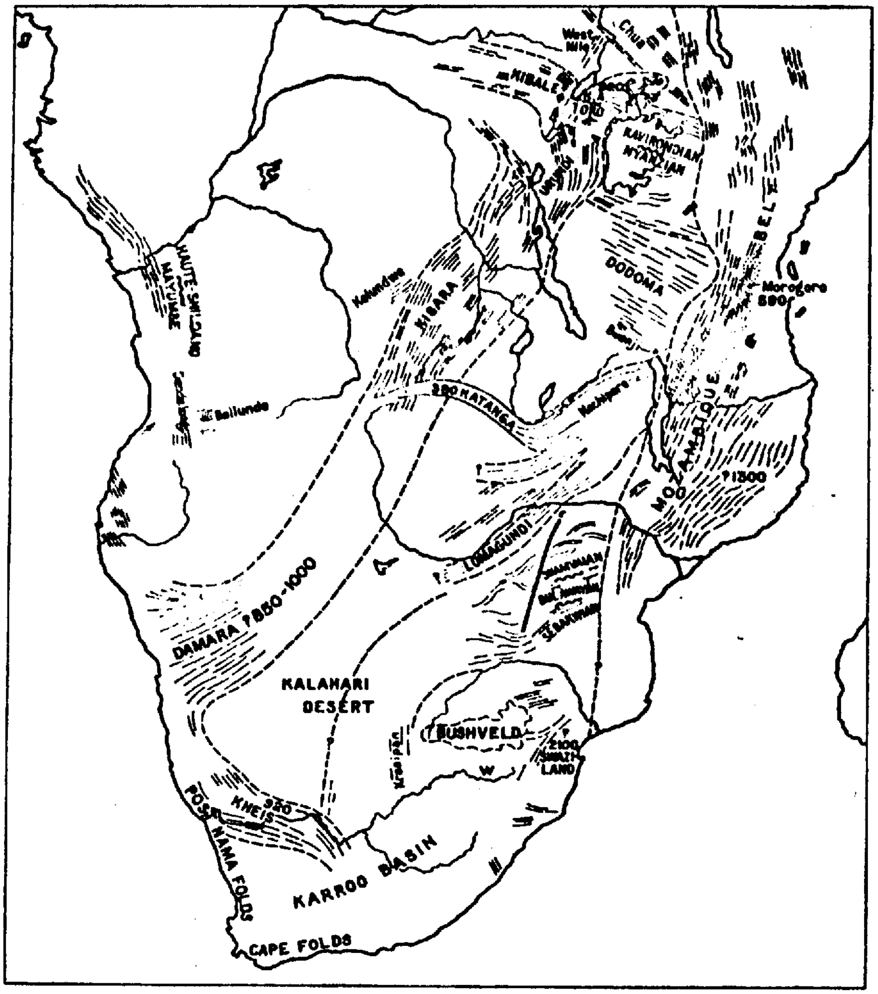

FIG. 1.—Provisional map of Pre-Cambrian orogenic belts in south and central Africa. Taken from Holmes (1951). The figures represent the ages of radioactive minerals in millions of years. K.A. = Karagwe-Ankolean. W = Witwatersrand.
Correction : Nachipere (NE end of L. Nyasa) should be Mafingi. The Nachipere rocks are south of L. Nyasa.

as metamorphic rocks : thus one can refer to the Scottish Tertiary Volcanic Complex, the Bushveld Complex, or, in Anglesey, the Mona Complex. The definition also fits the requirements of a unit composed of all the rocks in an orogen, but in order to avoid ambiguity the term can be qualified to *Orogenic Complex*. It is clear from its definition that the term *Orogenic Complex* unites diverse classes of rocks with gross structural conformity. For this reason it is considered that post-orogenic intrusives, which are often geographically within the orogenic belt, but structurally discordant, cannot be included in the *Orogenic Complex*.

Orogenic Assemblage is a conceptual term, depending, for its application, on the recognition of an orogenic belt and the identification of sedimentary and volcanic material formed in the orogenic zone during a specific cycle. The lateral limits of the *Orogenic Assemblage* may be difficult to define. For example, in orogens which have not been reduced by erosion it is possible to trace formations in the orogen laterally into the foreland, a good example of this being the so called " Katangan " (Cahen & Snelling, 1966). In such a case it is not possible to be precise about the lateral limit of an *Orogenic Assemblage* : it might coincide with a sedimentary facies change and thus be at the boundary between two purely lithostratigraphic units, or it might coincide with the limit of folding. In more deeply eroded belts where the remnants of the *Orogenic Assemblage* are likely to be highly metamorphosed and deformed it is not always possible to trace the strata onto the foreland, and the lateral limits of it have to be confined either to the limits of outcrop or to structural discontinuities.

The rocks deposited on the stable cratons are not included in the *Orogenic Assemblage*. Any craton is built up of the orogenic belts of previous eras ; the sediments laid down upon it may subsequently form the floor of a geosyncline and be incorporated into an *Orogenic Complex*. They will not, however, properly form a part of the *Orogenic Assemblage*. Many of the ancient cratons, however, have remained relatively stable to the present day and the sediments deposited upon them during their long period of stability remain as scattered tabular successions, the older successions frequently being covered by a blanket of more recent sediments. The cratonic successions can be subdivided into lithostratigraphic units and often into *Sequences* and should be named accordingly.

The *Orogenic Assemblage* is defined so as to include both the pre-orogenic and post-orogenic sediments of a particular cycle. Detailed sedimentological and geochronological studies may be necessary in order to recognize the post-orogenic sediments of a particular cycle, but where this is possible the *Orogenic Assemblage* will contain at least two *Sequences*. The lateral extent of a named *Sequence* depends on the extent of its bounding unconformities. It may be possible to trace a *Sequence* which forms a part of an *Orogenic Assemblage* onto the craton bounding the orogenic belt. However, as has been explained by Sloss (1963, p. 110), extra-cratonic *Sequences*, which are controlled by orogenic events within the geosyncline, bear no *necessary* relationship to the cratonic *Sequences*, and unless the bounding unconformities can be traced continuously through the foreland into the orogen, the cratonic and extracratonic *Sequences* must be named differently.

4. Conclusions

Most of the stratigraphic subdivisions recognized and named in the Pre-Cambrian successions of Africa are likely to be diachronous and, therefore, the chronostratigraphic terms System, Series, etc., should not be applied to them. Where units are recognized on lithological criteria alone they should be named according to the hierarchy of lithostratigraphic units proposed in the International Stratigraphic Code (I.G.C., 1961). Unconformity-bounded successions are termed *Sequences*, and are the most generally recognizable natural groupings of rock strata in the Pre-Cambrian except in highly metamorphosed terrains. A *Sequence* consists of an unspecified number of lithostratigraphic units though it is not itself a lithostratigraphic unit. Even the products of the highest grades of regional metamorphism can be assigned on the basis of structural investigation to a particular *Orogenic Complex* which, it is suggested, is the largest rock stratigraphic unit distinguishable in Pre-Cambrian terrains. The two principal components of the *Orogenic Complex* are the refoliated basement, which itself may be attributable to an *Orogenic Complex* of an older orogenic cycle, and the *Orogenic Assemblage*, which ideally contains at least two *Sequences*.

Ultimately, it is to be hoped that a chronostratigraphic scheme can be erected for Pre-Cambrian strata. The above scheme, which is justified by its proven practicability in the field and has been intuitively employed by geologists in Africa for at least a decade, is also compatible with this aim. The data for chronostratigraphic correlation in the absence of organic remains is at present drawn mainly from the radioactive dating of events within an orogenic cycle, and so a division of Pre-Cambrian strata into stratigraphic units which combines local lithostratigraphic units into larger tectonostratigraphic units is highly appropriate.

ACKNOWLEDGMENTS. This paper is published with the permission of the Director of the Institute of Geological Sciences. We would like to thank our colleagues in the Leeds office of the Institute of Geological Sciences, and the Department of Earth Sciences at Leeds University for discussion, and Dr. J. E. Hepworth for help with the manuscript.

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STRATIGRAPHIC CLASSIFICATION IN PRE-CAMBRIAN ROCKS

SIR,–Dr. Allen's and Dr. Reedman's proposal (*Geol. Mag.*, 105, (3), 290–297, 1968) that the term 'orogenic complex' should be given to 'the complete suite of rocks of the orogenic belt' (p.293) will be welcomed by geologists working in the African metamorphic Pre-Cambrian terrains. It will be the more readily accepted since there is a terminological gap to be filled and because its necessity has been tacitly understood, or as the authors say 'the scheme has been intuitively employed by geologists in Africa for at least a decade'. Sutton & Watson (1951), in one of the fundamental texts of 'basement' geology from which much African work derives, referred to the Scourian and Laxfordian 'complexes'. But as the authors have pointed out 'complex' can be used for diverse groups of rocks and it would seem that the term lacks that degree of particularity which something as impressive as the suite of rocks united in orogenesis demands of the imagination. To add the qualifying 'orogenic' to 'complex' overcomes this objection.

The term then approximately replaces the semi-geographical 'The Something (or Somewhere) orogenic belt' or the etymologically dubious 'Somethingides'. For practical purposes it would seem to be equivalent to the adjectival form ('Somewherean') advocated by Cahen & Snelling (1966 p.21) but to have additional advantages.

One might wish, however, that the authors had gone further in giving examples of the usage they advocated. They might have tried out 'Laxfordian orogenic complex', or Macdonald's 'Watian orogenic complex' or 'the Kibaran orogenic complex'. One may ask whether these examples are acceptable and more meaningful than the adjectival form. This writer thinks these examples are in fact acceptable and probably more meaningful than 'Laxfordian', 'Watian' or 'Kibaran'. Again, if we attempt to add 'orogenic complex' to Clifford's 'Damaran' we find that it is inapplicable and hence heightens the meaning of 'Damaran' which, of course, Clifford (1967) referred to in full as the 'Damaran episode', although on Holmes' early map (reproduced facsimile complete with the original mistake as Allen & Reedman's Fig.1) it was an 'orogenic belt'. And to settle for a 'Mozambique orogenic complex' might save the words Mozambique and Mozambiquian from degenerating into uselessness through the acquisition of various shades of meaning (orogeny? thermal event? epeirogenic event? geosyncline?).

I conclude, therefore, that 'orogenic complex' is an acceptable, useful term, only pleading that it should be remembered that the giving of a name does not necessarily imply that the suite of rocks referred to is any better understood than before it acquired its cognomen. In referring, for example, to the 'Mozambique orogenic complex' there is some danger in giving the impression that it is a well-defined, tightly knit group of rocks whose general character over a large area is well understood. This would be quite misleading. The usefulness of the term 'orogenic complex' would to some extent depend on the realization that it is mainly applicable to still abstruse metamorphic complexes. It would, for example, be inappropriate to refer to the Caledonian orogenic complex (of Europe).

While it would seem that 'orogenic complex' will be welcomed, the writers' second term 'orogenic assemblage' finds a less ready response. The present writer agrees with the authors' own verdict that it is a 'conceptual term' (p.295) and in attempting to apply it in practice he is at a loss to find a suitable example. It is indeed very difficult to visualize circumstances in which 'orogenic complex' might be used as a term for a complicated mass of diverse rocks characterized by gross structural conformity in which it would be possible to recognize those components which would allow the further distinction of an 'orogenic assemblage' in the sense visualized by the authors. Experience suggests that it is as much as can be expected that the 'orogenic complex' should be recognized, or, in less complex terrains, that conventional lithostratigraphic units should be discerned. Conversely it is to be supposed that if the 'detailed sedimentological and geochronological studies [which] may be necessary in order to recognize the post-orogenic sediments of a particular cycle' (p.295) were successfully carried out there would be no need to use the proposed terms, but to employ the established lithostratigraphic ones.

The authors are probably right in saying that the 'Sequence' is the most widely mapped unit in the Pre-Cambrian of Africa, but here again no potential example of two Sequences adding up to an Orogenic Assemblage comes to mind.

These objections, however, should not be allowed to prevent the term 'Orogenic Complex' which they advocated from being given serious consideration.

(Geol. Mag. Vol. 106,1969, pp. 212-213)

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SIR,–Dr. Hepworth's comments on our proposals concerning stratigraphic nomenclature are most welcome. In view of Dr. Hepworth's long experience in studying and interpreting the complex stratigraphy and tectonics of orogenic belts in East Africa, his conclusion that the term 'orogenic complex' is an acceptable and useful term is encouraging.

We disagree with Dr. Hepworth that it would be inappropriate to refer to the Caledonian Orogenic Complex (of Europe). This is, perhaps, not as necessary as with the older belts, but Phanerozoic orogens are just as readily divisible into 'orogenic complexes', 'orogenic assemblages' and 'sequences' as those in the Pre-Cambrian.

Dr. Hepworth finds the term 'orogenic assemblage' less useful than 'orogenic complex' and believes the term to have little practical application. We agree that the term 'orogenic assemblage' has disadvantages as a formal stratigraphic unit, the main one being that its definition is not based on purely objective criteria as are those of the 'orogenic complex' and the 'sequence'. As we originally stressed, it is a conceptual term. For this reason it could be argued that 'orogenic assemblage' should remain a convenient descriptive term for a part of the 'orogenic complex', the terms 'sequence' and 'orogenic complex' being the formal tectonostratigraphic units. However, whether used formally or informally, we believe the term to be a useful one in grouping together 'sequences', and two examples from areas where we have ourselves undertaken field mapping are given below.

Prof. W. Q. Kennedy first recognised the presence of an orogenic belt along the coast of West Africa and suggested that it was Pan-African in age (i.e. ± 550 m.y.). Later work has proved its extent from the Rio de Oro southwards to Liberia. It has no single name: Sougy (1962) suggested the Mauritanides for the northern part, which he believed to be Hercynian, and Allen (in press) suggested Rokelides for the southern part, which is Pan-African in age. Perhaps the term Rokel Orogenic Complex might be adopted for it. Excluding the intrusive rocks, the complex consists of three components: the refoliated basement of south-west Rio de Oro represented by the Kasila Group in Sierra Leone, the folded and metamorphosed geosynclinal rocks, a few examples of which are the Serié de Faleme in Senegal, the Serié de M'Bout in Mauritania and the Rokel River Group in Sierra Leone; and finally the molasse, which lies unconformably on the geosynclinal rocks. Examples of the latter are the Taban Formation in Sierra Leone and Guinea and its probable correlative, the Serié de Youkounkoun, also in Guinea. In our definition both the geosynclinal rocks and the molasse comprise the 'orogenic assemblage': thus, taking Sierra Leone as an example, the Rokel River Group and the Taban Formation belong to it. They are separated by an unconformity and are, therefore, representative of two sequences.

Table II

Time-Stratigraphic Classification and Nomenclature for the Canadian Shield
Showing Standard MM Horizons for Orogenic Micas
Determined by the Potassium-Argon Method

(Letters in parenthesis are suggested symbols for geological or tectonic maps.)

EON	ERA	SUB-ERA	K-AR AGE (m.y.) and OROGENY
			600
PROTEROZOIC(P)	HADRYNIAN (HN)		
			MM 880 GRENVILLE (G)
	HELIKIAN (HK)	NEOHELIKIAN (HK")	
			MM 1280? ELSONIAN (E)
		PALAEOHELIKIAN(HK')	
			MM 1640 HUDSONIAN (H)
	APHEBIAN (AB)		
			MM 2390 KENORAN (K)
ARCHAEAN (A)			

Precambrian Time and Rock Units of the Canadian Shield

C.H. Stockwell (G.S.C. paper 64-17)

EON	ERA	SUB-ERA	TYPE OROGENY M M in m.y.	ROCK-STRATIGRAPHIC UNITS In any one category not necessarily contemporaneous nor in order of age			
			600				
PROTER[illegible]C	HADRYNIAN			Double Mer Chatham-Grenville stock		Upper Keweenawan Lower and Upper Coppermine River	
	HELIKIAN	NEOHELIKIAN	880 GRENVILLE	Killarney, Doloro and other granites Seal Wakeham	Ulukan Equalulik	- - - - - - - - - - Duluth, Muskox, Logan, Lackner, and Coldwell intrusions Lower and Middle Kewenawan	
		PALAEOHELIKIAN	1280 ? ELSONIAN	Granite, adamellite and anorthosite Martin Dubawnt Sims Chukotat	Athabasca Et-Then	Hornby Bay	
	APHEBIAN		1640 HUDSONIAN	Kaminis and other granites, Sudbury irruptive.			
				Huronian	Epworth		
				Animiki (e)	Nonacho		
				Kaniapiskau	Tazin		
				Povungnituk	Hurwitz		
				Belcher	Chantry		
				Great Slave	Great Island	Nipissing diabase	
				Snare	Cross Lake		
				Echo Bay - Cameron Bay	San Antonio		
				Goulburn	Grenville	Matachewan diabase	
A[illegible]EAN			2390 KENORAN	Algoman, Giants Range, Prosperous, and other granites			
				Knife Lake	Sickle, Kisseynew, Missi	Timiskaming	Ridout Windigokan
			- - - ? - -	Saganaga Granite Keewatin - Coutchiching	Cliff Lake Granite Wasekman, Kisseynew, Amisk	Abitibi, Pontiac	Rice Lake Seine Yellowknife

ABBEVILLE FAULT ZONE

"It includes two parallel east-west-trending bands of schist occuring adjacent to the north shore of the west end of Pelletier Lake. It is 30 to 50 feet wide, and dips 75 to 80 degrees north".

Wilson, M.E., 1962, Rouyn-Beauchastel map-areas, Quebec: Canada, Geol Surv., Mem, 315, p. 40.

ABIJEVIS SYNCLINE

This syncline trends slightly north of west across the northern part of the Cléricy and La Pause map-areas. Dips are 70°to 90°, and the plunge is not known.

Ambrose, J.W., 1950, Cléricy and La Pause Map-areas, Quebec: Geol. Surv. Can., Mem, 233, p. 30.

ABITIBI GROUP, SERIES, (Wilmarth, 1-9). Archean

M.E. Wilson (1912, p. 275) gives a table of formations for Kewagama Lake map-area with a part:

Cobalt series (Huronian)

Granite and gneiss (Laurentian?)

Igneous contact

Pontiac group (Huronian?)

Abitibi group (Keewatin?)

He points out (p. 276) that the Abitibi group is made up of grey or greenish gray meta-lavas rather than the green of the Keewatin (?) greenstone cropping out to the south. In the final report on the same area he (Wilson 1913, p. 42) lists Pontiac series and Abitibi volcanics as series of the Abitibi group (Keewatin ?). The Abitibi group was this considered a synonym for Keewatin. The Abitibi volcanics or Abitibi volcanic complex was treated as a series, a series at that time being part of a group. However by 1920 the name was obsolescent.

In 1942, Wilson (p. 57) wrote: "The Keewatin volcanics, for which the local name Abitibi series is proposed, ...". He changed this definition in 1943. Essentially a similar definition equating the Abitibi Series to the whole of the complex of metasedimentary and metavolcanic rocks older than the Temiskaming Series was offered in 1956 (Wilson, pp. 1412-1413).

In 1962 another usage was suggested in the report on the Rouyn-Beauchastel map-areas (Wilson, 1962, p. 7). In this report Wilson equates Abitibi-Group to (Keewatin) and restricts it to volcanic rocks. It is in this area essentially Blake River volcanics (q.v.).

The term Abitibi Series has never become current in Quebec, and diverse usages even by Wilson the proposer of the name, have made its meaning unclear. The term does no more than the corresponding Keewatin names and in its final (1962) sense is less precise than Blake River.

Wilson, M.E. 1912, Kewagama Lake map-area, Pontiac and Abitibi, Quebec: Geol. Surv. Can., Summ. Rept. 1911, pp. 276-277.

Wilson. M.E. 1913, Kewagama Lake map-area: Geol. Surv. Can. Mem. 39, p. 42.

Wilson, 1942, Structural features of the Keewatin volcanic rocks of western Quebec: Geol. Soc. Am., Bull. v. 53, p. 56.

Wilson, M.E., 1943, The Early Precambrian Succession in western Quebec: Roy. Soc. Can., Tr. vol. 37, Soc. IV p. 134.

Wilson, M.E., 1956, Early Precambrian rocks of the Timiskaming region, Quebec and Ontario, Canada: Geol. Soc. Am., Bull. v. 67, pp. 1412-1413.

Wilson, M.E. 1962, Rouyn-Boischatel map-areas, Quebec: Geol. Surv. Can., Mem. 315, p.7.

ABNER DOLOMITE

This name is from Abner lake in the Bones lake area and was given by geologists working for Fenimore Iron Mines Limited. From Abner lake the dolomite formation may be traced almost continuously to the northwestern part of the Harveng Lake area (Bérard, 1958).

The Abner dolomite overlies conformably the Chioak. The contact is marked by a thin interlayering of dolomite and biotite-chlorite schists. The estimated thickness of the formation is 400 feet.

The dolomite is dark grey, buff, or brown on fresh surfaces and buff on weathered surfaces.

Sauvé, Pierre; Bergeron, Robert; 1965, Gerido Lake-Thevenet Lake Area, New Quebec: Quebec Dept. of Nat. Res., G.R. No. 104, p. 9.

ACADIA-ACADIAN

Acadia, which is the name for Nova Scotia, Prince Edward Island, and part of New Brunswick, has been used for several things in geology.

I- Acadian Region

Successive editions of "Geology and Economic Minerals of Canada", show changes in the use of the term for the geological region. In 1926 it is given a co-ordinate position with Appalachian, thus "The Appalachian and Acadian regions include all of Canada ...". (p. 83). In 1947, the same publication has (p. 28): "The Appalachian region of Canada sometimes called the Appalachian-Acadian region comprises...".

II- Acadian Series, Epoch. (Wilmarth -1-11) Cambrian

Dawson in 1867 proposed Acadian for the Paradoxides-bearing beds of New Brunswick and the name was extended to beds with that trilobite in North America. It then became an epoch of the Middle Cambrian. The British term "Menevian" was used for some of these rocks prior to 1880.

Dawson, J.W., 1868, On recent geological discoveries in the Acadian Provinces of British North America: Am. Assn. Adv. Sci., Pr. v. 18, p. 118.

III- Acadian Orogeny, Disturbance, Revolution.

J.W. Dawson recognized that a great orogenic event had occurred in Acadia, but it was H.S. Williams who, in 1895, gave the name Acadian, to this event. Although, it is difficult to separate the effects of this orogeny from others unless Silurian or Devonian rocks are involved, the Acadian was an extremely significant event with folding accompanied by granitic intrusions. The intrusives in general are mesozone types and are post kinematic.

The event shows some diversity in date from locality to locality. Boucot et. al (1964) have set Upper Emsian as the time of the "first intense phase". Dinely and Williams (1968) believe that they can recognize three divisions: "A", Early Devonian, "B", is middle Late, and "C" is Late Devonian. Rodgers (1967) with some hesitation suggests that deformation continued into Carboniferous. Shickshockian (q.v.) is a junior synonym for Acadian.

Boucot, A.J. et. al., 1964, Reconnaissance bedrock geology of the Presque Isle Quadrangle, Maine: Maine Geol. Surv. Quadrangle Mapping Series 2, pp. 93-99.

Dineley, D.L. and Williams, B.P.J., 1968, The Devonian continental rocks of the lower Restigouche River, Quebec: Can. Jour. Earth Soc., v. 5, pp. 952-953.

Rodgers, John, 1967, Chronology of the tectonic movements in the Appalachian region of eastern North America: Am. Jour. Sci., v. 267, p. 417.

IV- Acadian Geosyncline, Acadic Geosyncline.

Schuchert has used Acadic Geosyncline for the trough lying southeast of the New Brunswick Geanticline.

ADANAC FAULT.

"It is the zone of crumpled, schistose rock and quartz veins about 50 feet wide that lies along the Timiskaming-Pontiac contact. The Adanac shaft was sunk on zones of fissile graphitic schist and veins of quartz striking east-west and dipping 60°N. - "

Wilson, M.E., 1962, Rouyn-Beauchastel map-areas, Quebec: Canada, Geol. Surv., Mem, 315, p. 41-42.

ALBANEL GROUP Proterozoic

Wahl proposed this name in 1947 (Quebec Dept. Mines, P.R. 211, p. 8) but later used Upper Albanel and Lower Albanel Formations for the same rocks and assigned them to Mistassini Group.

ALBERTVILLE ANTICLINE

This anticline, which trends northeast across the north western part of the Causapscal map-area, Gaspé, brings Silurian rocks to the surface on the west side of the area. Some dips on the northwest side of the fold are as much as 65°. Plunge is northeast.

Stearn, C.W., 1965, Causapscal Area, Matapedia and Matane Counties: Quebec, Dept of Nat. Res., G.R. 117, p. 35.

ALDERMAC SYENITE PORPHYRY

Aldermac syenite porphyry in western Beauchastel township forms a mass about 1½ miles in lenght from north to south, and a mile in width. It has been studied in details by H.C. Gunning. The body is not a single intrusive, but is composed of a large number of more or less regular dyke-like masses of widely varying though related composition.

Cooke, H.C., James, W.F., Mawdsley, J.B., 1931, Geology and Ore Deposits of Rouyn-Harricanaw Region, Quebec: Canada Geol. Surv., Mem. 166, p. 112-113.

Gunning, H.C., 1927, Syenite porphyry of Boischatel Township, Quebec: Canada Geol. Surv., Bulletin No 46, p. 31.

ALGONKIAN, PERIOD, SYSTEM Proterozoic(s)

This term came into use in the United States about 1890 for Precambrian clastic sedimentary rocks. With the realization that even the oldest Precambrian system has clastic sedimentary rocks the term was later restricted by most writers to post-Archean rocks.

Algonkian has not been extensively used in Quebec or Ontario. Americans writing on Canadian topics have used Algonkian, but, in Canada, Proterozoic has been preferred to it.

AMOS ANTICLINE.

"In the northwest corner of Landrienne Township, about one mile from the north boundary and 1½ miles from the west boundary, a single determination was obtained, yielding a strike of north 80 degrees east, top facing north. This, coupled with the determination south of Amos, indicates that an anticlinal axis passes through or near the town of Amos, presumably in a direction more or less parallel to the known axes. It may be termed the Amos anticline."

Cooke, H.C., James, W.F., Mawdsley, J.B., 1931, Geology and Ore Deposits of Rouyn-Harricanaw-Region, Quebec:: Canada, Geol. Surv, Mem, 166, p. 92.

AMULET ANTICLINE

"The Amulet rhyolite and rhyolite breccia with the overlying Amulet Hills andesite have been folded into 5 minor anticlines, all part of the larger Amulet anticline. The minor anticlines have a plunge to the eastward of 20 to 25 degrees and dips on their limbs up to 45 degrees".

Wilson, M.E., 1949, Noranda District, Quebec: Canada, Geol. Surv., Mem 229, p. 50.

ANSE SAINT JEAN GRANODIORITE

The Anse Saint Jean Granodiorite is distinguished easily from both the syenite and quartz monzonite by its greater tenor (20%) of dark minerals. It crops out over an area of more than 10 square miles between the villages of l'Anse Saint Jean and Petit Saguenay. The contact with the surrounding rocks is sharp and regular.

The granodiorite is a homogeneous, massive, coarse-grained rock containing globular masses of ferromagnesians ½ cm. in diameter, and scattered feldspar phenocrysts 2 to 3 cm. long. It is composed of quartz, abundant antiperthitic plagioclase, a minor amount of perthite, hypersthene, augite and many grains of apatite and opaque oxides.

Rondot, Jehan., 1966, Geology of l'Anse Saint Jean Area, Chicoutimi and Charlevoix Counties: Quebec, Dept. of Nat. Res., P.R. No. 556, p. 6.

ANTICOSTI GROUP, SERIES, ANTICOSTIAN Silurian

Elkanah Billings after a study of fossils collected in Anticosti by Richardson proposed (1857, p. 255) Anticosti Group for the beds included in Richardson's C, D, E, F divisions. This was a proper procedure, but Billings and later Logan (Geology of Canada, 1863, p. 298) correlated the Anticosti Group with Medina, Clinton and Niagara of the New York section, and, in an attempt to use it as a series designation, a conflict developed with the Niagara. Twenhofel (1927, p. 38) resolved part of this difficulty by restricting Anticosti to the Becsie and Gun River Formations. In the Silurian correlation chart (1942) the Becsie and most of the Gun River are assigned to the Albion Series.

Billings, Elkanah, 1857, Report for year 1856, Can. Geol. Surv., Rept. of Prog. 1853-56, p. 255.

Twenhofel, W.H., 1927, Geology of Anticosti Island: Can. Geol. Surv., Mem. 154, p. 38.

Swartz, C.K., et al., 1942, Correlation of the Silurian formations of North America; Geol. Soc. Am., Bull. v. 53, pp. 533-538.

Bottow, T.E., 1961, Ordivician and Silurian formations of Anticosti Island Quebec: Can. Geol. Surv. Paper 61-26

Silurian	Niagaran	Chicotte (F 1-4)	Limestone, 73 feet
		Jupiter (D 9-10, E 1-10)	Limestone and shale followed by limestone, 653 feet
	Anticostian	Gun River (D 2-8)	Alternating limestone and shale, 308 feet
		Becscie (C 12-14, D 1)	Limestone with shale partings, 199 feet
Ordovician	Gamachian	Ellis Bay (C 1-12)	On south shore, shale and limestone; on north shore, sandstone followed by limestone, 200 feet
	Richmondian	Vauréal (B 1-11)	Limestone and shale interbedded, 730 feet
		English Head (A 1-6)	Limestone and shale, 228 feet
	Mohawkian	Macasty	Black shale

(Twenhofel, G.S.C. Mem. 154, 1927)

TABLE I. TABLE OF FORMATIONS

PERIOD	GROUP	FORMATION	LITHOLOGY	MAXIMUM THICKNESSES TAKEN FROM WELL LOGS	EQUIVALENTS ELSEWHERE
			Saint-Laurent Lowland Province		
	RICHMOND	Bécancour Carmel Member	Red and green shale and sandstone. Greenish-gray shale. Non-marine	565'	Queenston
		Pontgravé	Crystalline limestone with some shale. Marine, fossils abundant.	415'	Waynesville
	LORRAINE	Nicolet Upper	Shale and fine-grained sandstone with limestone. Shale becoming calcareous toward the top.	4310'	Pulaski
		Lower	Shale and fine-grained sandstone.		Frankfort Eden.
			(The following formations are not exposed in this area)		
ORDOVICIAN	UTICA	Lotbinière (Lachine)	Shale and minor limestone. Graywacke, siltstone and shale	2464' (Probably some of this inordinate thickness should have been included in the Lorraine.	Lachine
	TRENTON	Neuville	Semi-lithographic limestone and shale	1100'	Cobourg Sherman Fall
		Deschambault	Light gray crystalline limestone		Hull
	BLACK RIVER	Undifferentiated	Limestone	150'	Leray [illegible]
	CHAZY	Laval	Limestone	514' (minimum)	
		Batiscan	Sandstone	670' (minimum)	

	BEEKMANTOWN	Beauharnois	Dolomite	783' (minimum)	
CAMBRIAN	POTSDAM	Châteauguay	Sandstone with dolomite interbeds near top	601' (minimum)	
PRECAMBRIAN	PRECAMBRIAN	Grenville	Granitic gneiss	510' (minimum)	
			<u>Appalachian Province</u>		
ORDOVICIAN	LAURIER	Bourret	Black slates, argillaceous limestone, dolomite and sandstone.		
CAMBRIAN	SILLERY	Sillery	Red, green and gray shale and green sandstone.		

(Clark & Globensky, 197 , Q.D.N.R.. G.R.-165)

ANTICOSTI SEQUENCE Ordovician-Silurian

Twenhofel has used this term for the Ordovician and Silurian Rocks exposed on Anticosti island.

Twenhofel, W.H., 1921, Faunal and sediment variation in the Anticosti sequence: Can. Geol. Surv., Bull. No. 33, pp. 1-14.

APPALACHIAN

The Appalachian mountain ranges, Appalachian region, or equivalent terms are common in North American conversation. In general, it is recognized that the Appalachians extends through Newfoundland, the maritime provinces, part of Quebec, and New England to Alabama. The name has been used for several things geological, but there is no formal use of the name as a stratigraphic name. "Appalachian rocks" is simply a condensed reference to "rocks of the Appalachian region".

I- Appalachian Orogeny, Revolution. (Wilmarth -1-61) Paleozoic

Deformation in Quebec towards the end of the Paleozoic is hard to prove. (Geology of Quebec, p. 1944, p. 485). As pointed out by Woodward, the Appalachian Highlands have been the site of several orogenies. He therefore proposed "Alleghany"for the youngest Paleozoic orogeny.

Osborne, F. Fitz, 1967, Appalachian region of Quebec: Some aspects of its divisions and geology: Roy. Soc. Can., Special Pub. No. 10, pp. 18-24.

Woodward, H.P., 1957, Chronology of Appalachian folding: Am. Assn. Pet. Geol., Bull. v. 41, p. 2322.

Woodward, H.P., 1957, Structural elements of northeastern Appalachians: Am. Assn. Pet. Geol. Bull. 41, p. 1440.

II- Appalachian Geosyncline - Appalachian Foreland.

Although study in the Appalachian region by James Hall gave him the ideas that led to the geosynclinal concept the name was given only later. The foreland of the Appalachian folded zone is in the Appalachian plateau.

III- Appalachian Glacier (System of Glaciers).

Chalmers (1890) gave the name Appalachian Glacier or System of Glaciers to an ice sheet or sheets that he inferred existed on upland Appalachian areas northeast of Etchemin river prior to the development of the Laurentide or Labradorean ice. That local accumulations of ice formed on the higher parts of the Appalachian uplands is acceptable, however, the evidence put forward by Chalmers is not valid and his name is regarded as obsolete.

Chalmers, Robt., 1890, Glaciation of the Cordillera and the Laurentide: Am. Geol. vo. 6, p. 325.

Chalmers, Robt., 1898, Surface Geology and auriferous deposits of south-eastern Quebec: Geol. Surv. Can., Ann. Rept. v. X, pp. 39-42, J.

McGerrigle, H.W., 1952, Pleistocene glaciation of Gaspé Peninsula: Roy. Soc. Can., Tr. 44, sect. IV, pp. 37-51.

ARCHIAC LAKE (THRUST) FAULT.

"The Archiac Lake (Léopard Lake area) strike fault is one of the main faults of the area. It runs from north of Désery lake, to the eastern limit of the Léopard Lake area, a distance of about 28 miles. The schistosity of the shear zones commonly dips 65° to 85° eastward".

Sauvé. Pierre., Bergeron, Robert., 1965, Gerido Lake-Thévenet Lake Area, New Quebec: Quebec Dept. of Nat. Res., G.R. No. 104, p. 79-80.

ARMAGH GROUP (Wilmarth -2-19) Cambrian

I- Armagh is composed of green, red, and gray gritty sandstones interbedded with colored slates and white siltstones. The group is lithologically similar to a part of the Sillery Group except that near Quebec the red sandstones are not so abundant as in the Armagh.

Although diagnostic fossils have not been found, the formation is assigned to the Cambrian. Hubert (1967, p. 37) has stated that the source of the sediments was a crystalline terrane southeast of the site of deposition. He infers that the group was deposited on an unstable shelf.

Béland, Jacques, 1957, St. Magloire and Rosaire-St-Pamphile areas, Electoral Districts of Dorchester, Bellechasse, Montmagny and L'Islet: Quebec Dept. of Mines, G.R. 76, 11-13, First published note P.R. 279, pp. 3,4, 1952.

Hubert, Claude, 1967, Tectonic of part of the Sillery Formation in the Chaudière-Matapédia segment of the Quebec Appalachians: Roy. Soc. Can., Special Pub. 10, p. 37.

ARNOLD RIVER FORMATION Paleozoic

A small part of the Arnold River Formation was considered by Selwyn and Dawson (1884) and by Ells (1887) as granitic rock of "Silurian" (now Ordovician) age. Ells as did Dresser later mapped most of these rocks as Precambrian and described the rocks as "hard feldspathic schists of Huronian aspect". Hitchcock and Huntington (1874) described similar rocks in northern Maine as gneisses, and regarded them as "altered Paleozoic rocks". The reconnaissance survey by Hurley and Thompson (1950) in Maine threw further light on the character of these gneisses. This formation is in the southern part of the map-area, close to and along the International Boundary. In Quebec, the formation underlies about 75 square miles in two areas separated by the Araignées (Spider) Lake granite. It occurs in Woburn, Louise, and Ditchfield townships, and is best exposed near the junction of Arnold river and Morin brook. The main mass of the Arnold Formation is homogeneous, dark gray, fine-to medium-grained metasandstone. Quartz, feldspar and biotite can be identified with the naked eye. Foliation, the most widespread structural element of the formation, generally is parallel to the regional foliation. It increase from barely apparent to well developed going westward.

The formation to crop out across a width of 20 miles. This suggests that the formation probably is some thousands of feet thick, even though numerous minor folds are know on the eastern side.

Marleau, R.A., 1968, Woburn-East Megantic-Armstrong Area, Frontenac and Beauce Counties: Quebec Dept. of Nat. Res., G.R. No. 131, p. 9-13.

Dresser, J.A., 1908, Accent dicovery of gold near lake Megantic, Quebec: Can., Geol. Surv. pub. 1028, p. 7.

ASCOT FORMATION Ordovician (?)

" Ascot Formation " was introduced to designate the assemblage of metamorphosed volcanic and sedimentary rocks that constitutes the bedrock of Stoke mountains and have their optimum development in Ascot township. The volcanic sequence of this assemblage is probably equivalent to the Weedon Schists (q.v.). The lower member of the Ascot Formation is acidic metapyroclastic rocks, meta-rhyolites, and sericite schists with some metavolcanic rocks of intermediate and basia composition. Hematite cherts were encountered on the margin of chlorite schists and greenstones in the city of Sherbrooke. Sandstone interstratified with beds of microconglomerate occur on the margin of the greenstones west of Lennoxville and northeast of Sherbrooke. In the upper part of the Ascot stratigraphic sequence, a member composed of chert, siltstone, sandstone and thin-bedded rocks has been recognized. Structural observation shows that phyllites occupy the upper part of the Ascot Formation.

St. Julien, P., Lamarche, R.Y., 1965, Geology of Sherbrooke Area, Sherbrooke County: Quebec Dept. of Nat. Res., P.R. No. 530, p. 4-8.

ASHUANIPI COMPLEX SERIES (Gneiss and Schist) Archean

This term was used by workers of the Iron Ore Company of Canada in 1947 or earlier to designate biotite, hornblende, garnetiferous and granitic gneisses as well as granitic intrusive rocks. The rocks are assigned to the Archean and are on the west side of the trough observed to be beneath the Proterozoic rocks.

Dimroth has used "Wheeler" for an Archean complex on the east side of the Labrador Trough.

ASSELIN FORMATION Middle (?) Silurian

It crops out poorly. Near Auclair lake, it has a high content of lime in the form of cement for the arenites and as limestone beds. The high solubility of calcite cement under surficial weathering, and the consequent disintegration of the arenites, is probably the reason why the Asselin Formation is found in valley bottoms.

Lespérance, P.J., Greiner, H.R., 1969, Squatec-Cabano Area, Rimouski, Rivière du Loup and Témiscouata Counties: Quebec Dept. of Nat. Res., G.R. No. 128, p. 52-54.

AUGER LAKE CONGLOMERATE

Graywacke and conglomerate form a small outcrop extending northeast through the west end of Auger Lake. The conglomerates have rounded pebbles, among which two of coarse anorthosite were recognized. It is said to be Temiscamian.

Longley, W.W., 1951, Bachelor Lake Area, Abitibi-East County: Quebec Dept. Mines, G.R. No. 47, p. 7, 14.

AWANTJISH FORMATION Lower Silurian

Béland gave the name to fossiliferous gray-green shales and siltstones with some red siltstone cropping out two miles south of St. Cléophas in Awantjish Township. The formation is about 90 feet thick at the type locality, but southwest of this, it is 2,500 feet thick and is seen to overlie Cabano Formation conformably. It passes into Val Brillant Formation by interdigitation.

The fossils indicate a range from C_1 to C_5 of Upper Llandoverian, however, at the type locality only younger beds are known.

Béland, Jacques, 1960, Rimouski-Matapedia area: Quebec Dept. Mines, P.R. 430, p. 3.

Lajoie, J., Lespérance, P.J., and Béland, J., 1968, Silurian Stratigraphy and paleogeography of Matapedia-Témiscouata region, Quebec: Am. Assn. Pet. Geol., Bull. v. 52, p. 628.

AYLMER FORMATION (Wilmarth -1-98) Chazy

Raymond (1905, p. 362) gave this name to sandstones and shales cropping out near the town of Aylmer, which is a short distance west of Hull. He considered that the formation, which is upper Chazy, to be sufficiently distinctive in lithology and fauna to merit the name. It is of diverse thickness and is developed best along Ottawa valley. Raymond (1913, p. 140) states that limestones of the Aylmer Formation are thick at Montreal but thin westward. In Geology of Quebec (1944, p. 182) the formation is stated to occur only in the Aylmer-Hull district.

A.E. Wilson (1937m p. 46) has substituted tha names "Rockcliffe" and St-Martin for Aylmer Formation. "Rockcliffe Formation" is, however, not used in Quebec except for rocks in the vicinity of Hull.

Raymond, P.E., 1905, The fauna of the Chazy limestone: Am. Jour. Sci. v. 20, p.362 .

Raymond, P.E., 1913, Ordovician of Montreal and Ottawa: Geol. Surv. Can., Int. Cong. 1913, Guide Book 3, p.140.

Wilson, A.E., 1937, Erosional intervals indicated by contacts in the vicinity of Ottawa, Roy. Soc. Can., Tn; v. 31, Sect. IV, p. 46.

AZOIC ERA Precambrian

In "Geology of Quebec" (1863, p. 20) "Azoic" or "azoic" is used as a synonym for Precambrian. It was divided into two divisions, - actually the first divisions proposed for Azoic rocks anywhere , Laurentian and Huronian.

BACHELOR LAKE GRANITE Precambrian

This granite is so poorly exposed that the outcrop area can be shown only approximately. Good exposures on the south shore of Bachelor lake show a medium- to coarse-grained rock of fresh appearance with 25 per cent quartz, with potassic feldspar and albite. It is surmised that this granite was related to the metallic mineral deposits southwest of the lake.

Longley, W.W., 1951, Bachelor Lake Area, Abitibi-East County: Quebec Dept. of Mines, G.R. No. 47, p. 21.

BAGAMAC FAULT.

A zone of schistosity and fracturing can be seen at intervals for nearly 2 miles, from the Nipissing Central Railway on the west to the eastern outskirts of Rouyn townsite. The amount of displacement of this fault has not been determined, but the width of the zone of schistosity and the difference in the rocks on opposite sides of the fault indicate that the movement was considerable.

Wilson, M.E., 1949, Noranda District, Quebec: Canada, Dept. of Mines and Resources, Mem, 229, p. 54-55.

BAIE-DES-MOUTONS-SYENITE

Davies has given this name to a medium- to fine-grained syenite to quartz syenite with a circular outcrop, partly covered by water, about fifteen miles diameter. The body is heterogeneous, and, although the walls are steep, layers dip inward with decreasing inclination towards the center.

Davies, Raymond, 1965, Baie-des-Moutons area, Duplessis county: Quebec Dept. Nat. Res., P.R. 543, p. 7.

BARDEY (MAN) LAKE ZONE (Of Shickshock Group) Lower Paleozoic

Rocks of this zone are similar to those of Bivé Brook except that they are generally finer grained. Colour banding is rare; this and the fineness of grain makes bedding particularly difficult to recognize. In the one outcrop in which bedding was recognized with certainty it is parallel to schistosity. The relatively rare quartz veins are generally less than one inch thick and one foot long, and they are parallel to the foliation. . Scattered small veins of feldspar or pegmatitic feldspar and quartz also occur.

Mattinson, C.R., 1964, Mount Logan Area, Matane and Gaspé-North Counties: Quebec Dept. of Nat. Res., G.R. No. 118, p. 38-39.

BARRAUTE (PLUG) GRANITE Precambrian

The intrusive is about 7,000 feet long and 5,000 feet wide. The rock is a porphyritic albite granite in which the phenocrysts of quartz and feldspar reach nearly half an inch diameter.

McDougall, David J., 1965, Southeast quarter of Barraute Township: Quebec Dept. of Nat. Res., G.R. No. 114, p. 10.

BARRY LAKE GNEISS Precambrian

Light, grey, coarse-grained gneiss underlies the greater part of Barry, Bailly, Lacroix, and Coursol townships. The rock is composed of diverse proportions of quartz, biotite, and oligoclase or andesine feldspar. Hornblende is locally abundant constituent and may take the place of biotite. The feldspar is only slightly altered, chiefly to epidote and zoisite, and in general the rock has a fresh appearance. Although commonly referred to as granite gneiss, the rock in several occurrences would be described as oligoclase-granite gneiss.

Milner, R.L., 1943, Barry Lake Area, Abitibi County and Abitibi Territory: Quebec Dept. of Mines, G.R. No. 14, p. 11-12.

BASCON (MEM) BROOK ZONE (of Shickshock Group) Lower Paleozoic

Rocks of this zone are mainly white mica schists, but some limestones are exposed at places along Bascon Brook. The principal minerals of the schists are white mica, quartz, and albite; lesser ones are chlorite, epidote, titanite, magnetite, and pyrite. In some of the schists, quartz and feldspar are arranged in minute segregation layers parallel to the schistosity. Many such layers trace out complex recumbent folds with dimensions of the order of 1-2 cm. The axial planes and long limbs of these minute folds are parallel to the schistosity of the rock as a whole.

Mattinson, C.R., 1964, Mount Logan Area, Matane and Gaspe-North Counties, Quebec Dept. of Nat. Res., G.R. no. 118, p. 43-44.

BAS DE STE-ROSE FAULT

There is no visible evidence in the Beloeil sheet for the existence of the Bas de Ste-Rose fault. This fault is projected from its known position in the Laval area eastward into the Beloeil area, first, because the dislocation involved along this fault in the Laval area was so great as to demand some such extension, and second, because evidence from water-wells concerning the distribution of the red Queenston beds indicates a disruption of the western margin of the Queenston, into the area of Queenston rocks. It strikes eastwest.

Clark, T.H., 1944, Structure and stratigraphy in the vicinity of Montreal: Roy. Soc. Can., Tn. 38, Sec. IV, p. 31.

BASSWOOD CREEK FORMATION (Wilmarth -1-124) U. Canadian

In "Geology of Canada" (1863, pp. 844-847) Logan gives a section of the "Phillipsburgh Series" (q.v.), a part of the Quebec Group. The section is within what was later termed the Philipsburg slice. Basswood Creek is the uppermost of four formations assigned to Upper Canadian, Clark (1934, p. 5-7) published the name, but the brief description is from Geology of Quebec (1944, p. 400) and is by Clark and McGerrigle. The formation, which is made up of dark grey shales with dark limestone, is about 70 feet thick and is not known to have fossils.

Clark, T.H., 1934, Structure and stratigraphy of southern Quebec, Geol. Soc. Am., Bull. v. 45, pp. 6-7.

BEACONSFIELD MEMBER Chazy

Hoffman proposed this name for greenish shales, shaly limestones, and gray limestones in the Pointe Claire Quarry, St. Charles Road, Beaconsfield. Neither the base nor summit of the 65 foot section is exposed. The member is characterized by Rostricellula plena and makes up part of the upper Laval Formation of the Chazy.

Hoffman, H.J., 1963, Ordovician Chazy Group in Southern Quebec: Am. Assn. Pet. Geol., v. 63, p. 281.

BEATTIE FAULT

"It branches away from the Porcupine - Destor fault 4,000 feet west of the Beattie shaft. It has been traced east for a distance of 4 miles. The fault zone has a width of 400 to 600 feet. It dips 75° to 80° north."

Graham, R.Bruce., 1954, Parts of Hebecourt, Duparquet and Destor Townships, Abitibi-West County: Quebec, Dept. of Mines, G.R. No. 61, p. 34.

BEATTIE SYENITE PORPHYRY Precambrian

The Beattie Mine vicinity was mapped by O'Neill (1933) and it was recognized that the then known ore bodies were associated with a stock of syenite to quartz syenite. Two varieties, a syenite porphyry and a bostonite porphyry, were mapped. Both rocks are essentially leucocratic with an obvious trachytic fabric in the bostonite, which name is unsuitable for the rock. Davidson and Banfield (1944) used Beattie Syenite Porphyry for both rocks.

O'Neill, J.J., The Beattie Gold Mine, Duparquet Township: Quebec Bur. Mines, Ann. Rept. 1932, pt. C., pp. 15-17.

Davidson, S. and Banfield, A.F., 1944, Geology of the Beattie Gold Mine, Duparquet, Quebec: Econ. Geol. v. 39, pp. 537-538.

BEAUHARNOIS FORMATION

This name was used as early as 1863 by Chapman, but it is generally considered, that the 1913 description by Raymond marks the formal proposal of the use of the name for the upper part of the Beekmantown Group. The formation consists of dolomites and sandy dolomites in the vicinity of Montreal. The formation includes some shales in a section of more than 1,000 feet shown in a well north of Montreal, but it is appreciably thinner at other localities and is not recognized in exposures east of St. Maurice River.

Clark, T.H., 1952, Montreal Area: Que. Dept. of Mines, G.R. 46, pp. 29-34.

BECANCOUR RIVER Richmond Group **Ordovician**

Bécancour River Formation is the name proposed by Clark for the red shales and sandstones that have been consistently referred to as Queenston. Carmel River member is the lower 53 feet of the section on Nicolet river and is greenish-grey shales or sandstones. The formation which is without fossils, is between 1,000 and 1,500 feet thick along the syncline in which it crops out.

Clark, T.H., 1964, Yamaska-Aston area: Quebec Dept. Nat. Res., G.R. 102, pp. 8-16.

BECSIE (RIVER) FORMATION Silurian

The very fossiliferous lower part of the Silurian section on Anticosti island bearing Richardson-Logan designation C.12 to D-1 was named the Becsie River Formation by Schuchert and Twenhofel. The name was changed, perhaps by inadvertance, to Becsie. The formation consists of above 200 feet of gray to redsish gray limestone with shale partings.

Schuchert, C., Twenhofel, W.H., 1010, Ordovicic-Siluric Section of the Mingan and Anticosti Islands, Gulf of Saint-Lawrence, Geol. Soc. Am., Bull., vol. 21, p. 695.

BEDFORD FORMATION Ordovician

Ami proposed this name for calcareous beds believed to be about the age of the Levis Formation. No type section is given. Confusion with "Bedford limestone used for building is another reason for abandonning this name. See Corey limestone

Ami, H.M., 1900, Synopsis of the Geology of Canada: Roy. Soc. Canada, Proc. and Trans., 2nd ser., vol. 6, sec. 4, p. 200.

BEEKMANTOWN GROUP (FORMATION) Ordovician

This name has been used both as a group and formation designation since about 1900 and is equivalent to the Calciferous of older writers. Logan (1863, p. 20) for example, lists Calciferous as equivalent to Levis and together with Chazy as making up the "Lower Silurian" Quebec Group. Canadian has been used for essentially the same beds or interval, but its use in this sense is not necessary for it can be confused with a geographical reference.

Near Montreal the lowlands facies of the Beekmantown is divided into the Theresa and Beauharnois Formations.

BEETZ LAKE ANTICLINE.

This symmetrical anticline trends northwesterly and plunges southeast at an undetermined angle. Its axial plane is vertical in the vicinity of Lac de l'Est but dips approximately 70° west in its southern part. The axis crosses the southern limit of the area one mile east of Napoléon lake.

Grenier, Paul-E., 1957, Beetz Lake Area, Electoral District of Saguenay: Quebec, Department of Mines, G.R. No. 73, p. 53-54.

BELAND ANTICLINE.

The position of the axis of this anticline, which is south of the Bonnécamp syncline, was determined by the type and distribution of debris. Silurian rocks are exposed along its axis.

McGerrigle, H.W., 1959, Madeleine River Area, Electoral District of Gaspé North: Quebec, Dept of Mines, G.R. No. 11, p. 41.

BELDENS FORMATION

Beekmantown
Ordovician

Cady (1945, p. 550) gave this name to orange-buff-weathering limestone interbedded with snow-white limestone occurring in thickness up

to 700 feet in foreland or foreland-fault slices in Vermont. The formation was assigned by Cady to Chazy, but both Clark (1964, p. 11) and Kay (1958, p. 79) assign the formation to the Beekmantown in discussing the occurrence near St. Dominique.

Cady (1960, p. 573) agreed with the conclusion set forth by Kay (1958, p. 79) that the Beldens Formation is the eastern facies of the Bridport Dolomite and is to be considered Beekmantown rather than Chazy, and Cady and Zen (1960, p. 728-739) suggested that the Burchards, Weybridge, Beldens, and Bridport are members of the Chipman Formation. In the Hubert wells, Quebec (Clark, 1955) core from immediately below the sandy beds of the Laval Formation shows cuttings of an alabaster-like dolomitic limestone, identical in lithology and stratigraphic position with the Beldens formation of the St. Dominique area. There the Beldens formation has been estimated to be about 275 feet thick.

Cady, W.M., 1945, Stratigraphy and structure of west central Vermont: Geol. Soc. Am., Bull. v. 56, p. 550.

Clark, T.H., 1964, St. Hyacinthe area (West Half): Quebec Dept. Nat. Res., G.R. 101, p. 11-16.

Kay, G.M., 1958, Ordovician Highgate Springs sequence of Vermont and Quebec and Ordovician classification: Am. Jour. Sci., v. 256, pp. 78-80.

Cady, W.M., 1960, Stratigraphic and tectonic relationships in Northern Vermont and Southern Quebec: Geol. Soc. Am., Bull. v. 71, p. 573.

Kay, G.M., 1958, Ordovician Highgate Springs sequence of Vermont and Quebec and Ordovician classification: Am. Jour. Sci., v. 256, p. 79.

Cady, W.M., and Zen, E-An., 1960, Stratigraphic relationships of the Lower Ordovician Chipman Formation in west-central Vermont: Am. Jour. Sci., v. 258, pp. 728-739.

Clark, T.H., 1955, St. Jean-Beloeil Area, Iberville, St. Jean, Napierville-Laprairie, Rouville, Chambly, St. Hyacinthe and Verchères Counties: Quebec Dept. of Mines, G.R. No. 66, p. 10.

BELL RIVER COMPLEX (ANORTHOSITE)

The name was given by Freeman (1939) to rocks grading from meta-anorthosite to meta-pyroxenite cropping out along Bell River. He gives a section of about 20,000 feet, but in adequate exposures render the interpretation suspect. The layered part of the complex with both assymetrical and symmetrical layers have been described by Black (Freeman and Black, 1944)

The plagioclase is between An_{50} to An_{67} but is associated with clinozoisite and epidote which suggests that the original composition was calcic than An_{67}. The high calcity is characteristic of the stratiform bodies. The so-called Chibougamau anorthosite is a probable correlative of this complex if both are not a part is of one body introduced before folding of the adjacent metavolcanics.

Freeman, B.C., 1939, The Bell River Complex, northwestern Quebec, Jour. Geol. v. 47, pp. 27-46.

Freeman, B.C., and Black, J.M.. 1944, The Opoaka River Area, Abitibi Territory: Quebec, Dept. of Mines, G.R. No. 16, pp. 8-13

BENNETT Cambrian (?)

Bennett is an insignificant hamlet six miles west of Black Lake.

I- Bennett Quartzite (Wilmarth -1-161)

Knox states that the name was given because of the good exposures on the hill slopes around Bennett. It is much crumpled whitish gray to greenish gray quartzite. The associated schists are "hard, solid, and compact", a feature which distinguishes them from the schists of L'Islet. Formation (q.v.). Knox assigns it to Precambrian.

Knox, J.K., (1917), Southwestern part of Thetford-Black Lake Mining District (Coleraine Sheet): Geol. Surv. Can., Summ. Rept. 1916, p. 233-234.

II- Bennett Schist (Group) Cambrian (?)

Most workers after Knox have used Bennett for rocks so lithologically unlike the description by Knox that the name must be regarded as that of another formation. For example, Cooke (1937) states that sericite schist, and chlorite schist are common constituents of the formation, which also has some limestone. Tolman (1936), Cooke (1937), Béland (1957), have considered that the Bennett is metamorphosed Caldwell with, for Cooke (1954), some Oak Hill (Sweetsburg) and for Béland some Rosaire and Armagh.

The evidence available in 1969 shows that the Bennett is a metamorphic facies developed on predominantely clastic rocks of several formations. The name should be abandoned in the larger sense because Sutton has priority.

Knox, J.K., 1917, loc. cit., Tolman, Carl., 1936, Lake Etchemin Map-area, Quebec: Geol. Surv. Can., Mem. 199, pp. 56.

Cooke, H.C., 1937, Thetford, Disraeli, and Eastern half of Warwick map-areas, Quebec: Geol. Surv. Can., Mem. 211, pp. 10-13.

Cooke, H.C., 1954, The Green Mountains anticlinorium in Quebec: Geol. Assn. Can. Pr. v. 6, Pt. 11, p. 43.

Béland, Jacques, 1957, St. Magloire and Rosaire - St-Pamphile areas: Quebec Dept. Mines, G.R. 76, p. 10. Geology of Quebec, 1944, G.R. 20, p. 340, p. 377.

BERRY MOUNTAIN SYNCLINE

It is a somewhat basin-like fold, subcircular in surface plan, the axis of which runs slightly south of west in the central part of the area. The fold plunges west, except in the southwestern part of the area where the axis appears to be approximately horizontal. It is part of the synclinorium which extends along the axis of the peninsula, and corresponds in position to the Central belt,

Carbonneau, C., 1959, Richard-Gravier Area, Gaspé Peninsula: Quebec Dept. of Mines, G.R. No. 90, p. 13.

BERTIN LAKE FAULT.

A fault southeast of Bertin Lake separates a "block" with predominant basalts from one on its northeast with arkoses and conglomerate.

Dimroth, Erich, 1964, Geology of Romanet Lake Area, New Quebec: Quebec, Dept. of Nat. Res., P.R. No. 523, p. 11-12.

BETHOULAT LAKE PLUTONIC SERIES (Neale)

BETHOULAT LAKE SERIES (BERARD) Precambrian

Anorthosite, pyroxene amphibole diorite, granite, augengneiss, etc... have been grouped together as possibly comagmatic rocks by Neale (1965, p. 22) who proposed the name in an unpublished thesis presented in 1922.

Neale, E.R.W., 1965, Bethoulat Lake Area, Mistassini Territory: Quebec Dept. Nat. Res., G.R. 112, p. 22.

Berard, Jean, 1965, Toco-Temiscamie Area, Mistassini Territory, Quebec Dept. Nat. Res., G.R. 113, pp. 18-22.

BILLY LAKE QUARTZ PORPHYRY — Precambrian

Longley has called an extensively altered rock showing what he believes are phenocrysts of opalescent quartz the Billy Lake Quartz Porphyry. The outcrop is mostly north of Billy lake but extends across the eastern limit of the map area. The feldspars, apparently both potassic and plagioclase, have been converted to scaly alteration products, and the rock shows evidence of shearing.

Longley, W.W., 1951, Bachelor Lake Area, Abitibi-East County: Quebec Dept. of Mines, G.R. no. 47, p. 20.

BIRDSEYE LIMESTONE — Lower Ordovician

This term was in use for a limestone above the Beekmantown Sandstone of New York and thus included Chazy Limestone. In "Geology of Canada" (1863, p. 137) ten feet of limestone between the Chazy Limestone below and the Lowville Limestone above is assigned to the Birdseye. At present, Birdseye is considered the middle formation (Lowville) of a Black River Group.

The Birdseye is a dark, commonly somewhat shaly, limestone with the small white spots, which give it is name. The spots are sections of corals.

The name has not been used formally for a formation in a geological publication since 1904. It has some use as a descriptive term.

BIVE (TAG) BROOK ZONE (of Shickshock Group). — Lower Paleozoic

These metasedimentary rocks are typically grey to black on fresh surface. The weathered surface is some shade of brown. Granularity ranges from medium to aphanitic. Apart from a very few outcrops all these rocks show one dominant _S_-plane here called foliation. The foliation results from the coincident orientation of one or more of the planar elements, including fissility, platy mineral aligment (schistosity), colour layering, and fine lamination apparently due to metamorphic segregation. Bedding is revealed at a few places by coarse colour layering, grain gradation, interlayering of fine and coarse layers, and interlayering of different lithologies.

Mattison, C.R., 1964, Mount Logan Area, Matane and Gaspé-North Counties: Quebec Dept. of Nat. Res., G.R. No. 118, p. 34-38.

BLAKE RIVER VOLCANICS, GROUP — Archaean

The Blake River Volcanics or Group include formations assigned to the Cadillac Belt by Gunning (1937, p. 6, p. 11). The group consists of 700 feet of volcanis on the north limb of the syncline south of Malartic lake, but the thickness is greater to the northwest, becoming 6,000 feet in 20 miles. Some metasedimentary rocks are intercalated in the volcanics.

On the map for the Cadillac area, Gunning (_loc. cit._) divided the group into three parts: cropping out on the north, the lower half of the group is greenstones; a thin middle part consists of rhyolite derivatives, and an upper part consists of tuff and agglomerate. For the Cléricy map area Ambrose (1941, p. 14-18) suggests a minimum thickness of 20,000 feet and uses a fourfold division of the group.

Baragar (1968) has presented results of sampling of two sections of the group. One involves about 40,000 feet of strata and extends across the Ontario border south of the Porcupine-Destor fault. The other section of 12,500 feet is north of the fault in Quebec. The longer section is believed to show systematic variation in composition in rocks altered at a low grade. The analyses show that the rocks are mostly of the composition of andesites and basalts.

Gunning, H.C., 1937, Cadillac Area, Quebec: Canada Geol. Surv., Mem. 206, p. 6, p. 11.

Gunning, H.C., Ambrose, J.W., 1939, The Timiskaming-Keewatin Problem in the Rouyn-Harricanaw Region, North-Western Quebec: Roy. Soc. of Canada, Third Series, Section IV, Tn. volume XXXIII, 1939, p. 27.

Ambrose, J.W., 1941, Cléricy and La Pause Map-Areas, Quebec: Canada Geol. Surv., Mem. 233, pp. 14-18.

Baragar, W.R.A., 1968, Major element geochemistry of the Noranda belt, Quebec-Ontario: Can. Jour. Earth Sci., 5, p. 773-790.

BOLTON LAVAS Ordovician

(Wilmarth -1-230) Clark (1934) suggested that certain altered basic lavas of the Mansonville map-area are younger than the Magog Shales with which they are associated and gave to these rocks and to some meta-gabbros and serpentinites the name "Bolton igneous series". In 1936, he and Fairbairn used for them the designation "igneous group".

Ambrose (1942) and Fortier (1963) were able to demonstrate that the lavas are interbedded with the Ordovician rocks, but Cooke (1948, 1950) reasseverated the conclusions of Clark. Ambrose (1957) showed the untenability of the Clark-Cooke interpretation.

It is difficult to relate plutonic and effusive rocks so that Bolton can well be eliminated as a stratigraphic name. The meta-lavas are most easily designated by the name of the sequence in which they occur.

Clark, T.H., 1934, Structure and stratigraphy of southern Quebec:

Geol. Soc. Am., Bull. 45, p. 12, p. 19.

Clark, T.H. and Fairbairn, H.W., 1936, The Bolton igneous group of southern Quebec: Royal Soc. Can., Tn. vol. 30, Sec. IV, v. 30, p. 13-18.

Ambrose, J.W., 1942, Mansonville Map-area: Geol. Surv. Can., Paper 42.1,

Fortier, Y.O., 1946, Geology of Orford Map-area: Stanford University thesis, p. 128.

Cooke, H.C., 1948, Age of the Bolton lavas, Memphremagog district, Quebec: Royal. Soc. Can. Tn. 42, Sec. IV, pp. 17-27.

Cooke, H.C., 1950, Geology of a southwestern part of the Eastern Townships of Quebec: Geol. Surv. Can., Mem. 257, pp. 79-99.

Ambrose, J.W., 1957, The age of the Bolton lavas, Memphremagog district, Quebec: Nat. Can. 84, pp. 161-170.

BONNECAMP SYNCLINE.

This syncline, which trends north of east, is characterized by folds on a smaller scale than those of the Champou syncline and Bald Mountain anticline. It has localized folds associated with some cross-folds. The dome structure on the north side of Needle mountain is a result of a cross-fold.

McGerrigle, H.W., 1959, Madeleine River Area, Electoral District of Gaspé North: Quebec, Dept. of Mines, G.R. No. 11, p. 40.

BONSECOURS FORMATION | Cambrian (?)

Osberg proposed Bonsecours Formation for 500 to 2000 feet of grey and green phyllite or locally red slate occurring in an area about Knowlton and Richmond. The beds are considered equivalent to parts of the Oak Hill Group.

Osberg, P.H., 1965, Structural geology of the Knowlton-Richmond area, Quebec: Geol. Soc. Am., Bull. v. 76, p. 226.

BOULDER BAY QUARTZITE — Proterozoic

See Témiscamie Formation.

BOULEAUX POINT SEQUENCE - CALC-ARGILLITIC SEQUENCE — Precambrian

This formation, composed of argillites, sandstones, quartzites, and limestone, overlies the stromatolitic limestones. The argillites and gray, brown weathering limestones, in beds varying from some inches to one foot in thickness predominate in the lower portion of this formation. The higher portion of the formation consists of dark gray quartzites (beds between 2 inches and one foot thick) of argillite, calcareous sandstone and limestone. Quartzite and argillite predominate in the upper portion of the formation.

Dimroth, Erick, 1966, Geology of Dunphy Lake Area, New Quebec Territory: Quebec Dept. of Nat. Res., P.R. No. 557, p. 4, 6.

BOURGAULT LAKE SYNCLINE

This Syncline, which is the most obvious of those of the Harveng Lake area, plunges 20° southeastward. Its western limb dips moderately to steeply east, and the eastern limb is overturned with most dips 50° to 80° east.

Sauvé., Pierre and Bergeron, Robert., 1965, Gerido Lake-Thérenet Lake Area, New Quebec: Quebec, Dept. of Mines, G.R. No. 104, p. 85

BOURLAMAQUE GRANODIORITE

The Bourlamaque granodiorite is a mass about 6 miles from north to south. It lies chiefly in Bourlamaque township but also extends north into Senneville and Pascalis, and east into Louvicourt townships.

The body is a coarse-grained rock, pink to grey, granitic in texture and distinguished in most localities by large, opalescent eyes of quartz.

Cooke, H.C., James, W.F., Mawdsley, J.b., 1931, Geology and Ore Deposits of Rouyn-Harricanaw Region Quebec: Canada, Geol. Surv., Mem, 166, p. 133.

BOUZAN LAKE FAULT

"This thrust fault is the eastward continuation of one recognized in the Granada area along the contact between the Temiscamian conglomerates and the Keewatin tuffs". This fault was later considered part of the Cadillac - Lac Bouzan system (q.v.)

Hawley, J.E., 1933, McWatters Mine Gold Belt, East-Rouyn and Joannès Townships, Annual Report of the Quebec Bureau of Mines for the Calendar Year 1933, Part C, p. 25-26.

BOWES FAULT.

"It lies along the south boundary of the McWaters syncline at its western wedge-shaped end. Its dip is steep to the north"

Wilson, M.E., 1962, Rouyn-Beauchastel Map-Areas, Quebec: Canada, Geol. Surv., Mem, 315, p. 41

BRANDON ANORTHOSITE

In the western half of Brandon, there are three important areas of anorthosite which occur interbanded with the nearly horizontal gneisses of this district. Anorthosite has the appearance of an interstratified mass.

Adams, Frank D., 1896, Report on the geology of a portion of the Laurentian Area lying to the North of the Island of Montreal: Ottawa Geol. Surv. of Canada, Ann. Rept. VIII, 1895, J., p. 126

BRIEN ANORTHOSITE GABBRO Precambrian

Anorthosic gabbros and their altered varieties underlie about five square miles in the central part of Brien township, north of the Hart-Jaune fault. The peaks in the western part of the massif are made up of dark massive anorthositic and gabbroic rocks, and rocks of the slopes to the south are hornblende-plagioclase gneisses. Mineralogical and textural changes can be followed from the massive, coroitic, anorthositic gabbro to the hornblende plagioclase gneisses. The degree of deformation increases gradually southward.

Kish, Leslie, 1968, Hart-Jaune River Area, Saguenay County: Quebec Dept. of Nat. Res., G.R. No. 132, p. 61-63.

BRISTOL SERIES Precambrian

M.E. Wilson (1924) gave the name to metasedimentary and possibly metavolcanic rocks cropping out in a small area in Bristol township, Quebec. Sabourin (1965) in re-mapping the area confirmed the presence of limestone and quartzite but presented the opinion that "meta-rhyolites and meta-andesites" are derived from sedimentary rocks, perhaps calcareous siltstones.

The view presented by Wilson that the rocks are a facies of the Grenville Series is reasonable.

Wilson, M.E., 1924, Arnprior-Quyon and Maniwaki Areas, Ontario and Quebec: Canada Geol. Surv., Mem. 136, pp. 23-28.

Sabourin, R.J.E., 1965, Bristol-Masham Area, Pontiac and Gatineau County: Quebec Dept. of Nat. Res., G.R. 110, pp. 14-15.

BROADBACK SERIES

H.C. Cooke (1914, p. 337) used this name for metasedimentary rocks overlying metavolcanic rocks along Broadback river. Cooke states that, if the conglomerates at the base of the series are not repeated, their thickness is about 1000 feet. He records granite pebbles and cross-bedding in the conglomerates. Shaw (1940) has used the name, but adds little to the data on the series. Gillett (1966) is of the opinion that in the Assinica Lake Areas. The conglomerates are near the top of the Group.

Cooke, H.C., 1914, An exploration of the headwaters of the Broadback or Little Nottaway river, northwestern Quebec Can. Geol. Surv. Summ. Rept, 1912 p. 339

Shaw, George, 1940, Assinica Lake Quebec: Can. Geol. Surv. Paper 40-20 Mishagomish Lake Quebec: Geol. Surv. Paper 40-21

Gillett, L.B., 1966, Geology of Lake Assinica Area, Abitibi Territory: Quebec, Dept. Nat. Res. P.R. 550

BROCK SERIES Archean

Cooke (1919) used this name for a the metasedimentary rocks that cross Brock river above its junction with Chibougamau river. The unit there has a "basal" conglomerate very poorly exposed but showing 30 per cent hornblende granite pebbles. Alteration products of grits and sandy shales are found.

This name cannot be considered current. Workers in adjacent areas and even in the original region have used Opimeska or other names.

Cooke, H.C., 1919, Some stratigraphic and structural features of the pre-Cambrian of northern Quebec: Jour. Geol. v. 27, pp. 191-193.

BROUGHTON SERIES (facies of "Serpentine belt") Paleozoic (?)

The Broughton series consist of serpentine, soapstone, and greenstone schists. They are the rocks containing, and adjacent to, the asbestos and talc deposits of Robertson, East Broughton, and Broughton, and of several isolated locations in the vicinity. This "series" is softer than the Thetford series (q.v.). The term serves no useful purpose.

Dresser, J.A., 1910, Serpentine Belt of Southern Quebec: Canada Geol. Surv., Summ. Rept., 1909, p. 190.

BRUNET LAKE FAULT.

"It is probably a high-angle reverse one like the Archiac Lake fault and other major longitudinal faults of the area. Its displacement is large near Brunet lake, but could be small in the Gerido Lake area. The fault possibly extends southward and joins the Archiac Lake fault." It strikes northerly.

Sauvé, Pierre., Bergeron, Robert., 1965, Gerido Lake-Thévenet Lake Area, New Quebec: Quebec, Dept. of Mines, G.R. No. 104, p. 78

BUNKER SLATES Paleozoic

Clark (1934, p. 11-12) published this name proposed by Kerr for dark slates in the area east of Memphremagog lake. A tentative age of Lower Cambrian was assigned to these rocks. However, their precise location has not been published,and the formation name is best regarded as abandoned.

Clark, T.H., 1934, Structure and stratigraphy of southern Quebec: Geol. Soc. Am., Bull., v. 45, pp. 11-12.

BUNKER THRUST, BUNKER UNDERTHRUST

Kerr concluded that a fault extending across the southern part of Memphremagog lake and along Massawippi lake is an underthrust although the arguments in support of the concluded have not been published by Clark (op. cit., p. 15) who mentioned the fault. Doll (1951, p. 52) states that its southwestward prolongation in Vermont is the Ware Creek thrust which is believed to have a displacement of 4000 feet.

Doll, C.G., 1951, The Memphremagog quadrangle and the southeastern portion of the Irasburg quadrangle, Vermont: Vermont Geol. Surv., Bull. No. 3, p. 52.

CADILLAC SEDIMENTS GROUP

Gunning (1937, pp. 8-11),in the Cadillac area, used Cadillac Sediments for graywackes with some iron formation and conglomerate lying between Blake River Volcanics on the north and the "Cadillac belt" on the south. In 1939, Gunning and Ambrose use Cadillac Group for the 5,000 feet or more of metasedimentary rock occupying the trough of the regional syncline.

They record more varieties of rock than reported by Gunning and also point out the irregularity of distribution of varieties. Wilson (1956, p. 148) inclines to the opinion that the Cadillac Groups belongs to the Timiskaming Series.

Gunning, H.C., 1937, Cadillac Area, Quebec: Canada Geol. Surv., Mem. 206, p. 8-11.

Gunning, H.C., Ambrose, J.W., 1939, The Timiskaming-Keewatin Problem in the Rouyn-Harricanaw Region, North-Western Quebec: Roy. Soc. of Canada, Third Series, Section IV, vol. XXXIII, 1939, p. 30-31.

Wilson, M.E., 1956, Early Precambrian Rocks of the Timiskaming Region, Quebec and Ont., Can. Bull. of the Geol. Soc. of America, vol. 67, p. 1409.

CADILLAC BREAK FAULT
CADILLAC - LAC BOUZAN FAULT
CADILLAC - LARDER LAKE FAULT

Gunning and Ambrose (1939, p. 35) proposed the name Cadillac Break for the fault causing east-west striking shearing in the Rouyn-Harricanaw region. M.E. Wilson (1943, p. 123) in an area to the west referred to the fault as the Cadillac - Lac Bouzan fault zone. Hawley (1934, p. 26) had given the name Bouzan Lake fault in the McWatters area and recognized its extension westward into the Granada area. Finally, M.E. Wilson uses the name Cadillac - Larder Lake fault.

Gunning, H.C., and Ambrose J.W., 1939, The Timiskaming-Keewatin Problem in the Rouyn-Harricanaw Region, North-Western Quebec: Roy. Soc. Can., Tn. v. 33, p. 35.

Wilson, M.E., 1962, Rouyn-Beauchastel Map-Areas, Quebec: Canada Geol. Surv., Mem. 315, p. 40-41.

Hawley, J.E., 1934, McWatters Mine gold belt, East-Rouyn and Joannis: Annual Rept. of the Quebec Bureau of Mines for the Calendar Year 1933, p. 26.

Wilson, M.E., 1943, The Early Precambrian succession in Western Quebec: Roy. Soc. Can., Proc. 1943, Third ser., Vol. XXXVII, sec. IV, p. 123.

CADILLAC - LARDER LAKE FAULT.

"The fault is indicated by a zone of rusty westhering ankerite - talc - chlorite schist from 100 to 500 feet wide cut by numerous veins of quartz. The fault plane dips about 70° N, and in places, as is usual with thrust faults, occur where an overturned anticline has been thrust over an adjacent syncline; in other places, however, the structure is more complex".

Wilson, M.E., 1962, Rouyn-Beauchastel Map-Areas, Quebec: Canada, Geol. Surv., Mem 315, p. 40.

CAIRNSIDE MEMBER (Of Châteauguay Formation). Cambrian

The rocks of this member are typically exposed for a few miles southeast of Cairnside corners. The type section is to be seen along the road going southeast from Cairnside. It is nearly pure orthoquartzite with siliceous, or rarely dolomitic cement.

Clark, T.H., 1966, Châteauguay Area, Châteauguay, Huntingdon, Beauharnois, Napierville and St. Jean Counties: Quebec Dept. of Nat. Res., G.R. No. 122, p. 20-29.

CAIRNSIDE AND SAINT-ANTOINE-ABBE FOLDS.

"The peculiar distribution of the Cairnside beds between Cairnside and Saint-Antoine-Abbé invites the suggestion that these beds have been folded into synclinal forms."

This structure is so poorly defined that it can be disregarded.

Clark, T.H., 1966, Châteauguay Area, Châteauguay, Huntingdon, Beauharnois, Napierville and St. Jean Counties: Quebec, Dept. of Nat. Res., G.R. No. 122, p. 46

CALCIFEROUS Lower Ordovician

This a term used with group, sandrock, sandstone, or formation for beds between the Potsdam Sandstone and the Lowville (Birdseye) Limestone. It is essentially the old name for beds now termed Beekmantown. In "Geology of Canada" (1863, p. 110) it is pointed out that in Quebec the beds are dolomite rather than principally sandstone. The Lévis Formation was early assigned to the same age as the Calciferous. This term is mentioned only rarely after 1904.

CALDWELL SERIES (GROUP) (Wilmarth -1-316) Cambrian-Ordovician (?)

B.R. MacKay gave the name Caldwell to sedimentary and volcanic rocks from the brook that enters Chaudière river 5½ miles downstream from Beauceville. The brook is known as "Colway", "Calway"or"Guillaume"brook. The series has dirty sandstones, basic lavas and tuffs, and green, grey, and red shales. The pink to red marble described from this series is partly if not entirely metasomatic.

Tolman (1936) in the Lake Etchemin area has three divisions.

III - Impure quartzites and minor quantity of interbedded coloured slates.

II - Basic volcanic rocks, including some closely related grey, green, and red slate.

I - Mica and chlorite schists and impure quartzites.

It is very doubtful whether this sequence can be found elsewhere, but lithologically equivalent rocks can be recognized from Memphremagog lake to Temiscouata lake on the southeast side of Sutton axis.

The Caldwell series is not dated. MacKay inferred, perhaps by analogy with Sillery formation, that the formation is Cambrian. It is generally agreed that the Caldwell is older than the Beauceville Series, and the latter has shown by graptolites to be Middle Ordovician.

In the Ste. Justine area, Gorman encountered graptolites of the age of the shales near Magog. The lithology of the exposures near the fossil locality is essentially that of the local Caldwell but Gorman has shown it as Beauceville. The possibility nevertheless remains that some or all rocks Caldwell series are Ordovician rather than Cambrian.

With the realization that the group is but loosely dated, it seems to be advisable that the name be replaced by formation names as better dated sections are found.

MacKay, B.R., 1921, Beauceville Map-area, Quebec: Geol. Surv. Can., Mem. 127, pp. 12-20.

Tolman, Carl, 1934, Lake Etchemin Map-area: Geol. Surv. Can., Mem. 199, pp. 4-9.

Gorman, W.A., 1955, Geology of Ste. Justine Map-area: McGill University thesis.

Geology of Quebec: G.R. 20, pp. 340-341, p. 406, p. 427.

Caldwell Thrust

H.C. Cooke (1954) has used this name for a hypothetical fault presumed to have brought quartzites of the Caldwell Group over rocks of the Oak Hill Group.

Cooke, H.C. (1959), The Green Mountain anticlinorium in Quebec: Geol. Ass. Can.; PR. 6, Pt. 2, p. 42.

CALL MILL SLATE Cambrian (?)

This hard dark gray to dark blue gray slate can form a much as 100 feet of bed overlying the Tibbit Hill Schist but it can also be absent. This is the oldest metasedimentary formation of the Oak Hill Group.

Clark, T.H., 1936, A lower Cambrian Series from Southern Quebec: Roy. Can. Inst., v. 21, Pt. 1, pp. 138.

CAMPBELL LAKE FAULT.

"It crosses the northern half of the area. A highly-sheared zone in basic volcanic rock reveals the presence of the fault in the southern part of the Opemiska Copper property. For the most part, however, the fault is hidden under a thick cover of sand".

Archibald, G.M., 1960, Southwest quarter of Levy township, Electoral District of Abitibi-East: Quebec, Dept. of Nat. Res., P.R. No. 419, p. 7.

CANADIAN SHIELD

This term was introduced by Ed. Suess for the area of Precambrian rocks cropping out around Hudson Bay. Canadian Protaxis, Northern Protais, and Precambrian Shield have been used. Archaean Nuclear Area and some similar terms are outmoded.

CANIAPISKAU SERIES

Named by James and Gill (1929), in an unpublished report, this large geological unit contains the major part of the formations of the Labrador geosyncline. The Caniapiskau series lie unconformably along the southwestern border of the geosyncline on the crystalline basement rocks of the Early Precambrian. To the northeast, it is in contact with an important series of schists containing massive lavas and basic to intermediate intrusions to which was given the name "Nachikopi Series". See Kaniapiskau.

Gilbert, J.E., 1953, Northern Quebec, A new mining area, A study of the territory between Eastmain river and Ungava Bay: Quebec Dept. of Mines, G.R. No. 56, p. 14.

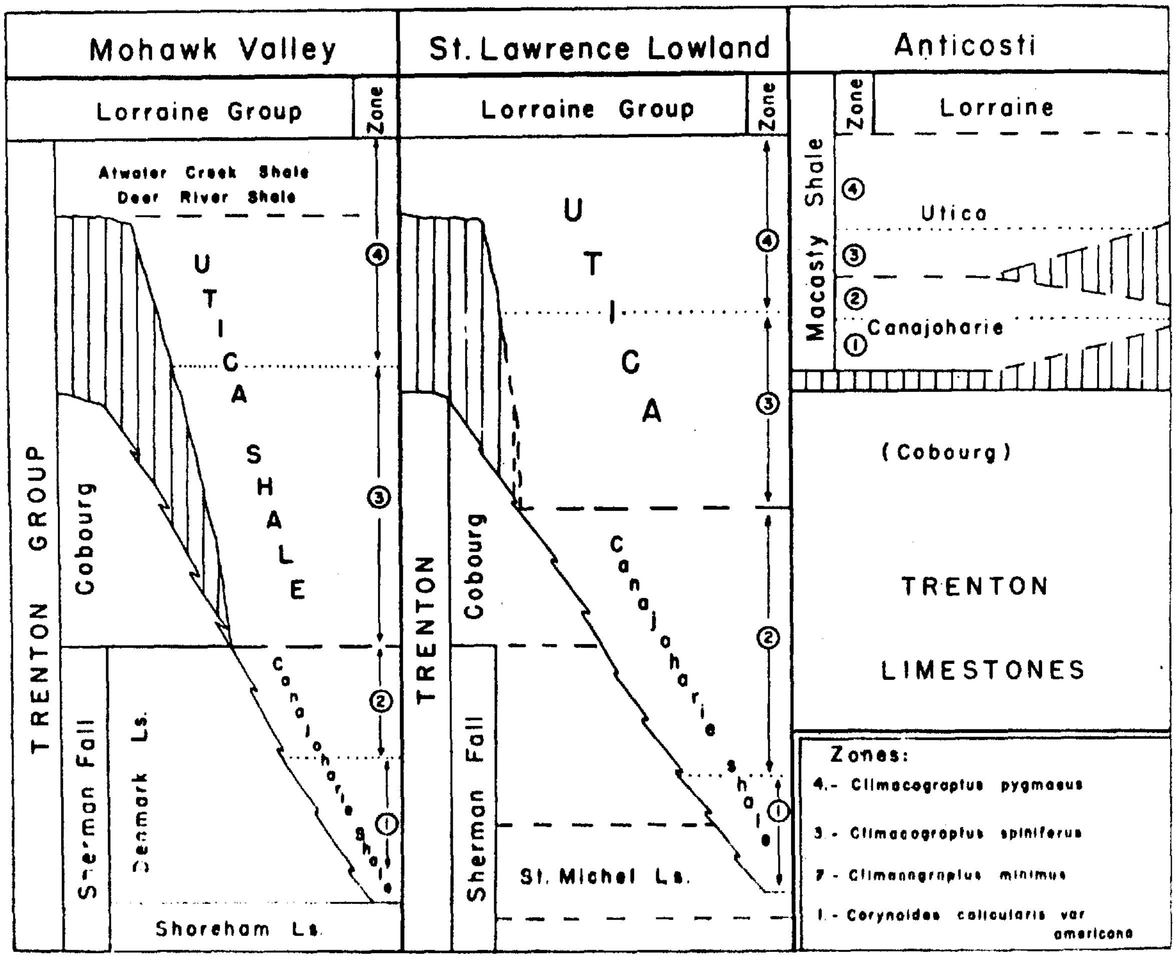


FIG. 9.—Trenton-Canajoharie-Utica correlations as interpreted in Mohawk Valley, St. Lawrence Lowlands, and Anticosti Island.

(Riva, A.A.P.C., Mem. 12, 1969) p. 532

Table II
Revised Table of Formations

Era	Supergroup	Group	Formation	Lithology and Remarks
PROTEROZOIC			Shabogamo Gabbro	Diabasic olivine gabbro, coarse-grained norite, anorthositic gabbro, hyperathene-augite-plagioclase gneiss.
			Sims	Quartzite, grit, conglomerate (flat lying).
	Unconformity			
		MONTAGNAIS	Retty Peridotite	Serpentinised peridotite; pyroxenite sills may be older than Wakuach Gabbro.
			Wakuach Gabbro	Gabbro, metagabbro, glomeroporphyritic gabbro ("leopard rock"), diorite.
	Intrusive Contact			
	KANIAPISKAU	DOUBLET	Willbob	Basalt, metabasalt, flow breccia, minor sediments.
			Thompson Lake	Quartzite, greywacke, shale, argillite, conglomerate, intercalated basalt.
			Murdoch	Agglomerate, breccia, tuff, basalt, minor sediments.
		KNOB LAKE	Menihek	Carbonaceous slate and shale, quartzite, greywacke; basic volcanic rocks; minor dolomite and chert.
			Purdy	Dolomite, minor argillaceous beds.
			Sokoman	Iron-formation; intercalated basic volcanic rocks.
			Ruth	Ferruginous slate, slaty iron-formation, black and brown slate, carbonaceous shale.
			Wishart	Feldspathic quartzite, arkose, minor chert, greywacke and slate, intercalated basic volcanic rocks.
			Fleming	Chert breccia, minor lenses of shale and slate.
			Denault	Dolomite, limestone and cherty facies, fragmental dolomite.
			Attikamagen	Green, red, grey and black shales, slate, graphitic slates, phyllites and argillites, intercalated basic flows.
			Seward	Grit, arkose, conglomerate, white or pink quartzite, greywacke, acidic flows.

Fravey & Duffel
(G.S.C., Paper 64-25, 1964)

Table of Formations

Age	Formation	Description
Quaternary		Clay, sand, gravel, boulder deposits
	Great unconformity	
Proterozoic	Unit 15	Gabbro dykes, diabasic in part
	Intrusive contact	
	Belcher Group (14)	Basalt; agglomerate; tuff; dolomite; limestone; argillite; quartzite; greywacke; black slate; vari-coloured ferruginous 'argillites' (iron-formation), chert; jasper; conglomerate; dykes of diabase and feldspar porphyry. Relationship to 10, 13 unknown
	Manitounuk Group (13)	Gabbro; basalt; tuff; sandstone; arkosic sandstone; shale; dolomitic limestone; siliceous, cherty or concretionary limestone; quartzite
		Unconformity
		Arkose. Relationship to 10, 11, 12, 14 unknown.
	Otish Mountains Group (12)	Gabbro; arkose; arkosic sandstone; argillite; sandstone; grit; pebble- and boulder-conglomerate Relationship to 10, 11, 13, 14 unknown
	Sakami Formation (11)	Boulder-conglomerate; pebble-conglomerate; mudstone; siltstone; arkose; sandstone. Relationship to 10, 12, 13, 14 unknown
	Kaniapiskau Supergroup (10)	Sandstone; argillite; cherty metallic iron-formation; slate; phyllite; dolomite; jasper-hematite iron-formation; arkose; gabbro. Metamorphosed equivalents: crystalline limestone; chert; quartzite; quartz-specularite-magnetite iron-formation; garnetiferous, graphitic, biotite-muscovite-hornblende gneiss; coronite (meta-gabbro). Relationship to 11 to 14 unknown
	Unconformity	
Archaean	Unit 9	Pyroxenite; peridotite; norite; gabbro; anorthositic gabbro; metamorphosed equivalents
	Intrusive contact, rarely structurally conformable	
	Unit 7	Massive biotite and/or hornblende granite; some granodiorite and quartz monzonite; alaskite; porphyritic in part
	Commonly gradational contact, may be intrusive	

Table of Formations (*conc.*)

Age	Formation	Description
Archaean (con't)	Unit 6	Pyroxene-biotite granodiorite and gneiss
	Gradational or structurally conformable contact	
	Unit 5	Granodiorite and granite gneiss; migmatite; banded gneiss. May include minor metamorphosed Kaniapiskau Supergroup rock in the southeast
	Gradational or structurally conformable contact	
	Unit 4	Pink to white pegmatite and pegmatitic granodiorite; granodiorite
	Structurally conformable contact	
	Unit 3	Sedimentary schist and gneiss with interlayered granite and pegmatitic granite
	Structurally conformable contact	
	Unit 2	Gneiss and schist derived from volcanic and sedimentary rocks with minor granitic material.
	Structurally conformable contact	
	Unit 1	Andesite, dacite, rhyolite, and pyroclastic rocks; greywacke, quartzite, impure quartzite and conglomerate; metamorphosed equivalents; minor serpentinite

(G.S.C. Mem. 339, pp. 10-11, 1966) p. 11

Table I: Tentative correlations along the Labrador Trough

Between 59° and 58°		Between 58° and 57°			Between 57° and 54°		
west (Bérard 1965)	east (Sauvé and Bergeron 1965)	west (Bergeron 1954, Fahrig 1955)	east (Fahrig 1955, 1956a)		west (Harrison 1952, Dimroth 1969)	east (Baragar 1967, Dimroth 1969)	
		conglomerate			Sims Quartzite		POST-HUDSONIAN COVER
	Thévénet Slate						CYCLE III
	Hellancourt Basalt		basalt			Willbob Basalt	
Larch River Slate		Larch River Slate	slate			Thompson Lake Slate and Irene Lake iron formation	
		upper iron formation	upper iron formation	locally basalt and pyroclastics			
Abner Dolomite ?		Abner Dolomite ?	dolomite	?	?	?	
						Murdoch Pyroclastics	CYCLE II
Chioak Formation (slate, conglomerate, greywacke)	Baby Schist	Chioak Formation (slate, conglomerate, greywacke)	basalt and pyroclastics			basalt	
Dragon Formation (slate, siltstone)			slate		Menihek	Menihek Slate	
Fenimore Iron Formation	iron formation	Fenimore iron formation	iron formation (local)		Sokoman Iron Formation	Sokoman Iron Formation	
Lower Slate	Baby Schist				Ruth Slate		
Allison Quartzite	Harveng Dolomite	Allison Quartzite	quartzite		Wishart Quartzite	Wishart Quartzite	
NOT PRESENT		NOT PRESENT			Attikamagen IV Slate		CYCLE I
					Denault Dolomite	Denault Dolomite	
					Attikamagen III Slate	basalt-shale sequence (Attikamagen II)	
					Swampy Bay Subgroup (Attikamagen I)	Swampy Bay Subgroup	
					Pistolet Subgroup	Pistolet Subgroup	
					Seward Subgroup	Seward Subgroup	
ARCHEAN		ARCHEAN			ARCHEAN		BASEMENT

Dimroth, et al.
(G.S.C. Paper 70-40, 1970) p. 52

CAPE SMITH ZONE Proterozoic

It extends from Cape Smith, 125 miles south of Cape Wolstenholme on the east shore of Hudson bay to Wakeham bay, south of Hudson strait. It is 40 miles at its western extremity and 10 miles wide at the eastern. The rocks in this zone consist of greenish grey, to dark green lavas containing thin sedimentary bands and intruded by concordant diorite bodies. The rocks are more or less schistose. Ellipsoidal lavas are common, and the sediments are tuffaceous and feldspathic. The whole series is younger than the bordering granite gneisses.

Gilbert, J. E., and Bergeron, R., 1957, Northern Quebec: Quebec Dept. of Mines, G.R. No. 75, p. 15.

CAPE-SMITH-WAKEHAM BAY ZONE Precambrian

These rocks unconformably overlie an Archean granitic gneiss complex to the south, and grade through increasing metamorphism into paragneisses and amphibolites to the north.

Beall, G.H., 1959, Lac Cross Area, New-Quebec, Quebec Dept. of Mines, P.R. No. 396, p. 1.

CAPISISIT LAKE GRANITE Precambrian

The Capisisit Lake Granite has an outcrop extending about 9 miles in a northwesterly direction with a width of 1½ miles in the map area of that name. The granite is fresh appearing and pink with about 50 per cent albite, 15 to 35 per cent microcline, and 10 to 25 per cent quartz. Hornblende and biotite are dark minerals.

Gilbert, J.E., 1951, Capisisit Lake Area, Abitibi-East County: Quebec Dept. Mines, Geol. Rept. 48, p. 31-32.

CARMEL RIVER MEMBER Richmond Group (Ordovician)

Clark used this name for 53 feet of non fossiliferous gray green shale and sandstone forming the lowest 53 feet of the Bécancour River Formation on the section on Nicolet river.

Clark, T.H., 1964, Yamaska-Aston area: Quebec Dept. Nat. Res., G.R. 102, p. 9.

CASTIGNON-OTELNUK FAULT SYSTEM

"It consists of two branches south of Castignon lake: one separating red beds and dolomitic quartzite; the other separating the limestone-dolomite sequence.from slates of formation 10. Both are steep thrust faults with movement to the south. The limestone-dolomite sequence in between forms a narrow syncline plunging northeast and overturned to the southeast."

Dimroth, Erich, 1965, Geology of Otelnuk Lake Area, New Quebec Territory: Quebec, Dept. of Nat. Res., P.R. No. 532, p. 18-19.

CAUGHNAWA GA MEMBER Chazy

Clark introduced this name in 1944 (p. 29) for a member of the Laval Formation. In a final report (1952) on the area Caughnawaga is used only as a geographic reference. The limestone quarries there have long been operated, for example, the stone for the upper locks of the Lachine canal were quarried from there.

Clark, T.H., 1944, Structure and stratigraphy in the vicinity of Montreal: Roy. Soc. Can., Tn. 38, Sect. IV., p. 29.

Clark, T.H., 1952, Montreal area, Laval and Lachine map areas: Quebec Dept. of Mines, G.R. 46, p. 37.

CAUSAPSCAL ANTICLINE

"The Lake Branch Formation and the middle band of the York River Formation are on the south limb of the westward plunging, asymmetrical CAUSAPSCAL ANTICLINE. The fold dies out on the eastern border of the town of Causapscal. It has a steep southern limb, overturned as much as 15°on Chasseurs brook, and a gentle northern limb which is faulted and involved in minor cross-folding. The southern limb is also cut by faults of small displacement and minor folds".

Stearn, C.W., 1965, Causapscal Area, Matapédia and Matane Counties: Quebec, Dept. of Nat. Res, G.R. No. 117, p. 35.

CAWATOSE BASIN Précambrian

The Cawatose basin is roughly indicated by the shape of Cawatose lake, the elliptical outline of which is a reflection of the structure of the underlying gneisses. The basin is about nine miles long and seven miles wide, with its long axis trending N. 60°E. It was mapped in detail, which established the arcuate arrangement of the gneisses and the concentric trends and inward dips of the schistosity and foliation. The lineation shows a tendency to converge inward to form a line of focus three miles long, trending N. 60°E.

Wahl, G. William., Osborne, F.F., 1950, Cawatose Map-Area, Pontiac County: Quebec, Dept. of Mines, G.R. No. 44, p. 13.

CEDAR RAPIDS GRANITE Precambrian

The Cedar Rapids granite, which projects for 2 or 3 miles into the map-area at its northwest corner, is massive, medium- to coarse-grained, and grey to pink. It is composed chiefly of sodic plagioclase and quartz, with lesser amounts of orthoclase, microcline, and biotite. The rock can be classed as a biotite granite.

Longley, W.W., 1946, Tonnancourt-Holmes Map-Area, Abitibi County: Quebec Dept. of Mines, G.R. No. 24, p. 13.

CENTRAL -DUPARQUET FAULT.

The point where this fault branches away from the Porcupine-Destor Fault is at the southeast corner of the town of Duparquet, at the junction of the Duparquet - La Sarre roads. It has an easterly strike and appears to dip to the south at a steep angle. Good exposures of the fault zone can be seen in the eastern part of Duparquet township. No displacements along this fault could be determined. However, if the northeasterly foliation of the rocks between shears within the fault zone is an expression of fracture cleavage, it is probable that the relative movement was north side towards the east. This fault dies out by "horse tailing" to the east in Destor Township.

Graham, R. Bruce, 1954, Parts of Hebecourt, Duparquet and Destor Townships, Abitibi-West County: Quebec, Dept. of Mines, G.R. No. 61, p. 35

CHADBOURNE SERIES Precambrian

The Chadbourne Series consists chiefly of andesite is many of them of the massive type. It includes thin but persistent dacite flows exhibiting exceptionally good flow top and flow base structures. The chief feature of the series, however, is the widespread occurrence, in scattered pods and lenses, of rhyolitic flow and tuffaceous material.

This is useful only as a local name.

Conolly, H.J., Hart, R.C., 1936, Structural Geology of the Osisko Lake Area, Quebec: Canadian Inst. Mining and Metallurgy Trans., v. 39, p. 11.

CHADBOURNE ORE BODY BRECCIA

The Chadbourne ore deposit includes all of the Chadbourne breccia that has been sufficiently mineralized with gold to warrant mining for flux and for the gold that it contains.

The fragments of the breccia consist of whatever rock was originally present at the time the brecciation occured. This, except were intrusions of diorite or syenite porphyry are brecciated, consists of rhyolite at and south of the shaft and andesite to the north.

Wilson, M.E., 1949, Noranda District, Quebec: Canada, Geol. Surv., Mem, 229, p. 97.

CHALEUR(S)(BAY)GROUP,SERIES, Silurian

Although the Silurian section on the north shore of Chaleurs Bay was one of the first in Canada to be examined by Logan, the designation "Chaleur Group" was not given until 1900 by Ami (1900, p. 204) who formalized the geographic reference to the locality found in the writings of E. Billings. Chaleur (s) Bay series or group have been used by several authors but these names seen to be less useful than the Ami form. The form with the terminal "s) is more correct, but "Chaleur" is the form proposed by Ami.

Ami, H.M., 1900, Synopsis of the geology of Canada: Roy. Soc. Can. Tn. v. 6, p. 204.

Burk, C.F., 1964, Silurian stratigraphy of Gaspé Peninsula, Quebec: Am. Assn. Pet. Geol. v. 48, p. 451.

CHAMBLY-FORTIERVILLE SYNCLINE

The dominating structural feature of this area is the syncline whose axis passes approximately along the line of Huron river and also through Chambly. One hundred miles farther northeast it passes through Fortierville. Because of the general low dips, the syncline cannot be seen easily. Its axis trends northeast.

Clark, T.H., 1955, St. Jean-Beloeil Area, Iberville, St-Jean, Napierville-Laprairie, Rouville, Chambly, St. Hyacinthe and Verchères Counties: Quebec Dept. of Mines, G.R. No. 66, p. 48.

Clark, T.H., 1964, Upton Area, Bagot, Drummond, Richelieu, Saint-Hyacinthe and Yamaska Counties: Dept. of Mines, G.R. No. 100, p. 22.

CHAMPLAIN

The lake has given its name to a period and to a marine flooding.

I- CHAMPLAIN, CHAMPLANIAN, CHAMPLAINIC. Period, System, Group, Division.

E. Emmons introduced in 1842 Champlain Group for the formations Potsdam to Lower Silurian in New York. In this use the name had priority over Ordovician but,despite attempts to substitute it for Ordovician as recently as 1924 when Schuchert in the textbook of historical geology used Champlainian to the exclusion of Ordovician, this use is now abandoned.

II- CHAMPLAINIAN EPOCH SERIES.

Authors have used CHAMPLAINIAN for Mohawhian and Chazy of Middle Ordovician.

III- CHAMPLAIN CLAY (SEA) (EPOQUE).

C.H. Hitchcock in 1861 in the Geology of Vermont (vol. 1, p. 156) proposed Champlain Clay for the fossiliferous unconsolidated deposits occurring along Champlain and St. Lawrence valleys at elevations less than 1000 feet. Although there was reluctance on the part of Logan and J.W. Dawson to accept the name, Champlain gained currency, and Hitchcock's two divisions the older and deeper Leda Clay and the younger and shallower Saxicava Sand were recognized in many places. Hochelagan Formation was suggested as a substitute by Woudworth in 1905.

IV- CHAMPLAIN FAULT

Authors have used Champlain fault if the segment of the St. Lawrence and Champlain fault (q.v.) in the United States is referred to.

V- CHAMPLAIN PERIOD

The use by several authors of Champlain for a period of the Tertiary or Quaternary can be found prior to 1900, but Ami has listed it as a period (Ami, 1900, p. 224) although not as a system (p. 188).

Ami, H.M., 1900, Synopsis of the Geology of Canada, Roy. Soc. Can., Tn. v. 6, Pt. IV, p. 224.

CHARLETON FORMATION Ordovician

See Vauréal Formation.

CHATEAUGUAY FORMATION Cambrian

Lying unconformably upon the Covey Hill beds is a series of sandstones and dolomites here named the Châteauguay Formation, covered disconformably by the dolomite beds of the Beauharnois Formation of Beekmantown age. The Châteauguay Formation is made up of 2 members, the Cairnside and the Ruisseau Norton. The Cairnside consists of

TABLEAU DES FORMATIONS

et

CARTE DE CORRELATION DES FORMATIONS DANS LA REGION DE CHATEAUGUAY

TRAVAUX ANTERIEURS				PRESENT RAPPORT							
	Logan Ells	1900 - 1960 AUCT.		SYSTEME	SERIE	ETAGE	GROUPE	FORMATION	MEMBRE	CORRELATION SUGGEREE LITHIQUE	CORRELATION SUGGEREE TEMPS
ORDOVICIEN	CALCIFERE	BEEKMANTOWN BEAUHARNOIS (RAYMOND)		ORDOVICIEN	CANADIAN		BEEKMANTOWN	BEAUHARNOIS	Saint-Lin (n'affleure pas)		? Bellefonte
									Huntingdon (Mallet, 457')		Jefferson City
									Sainte-Clotilde (Mallet, 221')	Oxford	Roubidoux Gasconade Tribes Hill Heuvelton
		COUCHES DE TRANSITION	THERESA (RAYMOND CLARK)	CAMBRIEN	CROIXAN	TREMPEALEAUIEN	POTSDAM	CHATEAUGUAY	Ruisseau Norton	March Theresa	Little Falls
			MARCH (WILSON CLARK)						Cairnside 500'	?Keeseville	
			NEPEAN (WILSON)					COVEY HILL	Rivière aux Outardes 500'	?Keeseville	?Keeseville
CAMBRIEN	POTSDAM	?KEESEVILLE POTSDAM							Covey Hill restreint 1500'	Potsdam	

(Clark, 1966, Q.D.N.R., -122) p. 6

crossbedded orthoquartzite with siliceous cement, thick-bedded and poorly provided with fossils in its lower part, and showing abundant trails and tracks, together with *Lingulepis acuminata* in its upper part.

Clark, T.H., 1966, Châteauguay Area, Châteauguay, Huntingdon, Beauharnois, Napierville and St. Jean Counties: Quebec Dept. of Nat. Res., G.R. no. 122, p. 19.

CHATHAM GRENVILLE STOCK

The Chatham-Grenville stock is the youngest Precambrian formation recognized in the Lachute sheet. It is composed of syenite and granite of a type petrographically distinct from the other intrusives because of the presence of xenotime as an accessory mineral and of alkaline amphiboles and pyroxenes in some facies.

Osborne, F.F., 1938, Lachute Map-Area, General and Economic Geology, Québec Bureau of Mines, p. 19-20.

CHATTE RIVER LIMESTONES Silurian

This is intended as a nonce name for limestone encountered along the river in Gaspé and considered by Logan as being the age of the Guelph Formation.

Ami, H.M., 1900, Synopsis of the Geology of Canada: Roy. Soc. Canada, Trans., 2nd ser., vol. 6, sec. 4, p. 204.

CHAZY SERIES (GROUP)

The Chazy Group has been mapped for more than a century in Canada: Logan (1863, pp. 123-135) devotes a chapter to the Chazy Formation. Near Montreal, the Chazy limestones have been referred to particularly because of their use for buildings.

In general, the term has been used for rocks of the shelf facies that is those commonly composed of coarser clastics or calcareous rocks, and the series has been considered by some writers as the upper part of the Lower Ordovician but probably by most as the basal part of the Middle Ordovician.

The formations of this group are found in the St. Lawrence Lowlands both in the main part and on the Mingan islands. See Rockcliffe, Aylmer, Laval, St. Martin, Ste-Thérèse, Mingan.

The stratigraphy of the group derived from well logs has been presented by Roliff. The stratigraphy has also been discussed by Hofmann, and Roliff point out that the apparent anomaly of the thickness of the Chazy rocks near Trois-Rivières is a result of logging some Chazy as Potsdam.

Hofmann is inclined to the view that the contact between Chazy and Beekmantown is in the Pamelia dolomite. Furthermore, as shown in his paper (1963, Fig. 9), he believes that the Laval Formation includes beds correlative with the Crown Point and Day Point of New York, that is Lower and Middle Chazy, rather than Upper Chazy as most workers had contended.

Elkanah Billings suggested that the graptolites of the Levis Formation are of Beekmantown-Chazy age, and this view accepted in dating the Deepkill Formation of New York. The matter has not yet been decided, but at present the view is that the Levis beds contain correlatives of both Beekmantown and Chazy Formations of the shelly facies.

Hofmann, H.J., 1963, Ordovician Chazy Group in Southern Quebec: Am. Assn. Pet. Geol., v. 63, pp. 270-301.

Roliff, W.A., 1967, A stratigraphic analysis of the subsurface data relating to the Chazy Group in the St. Lawrence Lowland of Eastern Canada: Can. Jour. Earth Sci., v. 4, pp. 579-595.

Kay, Marshall, 1962, Classification of Ordovician Chazyan shelly and graptolitic sequences from central Nevada: Geol. Soc. Am., Bull. v. 73, pp. 1421-1430.

CHERTSEY FACIES (of MORIN ANORTHOSITE) Precambrian

Cataclastic deformation was particularly intense in the Morin anorthosite near the village of Chertsey from which Adams named the Chertsey facies. The Chertsey facies has, near the type locality, s planes that dip westward at a low angle. The same granulation is imposed on other formations such as Grenville gneisses, quartzite, and orthogneisses, and the foliation is parallel to that developed in the anorthosite. In the Chertsey facies, which is commonly deep blue-green, the granulation is extreme. Mafic minerals are drawn out to the dimensions of the blade of a table knife with an exceedingly marked lineation trending almost north-south. Under the microscope, the plagioclase is seen to be reduced to a fine mosaic with somewhat sutured outlines. Potassic feldspar and possibly quartz are present as grains interstitial to the plagioclase.

Osborne, F.F., 1949, Coronite, labradorite, anorthosite, and dykes of andesine,anorthosite,New Glasgow, P.Q., Roy. Soc. Canada Trans., Sec. 4, v. 43, p. 104.

Chibougamau is the name of a large lake and a mining district northeast of lake St. John.

I. CHIBOUGAMAU COMPLEX.

Tolman (1931) introduced this term for granitic and more basic rocks intrusive into metavolcanic and metasedimentary Archean rocks. Although Chibougamau complex is mentioned in "Geology of Quebec" (1944, p. 134), the term has not gained widespread use. Insted "Chibougamau anorthosite" has be used for the stratiform body with associated gabbros as well as to some rocks developed by reaction between the meta-anorthosite and younger granitic rocks.

Tolman, Carl., 1932, An early pre-Cambrian sedimentary series in Northern Quebec: Jour. Geol., vol. 40, p. 356.

II. CHIBOUGAMAU SERIES

Conglomerates and other clastic sedimentary had been mentioned as overlying unconformably the gneisses and granitic rocks at many localities in the Chibougamau district for many years. They had been considered equivalent to the Cobalt of the Témiscamingue Lake region. Mawdsley and Norman (1935, p. 43) proposed "Chibougamau series" for the conglomerates, arkoses, and grits and suggested that an unconformity may occur in the series but not much significance is to be attached to it. The conglomerates are the most spectacular part of the series and are characterized by boulders up to two feet long in a dark and poorly sorted matrix. No striae have been certainly recognized on the boulders, which are of graywacke, greenstone, and granitic rocks, but not of anorthosite. It has been suggested that the conglomerates are tillites.

It is difficult to arrive at an estimate of the thickness of this series. Gilbert (1958, p. 21) in the Bignell area has measured a section of 555 feet, which he states represents most of the beds. His section is:

Boulder conglomerate	300 feet
Massive arkose	10 feet
Bedded arkose and graywacke	15 feet

Greenish-gray slaty argillite	10 feet
Gray and pink arkose (few boulders)	100 feet
Pebble conglomerate	40 feet
Laminated graywacke	30 feet
Basal Boulder conglomerate	50 feet

Thicker sections have been encountind elsewhere.

Mawdsley, J.B., and Norman G.W.H. (1935) Chibougamau Lake Map-area, Quebec: Geol. Surv. Can., Mem. 185, p.43.

Gilbert, J.E., 1958, Bignell Area, Mistassini and Abitibi-East and Roberval Electoral Districts: Quebec, Dept of Mines, G.R. 79, p. 21.

CHIBOUGAMAU LAKE COMPLEX

This complex which is exposed in a small part of the northwestern part of Rinfret township, is composed of "diorite" and "quartz diorite" and is on the northwest side of the complex of anorthosite and gabbro. The term is poorly chosen because of other use of Chibougamau (q.v.) and should be abandoned.

Allard, G.O., 1967, Northwest quarter of Rinfret township, Abitibi-East and Roberval counties: Quebec Dept. of Nat. Res., P.R. 567, p. 8.

CHICOTTE FORMATION Silurian

This name (Schuchert and Twenhofel, 1910) was given to 75 feet of limestone that had been referred to as "F" formation of Anticosti island by Richardson and as 4, 1 to 4, by Logan. It is crinoidal and coralline and according to Twenhofel (1927, p. 17) is the only limestone on the island that has been extensively recrystallized. The change has been considered part of the diagenetic stage and has destroyed many fossils. The formation is considered Niagaran.

Schuchert, C., Twenhofel, W.H., 1910, Ordovicic-Siluric section of the Mingan and Anticosti Islands, Gulf of Saint Lawrence: Geol. Soc. Am. Bull., vol. 21, p. 715.

Twenhofel, W.H., 1927, Geology of Anticosti Island: Can. Geol. Surv., Mem. 154, p. 17.

CHUKOTAT GROUP Precambrian

This name has been given to conglomerates, sedimentary breccias, cherty beds with pillowed lavas now metamorphosed to minerals of the epidote group. The whole is cut by sills of basic and near ultrabasic rocks, which have been altered with the formation of serpentine and chlorite.

This group is believed to overlie granites and diabase intrusive in the Povungnituk Group, which in turn, is believed to overlie the Archean rocks unconformably.

Bergeron, Robt., 1959, Povungnituk Mountains Region, New Quebec: Quebec Dept. of Mines, P.R. 392, pp. 2-3.

CLERICY GRANODIORITE

It underlies an area about 1 mile wide with a long axis of seven miles trending north 30 degrees westIt lies mainly in the southwest corner of Clericy township, but extends some distance into Joanne on the south and Dufresnoy on the west. Like the western part of the Dufault mass, it is made up of both dioritic and granitic rocks. The diorite part forms a band with a maximum width of ½ mile along the western side of the body, extending from the north end of lake Savard southwest for nearly 4 miles.

The remainder of the body is for the most part a reddish granite of normal appearance, but toward the south end it is white.

Cooke, H.C., James, W.F., Mawdsley, J.B., 1931, Geology and ore deposits of the Rouyn-Harricanaw Region, Quebec: Canada Geol. Surv., Mem. 166, p. 126-127.

COMETIQUE LAKE STOCK

The effects of the Cometique Lake stock are self-evident. There was a westward push, well shown in the attitude of the gabbro-sediments complex west of the stock. The stock is mostly a medium grained biotite granite.

Claveau, Jacques, 1949, Wakeham Lake Area, Saguenay County: Quebec, Dept. of Mines. G.R., No. 37, p. 42, p. 50.

CONWEST BAY CHERTY IRON FORMATION Proterozoic

200 feet of cherty iron formation overlies the cherty iron carbonate member in the section exposed northeast of Trout point. Chert is the predominant constituent of the rock, although the composition varies considerably from bottom to top. The lower beds contain some iron carbonate and are gradational into the underlying member. The upper beds are characterized by disseminated magnetite and varying amounts of jasper, which appears as flecks and granules along the beds. The fresh rocks is light brown to reddish-brown, but weathered surfaces are commonly covered by a limonitic film.

Neilson, James M., 1953, Albanel Area, Mistassini Territory: Quebec Dept. of Mines, G.R. No. 53, p. 22.

COOM LAKE INTRUSIVES Proterozoic

Wahl (1953, p. 19) proposed the name for basic intrusive rocks which can be seen chilled against the "c" member of the Témiscamie Formation of the Mistassini Series in the eastern part of the Témiscamie River Area.

The rocks have an ophitic texture with more than 50% dark mineral, now represented by hornblende and chloritized biotite. The much clouded plagioclase is andesine. Both diorite and gabbro have been used as field names for these rocks.

Wahl, W.G., 1953, Témiscamie River Area, Mistassini Territory: Quebec Dept. of Mines, G.R. 53, pp. 19-20.

Neilson, J.M., 1966, Takwa River Area, Mistassini Territory: Quebec Dept. of Nat. Res., G.R. 124, p. 37-39.

COREY LIMESTONE (FORMATION) (Wilmarth -1-521) Upper Beekmantown

This limestone is noteworthy for its purity and is commonly referred to as "Bedford" when the stone is destined for commercial use (Goudge, 1935, pp. 218-218). The stone, which is a fine-grained light bluish and white weathering, is division C_1 at Logan's Philipsburg Series (q.v.) and is 275 feet thick of which 250 feet is very high-calcium.

Goudge, M.F., 1935, Limestone of Canada, Part III: Canada, Mines Branch, No. 755, pp. 218-221.

Geology of Quebec, 1944, p. 396.

CORNER-OF-THE-BEACH Middle (?) Cambrian

Charles Schuchert discovered Cambrian fossils in thin bedded limestones and shales along Murphy River, a mile and a half west of Coin-

CRANBOURNE SERIES (Formation) (Wilmarth -1-94) Upper Silurian

Tolman (1936) gave the name to a folded and locally schistose limestone and shale cropping out in an area 1¼ by 4 miles near St. Odilon-de-Cranbourne. The thickness of the formation is unknown. Fossils studied T.H. Clark suggested to him an Oriskany-Helderberg age. However, A.J. Boucot in his comprehensive examination of the Silurian and Devonian rocks of the north Appalachians has visited the locality, and new collections made by him suggest an Early Ludlow age. With present knowledge, this unit should rank as a formation.

Tolman, Carl, 1936, Lake Etchemin Map-area, Quebec: Geol. Surv. Can., Mem. 199, pp. 14-16.

Naylor, R.S., Boucot. A.J., 1965, Origin and distribution of rocks of Ludlow age (Late Silurian) in the northern Appalachians: Am. Jour. Sci. v. 263, p. 159.

CROCHET (HOOK) LAKE BASIN

The few sills west of Crochet lake and Léopard lake dip gently to moderately east and most are right-side-up. East of the eastward dipping sills are the Crochet Lake basin and the Gerido Lake-Léopard Lake complex syncline. The lavas in the central part of the basin forms a plateau rising higher than the country for miles around. The surrounding sedimentary rocks dip gently to moderately under the lavas, except on the northeast side where they are in part sheared and possibly faulted. The plunge at the south side of the basin is about 10°north; the plunge to the south at the northern side is slightly steeper.

Sauvé, Pierre., Bergeron, Robert., 1965, Gerido Lake Thévenet Lake Area, New Quebec:: Quebec, Dept. of Nat. Res., G.R. No. 104, p. 77.

du-Banc on Baie de Malbaie, Gaspé. Other collections of fossils were made by C.H. Kindle, who suggested that the formation is Lower or Middle Cambrian. Most of the trilobites of the fauna were new in 1942, but in 1969 a study of them by palaeontologists of the Geological Survey suggests a late Middle Cambrian age.

Kindle, C.H., 1942, A Lower (?) Cambrian fauna from Eastern Gaspé, Quebec: Am. Jour. Sci., vol. 240, pp. 633-641.

COVEY HILL FORMATION (Including Rivière aux Outardes Member). Cambrian(?)

This formation, the oldest in the Châteauguay area, is composed of many varieties of white, gray, or reddish immature orthoquartzite. It underlies all of Covey hill and outcrops in a few isolated patches to the north. Southward, beyond the International border, it stretches as far as the lower slopes of Lyon mountain in the Adirondacks. This is one of the 3 local formations which were earlier included under the term "Postdam sandstone".

The dips are low, 1^o to 2^o in general, and on the hillside slopeto the north, Covey Hill beds are exposed discontinuously over the surface.

Clark, T.H., 1966, Châteauguay Area, Châteauguay, Huntingdon, Beauharnois, Napierville and St. Jean Counties: Quebec Dept. of Nat. Res., G.R. no. 122, p. 8-19.

COVEY HILL SYNCLINE.

"The Covey Hill beds are disposed in a wide-open syncline the axis of which plunges west-southwest." This structure is very poorly defined and without exposures; its axis is hard to fix.

Clark, T.H., 1966, Châteauguay Area, Châteauguay , Huntingdon, Beauharnois, Napierville and St. Jean Counties: Quebec, Dept. of Nat. Res. G.R. No. 122, p. 16.

DASSERAT SYNCLINE

The axis of in overturned fold in the Keewatin metavolcanic rocks passes through the south end of Dasserat lake and near the south end of Uwass lake. The axial plane strikes N75°W and dips 70° north.

Cooke, H.C., James, W.F., Mawdsley, J.B., 1931, Geology and Ore Deposits of Rouyn-Harricanaw Region Quebec: Can. Geol. Surv., Memoir 166, p. 88.

DAUVERSIERE STOCK

This roughly-circular granitic body underlies approximately 60 square miles in the central part of La Dauversière township. It is well exposed along the shores of the chain of lakes and of their numerous islands. The stock is essentially a biotite granite, generally pink, and rarely grey in colour, medium to coarse in grain and, as a rule, hypidiomorphic-granular in texture.

Imbault, P.E., 1959, Queylus Area, Abitibi-East and Roberval Electoral Districts: Quebec, Dept. of Mines, G.R. No. 83, p. 18-21.

DAVIDSON CREEK FAULT.

Described by Cooke, James and Mawdsley, its exact age is difficult to establish. It follows Davidson Creek and the Kinojevis river southwest into Vallet lake, and differs from the other major faults in cutting across, rather than paralleling, the strata through the greater part of its course. It dips probably steeply northwest.

Hawley, J.E., 1933, McWatters Mine Gold Belt, East Rouyn and Joannès Townships: Quebec, Annual Report of the Quebec, Bureau of Mines for the Calendar Year 1933, Part C. p. 29.

Gunning and Ambrose considor that the southeast side mouved northeast and downward relative to the northwest side.

Gunning, H.C. and Ambrose, J.W., 1939, The Timiskaming-Keewatin to /the Rouyn Harricanaw region North-western Quebec: Roy. Soc. Can., Tn. v. 33, p. 38

DAVY LAKE BRECCIA (igneous) Precambrian

Along the eastern shore of Davy Lake and at the point of outlet of a small lake a mile and a half northwest of it, blocks of gabbro in a matrix of gabbro were encountered.

Claveau, Jacques, 1949, Wakeham Lake Area, Saguenay County: Quebec Dept. of Mines, G.R. No. 37, p. 28-29.

DEEPKILL SHALE Lower Ordovician

Ruedemann measured and described the lithology and fauna of beds of shale and sandy and calcareous shales in New York State about the turn of this century. His study of the fauna was based on Hall's studies at Lévis, and his dating was based on Elkanah Billing's determination of the age of the Lévis Formation. His original publication bore the title "The graptolite (Levis) facies of the Beekmantown formation in Rennselaer Co., N.Y."Many of the American citation omit"(Lévis)".

Deepkill has been used in Quebec for Lower Ordovician rocks of the graptolite facies. Levis has priority and would serve better, the section at Lévis being more complete than at Deepkill.

DELSON FAULT

The Delson fault in the St. Jean sheet is the prolongation of that fault in the Lachine map-area. The vertical displacement in the vicinity of Menard Corner, where the Rosemont member of the Montreal formation is brought against the upper part of the Utica, is of the order of 800 feet. It strikes northwest.

Clark, T.H., 1955, St. Jean - Beloeil Area, Iberville, St. Jean, Napierville-Laprairie, Rouville, Chambly, St. Hyacinthe and Verchères Counties: Quebec Dept. of Mines, G.R. No. 66, p. 51-52.

DEMIN LAKE SYNCLINE

"From structural determinations in the volcanics around Washusk and Ogima lakes and around the south end of Dasserat lake, Cooke concluded that an axis of synclinal folding passes through the south end of Dasserat lake and across the south end of Uwass (Demin) lake. It trends slightly north of west."

Robinson, W.G., 1948, Part of Northwest Quarter of Beauchastel Townships, Rouyn-Noranda County: Quebec, Dept., of Mines , G.R.No. 30, p. 12-14.

DERBUEL BLOCK.

"The Derbuel block forms a wide southeast-trending, syncline, whcih continues into the areas farther east, northeast and north. Flat open folds trending north and east-northeast are present in this block in the Romaned

Lake area, but are not conspicuous in this area. The style of the structure of these zones and blocks is clearly a function of the facies of the rocks."

Dimroth, Erich, 1965, Geology of Otelnuk Lake Area, New Quebec, Territory: Quebec, Department of Natural Resources, P.R. No. 532, p. 19.

DESCHAMBAULT FORMATION Trenton Group

Clark (1959) proposed this name for lower but not the lowest beds of the Trenton Group. Clark has described these limestones as light gray and fragmental. This is true for many of the exposures particularly in quarries because this is one of the parts of the Trenton yielding high calcium limestone between Montreal and Quebec city. However, in addition to the calcarenites, calcilutites occur and there are also some shaly and cherty beds. Clark considers that the fauna justifies correlation with the Hull Formation. This formation mane includes beds assigned to the Mile End Formation.

Clark, T.H., 1959, Stratigraphy of the Trenton Group, St. Lawrence Lowland, Quebec: Geol. Assn. Can., Pr. v. 11, p. 16.

DESTOR BREAK -

"Destor" break" is the wide zone of heavily sheared rocks, between the outcrops of sediments and the northward facing lavas on the ridge north of Beattie railway. Topographically, it is marked by a persistent swamp, and is evidently a fault-zone of considerable importance."

Bannerman, H.M., 1940, Lépine Lake Area, Destor Township, Abitibi County: Quebec,;Dept, of Mines, G.R. NO. 4, p. 20.

TABLE 1. Table of formations* for the Grondines map-area

System	Series	Group	Formations Members Zones	Thickness (ft)	Stratigraphic equivalents in New York–Ontario
Ordovician	Champlain	Utica	Lotbiniere Formation Delisle Member	450 (137 m)	Utica
		Trenton	Neuville Formation Grondines Member *Rafinesquina deltoidea* zone *Cryptolithus lorettensis* zone	250 (76 m)	Cobourg
			St-Casimir Member	184 (56 m)	Sherman Fall
			Deschambault Formation	85 (26 m)	Hull
			Ste-Anne Formation		Rockland
		Black River	Leray Formation	5 (1.5 m)	Coboconk

*Adopted from Clark *et al.* 1969.

(Globensky & Jauffred, 1971, Can. Journ. Eath. Scie. Vol. 8, No. 11) p. 1475

DISRAELI SERIES, FORMATION Ordovician

Burton (1931) gave the name Disraeli Series to conglomerate, graywacke, quartzite, and slate occurring in the vicinity of Lake Aylmer. Duquette (1961) made a more complete examination of the rocks and showed that the quartzites of Burton are, at least, in part, acidic tuffs. The structural relationships are complex and the estimates of thickness, from 10,000 to 21,000 are probably excessive but very uncertain.

Burton dated the formation Silurian (?), but Cooke suggested an Ordovician age. Duquette suggests a correlation with the Magog Formation (q.v.) and with part of the Beauceville Group .

Burton, F.R., 1931, Vicinity of Lake Aylmer, Eastern Townships: Que. Bur. of Mines, Ann. Rept. 1930D., pp. 111-118.

Duquette, Gilles, 1961, Geology of Weedon Lake area and its vicinity, Wolfe and Compton Counties: Université Laval, thèse pour Doctorat, pp. 20-33.

DIXVILLE FAULT.

This large fault has been recognized in the southern part of Coaticook map-area. South of it the quartzite beds strike a few degrees east or west of north, dip steeply east, but face west, whereas north of it the beds have normal north-northeast strikes, dip steeply west, and face east. It would seem that the beds south of the fault must have been shifted westward, relative to those on the north, a distance of at least ten miles, so that the beds south of the fault correspond to those lying east of the slate in the central part of the syncline north and northeast of the fault. Throughout its course this fault is marked by a prominent valley, in most places 200 feet deep.

Cooke, H.C., 1957, Coaticook-Malvina Area, Electoral Districts of Stanstead and Complex: Quebec, Dept. of Mines, G.R. No. 69, p. 16-17.

DONCHESTER FAULT.

The Donchester fault branches from the Porcupine-Destor fault 6,000 feet west of the Donchester shaft. It strikes easterly, parallel to the Beattie fault and dips vertically to steeply north. The shear zone has a width of 100 to 300 feet.

Graham, R. Bruce., 1954, Parts of Hebecourt, Duparquet and Destor Townships, Abitibi-West County: Quebec, Dept. of Mines, G.R. No. 61, p. 35.

DORE LAKE COMPLEX

This name has been proposed by Allard for a stratiform body of anorthosite, gabbro, and related and derivative rocks. The complex is considered to be 12,000 feet thick. This name is likely to be confused with Doré Conglomerate and Doré Series of western Ontario. The term is also essentially a synonym of Chibougamau Complex (q.v.).

Allard, G.O., 1967, Northwest quarter of Rinfret township, Abitibi-East and Roberval counties: Quebec Dept. of Nat. Res., P.R. 567, p. 3.

DORE LAKE (MCKENZIE NARROWS?) FAULT — Precambrian

This fault is apparently the same as the McKenzie Narrows fault. See McKenzie Narrows Fault.

Allard, G., 1960, South Half of McKenzie Township, Abitibi-East Electoral District, Part II, South Half of Southeast Quarter: Quebec Dept. of Mines, G.R. No. 95, p. 58.

DUFAULT GRANODIORITE, Lake Dufault Laccolith. — Precambrian.

It underlies an area of about 10 square miles bordering the north part of Dufault lake, Dufresnoy township. It is of interest, because of its unusual differentiation. The mass is made up of two separate bodies of intrusive rock with dioritic to dioritic facies. The western body extends from the western margin of the mass to the middle of Dufault lake. The eastern body underlies the eastern half of the lake, and extends north half a mile beyond the centre line of Dufresnoy township. It is made up of a series of sills or laccoliths piled one upon the other. The oldest is that which now occupies the centre of the mass. It has differentiated into diorite, aplite, and graphic granite.

Cooke, H.C., 1930, the compound laccolith of Lake Dufault, Quebec: Roy. Soc. Can., Tn. 24, Sec. IV, pp. 89-98.

DUFAULT ANTICLINE

"The Dufault anticline is a very broad, open fold involving all the lavas between the north end of Dufault lake and the Timiskaming boundary on the south. It trends north-west and dips southeast."

Cooke, H.C., James, W.F., Mawdsley, J.B., 1931, Geology and Ore Deposits of Rouyn-Harricanaw Region, Quebec: Can., Geol. Survey, Memoir 166, p. 85.

DULEY (LAKE) SERIES, MARBLE, FORMATION Precambrian

Gill et al (1937) proposed Duley Lake Series for crystalline limestone, garnet cyanite schist, and metamorphosed iron formation in an area near the height-of-land southwest of the Wapussakatoo mountains. It was believed that this series is older than the Wapussakatoo Series. The prospecting for iron ores caused a revised classification to be evolved as reported by Gastil and Knowles (1960). Duley Marble has formation status and is made up of granular white dolomite with silicates. The iron formations were assigned to a new Wabush Lake Iron Formation. Later Duley Marble, Wapussakatoo Quartzite, and Wabush Lake Iron Formation were assigned to a Gagnon Group.

Gill, J.E., Bannerman, H.M., and Tolman, C., 1937, Wapussakatoo Mountains, Labrador: Geol. Soc. Am., Bull. v. 48, pp. 572-573.

Gastil, G., and Knowles, D.-M., 1960, Geology of the Wabush Lake Area, southwestern Labrador and eastern Quebec, Canada: Geol. Soc. Am., Bull. v. 71, p. 1247.

Clarke, P.J., 1967, Gras Lake-Felix Lake Area, Saguenay County: Quebec Dept. Nat. Res., G.R. 129, pp. 29-30.

DUNHAM DOLOMITE — Lower Cambrian

The Dunham Dolomite of the Oak Hill Group is, in the Lacolle area, 40 to 150 feet of dark gray or gray finely crystalline dolomite. The weathered surfaces are beige to dark brown, and such surfaces show rounded grains of quartz. Robt. Harvie (1915, p. 99) had traced the dolomite through Sweetsburg and Dunham into the United States where he noted that the formation is much thicker than in Quebec. Clark (1934, p. 7) correlated the Dunham with the Milton Dolomite but the mapping in Vermont (Shaw, 1958, p. 527) shows that the Dunham is older than the Milton, and the use of Dunham has been extended into Vermont, where the formation is from 25 to more than 2,800 feet thick.

The formation has yielded few and poorly preserved fossils in Quebec but a more extensive faunal list is available for Vermont.

Clark, T.H., 1934, Structure and stratigraphy of southern Quebec: Geol. Soc. Am., Bull. v. 45, fig. 3, p. 7.

Clark, T.H., 1936, A Lower Cambrian Series from Southern Quebec: Roy. Can. Inst., v. 21, Pt. 1, pp. 146-147.

Harvie, Robt., 1915, Brome and Missisquoi Counties, Quebec: Can. Geol. Surv., Ann. Rept., 1914, p. 99.

Booth, V.H., 1950, Structure and Stratigraphy of the Oak Hill Succession in Vermont: Geol. Soc. Am., Bull., v. 61, pp. 1149-1151.

Shaw, A.B., 1958, Stratigraphy and structure of the Albans area, northwestern Vermont: Geol. Soc. Am., Bull. v. 69, pp. 525-528.

Cady, W.M., 1960, Stratigraphy and geotectonic relationships in northern Vermont and Southern Quebec: Geol. Soc. Am., Bull. v. 71, p. 571-572.

DUNLOP INTRUSIVE Precambrian

A body of granitic rock which, in the Kitchigama area to the west, Longley has named the Dunlop intrusive, extends into the present map-area as an elongated tongue along the north side of the hills of Mount Laurier ridge. Longley found that this body of rock is more basic, having the composition of diorite, on the southern side than on the northern side, where the rock is a typical hornblende granite. He concluded that it has the form of a sill, with bottom toward the south, and that it was intruded before, or during the early stages of, the post-Keewatin folding, which would make it earlier than the other granitic intrusives of the area.

Auger, P.E., 1942, Olga-Mattagami Area, Abitibi Territory: Quebec Dept. of Mines, G.R. No. 10, p. 12.

Longley, W.W., 1941, Kitchigama Area, Abitibi Territory: Quebec Bur. Mines, G.R. No. 12.

DUNMORE QUARTZITE Lower (?) Cambrian

Cooke has proposed this hybrid name, derived from Dunham Dolomite and Scottsmore Quartzite for dolomitic sandstones supposed to be equivalent to the two formations. The term is neither necessary nor desirable.

Cooke, H.C., 1954, The Green Mountain Anticlinorium in Quebec: Geol. Assn. Can., Pr. v. 5, Pt. 2, p. 40.

DUNPHY RIVER PINK STROMATOLITIC LIMESTONE Precambrian

This formation is well exposed at the northern shore of Dunphy river near the western boundary of the area. The pink color of the limestone is produced by a little hematite dust, occurring finely dispersed in the limestone. The pink color vanishes during the recrystallization of the rock. The metamorphic equivalents of this limestone are therefore either gray or gray and red mottled. The limestone contains a few sand grains (1 mm. diameter) at the western boundary of the area, where it is also interlayered with thin beds of a dark red siltstone. The proportion of this psammitic material decreases to the east.

Dimroth, Erich, 1966, Geology of Dunphy Lake Area, New Quebec Territory: Quebec Dept. of Nat. Res., P.R. No. 557, p. 5-6.

DUPARQUET SEDIMENTS Precambrian

Several patches of sedimentary rock of "Temiscamian type" outcropping in the country north east of Lépine lake are similar lithologically and structurally to the more extensive band occuring farther west of the map-area, along the east-west centre-line of Destor and Duparquet townships. They consist mainly of beds of coarse conglomerate, quartzite, and arkose, and differ from one another only in the relative amounts of the various sedimentary materials of which they are composed.

Bannerman, H.M., 1940, Lépine Lake Area, Destor Township, Abitibi County: Quebec, Bureau of Mines, G.R. No. 4, p. 12-15.

DU PARQUET LAKE SYNCLINE

"It appears to have a vertical plunge. Its axis extends from the south shore of Hébécourt lake to the south shore of the northwest arm of Duparquet lake. From there it trends southeast through Duparquet lake to the south boundary of the map-area. The south limb dips vertically, local observations indicating slight overturning. The tops are to the north. The north limb has a vertical dip and tops face south. Dips around the nose of the syncline are vertical."

Graham, R. Bruce., 1954, Parts of Hébécourt, Duparquet and Destor Townships, Abitibi-West county: Québec, Dept. of Mines, G.R. No. 61, p. 33.

DUPRAT ANTICLINE

This northwest trending anticline has been traced along range VII of Duprat township and appears to extend southwesterly into the Montbrey map-area. The axis follows the main rhyolite belt in page V. The fold plunges south to southwest with a nose in the vicinity of Sablonnière lake. On the crest of the anticline, the formations are nearly horizontal, but on the limbs they have steep dips.

Hogg, W.A., Dugas, J., 1965, East half of Montbray Township, Rouyn-Noranda County: Quebec, Dept. of Nat. Resources, G.R. No. 115, p. 24.

DUPRAT, TWIN LAKE, AND OLIER LAKE SYENITE PORPHYRIES

The Duprat porphyry is a triangular mass about 1 mile long and ½ mile wide at the base, lying about 2 miles west-southwest of the centre of the township.

The Twin lake mass is an oval body of about the same size, just south of Twin lake in the northwestern part of Beauchastel township.

The Lake Olier porphyry lies between Olier and Renaud Lakes, in south-western Beauchastel.

Cooke, H.C., James, W.F., Mawdsley, J.B., 1931, Geology and Ore Deposits of Rouyn-Harricanaw Region, Quebec: Canada Geol. Surv., Mem. 166, p. 113.

DUQUESNE FAULT.

It branches away from the Porcupine-Destor fault 3,000 feet east of the power line. It consists of numerous well developed shear zones in the younger volcanics. The zones vary in width, but rarely ezceed 200 feet and dip 80° south. It splits in the western part of lot 34, range west of Macamic road. One branch strikes east and the other N. 60°E. The latter branch is probably represented in the Lépine lake area by the northeasterly trending shear parallel to the south boundary of the southern body of ultrabasic rock in range V.

Graham, R. Bruce., 1954, Parts of Hebecourt, Duparquet and Destor Townships, Abitibi-West County: Quebec, Dept. of Mines, G.R. No. 61, p. 36,

EAST BRANCH POND FORMATION Ordovician

St. Julien has given this name to clastic rocks having an aggregate thickness of more than 4,000 feet near East Branch Pond, which is six miles north of the town of Magog. The beds with conglomerates near the base are tightly folded and overlie the rocks of the Magog Group. The upper beds are largely meta-pelites and appear to underlie the Glenbrooke Group.

Fossils, unfortunately not definitely datable, are found at several localities may be Upper Ordovician or Silurian.

This formation shows some characteristics in common with the Sherbrooke Formation.

Lamarche, R.Y., 1962, Etudes des conglomérats de la Région de Orford-Sherbrooke: Université Laval, Thèse, pp. 23-32.

St. Julien, Pierre, 1963, Géologie de la Région d'Orford-Sherbrooke: Université Laval, Thèse pour Doctorat, pp. 160-178.

EAU-JAUNE COMPLEX (IGNEOUS)

This complex is made up of diorite to quartz diorite facies and underlies approximately 10 square miles at the southwestern part of the area and is exposed mainly on islands in Eau-Jaune and Irene lakes. The boundaries of this intrusion are very indefinite, especially on the east where it appears to marge with a broad contact zone of metamorphosed volcanics.

Holmes, Stanley W., 1959, Fancamp-Hauy Area, Abitibi-East Electoral District: Quebec Dept. of Mines, G.R., No. 84, p. 11.

ELLIS BAY Ordovician (?)

Richardson division C is made up of arenaceous and calcareous shales grading upward into argillaceous limestone and finally into limestone with shale interbeds. He assigned the formation a thickness of 306 feet. Schuchert and Twenhofel (1910, p. 695) called the lower 200 to 300 feet of the "C" division Ellis Bay Formation. Twenhofel's statement that Richardson"s zones, C-1 to C-12, are limits of the formation is in error for Richardson did not use numbers. The numbers appear in "Geology of Canada" (1863, pp. 298-300) as headings for statements of the measured section, thus "6" refers to 40 feet of concealed beds.

The age of the beds has been the subject for controversy. Schuchert and Twenhofel (op. cit. p. 700) assigned them to a position above the Richmond but below the Silurian and they proposed Gamache Series (q.v.) This was not accepted by authors and the beds were assigned to Richmond. In 1969 (Ayrton, et al.) faunal evidence was adduced that at least part of this formation is Silurian and assigned it to the lower Llandovery.

Richardson, James, 1857, Report for year 1856: Can. Geol. Surv., Rept. of Progress 1853-1856, pp. 214-217.

Schuchert, C., Twenhofel, W.H., 1910, Ordovicic-Siluric Section of the Mingan and Anticosti Islands, Gulf of Saint Lawrence, Geol. Soc. Am. Bull., vol. 21, p. 695.

Twenhofel, W.H., 1927, Geology of Anticosti Island: Can. Geol. Surv. Mem. 154, p. 23.

Ayrton, W.G. et al., 1969, Lower Llandovery of the Northern Appalachians and adjacent regions: Geol. Soc. Am. Bull. 80, p. 462.

ENGLISH HEAD FORMATION

The first significant observations on the geology of Anticosti island were based on work done in 1956 on the shores by Richardson (1857, pp. 191-238) who assigned letters to formations later named by others. His results together with Billing's examination of the fossils were summarized in Geology of Canada (1863, pp. 220-224, pp. 298-309). Formation "A" cropping out along the northeast side of the island, consists of about 250 feet of grey and reddish limestone with greenish shales and was later called English Head by Schuchert and Twenhofel (1910, p. 695), who suggested that it belongs to the Richmond of the Upper Ordovician. Deep drilling shows that the English Head thickens going southward and may be as much as 1,600 feet of limestone, shaly limestone, and shale (Roliff, 1968, p. 34).

Richardson, James, 1857, Report for year 1856: Can. Geol. Surv., Rept. of Progress 1853, 1856, pp. 191-238.

Schuchert, C., Twenhofel, W.H., 1910, Ordovicic-Siluric section of the Mingan and Anticosti Islands, Gulf of Saint-Lawrence, Geol. Soc. Am. Bull., vol. 21, p. 695.

Twenhofel, W.H., 1927, Geology of Anticosti Island: Can. Geol. Surv., Mem. 154, p. 22.

Roliff, W.A., 1968, Oil and gas exploration - Anticosti island, Quebec: Geol. Assn. Can., Pr. v. 19, p. 34.

EOZOIC ERA — Precambrian

After his work on the Eozoon canadense, which is now recognized as non-biogenic, J.W. Dawson felt that the term "Azoic" used for Precambrian period was improper. He proposed (1868) to replace it by Eozoic which he applied to a period embracing a Laurentian System divided into three parts and a Huronian System divided int two parts.

Dawson, J.W., 1880, Lecture notes on geology and outline of the geology of Canada: Montreal, Dawson Bros., pp. 54-55.

ESCUMINAC (Wilmarth -1-699) — Upper Devonian

Ami (1900, p. 208) proposed "Scauminac Formation" for the sandstones bearing the well known Upper Devonian flora and fauna. The name was indexed as "Acauminac Formation" in the United Geological Survey Bulletin 896, and this has contributed to the fact that its priority over Escuminac Formation was not noted. "Escuminac beds" was used by E.M. Kindle for the rocks of the same 370 feet section of greenish shales, sandy shales, and sandstones with 16 feet of red sandstone at the summit. The formation is Upper Devonian (Frasnian) and is overlain by the Bonaventure Formation. The underlying formation is the Fleurant, which is 45 to 60 feet of conglomerate. The Fleurant Conglomerate has been combined with the Escuminac Formation to form the Miguasha Group by Dineley and Williams. This group does not seem to be justified.

Ami, Henry M. (1900), Synopsis of the geology of Canada: Roy. Soc. Can. Tr. VI, Sec. IV, p. 208.

Kindle, E.M. (1930), Stratigraphic relations of the Upper Devonian beds and the Bonaventure Conglomerate, at Escuminac Bay, Quebec: Geol. Surv. Can., Summ. Rept. 1928, C., p. 84.

Williams, B.P. and Dineley, D.L., 1966, Studies on the Devonian strata of Chaleur Bay, Québec: Maritime Sediments, vol. 2, No. 1, p. 8.

Alcock, F.J. has used "Escuminac Dolorite" for basic dykes believed to be Lower Devonian found near Bay of Chaleur.

Alcock, F.J., 1935, Geology of Chaleur Bay Region; Geol. Surv. Can., Mem. 183, p. 73.

- EUSTIS ANTICLINE -

The Eustis Mine is on the axis of the Eustis anticline. This fold is overturned northwest and plunges southeast.

St-Julien, P., Lamarche, R.Y., 1965, Geology of Sherbrooke Area, Sherbrooke County: Quebec, Dept of Nat. Res., P.R. No. 530, p. 12.

EUSTIS PORPHYRY

Vibert Douglas (1941) gave the names Eustis and Suffield to two sills which he considered intrusive into the Ordovician rocks of the vicinity of the mines of those names.

Further work has shown that the rocks are not intrusive but are parts of the Ascot Formation (q.v.)

Vibert Douglas., G., 1941, Eustis Mine Area, Ascot Township: Quebec, Bur. Mines, G.R. 8, p. 16-18.

EUSTIS-MOULTON HILL SERIES

Pillowed meta-andesites, mica and chlorite schist, meta-rhyolite, and graphitic slates near Eustis and Aldermac Mines were assigned to this series. These and other rocks were later assigned to the Ascot Group (q.v.).

Hawley, J.E., Fritzsche, K.W., Clark, A.R., and Honeyman, K.G., 1945, The Aldermac Moulton Hill deposit: Can. Inst. Min. Met., Tr. v. 48, p. 372.

FABIE LAKE RHYOLITE Precambrian

Porphyritic rhyolite is found as an oval-shaped mass north of Fabie lake. The phenocrysts are composed of glassy quartz and feldspar. The groundmass is very fine. The rock weathers reddish or pink, somewhat like a red granite, and is massive throughout. The rock was mapped formerly on the Duparquet sheet (1933) as granite.

Porphyritic rhyolite of Fabie lake is made up of phenocrysts of quartz, potash feldspar and plagioclase feldspar with minor accessory minerals in a base of fine grains of quartz and feldspar.

Hogg, W.A., Dugas, J., 1965, East half of Montbray Township, Rouyn-Noranda County: Quebec Dept. of Nat. Res., G.R. No. 115, p. 13.

FABRE (SERIES) (MEMBER) (Wilmarth -1-713) Huronian

Robt. Harvie (1911) proposed Fabre Series for Lower Huronian. It is made up of "schistose conglomerate", "Schistose quartzite" and "Graywacke" and is overlain by the middle Huronian "Cobalt Series", the lowest unit of which is "rounded conglomerate". The only exposures that are certainly to be attributed to the Fabre Series are in Fabre township at the south of Temiscamingue lake and are few in number. They are mostly siltstones and are similar to those of the Cobalt in the vicinity. Although, the contact of the siltstone (graywacke of Harvie) and the overlying conglomerate is "stepped", as described by Harvie, the Cobalt Series, now Gowganda Formation, could be a tillite or fluxoturbidite. No substantial unconformity is indicated.

The interpretation of the stratigraphic position of the few exposures is diverse: Harvie made the beds a major division of the Huronian; Mauffette (1953) considered the beds as part of the Bruce Series, and the most recent worker Robert (1963), has reduced the unit to the status of a member of the Gowganda Formation.

Harvie, Robt., 1911, Geology of a portion of Fabre township, Pontiac County; Quebec Dept. of Col., Mines, Fisheries, 1911, 33 pp. Map 1911., marginal notes.

Mauffette, Pierre, 1953, Part of Fabre township, Temiscamingue County: Quebec Dept. of Mines, R.P. 274.

Robert, J.L., 1963, Géologie de la région du lac Kipawa, Comté de Témiscamingue: Université Laval, Thèse de Doctorat, pp. 133-136.

FAMINE SERIES (GROUP) (Wilmarth -1-720) Devonian

In "Geology of Canada" Logan (1863, p. 427-428) states that along the Chaudière, the Quebec Group is bounded on the south by Upper Silurian rocks. The Quebec Group at this place is what became Caldwell Group, and part of the Silurian of Logan became Beauceville Group. Logan recognized the fossiliferous beds along Famine river and assigned them to the Upper Silurian, which then included some beds now considered Devonian.

B.R. MacKay (1921) proposed Famine Series for the fossiliferous rocks, but in the French edition of his report, (1923, p. 20, p. 34) both Série de Famine and Série de la Famine River appear. The rocks are limestone which are rubbly and very shaly with calcareous slates above. MacKay considered the Famine Series to be relatively thin and shows it on the map as only in a narrow zone, the outcrop of a tightly folded syncline. However, Gorman (1955) shows that the Famine "formation" consisting of lenses of conglomerate and the fossiliferous limestone is the base of a thick sequence with sandy shales in the upper part.

The fossils indicate an Onondagan age.

This name does not merit group or series status but may be used as a local formational name for the basal part of the St. Juste Group.

MacKay, B.R., 1921, Beauceville map area, Quebec: Geol. Surv. Can. Mem. 127, p. 12, p. 31. French edition 1923.

Gorman, W.A., 1955, St. Georges-St. Zacharie area: Quebec Dept. Mines, P.R. 314, p. 4.

FARNHAM (SLATES AND LIMESTONE)(FORMATION) (SERIES) Ordovician

(Wilmarth -1-722)

Logan recognized fossils in the limestone lens included in shales near Farnham and had difficulty in assigning the beds a position relative to the Quebec Group.

The legend for Map 571 accompany the report by Ells (1896) has under

"East of St. Lawrence and Champlain Fault" "Farnham black slates and limestone". Another unit bracketed with it is "black and grey graptolitic slates of Memphremagog lake". The two are shown as equivalent to the Trenton and Black River west of the fault. The Farnham as defined had the status of a formation, and it was so termed by Young (1906). However, Dresser (1911) called "Farnham Graphitic Argillite and Limestone Conglomerate" a series as did Harvie (1912), who also places the Magog graptolitic rocks in the unit.

Finally in the "Geology of Quebec" Farnham Series is made to contain diverse formations apparently as a chronostratigraphy designation for mid-Ordovician argillaceous rocks. Some younger formations are included.

Farnham has priority over many names that have been proposed, however, it is no longer shown as a formation at its type locality, and it is unserviceable as a chronostratigraphic term, so it should be abandoned.

Logan, W.E., 1863, Geology of Canada, p. 239.

Ells, R.W., 1896, Report on a portion of the province of Quebec: Geol. Surv. Rept. VLL, p. 17J.

Young, G.A., 1906, Geology and Petrography of Mount Yamaska: Geol. Surv. Can., Summ. Rept. XVI, p. 10H.

Dresser, J.A., 1911, Serpentine belt of southern Quebec: Geol. Surv. Can., Summ. Rept. 1910, pp. 210-211.

Harvie, Robt., 1912, Geology of Orford Map Area, Quebec, Geol. Surv. Can., Summ. Rept. 1911, p. 288.

Dresser, J.A. and Denis, T.C., 1944, Geology of Quebec: G.R. 20, p. 353, p. 401, p. 406.

FERLAND LAKE GRANITE Precambrian

Ten square miles in the northwest corner of the map-area is underlain by reddish to grayish coarse-grained granite. The distinctive feature of the rock is the large size of the feldspar crystals in comparison to the remaining minerals. In some exposures, the feldspars are lath-shaped and have a preferred orientation parallel to the contact of the granite.

Cooper, Gerald, E., 1957, Johan Beetz-Area, Electoral District of Saguenay: Quebec Dept. of Mines, G.R. No. 74, p. 37-38.

FIEDMONT GRANODIORITE Precambrian

In ranges 1, 11, and 111, Courville township, three outcrops of granodiorite project through the clays, and may possibly be parts of a single continuous mass, with a possible diameter of 2½ miles. The rock is medium-grained (1 to 2 mm.), light grey or pinkish, and rather badly altered. It is composed of some 20% of quartz, about the same amount of biotite, and the rest feldspar, Ab_{85} An_{15} with accessory apatite and zircon. The feldspar is largely converted to a mat of white mica and zoisite".

Cooke, H.C., James, W.F., Mawdesley, J.B., 1931, Geology and ore deposits of Rouyn-Harricanaw Region, Quebec: Canada Geol. Surv., Mem. 166, p. 134.

FIGUERY GRANODIORITE Precambrian

On the south shore of Figuery lake, Figuery township, is a body of granodiorite whose exposed length is somewhat less than a mile, and whose width is less than one-quarter mile, to the east, within a distance of 3 miles, are two outcrops of similar rock. The granodiorite is pink or reddish, rather coarse grained (3 mm.) and in places is sheared in an east west direction, parallel to its strike.

Cooke, H.C., James, W.F., Mawdsley, J.B., 1931, Geology and ore deposits of Rouyn-Harricanaw Region, Quebec: Canada Geol. Surv., Mem. 166, p. 133.

FLAVRIAN GRANITE Precambrian

FLAVRIAN LAKE GRANITE (ALASKITE)

Cooke, James, and Mawdsley use the first quoted name for an outcrop of about 25 square miles in southern Duprat and northern Beauchastel townships. They call it a granodiorite, but Wilson places the rock under the heading "albite granite" and calls it "Flavrian Lake Granite".

Cooke, H.C., James, W.F., Mawdsley, J.B., 1931, Geology and Ore Deposits of Rouyn-Harricanaw Region, Quebec: Canada Geol. Surv., Mem. 166, p. 127.

Wilson, M.E., 1949, Noranda District, Quebec: Canada Geol. Surv., Mem. 229, p. 34-36.

FLEURANT CONGLOMERATE (Wilmarth -1-742) Upper Devonian

This boulder and pebble conglomerate is 45-60 feet thick and is beneath the Escuminac Formation and together with it is the Miguasha Group (q.v.). Schuchert (1927) quotes J.M. Clarke to the effect that the conglomerate is of glacial origin, but more recent workers do not subscribe to this view.

Kindle, E.M., 1930, Stratigraphic relations of the Upper Devonian beds, and the Bonaventure Conglomerate at Escuminac Bay, Quebec: Geol. Surv. Can., Summ. Rept., 1928C, p. 84C.

Schuchert, Charles, 1927, Winters in the Upper Devonian of New York and Acadia: Am. Jour. Sci. vol. 13, p. 126.

Dineley, D.L. and Williams, B.P.J., 1968, The Devonian continental rocks of the lower Restigouche River, Quebec: Can. Jour. Earth Sci., vol. 5, P. 950.

FONTAINE FORMATION Trenton

Fontaine Quarry is on Rivière du Lard and about midway between the roads from St. Louis and to St. Narcisse. Radnor Forge is near the northern road. Okulitch has described the section as affording one of the better exposed contacts between Black River and lower Trenton. Clark (1959, p. 16) has called the lower eight feet of Trenton the Fontaine Formation. This unit underlies the Deschambault Formation.

Okulitch, V.J., 1939, Black River Group in the region between Montreal and Quebec: Am. Jour. Sci., v. 237, p. 90.

Clark, T.H., 1959, Stratigraphy of the Trenton Group, St. Lawrence Lowland, Quebec: Geol. Assn. Can., Pr., v. 11, p. 16.

FORTIN SERIES Lower

The term Fortin series is introduced for 5,000 to 7,000 feet of dark gray shaly limestone and shaly slates with sandstones occupying a stratigraphical position roughly equivalent to that of the York Lake series. In eastern to central Gaspé this series is restricted to the southern side of the St. John River anticlinal structure, whereas the York Lake series is recognized only to the north of this fold. But

System	Séries	Group	Formations Members
O R D O V I C I A N	CINCINNATIAN	Richmond	Bécancour River Pontgravé River
		Lorraine	Not exposed
		Utica	Lotbinière
	CHAMPLAINIAN	Trenton	Neuville: Grondines Member Neuville: St. Casimir Member
			Deschambault Fontaine
		Black River	Leray La Gabelle
		Chazy	Not represented

(Clark & Globensky, 197 , Q.D.N.R., G.R.- 164) both series intervene, in part at least, between the Grande Grève and the York River. The series becomes more and more sandy and appears to grade both laterally and vertically into the York River type of sandstones and shales. Fossils suggest an early Devonian age for at least part of the series.

McGerrigle, H.W., 1946, A revision of the Gaspé Devonian: Royal Soc. Canada Trans., sec. 4, v. 40, p. 47-49.

McGerrigle, H.W., 1950, The geology of eastern Gaspé: Quebec Dept. of Mines, G.R. 35, p. 52.

Boucot, A.J., Cumming, A.L., and Jaeger, H., 1967, Contribution to age of the Gaspé Sandstone and Gaspé Limestone: Can. Geol. Surv., Paper 67-25, pp. 1-2.

FOURNIERE SEDIMENTS | Precambrian

The Fournière sediments lie south of the Cadillac belt. They are fine-grained, bedded, grey strata resembling the greywacke of the Cadillac sediments and consisting of argillaceous, arkosic, and quartzitic greywacke, locally converted to mica schist and rarely, to chlorite and hornblende schist. There are no coarse-grained beds, the coarsest observed being a gritty, impure quartzite. Later these beds were assigned to the Kewagama Group.

Gunning, H.C., 1934, Cadillac Area: Canada Geol. Survey, Mem. 206, p. 19.

FRANCE LAKE GRANITE | Precambrian

This medium-grained, jointed but otherwise massive, granite underlies about 20 square miles in the southwestern part of the map-area. It is well exposed along the shores of France, Eva, and Ida lakes, and along Ida river.

It forms a stock apparently entirely surrounded by Keewatin-type volcanic and sedimentary rocks with which it is in intrusive contact except along its eastern margin and southwest of Ida lake where the contact is believed to be marked by faults. In hand specimen, it is medium-grained, light-grey to pink with feldspar, quartz and biotite as the essential constituents.

Gilbert, J.E., 1958, Bignell Area, Mistassini and Abitibi Territories, Abitibi East and Roverval Electoral Districts: Quebec Dept. of Mines, G.R. No. 79, p. 19.

GAGNE BROOK SERIES Paleozoic

Burton used this name for crenulated green paragneiss, garnetiferous gneisses, quartzites and slates cropping out near Aylmer Lake. He noted that many parts of the formation showed two intersecting s surface and inferred that they have been twice deformed. Burton considered the rocks to be Sillery correlatives, and Clark (in Cooke 1937) suggests that the rocks are correlative of the Caldwell Group, although Burton does not mention the presence of metavolcanics.

The unit has no stratigraphic value higher than formation and may be abandoned.

Burton, F.R., 1931, Vicinity of Lake Aylmer, Eastern Townships: Quebec Bur. Mines, Ann. Rept. 1930, D, 109-111.

Cooke, H.C., 1937, Thetford Disraeli, and eastern half of Warwick map-areas, Quebec: Can. Geol. Surv., Mem. 211, p. 38.

GAGNON GROUP Precambrian

Gagnon Group has been used for metamorphic rocks including Duley Marble, Wapussakatoo Quartzite, Wabush Lake Iron Formation.

The sequence has been considered the metamorphosed equivalents of the lower part of the Knob Lake Group.

Clarke, P.J., 1967, Gras Lake - Felix Lake Area: Saguenay County: Quebec Dept. of Nat. Res., G.R. 129, p. 28.

GAINSMOOR FAULT.

This fault strikes northeast and is normally clean cut but locally, a breccia is found along it.

Auger, P.E., 1952, Belleterre Area, Guillet Township: Quebec, Dept. of Mines, G.R. No. 55, p. 30-31.

GALET BEDS Trenton Group

About 15 feet of rubbly limestone underlies shales assigned to Gloucester at Chute aux Galets on the Shipshaw river. Sinclair, as had McGerrigle, correlates these with Cobourg.

Sinclair, G.W., 1953, Middle Ordovician beds in the Saguenay valley, Quebec: Am. Jour. Sci., v. 251, pp. 847-848.

GAMACHE SERIES, GAMACHIAN STAGE Ordovician(?)

Schuchert and Twenhofel (1910, p. 700) gave the series name to beds made up of Ellis Bay Formation (q.v.) on Anticosti island because the fauna did not resemble any other then known in North America. It was considered to be older than Silurian but younger than Richmond of the Ordovician. This view has not been universally accepted: authors have referred the series to the Richmond, and Ulrich has considered it Silurian, although he has also referred the Richmond to Silurian.

In the correlation chart for Ordovician (Twenhofel, 1954) Gamachian is listed as the uppermost stage of the Cincinnatian Series of the Ordovician. Kay (1960, p. 31) mentions the Gamachian Stage with a comment concerning the difficulty of placing the fauna but does not include it in the tabular summary of the Cincinnatian Series. **As noted under Ellis Bay Formation, the formation may be partly Silurian.**

Schuchert, C., Twenhofel, W.H., 1910, Ordovicic-Siluric Section of the Mingan and Anticosti Islands, Gulf of Saint Lawrence, Geol. Soc. Am., Bull., vol. 21, p. 700.

Twenhofel, W.H., et al., 1954, Correlation of the Ordovician formations of North America: Geol. Soc. Am., Bull. vol. 65, Chart 2, Column 6.

Kay, G.M., 1960, Classification of the Ordovician System in North America: Int. Geol. Cong. XXI, pt. VII, pp. 31-32.

GARDEN ISLAND LAKE GROUP (sediments) Precambrian

It consists of well-bedded interstratified graywacke, phyllitic silty slate, and tuffaceous beds. These are the western extension of the "Garden Island Lake Sediments" of Bell and Bell (1932, p. 75) in Vauquelin and Pershing townships. It is more than 1,000' thick near the east end of range IX where outcrops show well-developed graded bedding which indicates that the unit faces southward and strikes northwest. The main members, which may be observed are medium-grained, slightly, schistose, greenish-gray beds of subgraywacke separated by thin argillaceous beds or partings.

Bell, L.V., and Bell, A.M., 1932, Bell River headwaters area: Quebec Bur. Mines, 1931, p. 75B.

Sharpe, John I., 1968, Louvicourt Township, Abitibi-East County: Quebec Dept. of Nat. Res., G.R. No. 135, p. 11.

GASPE

The peninsula has given its name to several geological entities.

I- Gaspé Glacier

In "Geology of Quebec" (1944, p. 518), Gaspé glacier is spoken of as having its gathering ground in the Shickshock highlands. This is the only formal use of this term encountered. McGerrigle (1952) in the discussion of glaciation in Gaspé does not mention the term, but names two local ice caps. One is "Tabletops" and the other is "Béland - Upper York River".

McGerrigle, H.W., 1952, Pleistocene glaciation of Gaspé Péninsula: Roy. Soc. Can., Tr. v. 46, Sect. IV, pp. 37-51

II- GASPE (LIMESTONES) LIMESTONE SERIES, GROUP (Wilmarth 1-805)

Logan in "Geology of Canada" 1863, (pp. 390-394) used Gaspé Limestones as a series name for rocks that he considered "Middle and Upper Silurian, "of has stratigraphic schema some rocks correlated with the Helderberg of New York. Later a general agreement was achieved that the Grand Grève, Cape Bon Ami, and St. Alban limestones are in modern usage Devonian. The three formations according to McGerrigle (1950, p. 49) are together about 2800 feet along the coast in eastern Gaspé and about 12000 feet in the interior of the peninsula. The lowest formation is the St. Alban and is greenish, greyish shales, shaly and limestone with some red shale. The higher formations have more carbonate, but both are silicous with silt or chert.

Doubt has been expressed recently whether the St. Alban Formation is Devonian, but with this reservation, the limestone are Lower Devonian.

Logan, W.E., 1863, Geology of Canada, pp. 390-394.

McGERRIGLE 1950			CUMMING 1959				BURK 1964		BOURQUE (ce mémoire)				Auteurs et Sections types
Dévonien Inférieur	'SÉRIE' des CALCAIRES de GASPÉ	FM. de GRANDE GRÈVE	Dévonien	GROUPE des CALCAIRES de GASPÉ	FM. de GRANDE GRÈVE		Dévonien	FM. de GRANDE GRÈVE	Dévonien	Siegenien	FM. de GRANDE GRÈVE		Clarke, 1900 Péninsule de Forillon
		FM. de CAP BON AMI			FM. de CAP BON AMI	MB. de QUAY ROCK		FM. de CAP BON AMI			FM. de CÂP BON AMI	MB. de QUAY ROCK	Russell <u>in</u> Cumming, 1959 Péninsule de Forillon
		FM. de SAINT-ALBAN	Silurien			MB. de PETIT PORTAGE	Silurien	FM. de SAINT-LÉON				MB. de PETIT PORTAGE	Russell <u>in</u> Cumming, 1959 Péninsule de Forillon
					FM. de SAINT-ALBAN	MB. de l'ANSE-DES-ROSIERS				Gedinnien	FM. de SAINT-LÉON		Crickmay, 1932 Vallée de la rivière Humqui au N du Village de Saint-Léon-le-Grand
						MB. de RONCELLES		FM. de RONCELLES			FM. de RONCELLES		Russell <u>in</u> Cumming, 1959 Péninsule de Forillon (modifié)
									Silurien		FM. de SAYABEC		Crickmay, 1932 Rive SW du lac Matapédia
		FM. de la RIV. DE L'ANSE-AU-GRIFFON		FM. de la RIV. DE L'ANSE-AU-GRIFFON				FM. de la RIV. DE L'ANSE-AU-GRIFFON		Pridolien	FM. de la RIV. DE L'ANSE-AU-GRIFFON		Kindle, 1938 Rivière de l'Anse-au-Griffon

FIG.3 Résumé de la nomenclature stratigraphique dans la partie E de la région étudiée

(Bourque, 1969, M.Sc. thesis Univ. de Montréal)

Lajoie, Lespérance et Béland, 1968				Auteurs et Sections types
Dévonien	Siegenien		FM. de GRANDE GRÈVE	Clarke, 1900 Péninsule de Forillon
Dévonien	Gedinnien		FM. de CAP BON AMI	Clarke, 1900 Péninsule de Forillon
Silurien	Pridolien		FM. de SAINT-LÉON	Crickmay, 1932 Vallée de la rivière Humqui au N du village de Saint-Léon-le-Grand
Silurien	Ludlovien		FM. de SAINT-LÉON	
Silurien	Wenlockien		FM.de SAYABEC	Crickmay, 1932 Rive SW du lac Matapédia à 3 mi. à l'E du village de Sayabec
Silurien	Llandovérien	C	FM. de VAL-BRILLANT	Crickmay, 1932 Village de Val-Brillant sur la rive SW du lac Matapédia
Silurien	Llandovérien	C	FM. d'AWANTJISH	Béland, 1960 2½ mi. à l'E du village de La Rédemption, canton d'Awantjish
Silurien	Llandovérien	B	Silurien Inférieur non divisé	
Silurien	Llandovérien	A	Silurien Inférieur non divisé	

FIG. 2 Nomenclature stratigraphique dans la vallée de la Matapédia

(Bourque 1969, M.Sc. thesis, Univ. de Montréal) p. 4

Table II

Correlation of Formations from Becraft to Schoharie age.

Terebratuloid Zones		Eastern New York	Western Gaspé		Eastern Gaspé	
LOWER EMSIAN	*Amphigenia* zone	Schoharie Grit	Lake Branch Formation ? YORK RIVER Formation	'Heppel' Formation	BATTERY POINT Formation ? YORK RIVER Formation	GASPÉ SANDSTONE GROUP
SIEGENIAN	*Etymothyris* zone	Esopus Shale	YORK RIVER Formation	'Heppel' Formation 'Causapscal' Formation	YORK RIVER Formation ? GRANDE GRÈVE Formation	GASPÉ SANDSTONE GROUP GASPÉ LIMESTONE GROUP (upper part)
SIEGENIAN	*Rensselaeria* zone	Oriskany Sandstone Becraft Limestone	GRANDE GRÈVE Formation	'Causapscal' Formation	GRANDE GRÈVE Formation	GASPÉ LIMESTONE GROUP (upper part)

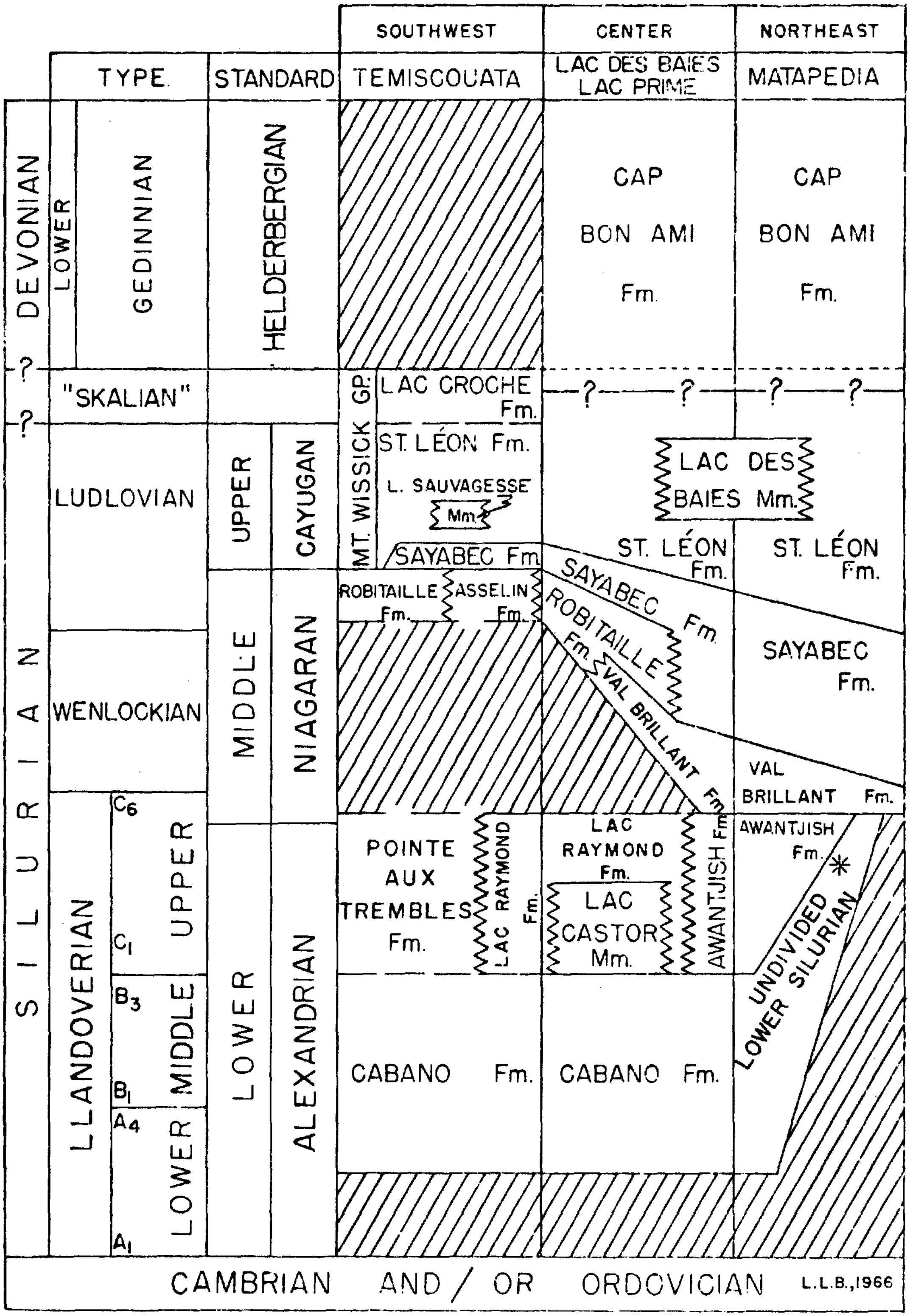
(Boucot, Cumming & Jacger, 1967, G.S.C. Paper 67-25) p. 3

Table I

Published opinions regarding the age of the York River and 'Heppel' Formations — Devonian Lower	Devonian Middle	Devonian Upper	Published opinions regarding the age of the Gaspé Sandstone Group — Devonian Lower	Devonian Middle	Devonian Upper	Author	Year
---			---			Dawson	1861
---			---	---	---	Dawson	1862
---			---	---	---	Logan	1863
---			---	---	---	Dawson	1871
---			---	---		Ells	1884
---			---	---	---	Schuchert	1900
	---			---		Clarke	1913
---			---			Williams (with Breger)	1916
	---			---		Alcock	1926
---						Bailey	1928
---	---		---	---		Jones	1931
	---			---		Parks	1931
	---			---		Alcock	1935
---				---		Allan	1935
	---			---		Jones	1936
	---	---		---	---	Kindle	1938
---			---			Cooper	1942
---			---			Dorf & Cooper	1943
	---			---		Fritz	1944
	---			---		McGerrigle	1946
	---			---		McGerrigle	1950
---			---			This Report	1963

(Boucot, Cumming & Jacger, 1967, G.S.C. Paper 67-25) p. 2

TABLE I. TABLE OF FORMATIONS, MATAPEDIA-TÉMISCOUATA REGION, QUÉBEC



*The undivided Lower Silurian of northeastern district refers to rocks underlying Awantjish and overlying Ordovician (Lac Raymond-Cabano). These rocks were grouped together because of large-scale mapping in that area (Lac Prime East).

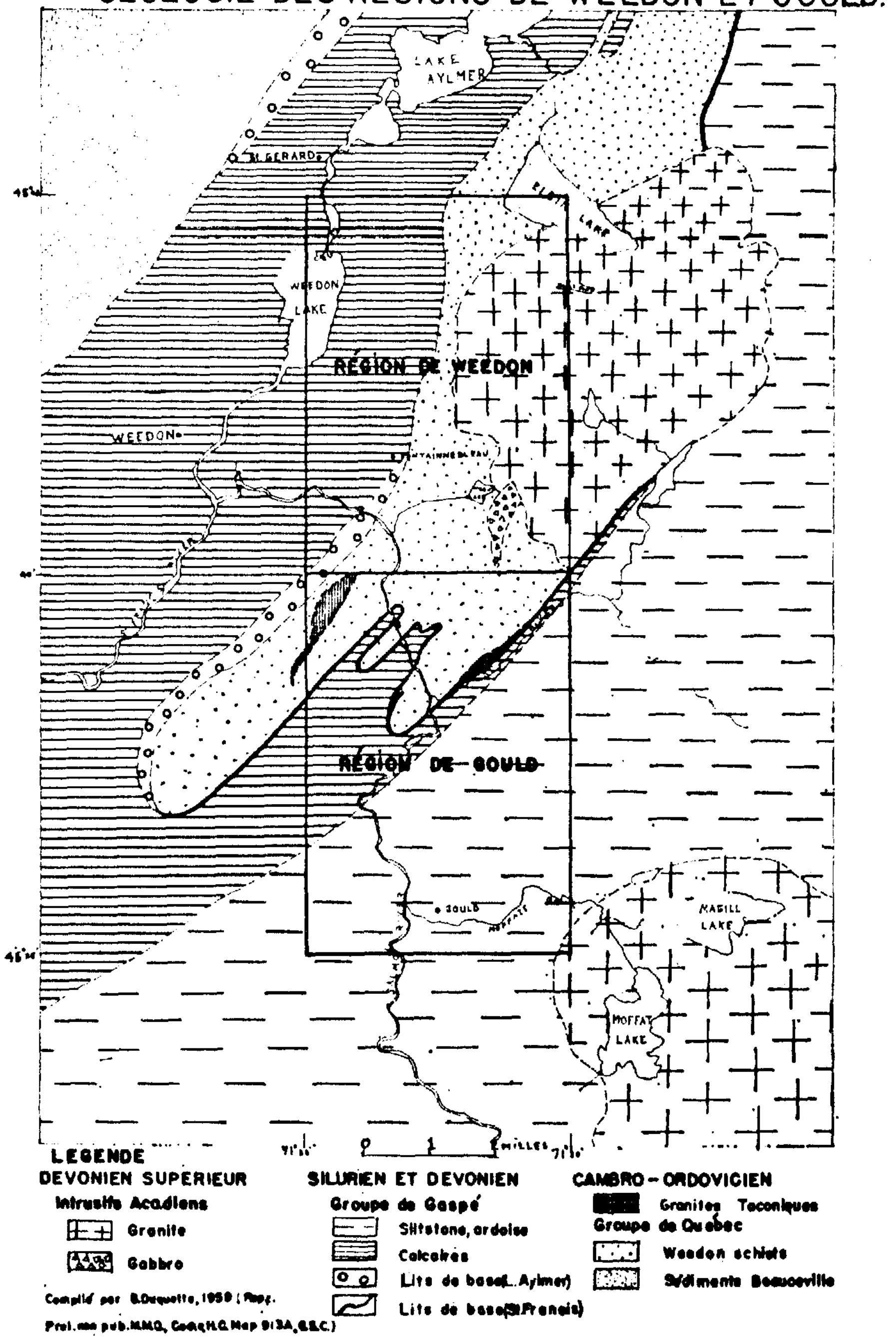
(Lajoie, Lespérance and Béland, A.A.C.G. Vol. 52. No. 4, 1963)

Tableau des formations

Pléistocène et Récent			Argile, sable et gravier.
Révolution acadienne.			
Siluro-Dévonien	Intrusifs acadiens		Granite à oligoclase.
			Gabbro.
	Contact d'intrusif.		
	Groupe de Gaspé.	Gr. Lake Aylmer, St. Francis.	siltstones interstratifiés d'ardoise noire (St. Francis supérieur).
			Calcaires Impurs. (Lake Aylmer et St. Francis inférieur).
			Lits de base: quartzites, dolomies et ardoises.
			Lentilles de conglomérat de base.
Révolution taconique.			
Cambro-Ordovicien.	Intrusifs taconiques.		Granite à albite.
			Granite à albite porphyritique.
	Contact d'intrusif.		
	Groupe de Québec.	Schistes de Weedon.	Schistes quartzifères à séricite et rhyolites porphyritiques.
			Roches vertes.
			Schistes à structure oeillée et conglomérats d'écrasement.
			Schistes quartzifères à séricite et roches volcaniques acides fracturées.
			Roches métavolcaniques de composition intermédiaire avec quelques roches vertes.

(Duquette, 1959, Nat. CAn. vol. LXXXVI(xxx 3ième serie)
No. 11. p. 248

GÉOLOGIE DES RÉGIONS DE WEEDON ET GOULD.



(Duquette, 1959, Nat. Can. Vol. LXXXVI (xxx 3ième serie)
No. 11. p. 249

McGerrigle, H.W., 1950, The geology of Eastern Gaspé: Quebec Dept. of Mines, G.R. 35, pp. 49-73.

III- GASPE (SANDSTONES) SANDSTONE SERIES, GROUP (Wilmarth -1-805).

Logan (op. cit. p. 394-402) reported about 7000 feet of drab and grey relatively soft sandstones overlie the Gaspé Limestones. These rocks have divided into several formations and traced over much of Gaspé. Plant and animal fossils have been believed to support a Middle Devonian age (McGerrigle, 1950, op. cit. p. 84-85), but the age has been questioned and it is possible that Gaspé Sandstones are Lower Devonian (Boucot et al. 1967).

Take in Ap. 2, Ap. 3

Boucot, A.J., Cumming, L.M., Jaeger, H., 1967, Contribution to the age of the Gaspé sandstone and Gaspé limestone: Geol. Surv. Can. paper 67-25, pp. 1-27.

IV- GASPE SERIES, GROUP, SUPERGROUP. (Wilmarth 1-805) Paleozoic

Logan used Gaspé Series for Gaspé Limestones and Gaspé Sandstones together with the Bonaventure Formation. Since 1863, the term has been used only little; perhaps because the Gaspé Limestones and Gaspé Sandstones have themselves a stratigraphic hierarchial position higher than formation Furthermore, even in the original discussion of Gaspé Series, the Bonaventure Formation seems to have an anomalous position.

As an alternative to abandoning the term, it is suggested that Gaspé Supergroup be used for the formations younger than those of Quebec Supergroup and older than the Acadian Orogeny. Duquette (1959) has used Gaspé Group in this sense for rocks in the Eastern Townships.

Duquette, Gilles, 1959, Le Groupe de Québec et le Groupe de Gaspé près du lac Weedon: Nat. Can., v. 86, p. 243-263.

The divisions of the Gaspé Sandstones has presented some difficulties, most of which has been summarized by McGerrigle, who divides the group into five units:

5. Malbaie Formation - Characterized by conglomerate zone; includes sandstones, some shales, and very occasional limestones .... 2000 feet

4. Battery Point Formation - Greenish-grey, coarse, feldspathic (red to brown feldspars), often pebbly sandstones; some conglomerates and shales; red beds toward the top .... 5000-7000 feet

3. York River Formation - Greenish-grey, fine to coarse, feldspathic (grey feldspars) sandstones, common, soft, green shale .... 1000-6000 feet

2. Fortin Series - Dark shaly slates with interbeds to interzones of dark shaly limestones and of sandstones and conglomerates. This series probably is a facies referrable to the general horizon of the York Lake. It is known only on the south side of the Saint-Jean (John) River anticline .... 0-5000 ± feet

1. York Lake Series - Interbedded sandstones of York River type and limestones of Grande Grève type, with shaly limestones, conglomerate, and quartzose sandstone. This series marks a transition from the Grande Grève to the York River. It is known only on the north side of the Saint-Jean (John) River anticline, and it is not recognized everywhere in this more northern area ....0-4000 ± feet

This section differs from that offered in Geology of Quebec (1944, p. 300) not only the thicknesses assigned to the formations but also in introduction of the Fortin Series between the York Lake Series and the York River Formation.

McGerrigle points out that the Battery Point Formation includes the beds measured by Logan and called Gaspé Sandstone.

V- GASPE SYNCLINORIUM

The several folds in the Gaspé Supergroup have made the use of Gaspé Synclinorium logical (McGerrigle, 1950, op. cit. p. 154). However, this major structure continues far to the south of Gaspé and is known to extend into the United States **along** Connecticut river valley, hence, Duquette (1959, op. cit. p. 243) and Marleau (1959) used Gaspé-Connecticut River Synclinorium for the feature as a whole. Cady (1960) has used "Connecticut Valley-Gaspé synclinorium" for the same structure.

Marleau, R.A., 1959, Age Relations in the Lake Megantic Range, southern Quebec: Geol. Assn. Canada, Pr. v. 11, p. 129.

Cady, W.M., 1960, Stratigraphic and geotectonic relationships in northern Vermont and southern Quebec: Geol. Soc. Am. Bull. v. 71, p. 535 also Plate 1.

GAUVIN ANDESITES Lower Devonian

The rocks that predominate in Maria mountain consist of latite in the southern part and oligoclase andesite in the northeastern part, particularly along Maria brook. The latter consists of reddish to greenish grey, porphyritic rocks with interbedded, amygdaloidal and tuffaceous rocks. Under the microscope, the rock is found to consist of phenocrysts of oligoclase-andesine in a groundmass composed essentially of a host of microlites of feldspar in black glass. (Lower Devonian).

Alcock, F.J., 1935, Geology of Chaleur Bay Region: Canada Geol. Surv., Mem. 183, p. 72.

GEORGIA (GEORGIAN) Cambrian (?)

The village Georgia in Vermont yielded fossils that were once considered to be middle Cambrian age, but investigations after 1891 proved them to be early Cambrian. Georgian is now a synonym for and preferable to Waucoban as a designation for the Lower Cambrian Series. The formations belonging to the original Georgian included some of several ages but are mostly of slates and shales. The usage of the name in northern Vermont and to as less extent in southern Quebec is complex, and the tracing of the changes of interpretation would demand a long account. Howell (1929) has given a summary of part of the history, and writings of T.S. Hunt and C.D. Walcott give other parts.

The name has been but little used in Quebec. The legend for 571 of the Geological Survey of Canada has "Lower Cambrian, Olenellus Zone, Lower Potsdam of Billings, Georgia Series of Walcott." Clark (1934, p. 8) refers to "the so-called Georgia slate formation" in the Rosenberg slice and assigns the rocks to the Ordovician. Cady (1960, p. 572) slates that Morses Line Slate is the present designation for Georgia slate, and the slate can be traced from Vermont into the Rosenberg slice a mapped by Clark. It is probably Ordovician.

The name "Georgian" can be appropriately retained for the Epoch or Series, but as it has been used in Quebec, Georgia Formation should be abandoned..

Howell, B.F., 1929, The Cambrian Paradoxides beds of Northwestern Vermont: Vermont, 16th Rept. of the State Geologist, 1927-28, pp. 249-273.

Clark, T.H., 1934, The structure and Stratigraphy of southern Quebec: Geol. Soc. Am, Bull. v. 45, p. 8.

Cady, W.M., 1960, Stratigraphic and geotectonic relationships in northern Vermont and southern Quebec: Geol. Soc. Am. Bull. v. 71, p. 572.

GERIDO LAKE-LEOPARD LAKE COMPLEX SYNCLINE

The structure is complex in detail. It is formed by two synclines which plunge 20°-40° southward in the Gerido Lake area. In the northern part of the Léopard Lake area, the eastern limb of the western syncline is cut off by an eastward dipping, high-angle, reverse, longitudinal fault and disappears. The eastern syncline is a nice example of tight fold with a highly sheared, attenuated, overturned limb. The western limb takes up three-fourths of the width of the syncline. It contains many shear zones, but undeformed pillow lavas are abundant. Their tops are to the east, and they dip 45°-70° eastward. The eastern limb is highly sheared, the schistosity dips mainly 65°-80° east, or about the same as the bedding in the sedimentary rocks immediately east of the lavas. Pillows are easily recognized, but most are too deformed for top determination. The axial plane of the fold cannot be located accurately, but coincides roughly with the western limit of extensive shearing.

Sauvé, Pierre., and Bergeron, Robert., 1965, Gerido Lake - Thévenet Lake Area New Quebec: Quebec, Dept of Nat. Res., G.R. No. 104, p. 77.

GERIDO LAKE - LIVAUDIERE - LAKE ANTICLINE

"This structure is anticlinal but may be complicated by faulting. On the east side, the dips range mainly from 60° to 75° east, with some as low as 40°, and, on the west side. They range from 75° east to vertical. The anticline can be traced as far north as the widest part of Gerido lake, but may extend farther north toward the northwest corner of the Gerido Lake area". It trends northwest -

Sauvé. Pierre, Bergeron, Robert., 1965, Gerido Lake - Thévenet, Lake Area, New Quebec: Quebec Dept, of Nat. Res., G.R. no. 104, p. 78.

GILMAN QUARTZITE

This formation, which is 2000 feet or more thick, is the thickness of the Oak Hill Group and is perhaps the hardest to define: the name quartzite is open to misinterpretation. The formation contains more mudstones and siltstones than highly silicious quartzites, and on slight metamorphism, slates and phyllites develop. The geologist accustomed to mapping tuffs gains the impression that the greenish to grayish beds are tuffaceous, but no volcanic detritus can be recognized.

Osberg (1965, p. 226) has restricted the formation in mapping to a wedge from a feather edge to 400 feet thick of gray and white mottled quartzite in the Knowlton-Richmond area. The rest of the formation he assigned to Bonsecours Formation. Booth (1950, p. 148-149) showed the discontinuity and diversity of the units in Vermont, where this formation has long been considered to be in part equivalent to the Cheshire Quartzite (Clark 1931).

The Gilman has been dated as Lower Cambrian based on poorly preserved Kutorgina, and is the oldest dated formation of the Oak Hill Group.

Clark, T.H., (1931) The lowest Cambrian of southern Quebec: Geol. Soc. Am. Bull, v. 42, p. 226

Clark, T.H., 1936, A Lower Cambrian Series from Southern Quebec: Roy. Can. Inst., v. 21, Pt. 1, pp. 144-146.

Osberg, P.H., 1965, Structural geology of the Knowlton-Richmond Area, Quebec: Geol. Soc. Am., Bull. v. 76, p. 226.

Booth, V.H., 1950, Structure and Stratigraphy of the Oak Hill Succession in Vermont: Geol. Soc. Am., Bull. v. 61, pp. 148-149.

GLENWOOD SERIES Precambrian

The Glenwood Series presents a variety of pillowed and massive andesites, the latter material becoming in places exceptionally coarse-grained.

This can be used as a local name.

Conolly, H.J., Hart, R.C., 1936, Structural Geology of the Osisko Lake Area, Quebec: Canadian Inst. Mining and Metallurgy, Trans., v. 39, p. 11.

GOLDVUE QUARTZ DIORITE-GABBRO Precambrian

In the western part of Duverny Township, this rock forms a lenticular mass of carbonate rich diorite and metadiabase.

Weber, W.W., 1951, La Morandière and Parts of Duverny, Landrienne and Barraute Townships, Abitibi-East County: Quebec Dept. of Mines, P.R. No. 255, p. 11.

GOWGANDA FORMATION Huronian

The name Gowganda was given by Collins, (1917, p. 10, p. 63) to the rocks called "Upper Slate Conglomerate"by Logan. The thickness of the formation is up to 3,000 feet but it is locally absent. It is made up of clastic rocks with spectacular conglomerates. In the Onaping map-area Collins did not separate banded cherty quartzites" and "white quartzites" occurring above the Lorrain from that formation on the map but does so in the table of formations. Collins then shows Cobalt Series as including in ascending order, Gowganda Formation, Lorrain Formation, Banded Cherty Quartzite, and Upper White Quartzite. More recent usage tends to place the last two mentioned units in the Lorrain.

Thomson (1957, p. 41) has proposed to divide the Gowganda formation of the Cobalt district into a lower unit, the Coleman Formation, which is conglomerate, bedded graywacke, and quartzite and has a maximum thickness of 1,000 feet, and Firstbrook Formation which is about 750 feet of bedded graywacke.

These new formations have not been described from Quebec.

Collins, W.H., 1917, Onaping Map-area: Can. Geol. Surv., Mem. 95, p. 10, p. 63.

Thomson, Robt., 1957, The Proterozoic of the Cobalt Area: Roy. Soc. Can., Spec. Paper No. 2, pp. 40-41.

GRANADA GREYWACKE (rocks of the Timiskaming Series) Precambrian

The Granada graywacke band consists mainly of well-bedded graywacke with here and there beds of conglomerate cropping out near Granada post office. In places as in the West McWatters property, local folds are present, but determinations of tops from change of grain and cross-bedding show that in the main the top of the band is to the north. The change from conglomerate to greywacke takes place by a gradual increase in the number of greywacke beds and a decrease in those of conglomerate. On its north side the graywacke, except near the McWatters mine where it is overlain by the McWatters volcanic adjoins the Cadillac-Bouzan Lake fault. The dip of the greywacke averages about 65 to the north and its thickness after correction for local folding is about 2,000 feet. In the northern area of the Timiskaming Series, the relationship of the two formations is reversed and the conglomerate is on the north side and the greywacke band is on the south.

Wilson, M.E., 1943, The Early Precambrian succession in western Quebec: Roy. Soc. Canada Trans., ser. 3, v. 37, sec. 4, p. 126-127.

GRANADA CONGLOMERATE Precambrian

The conglomerate of the south belt occurs predominantly in a band from 1 to 1½ miles wide near Granada Mine. Troughout most of this band the rock is almost wholly conglomerate with only thin beds of laminated greywacke in places, but in the eastern part of the Southeast Rouyn area the proportion of greywacke increases. It is also noteworthy that the width of the conglomeratic band in this locality and eastward in Joanne Township decreases greatly. The conglomerate consists of abundant pebbles and boulders of greywacke, granite, andesite, rhyolite, iron formation, and other rocks up to 5 feet in diameter. Wilson assigns this to the Timiskaming.

Wilson, M.E., 1943, The Early Precambrian succession in Western Quebec: Roy. Soc. Canada, Trans., ser. 3, v. 37, sec. 4, p. 126-127.

GRANBY slice Paleozoic

T.H. Clark (1934) gave the name Granby Slice to a terrane bounded on the southeast by the Philipsburg thrust and on the northwest by Logan's Line. He, as had all previous workers, recognized that sandstones, siltstones, and shales of the Sillery Formation are a very large part of the slice.

Some writers have used Granby as a synonym for Sillery, but the name serves no useful purpose.

Clark, T.H., 1934, Structure and stratigraphy of southern Quebec: Geol. Soc. Am., Bull. v. 45, p. 8.

GRENVILLE

Grenville is a village and township north of Ottawa river, 60 miles northwest of Montreal.

1- Grenville limestone band. - During his investigation of the crystalline rocks of the upland north of St. Lawrence river, Logan and his co-workers had the habit of referring to the individual outcrops of limestone layers by a geographic name. Grenville was one such name in use by 1847.

II- Grenville Series (Wilmarth -1-877) - By 1963, Logan had come to use Grenville as a group name for all the limestone bands. At the same time it was recognized that other rocks such as quartzite and some gneisses were closely related to the limestones and were assimilated to the name (Geology of Canada, 1863, p. 839). Also the conformable bodies of granitic and other gneisses were assigned a place in a stratigraphic section, and the whole was referred to a Laurentian System. For thirty years the use of Grenville was inconsistent, but with the work of Adams (1895) the name became better defined. It was used essentially for highly crystalline metasedimentary rocks but with some meta-volcanic rocks. This definition is satisfactory for western Quebec. However the outcrop area of the Grenville Series is only a small fraction of the Grenville Subprovince.

Logan, W.E., 1863, Geology of Canada, p. 839.

Adams, F.D., 1896, Geology of a portion of the Laurentian area lying to the north of the island of Montreal: Geol. Surv. Can., Ann. Rept. VIII, 1895 p. 11-14 J.

Thomson, J.E., 1956, The Grenville problem: Roy. Soc. Can., Spec. Pub. No. 1, Univ. of Toronto Press.

III- Grenville Gneisses - Some authors have used this term for orthogneisses as well as paragneisses. It is an unnecessary term and tends to cause misunderstanding. "Gneisses of the Grenville Province" can be used to designate the rocks.

IV- Grenville (Subprovince) (Province) - M.E. Wilson (in Thomson, 1956, *op.cit.*, p. 98) has stated that in 1922 he assigned the eastern part of the Canadian Shield to a St. Lawrence Province which was in turn divided into a Timiskaming Subprovince and a Grenville Subprovince. These names were not published until 1939 and were based on continuity of exposures of lithologic units. J.E. Gill (1949) and J.T. Wilson (1949) presented the results of studies of the Canadian Shield at the same time and proposed that Grenville Province be used for what was essentially Grenville Subprovince. Both Gill and J.T. Wilson used the trends of the structures to establish the divisions, although Wilson supplemented the information with data from geophysics.

The rise of the potassium-argon method of mineral dating and the interest in tectonic maps led to the use of designations such as tectonic province, orogenic belt, orogenic province. and mineral date province for units of which Grenville Province was one. The Grenville Province shows dates that cluster about 950 X 10^6 years, and this date is, by some authors, made part of the definition of Grenville Province.

It is suggested that the attempt to retain Grenville Subprovince in the sense of M.E. Wilson as a lithostratigraphic unit be abandoned, and that Grenville Province be used for the lithostratigraphic, mineral date, and tectonic division.

Wilson, M.E., 1941, Anniversary Volume: Geol. Soc. Am., p. 274.

Gill, J.E., 1949, Natural divisions of the Canadian Shield: Roy. Soc. Can., Tr. 43, Sect. IV, pp. 61-69.

Wilson, J.T., 1949, Some major structures of the Canadian Shield: Can. Inst. Min. and Met., Bull. No. 450, pp. 543-554.

Stockwell, C.H., 1962, A tectonic map of the Canadian Shield: Roy. Soc. Can., Spec. Pub. N. 4, pp. 6-15.

V- Grenville Front (or Fault Zone). - H.C. Cooke (1947) tentatively suggested that the boundary between the Grenville Subprovince and the Timiskaming Subprovince is a fault for which the trace is determined by joining the Murray fault near Sudbury, Ontario, to the fault that had been inferred by Norman to exist near Mistassini Lake. The suggested throughgoing fault passed across geologically mapped areas in Quebec and, although faults were found, one accordant with the suggestion does not exist. On the "Tectonic map of Canada", (*Derry et al.* 1950) the locus of the hypothetical fault is shown as "Grenville Front of Fault zone". The results of a substantial amount of mapping in Quebec has established that the Grenville Front is a zone of transition in which the grade and crystallinity of the metamorphic rocks increase going from northwest to southeast.

Cooke, H.C., 1947, The Canadian Shield: Geology and Economic Minerals of Canada, Ed. III, p. 20.

Derry, D.R., *et al.*, 1950, Tectonic Map of Canada.

VI- Grenville Orogeny - (Grenvillian Orogeny) - Grenville Thermal Event. -

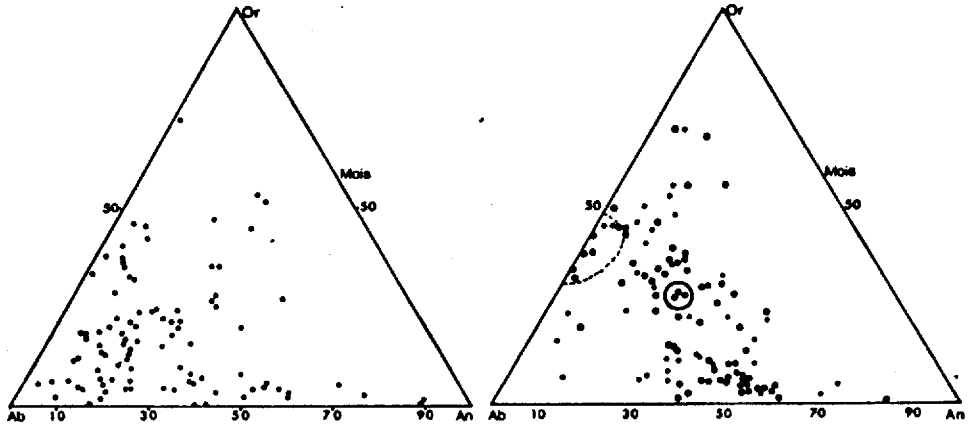
The potassium-argon ages from the Grenville Province tend to cluster about 950 X 10^6 years. Although the reality of the dates is unquestioned, the interpretation is a subject for debate. Evidence from other radiometric dates shows that at least some rocks in the province were deformed long before this. (Krogh and Davis, 1969). In fact it is not possible to point to any part of the province as certainly having been first deformed about 10^9 years ago. The date may be that of a thermal event. Grenville Orogeny (Stockwell, 1962, op. cit. p. 7), or Grenvillian Orogeny (Geol. Surv. Can. Map 1251A is probably a misnomer because the dates refer to an event, which is improbably that of an orogeny.

Krogh, T.E. and Davis, G.L., 1969, Geochronology of the Grenville Province: Carnegie Inst. Yearbook 67, pp. 222-230.

GRONDINES FORMATION Trenton

Clark proposed that if the Upper Trenton limestones of the Grondines-Neuville area be separated from the middle Trenton that Grondines be used for the formation. These beds would be Cobourg equivalent. See Neuville Formation.

Clark, T.H., 1959, Stratigraphy of the Trenton Group, St. Lawrence Lowland, Quebec: Geol. Assn. Can., Pr., v. 11, p. 18.

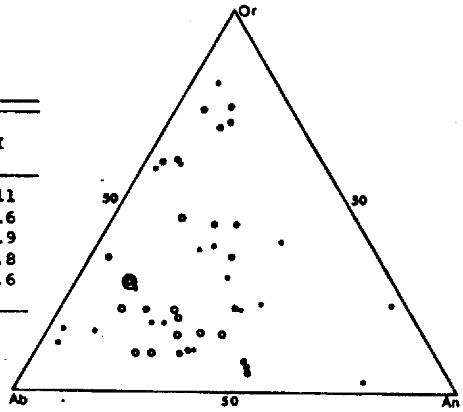


ABITIBI GRENVILLE SUBPROVINCE

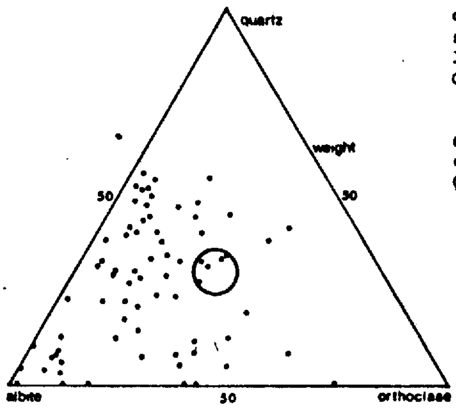
Ratio of normative Ab, An, and Or. Abitibi analyses left. Grenville analyses right. Solid circles—Grenville ingneous rocks. Small open circles—Wapussakatoo mountains. Squares—Buddington's averages of Adirondack igneous rocks. Large circle—average of seven analyses of clays from Fort Coulonge. Triangles—charnockitic rocks according to Quensel.

Modes of Paragneisses From Near Hull
Each is average of Rosiwal analyses of several thin sections. Volume per cent. (Sabourin, 1955, p. 35)

	I	II	III
Hornblende	65.1	39.2	nil
Biotite	nil	8.8	26.6
Plagioclase	(An_{29}) 26.4	(An_{23}) 43.1	(An_{12}) 55.9
Quartz	4.4	3.1	14.8
Accessory minerals	4.0	5.8	2.6



Ratio of normative feldspars in "paragneisses." Small solid circles—Keewatin volcanics" neglecting calcite of norm. Large solid circles—Grenville paragneisses. Large open circles—analyses from region between Abitibi and Grenville subprovince. Concentric circles—Adirondack paragneiss.



ABITIBI

Analyses of rocks from Abitibi region: Ratio of albite, potassic feldspar and quartz of norm. Large circle area of "normal" granite.

Chemical Compositions of the Grenville and the Southern Part of the Timiskaming-Keewatin Subprovince in Québec.

F. FITZ OSBORNE, F.R.S.C.

TABLE IV

APPROXIMATE
EQUIVALENTS OF NEUVILLE SECTION

Group	APPROXIMATE EQUIVALENTS: New York-Ontario	APPROXIMATE EQUIVALENTS: Montréal	Local Units	Thickness		Locations
TRENTON	Cobourg	Tétreauville	Neuville Formation: Grondines Member	431'9"		
			Rafinesquina deltoidea		325'7"	Neuville Shore N. 3
			Cryptolithus lorettensis		39'2"	Neuville Shore N. 3
	Denmark (Sherman Fall)	Montréal	St. Casimir Member		67'	Railway cut NS. 2
	Shoreham (Sherman Fall)	—				
	Kirkfield-Hull	Mile-End	Deschambault Formation	92'	24'	Railway cut NS. 2
					68'	Fields and Woods NS. 1

(Globensky & Jauffred, 1971, Geol. Ass. Can. Proc. Vol. 23) p. 52

GULL LAKE ANORTHOSITE Precambrian

The outcrop of basic rock and anorthosite is 10 by 6 miles and is south of Gull Lake in the Dalhousie mountains. The anorthosite has been much altered and is cut by many dikes and irregular masses of quartz-diorite. This is part of the Bell River Complex.

Freeman, B.C., 1939, The Bell River Complex, northwestern Quebec: Jour. Geology, v. 47, p. 28.

GUN RIVER FORMATION Silurian

The 300 feet of gray limestone with shale interbeds that was designated D_2 to D_8 of the Richardson-Logan scheme for Anticosti island was called Gun River by Schuchert and Twenhofel. Together with the Becsie it makes up the revised Anticosti Group of the lower Silurian or, according to some authors, the Anticostian Series. Twenhofel, (1927, p. 20) modified the definition somewhat by assigning about 60 feet of limestone west of Jupiter river to the overlying Jupiter Formation.

Schuchert, C., Twenhofel, W.H., 1919, Ordovicic-Siluric section of the Mingan and Anticosti Islands, Gulf of Saint Lawrence, Geol. Soc. Am. Bull., v. 21, p. 700.

Twenhofel, W.H., 1927, Geology of Anticosti Island: Can. Geol. Surv., Mem. 154, p. 26.

GWILLIM LAKE FAULT.

The existence of this northeasterly-striking fault was first recognized in Levy township where it appears to be related to the ore-bearing structures of Opemiska Copper Mines. Direct evidence for the presence of this major fault in the map-area is lacking. It can only be said that its assumed location coincides with a drift-covered region north and west of Noora lake. It strikes northeast and dips southwest.

Duquette, Gilles., Mathieu, Arthur., 1966, Geology of the Northeast Quarter of McKenzie Township, Abitibi-East County: Quebec, Dept. of Nat. Res., P.R. No. 551, p. 10-11

HARRICANAW SERIES, (Wilmarth -1-914) Precambrian

T.L. Tanton gave the name to less than 100 feet of sheared conglomerate, arkose, and greywacke forming a single exposure on Authier river, Disson Tshp., Quebec. Tanton states that the beds contain debris of and overlie unconformably iron formation of the Abitibi Group. The name is no longer current.

Tanton, T.L., 1919, The Harricanaw-Turgeon Basin, Northern Quebec: Geol. Surv. Can., Mem. 109, pp. 39-40.

HART-JAUNE FAULT Precambrian

The most important single structural feature of the area is the Hart-Jaune fault, which extends from the outlet of Hart-Jaune river northeasterly 28 miles across the area. It separates the granulite-grade rocks of the upland to the south from the amphibolite-grade gneisses to the north. It caused an uplift of the igneous and metamorphic rocks of the upland to the level of amphibolite-grade gneisses. It dips southwest.

Kish, Leslie, 1968, Hart-Jaune River Area, Saguenay County: Quebec Dept. of Nat. Res., G.R. No. 132, p. 88-89.

HARVENG DOLOMITIC SCHISTS AND DOLOMITES

The name Harveng is tentatively given to this formation after the area in which it was first observed. Although the formation is highly folded and its base not exposed, its thickness apparently exceeds 700 feet. The formation consists of dolomitic shales grading downward into sandy and massive dolomite. It outcrops within a small anticlinorium striking north-northwest in the northeast corner of the Harveng Lake area.

Sauvé, Pierre., Bergeron, Robert., 1965, Gerido Lake-Thévenet Lake Area, New Quebec: Quebec, Dept. of Nat. Res., G.R. No. 104, p. 12

HASTINGS CREEK LIMESTONE Ordovician

The 260 feet of white, dove gray, and dark gray limestones making up the lower part of division B_2 and the whole of B_1 of Logans Philipsburg section have been called Hasting Creek by McGerrigle.

McGerrigle, H.W., 1931, Three geological formations in northwestern Vermont: Rept. of State Geol., 17th, 1929-30, p. 185.

HAVELOCK BRECCIA

This breccia, which has a circular outcrop about 500 feet across, is $1\frac{1}{4}$ miles south of Havelock, and is considered to be the filling of a diatreme. The country rock is sandstone of the Covey Hill Member of the Covey Hill Formation, which is Cambrian. The breccia contains blocks large enough to support small quarries of Trenton limestone.

Clark, T.H., 1966, Châteauguay Area, Châteauguay Auntingdon, Beauharnois, Napierville and St. Jean Counties: Quebec, Department of Nat. Res., G.R. No. 122, p. 47.

HAVELOCK FAULT.

This fault which strikes N 20°E with east side downthrown, crosses the Chateauguay area. Clark surmises that the fault extends southward into New York. The displacement is not readily determinable but is probably between 800 and 1500 feet.

Clark, T.H., 1966, Chateauguay Area: Quebec Dept. Nat. Res. G.R. 122, pp. 43-44.

HAVRE-AUX-MAISONS FORMATION

The two members of the Havre-aux-Maisons formation are different in age. The Cap Adèle member, which is Lower Windsor, includes basaltic lava flows, with some andesitic and rhyolitic types, as well as tuffs and agglomerates. The latter rocks are interbedded with conglomerates, sandstones, siltstones, partly fossiliferous limestones and calcareous shales, and non-fossiliferous red and greyish green argillites. In places, this assemblage contains fairly regular beds of gypsum.

Sanschagrin, Roland, 1964, Magdalen Islands: Quebec Dept. of Nat. Res., G.R. No. 106, p. 14.

HELLANCOURT (VOLCANIC) FORMATION Precambrian

These volcanics are named after Hellancourt Lake (east half, Gerido Lake area), where the formation has been studied in greatest detail. Most, if not all, of the volcanic rocks of the area probably belong to the Hallancourt formation. It is between 4,000 and 5,000 feet thick on the western limb of the syncline near Hellancourt Lake, where shearing is rather mild or missing, but is much thinner, owing to intense shearing, on the eastern limb of the fold. The bulk of the formation is made up of pillow and massi ve flows of meta-basalt. Minor agglomerates occur and some of the coarser-grained rocks may be meta-diabase sills.

Sauvé, Pierre., Bergeron, Robert., 1965, Gerido Lake-Thévenet Lake Area, New Quebec: Quebec, Dept. of Nat. Res., G.R. No. 104, p. 23-31.

HIGHGATE FORMATION **Lower Ordovician**

This formation of the St. Albans synclinorium was named in Vermont but extends northward into Quebec. The formation has slates and carbonate rock and is from the fossils considered Lower Ordovician. The name is but rarely used in Quebec.

HIGHGATE SPRINGS (SERIES) SEQUENCE

Logan recognized that the exposures of some rocks occurring sparingly in Quebec were better exposed in Vermont than in Quebec. McGerrigle (1931, p. 179) proposed that the beds extending from Chazy to Trenton be called Highgate Springs Series. Kay (1958, p. 65) refers to the same rocks as a sequence and describes the formations at St. Dominique and St. Pie in Quebec. Clark (1964) in describing the same rocks does not refer to the work of Kay nor to the Highgate Springs Sequence.

Kay lists with thicknesses the formations found at the type locality. These are in ascending order with thicknesses in brackets. Belden's Fm. (150 ft) Carman Ss. (120 ft). The Beldens was considered Chazy but is probably Beekmantown,and the Hortonville is Trenton.

McGerrigle, H.W., 1931, Three geological formations in northwestern VermontL Rept. of State Geol. 17th, 1929-30, pp. 181-184.

Kay, G.M., 1958, Ordovician Highgate Springs Sequence fo Vermont and Quebec and Ordovician classification: Am. Jour. Sci., v. 256, pp. 68-73.

Clark, T.H., 1964, St. Hyacinthe Area (West Half): Quebec Dept. Nat. Res., G.R. 101, pp. 10-32.

HOCHELAGAN FORMATION (STAGE) Pleistocene

This term was proposed by Woodworth as a tribute to the Pleistocene studies made at Montreal and as a substitute for Champlain. It was to apply to both the marine deposits and to the stage.

The term did not pass into common use.

Woodworth, J.B., 1905, Ancient Water levels of the Champlain and Hudson valleys (N.Y.): N.Y. State Mus., Bull. 84, pp. 206-222.

HOLMES GNEISS Precambrian

Biotite-quartz diorite gneiss underlies most of Holmes township and extends as a band with a width decreasing from 6 miles to 3½ miles, across Cuvillier. Near the central part of the latter township, its continuity is interrupted by the southerly trending strip of greenstone about half a mile wide. The rock is medium-grained and light gray. The dip of the gneissic structure is steeper in the southern part of the body than in the northern part. Typical specimens of the gneiss contain calcic oligoclase (50%), quartz (30%) and biotite (10%).

Longley, W.W., 1946, Tonnancourt-Holmes Map-Area, Abitibi County: Quebec Dept. of Mines, G.R. No. 24, p. 12.

HONORAT GROUP ORDOVICIAN

The Honorat group occupies roughly the south-central quarter of the area, comprising mainly the drainage area of Garin brook. It is bordered on the north by the Matapedia group, and on the south by the Chaleurs Bay group. The name is taken from the township in which most of the best exposures are found. The geological structure within the group is complex, and it was not found possible to work out the stratigraphic sequence. Likewise, the thickness of the group is unknown, though it must be great, possibly as much as 14,000 feet. The bulk of the group is dark grey non-calcareous to very slightly calcareous mudstone or argillite and siltstone. In some places the rock is dark olive-grey, and in many places lighter coloured, commonly calcareous laminae and beds up to about 3 inches thick occur. It has no fossils.

Skidmore, W.B., 1965, Honorat-Reboul Area, Bonaventure County: Quebec Dept. of Nat. Res., G.R. No. 107, p. 8-9.

HUB LAKE SYENITE

The Hub Lake syenite forms a mass about 1½ miles in diameter, to the south and southwest of Hub lake near the centre of Montbray township. The rock near the centre of the mass is a rather ordinary variety of syenite of coarse, granitic texture. It consists largely of finely twinned pink albite with a well-developed zonal texture. Smaller quantities of orthoclase and hornblende are present, and a very little quartz. In addition to these principal minerals, epidote, titanite, zircon, and apatite occur as accessories.

Cooke, H.C., James, W.F., Mawdsley, J.B., 1931, Geology and Ore Depostis of Rouyn-Harricanaw-Region, Quebec: Canada, Geol. Surv., Mem, 166, p. 111.

HULL LIMESTONE (FORMATION) Trenton Group

The name Hull was given by Raymond (1914, p. 348) to the 100 feet of limestone with the "Crinoid fauna". The beds are commonly thin bedded with prominent shale partings. Despite the fact that the beds are reasonably distinctive, the name has not been used in Quebec other than in the part along Ottawa valley. Deschambault Formation is presumably the equivalent of at least part of the Hull. **At Hull the formation is above the Rockland and beneath Sherman Fall beds.**

Raymond, P.E., 1914, The Trenton Group in Ontario and Quebec: Can. Geol. Surv. Summ. Rept. 1912, p. 348.

HUDSON RIVER SHALES Ordovician

Divers combinations of Hudson or Hudson River with stratigraphic or petrographic names have appeared since 1840. Mostly the names designate gray shales or shales and sandstones or their metamorphosed equivalents ranging in age from Cambrian to Silurian. However, the name has been used for beds of late Middle to Late Ordovician. In Quebec, particularly among writers of the latter part of the 18th century, the name is used more or less as a synonym for Lorraine. This, however, is not invariably the case.

The name is of historical interest.

IBERVILLE FORMATION Middle Ordovician

Clark (1934, p. 4) shows Iberville formation as occupying the northeast quarter of the Lacolle map area. This formation is in the foreland and is with the underlying Stony Point formation considered to have a thickness in excess of 2,000 feet. In "Geology of Quebec" (1944, p. 267) the Stony Point is referred to as "Stony Creek". The Iberville is assigned to Utica. The best published description is by Hawley (1957, pp. 63-68) who

The Federal-Provincial Committee on Huronian Stratigraphy: Progress report.

J.A. Robertson

M.J. Frarey

AND

K.D. Card

TABLE I

Recommended Huronian stratigraphic nomenclature

Nipissing Diabase	
Intrusive contact	
Huronian Supergroup	
Cobalt Group	
Bar River Formation	(Top not seen)
Gordon Lake Formation	(Top not seen)
Lorrain Formation	(Local Members)
Gowganda Formation	(Local Members)
Unconformable to conformable contact	
Quirke Lake Group	
Serpent Formation	
Espanola Formation	(Local Members)
Bruce Formation	
Local disconformable contact	
Hough Lake Group	
Mississagi Formation	
Pecors Formation	
Ramsay Lake Formation	
Local disconformable contact	
Elliot Lake Group*	
McKin Formation	
Matinenda Formation	
Unconformity	
Archean	

described the formation from Vermont as consisting in the lower part of calcareous and non-calcareous shale, with beds of dolomite and in the upper part of rhythmically alternating interbeds of non-calcareous shale and laminated dolomitic siltstone.

Hawley (1957, p. 63) suggests that the Senigon well (Clark and Strachan, 1955, pp. 687-688) is in the Iberville, although the collar of the hole is within the outcrop of Stony Point. The descriptions of the lithology are inadequate to pass judgement on Hawley's statement.

Clark, T.H., 1934, Structure and stratigraphy of southern Quebec: Geol. Soc. Am., Bull. v. 45, p. 4.

Hawley, David, 1957, Ordovician shales and submarine slide breccias of northern Champlain valley in Vermont: Geol. Soc. Am., Bull. v. 68, pp. 63-68.

Clark, T.H., and Strachan, I., 1955, Log of the Senigon well, southern Quebec: Geol. Soc. Am. Bull., v. 66, pp. 685-693.

INCOGNITO boulders

Boulders occurring on the south shore of Matapedia lake have boulders and cobbles of Schickshock Formation in a matrix with Middle Silurian fossils. No exposure is known.

Ollerenshaw, N.C., 1967, Cuoq-Langis Area, Matane and Matapedia counties: Quebec Dept. Nat. Res., G.R. 121, pp. 96-102.

INDICATOR LAKE SERIES Proterozoic

This is apparently a synonym for Pépeshquasati or Otish Mountains Group. It is described as extending 100 miles northeast of Mistassini lake.

TABLE OF FORMATIONS

PERIOD	GROUP	FORMATION MEMBER	LITHOLOGICAL CHARACTERISTICS	THICKNESS
TERTIARY		Monteregian	Alkaline intrusives	
ORDOVICIAN	RICHMOND	Becancour River Carmel River Pontgravé River	Red & green sh. & ss. Non-marine Grey sh. Non-marine Calc. sh. & limestone. Marine	2,000'+ 170'
	LORRAINE	Nicolet River St.Hilaire Chambly Breault	Mostly sh., Fossils common Calc. sh., some ls. & ss. Sh. & fine-gr. ss. Grey sandy sh., dark	3,000'
	UTICA	Lachine — Lotbinière	Dark grey to black sh. Brown streak	300'-1000'
	TRENTON	Tetreauville — Grondines Terrebonne Montreal — St.Casimir — Neuville Deschambault Ouareau — Fontaine — St.Alban	Dense, dark grey ls. & interbedded sh. Medium grey ls., no bedding, no sh. Many var. of ls. & sh. Light grey, crystalline ls. Thin bedded, dense ls., some sh.	600'-2000'
	BLACK RIVER	Leray Lowville Pamelia	Dense, dark ls. Lithographic, light gray ls. Shaly or sandy dol.	60'±
	CHAZY	Laval ——— St.Dominique St.Martin St.Dom. ls. Joliette St.Dom. ss. Beldens	Ls., with sh. & ss. beds Light grey, crystalline ls. Fine-gr. ss. Orange weathering grey dol. & white ls.	0 - 410' 0 - 200' 0 - 275'
	BEEKMANTOWN	Beauharnois March	Dense, vuggy dol. Ss. & dol. ss.	0 - 1060'
	POTSDAM	Potsdam	Quartz ss. & congl.	0 - 2000'
PRECAMBRIAN	GRENVILLE	Various	Gneiss, quartzite, anorthosite, etc.	

(Clark, 1956, Can. Inst. Min. & Met., Tr., V. 59) p. 480

TABLE 1

Table of Formations

System	Series	Group	Formations	Thickness Min. - Max.
Ordovician	Cincinnation	Lorraine	Not exposed	100' - 1200'
		Utica	Not exposed	300' - 500'
	Champlainian	Trenton	Tétreauville Terrebonne Facies	400' - 500'
			Montréal	150' - 300'
			Deschambault Ouareau	70' - 100'
		Black River	Leray Lowville Pamélia	50' - 75'
		Chazy	Laval Joliette	200' - 500'
		Beekmantown	Beauharnois	500' - 800'
Cambrian	Croixian	Potsdam	Châteauguay Covey Hill	500' - 1000'
Precambrian	GRENVILLE AND MORIN SERIES			

(Clark & Globensky, 197 , Q.D.N.R., G.R.-197)

Robinson, W.G., 1956, Grenville of New Quebec: Roy Soc. Can., Spec. Pub. No. 2, p. 17.

JEAN VENNE GRANITE Precambrian

The Jean Venne granite is medium-grained and dark grey to chocolate brown. It differs from all other crystalline rocks of the district in that it shows little or no evidence of shearing.

Coté, P.E., 1960, Chertsey Area, Joliette, Montcalm and Terrebonne Electoral Districts: Quebec Dept. of Mines, G.R. No. 93, p. 19-20.

JOLIETTE MEMBER Chazy

Clark (1956, p. 278) has given this name to massive sandstone beds forming the base of the Laval Formation at Joliette.

Clark, T.H., 1956, Oil and gas in the St. Lawrence Lowland of Quebec: Can. Inst. Min. and Met., Tr., v. 59, p. 278 (Bull. p. 480).

JOSSELIN GNEISS Precambrian

The Josselin gneiss underlies a strip adjacent to the southern boundary of the area. It extends eastward across Holmes and Cuvillier townships as a band increasing in width to about one and 3/4 miles. The gneiss is cut by many dykes, chiefly of pegmatite and aplite. The rock is medium- to fine-grained in texture and grey to pink in colour. It has a well-developed schistose structure and in places has a definite banded appearance.

Longley, W.W., 1946, Tonnancourt-Holmes Map-Area, Abitibi County: Quebec Dept. of Mines, G.R. No. 24, p. 12.

JUPITER (RIVER) FORMATION Silurian

Beds designated D_9, D_{10}, and E_{1-10} in the Richardson-Logan scheme for Anticosti island were named Jupiter River by Schuchert and Twenhofel. The "River"was omitted from 1928. The lower part of the section which is about 650 feet, is made up of limestone and shales passing upward into limestone beds. Fossils are abundant. The beds in the Silurian Correlation chart (Swartz et al) are shown as "Niagaran Series".

Schuchert, C., Twenhofel, W.H., 1910, Ordovicic-Siluric Section of the Mingan and Anticosti Islands, Gulf of Saint Lawrence: Geol. Soc. Am., Bull., vol. 21, p. 713.

Swartz, C.K., et al., 1942, Correlation of the Silurian formations of North America: Geol. Soc. Am., Bull. v. 53, pp. 533-538.

KALLIO SLATE Proterozoic

The upper part of the "C" member or the Upper slate member of the Temiscamie Formation (q.v.) as defined by Wahl (1953) was referred to Kallio Formation by Quirke, Goldich, and Krueger (1960) following the suggestion in an unpublished thesis by Neilson. However in 1966 Neilson reverts to the usage suggested by Wahl and assigns the argillites and graywacke with pyrite and graphite to the Témiscamie Formation.

Wahl, W.G., 1953, Témiscamie River Area: Quebec Dept. of Mines, G.R. 54, p. 6.

Quirke, T.T., Jr., Goldich, S.S., and Krueger, H.W., 1960, Composition and age of the Témiscamie Iron Formation, Mistassini Territory, Quebec, Canada: Econ. Geol. vol. 55, pp. 316-317.

Neilson, J.M., 1966, Takwa River Area, Mistassini Territory: Quebec Dept. Nat. Res., G.R. 124, p. 37.

KASTASAKAU COMPLEX Precambrian

This is a nonce name used by Neilson (1950, p. 4) for granitic and syenitic gneisses and plutonic textured analogues southeast of Temiscamie river.

In the area described the complex is southwest of the inferred site of the Mistassini Fault and hence is in the Grenville Province.

Neilson, J.N., 1950, Temiscamie Mountains Area, Mistassini Territory: Quebec Dept. of Mines, P.R. 238, p. 4.

KEEWATIN

Two different localities have given their names to geological features. One locality is a district on the west side of Hudson Bay north of the 60th parallel and is in the Northwest Territories, whereas, the locality for "Keewatin greenstones" is in the Lake of the Woods districts, Ontario, very close to the Manitoba boundary.

I- KEEWATIN GLACIER Pleistocene

J.B. Tyrell named a centre of ice accumulation northwest of Hudson Bay from the local district viz. Keewatin. It has been inferred (Geology of Quebec, 1944, p. 494) that the deposits of till from the western sheet merged with those from a Labrador sheet near the western boundary of Quebec. Some tills have been given the name Keewatin.

II- KEEWATIN Archean

Logan as well as some later workers assigned most of the rocks of the Canadian Shield to one or other of two units, one being Laurentian or the older, the other being the Huronian. While mapping in western Ontario, A.C. Lawson found meta-lavas and some intrusive rocks of similar composition such as had been assigned to the Huronian. He was not satisfied with the accepted interpretation of their relationships to other rocks called Huronian and to some crystalline rocks considered Laurentian. He, therefore, introduced Keewatin for the formation and considered it "Huronian (?)". By 1904, it was realized that the Keewatin is distinct from the Huronian but an international committee at that time placed it above Laurentian. Until about 1912 there was considerable confusion, and the name Keewatin can be found applied to a formation, a series, a group, a system, or complex. One can find lower Huronian as a synonym, and such terms a Lower Keewatin crept into print.

In Quebec, little confusion of usage was encountered because little work was done on Archean rocks prior to 1912, and Abitibi was used as a name for rocks lithologically similar to Keewatin.

The present status of the name is uncertain: it is likely to be in the form "The Keewatin" and is at the least a period or system name.

III- KEEWATIN-TYPE — Archean

Keewatin-type is used in the same way as Temiscamian-type (q.v.) for metavolcanic rocks of Archean-like aspect.

KENSINGTON SYENITE (stock) — Precambrian

Syenite in the north-central part of Kensington township forms an outcrop about seven miles from east to west and a little more than three miles in its maximum north-south dimension. The rock is coarse-grained and is nowhere gneissic. In the western part of the stock, the rock is pink and low in dark minerals; in the central part it is grey. The Kensington syenite contains potassic feldspar. Biotite is the common ferromagnesian constituent, but hornblende also present in some facies of the rock. Most of the rock has quartz visible to the naked eye.

Aubert de la Rue, E., 1953, Kensington area, Gatineau and Labelle Counties: Quebec Dept. Mines, Geol. Rept. 50, p. 19-21.

KEWAGAMA GROUP Precambrian

This name was give to metasedimentary rocks forming a group separating the Malartic Volcanics below from the Blake River Volcanics above. The group is from 1,000 to 3,000 feet thick and may be as much as 10,000 feet thick near Clayhill rapids on Kinojevis river. Most of the group is made up of slightly metamorphosed sand-grade rocks described as varieties of graywacke. Conglomerates occur in zones from 200 to 1,200 feet thick. This group includes the Fournière sediments of the Cadillac area and the Cléricy band of sediments. Norman (1942, p. 97) is of the opinion that the Kewagama group overlies Blake River.

Gunning, H.C., Ambrose, J.W., 1939, The Timiskaming-Keewatin Problem in the Rouyn-Harricanaw Region, North-Western Quebec, Roy. Soc. of Canada, Third Series, Section IV, Tn., volume XXXIII, 1939, p. 23-24.

Norman, G.W.H., 1972, The Cadillac Synclinal belt of north-western Quebec: Roy. Soc. Can. Tr. 36, Sec IV, p. 97

THE KIEKKIEK LAKE FAULT

Not much is known about the bearing of this fault on mineral depositicn. The rocks north of it are intensely carbonatized over a large area on the north shore of Kiekiek Lake. The Decoeur-Bousquet showing lies along a shear that may be subsidiary to the main fault. Greenstone is in places highly pyritic around the west end of the lake and is intruded by small bodies of quartz syenite. The fault may continue a long way under drift in the depression west of the lake, but has not been proved to do so.

Gunning, H.C., 1941, Bousquet-Joannes Area, Quebec: Canada Geol. Surv., p. 52-53.

KITCHIGAMA GRANITE

The outcrop of a small batholith or stock of granite extends southward from the central part of Kitchigama lake. It has a known diameter of about five miles, but it may be much more extensive than this. Southeast of this body, about six miles southwest of MacIvor lake, there are several exposures of a similar granite in a ridge which has a northwest trend. The rock is medium-grained, massive, and fresh in appearance. In general, it is pink, but in places it is grey.

Longley, W.W., 1943, Kitchigama Lake Area, Abitibi Territory: Quebec Dept. of Mines, G.R. No. 12, p. 19-20.

LABRADOREAN, LABRADOR.

Labrador Peninsula is that part of mainland North America northeast of a line joining the southern tip of James Bay to lake St. John. It is not coincident with the political division.

I- LABRADORIAN SERIES, EPOCH, LABRADOR SERIES.

Labradorian Series was proposed by Logan for the Upper Laurentian, which is made up of anorthosites and related rocks, and was used briefly prior to 1870 but was superseded by Norian proposed by Hunt. There is no evidence that, as stated in U.S.G.S., Bull. 896, p. 1125, the term was used for the whole of the Laurentian.

Hunt, T.S., 1875, Chemical and Geological Essays,ppp. 278-281., James R. Osgood and Company, Boston.

II- LABRADOR FORMATION. (Wilmarth -1-1125). Pleistocene

This name has been used for till deposited by ice of the Labradorean glacier. Obsolete.

Ami, H.W., 1900, Synopsis of the geology of Canada: Roy. Soc. Can. Tn. v. 6, Sect. IV, p. 222.

III- LABRADOR ICE DIVIDE.

The "Atlas of Canada" (1957) Map 15, shows the position of the ice divide in the Labrador Peninsula.

IV- LABRADOREAN, LABRADORIAN - GLACIER.

Although G.M. Dawson had proposed Laurentide Glacier (q.v.) for a complex of ice sheets developed on the Canadian Shield , Tyrrel (1898, p. 150) published the name Labradorean for a glacier or ice cap resting on the Labrador Peninsula. One receives the impression that the name was in use, perhaps informally, in 1898. As commented on under Laurentide Glacier, the Labradorean despite objections is peculiarly suitable for use in Quebec.

Tyrrell, J.B., 1898, Glaciation of north central Canada: Jour. Geol. v. 6, p. 150.

V- LABRADOR GEOSYNCLINE, TROUGH. RANGE

In the July 1895 issue of the Scottish Geographical Magazine, Robert Bell presents an account of the geology of Labrador Peninsula, and a map at a scale of 1" equals 50 miles based largely on work by him and by A.P. Low.

This is the first delineation on a coloured map of the Labrador Trough, which is a 50 mile wide band from Leaf lake to Sand Girt Lake. The legend shows the rocks coloured as "Cambrian Strata" "apparently equivalent to the Animikie and Nipigon Series of Lake Superior".

A patch of rocks belonging to the"Huronian System" is shown at the southern end of the band. The rocks are pyroclastics.

The increase in interest in the Proterozoic rocks because of the iron ore deposits in them resulted in the common use of Labrador Trough for the basin containing the rocks and, by extension, the formations contained within the trough. Labrador Geosyncline is also used in almost identical sense. Cooke (1931) inferred a Labrador Range on the site of the Labrador Trough.

Bell, Robt., 1895, The Labrador Peninsula (with map) - The Scottish Geographical Magazine for July 1895, pp. 335-361.

Cooke, H.C., 1931, Studies of the Physiography of the Canadian Shield: Roy. Soc. Can. Tr. 25 Sect. IV, P. 139

Cooke, H.C. 1933, Land and sea on the Canadian Shield in Precambrian time: Am. Jour. Sci., v. 26, p. 473 (This may be first published reference using the name "Labrador Trough".)

VI- LABRADOR PENEPLAIN.

H.C. Cooke has used Labrador Peneplain for the paleopeneplane of the Labrador peninsula.

Cooke, H.C., 1929, Studies of the physiography of the Canadian Shield; Roy. Soc. Can., Tn. 23, Sect. IV, p. 92.

VII- LABRADOR SERIES — Lower Cambrian

This name was used by Schuchert and Dunbar for about 2,600 feet of Lower Cambrian beds overlying crystalline rocks on the northwest side

TABLE OF FORMATIONS (1)

ERA	GROUP (2)	FORMATION	LITHOLOGY
Cenozoic			Unconsolidated till, outwash, stream deposits.
Unconformity			
Proterozoic			Diorite, gabbro, serpentine ; diabase ; syeninte.
	Doublet		Basic flows and pyroclastic rocks ; quartzite, argillite, carbonaceous slates.
	Murdock		Basic agglomerate, breccia, tuff ; minor basic flows ; conglomerate, quartzite, argillite.
	Unconformity (?)		
	Howse		Thin bands of argillite, quartzite, and slate separated by thick sills of diorite and gabbro ; possibly some basic flows. May be part of Menihek formation.
	Knob Lake (3)	Menihek	Creamy grey to jet black carbonaceous slates ; varying amounts of impure dolomite ; greywacke ; pyritiferous slate ; minor chert.

(1) Except for the Knob Lake group, names of all rock units have been taken from Company reports and maps. However, included strata and unit classifications differ somewhat from Company usage.

(2) *Group* is here used as a general term, and probably includes units of formational and series rank.

(3) Volcanic flows and tuffs occur at several levels in the Knob Lake group, but their stratigraphic limits have not yet been determined.

		Unconformity (?)	
		SOKOMAN	Iron formations : banded silicate, thin-banded jasper, banded cherty, thick-banded jasper, cherty metallic, cherty iron carbonate, massive cherty, lean chert, and slaty members.
		RUTH	Black to greenish black, carbonaceous, slaty iron formation ; some chert interbeds, locally abundant ; base is black, massive chert.
		WISHART	Quartzite, arkose ; minor slaty and calcareous beds near base ; minor cherty beds at top.
		FLEMING	Massive chert, chert-breccia, quartzite with chert cement ; chertified slate ; conglomerate of chert pebbles in matrix of chert-cemented quartzite.
		Disconformity (?)	
		DENAULT	Buff to grey weathering, dense dolomite ; arenaceous dolomite ; dolomite breccia cemented by dolomite and (or) chert ; cherty dolomite ; slaty and quartzitic interbeds.
		ATTIKAMAGEN	Varicoloured slates ; local interbeds of dolomite ; porous, granular chert in lowest exposures.
Unconformity			
ARCHAEAN	LAPORTE		Biotite and hornblende schists. May be of same age as Ashuanipi, or may be equivalent to Doublet.
	ASHUANIPI		Biotite, hornblende, garnetiferous, and granitic gneisses ; amphibolites, granitic intrusions.

(Harrison, 1953, Cong. Geol. Int., 1952, Comptes Rendus 19e session) Section 10, Fascicule 10, p. 22 et 23 of the Strait of Belle Isle. They divide the part on the mainland into the lower Bradore Formation with a thickness of 225 of reddish arkosic sandstone and conglomerate. The succeeding Forteau Formation is about 185 feet thick and contains limestones and Archaeocyathus reefs.

Logan (1863, p. 97) cites the lower formation as Potsdam.

The abundant fossils indicate a Lower Cambrian age.

The name Labrador Series should be abandoned.

Schuchert, C., Dunbar, C.O., Stratigraphy of western Newfoundland: Geol. Soc. Am., Mem. 1., p. 17-18.

LABYRINTH LAKE GRANITE

An outcrop of granite a little more than one mile long and less than ¼ mile wide occurs on the northeast shore of Labyrinth lake, Dasserat township. It is in contact, on the north, with a large dyke or sill of quartz diorite, and its texture and composition suggest that the two are magmatically related. The granite is coarse in texture, with an average grain of about 3 mm. It contains 30 to 40% of quartz, some 5% of hornblende in elongated crystals, now largely chlorite, 2 or 3 % of magnetite in large grains, and the remainder chiefly albite, (An_{20}). The albite is much altered to carbonate.

Cooke, H.C., James, W.F., Mawdsley, J.B., 1931, Geology and Ore Deposits of Rouyn-Harricanaw Region, Quebec: Quebec: Canada Geol. Surv., Mem. 166, p. 129.

LAC GILMAN FORMATION

South of and overlying the Lac Waconichi Formation is a two-mile-thick and easterly-running band of mafic lava flows for which the formational name of "Lac Gilman" is proposed. The lavas are of various shades of green, and range in composition from andesitic to basaltic, but they have been metamorphosed to the green schist facies. As a rule, the rock from the upper part and the extreme bottom of a flow is very fine-grained but the rest of the rock is somewhat coarser.

Duquette, Gilles, and Mathieu, Arthur, 1966, Geology of the Northeast Quarter of McKenzie Township, Abitibi-East County: Quebec Dept. of Nat. Res., P.R. No. 551, p. 5.

LACHINE FORMATION Ordovician

It is now commonly recognized that the Utica Shale is not of one age at every locality. Defined properly as a formation viz as lithological unit, it can be traced from its type locality in New York through southern Quebec to Anticosti island with its surprisingly uniform lithology of black or deep brown calcareous shales. However, the fauna is not the same and it is possible to divide the unit into biostratigraphic units.

Unfortunately, in instances, these units have been given the status of formations. Lachine Formation has been assigned near Montreal as the sole formation to the Utica Group by Clark (1952).

Near Montreal this formation is about 300 feet thick, but beds of the same age in regions west or southwest of Montreal are much thicker than this.

It is logical to regard names such as this as geographical rather than stratigraphic. The name refers to Utica Shale in the Montreal Area.

Clark, T.H., 1944, Structure and stratigraphy in the vicinity of Montreal: Roy. Soc. Can., tn. v. 38, Sec. IV, p. 29.

Clark. T.H., 1952, Montreal area, Laval and Lachine map-areas: Quebec Dept. of Mines, G.R. 46, pp. 77-80.

Lacolle Conglomerate (Wilmarth -1-1126) Ordovician

Lacolle Conglomerate, which contains pebbles and boulders up to 6 feet across of Lower and Middle Ordovician formations, crops out west of Tracy Brook fault near the Quebec-New York border as a local formation. "Late St-Michel or early Rosemont age " was suggested by Clark.

Clark, T.H., McGerrigle, H.W., 1936, Lacolle conglomerate a new Ordovician Formation in southern Quebec: Geol. Soc. Am., Bull. v. 47, pp. 665-674.

Clark, T.H. 1955, St-Jean - Beloeil area; Que. Dept. Mines, G.R. 66, p. 14

LACORNE BATHOLITH

Hornblende monzonite, hornblende granodiorite, and biotite-hornblende granodiorite assigned to the Lacorne batholith occur in sparse outcrops in the southwest quarter of the Lacorne map-area. Rocks of the Lacorne batholith are presumed to underlie the whole of the map-area south and west of this line. All of these rocks, with the exception of the biotite granodiorite, are coarse - to medium-grained, faintly pink to grey on fresh surfaces, and light grey on weathered surface.

Jones, Richard E., 1964, Northwest quarter of Fiedmont Township, Abitibi-East County: Quebec Dept. of Nat. Res., G.R. No. 108, p. 16-19.

LAC RAYMOND FORMATION Lower Silurian

It crops out discontinuously both north and south of the upper part of Touladi river that flows into Biencourt lake. In both places, it is composed of mudstone, with minor interbeds of other rocks. Mudstone is gray to dark gray, green to greenish gray weathering, dense, poorly cleaved and massive. The greenish weathering is characteristic of the formation. See also Pointe-aux-Trembles Formation, Lac Castor Formation. Fossils show an Upper Ludlow age.

Lespérance, P.J., Greiner, H.R., 1969, Squatec-Cabano Area, Rimouski, Rivière du Loup and Témiscouata Counties: Quebec Dept. of Nat. Res., G.R. no. 128, p. 40-43.

LAC WACONICHI FORMATION

This name was proposed by Duquette and Mathieu for fragmental volcanic rocks believed to underly conformably the greenschists of the Lac Gilman Formation in Mckenzie, Blaiklock, Richardson, and Bignell Townships, Abitibi East county. The formation is composed of generally acidic rocks and is, if in unfaulted section, about 42,000 feet thick.

Duquette, G., and Mathieu, A., Northeast quarter of Mckenzie Township, Abitibi-East county: Quebec Dept. of Min. Res., P.R. 551, p. 4.

LAFLAMME FAULT.

This important zone of faulting striking between N. 20°E. and N. 30°E across the north central part of the map-area. It is about 4,000 feet wide.

McDougall, David, J., 1965, Southeast Quarter of Barraute Township, Abitibi-East County: Quebec Dept. of Nat. Res., G.R. No. 114, p. 14

LAKE BLONDEAU FORMATION

The formational name "lac Blondeau" is here used for the first time to designate a synclinal belt of dominantly pyroclastic rocks occupying the central and southern parts of the map-area. This formation, approximately 5,000 feet thick, consists mostly of siltstone, sandstone, and conglomerate believed to be derived from volcanic material. A few basic lava flows are present in the formation.

In P.R. 551, Duquette and Mathieu designate the fragmental rocks as tuff, lapilli, and agglomerate.

Duquette, Gilles, 1964, Geology of the Northwest Quarter of Roy Township, Abitibi-East County: Quebec Dept. of Nat. Res., P.R. No. 513, p. 4-9

LAKE EVANS SERIES KEEWATIN

H.C. Cooke (1914) used this name for metavolcanic rocks near Broadback River, Quebec. Aside from areas in the immediate vicinity, the term is of no use and has been abandoned.

Cooke, H.C., 1914, An exploration of the headwaters of the Broadback or Little Nottaway river, northwestern Quebec: Can. Geol. Surv. Summ. Rept. 1912 p. 339.

LAKEFIELD ANORTHOSITE Precambrian

This is 4½ miles long and 1 mile wide. The anorthosite of the peripheral portions is fine-grained, foliated, very poor in bisilicates and weathers white. In the inner part of the area, it is more massive and appears on the whole to be rather rich in iron-magnesia minerals, which vary in amount from place to place, often giving to the rock an irregularly banded structure.

Adams, Frank D., 1896, Report on the geology of a portion of the Laurentian Area lying to the North of the Island of Montreal: Canada Geol. Surv., Ann. Rept. VIII, 1895, p. 117-118J.

LAKE ROBERTSON GRANITE

Lake Robertson almost bisects a mass of granite which extends across it in a northwesterly direction, with a total length of 9 miles and width of 4½ miles. The granite is light pink to white, rather coarse-grained, and commonly porphyritic with quartz phenocrysts up to an inch in diameter.

Cooke, H.C., James, W.F., Mawdsley, J.B., 1931, Geology and Ore Deposits of Rouyn-Harricanaw Region, Quebec: Canada Geol. Surv., Mem. 166, p. 132-133.

LA MOTTE ANTICLINE

This anticline is developed between the Clericy syncline on the south and the Okikeska - Destor syncline on the north. The west and of this anticline lies between the fork of the Duparquet - Destor band of sediments. As in the case of the Okikeska syncline, its eastward course is roughly defined by scattered observations. The eastward of these was found in range VI, La Motte Township, 4½ miles from the northern and 3½ miles from the eastern boundary. At this point, a flow strikes north 12 degrees west, and faces east, suggesting that it lies directly upon the axis of the anticline.

Cooke, H.C., James, W.F., Mawdsley, J.B., 1931, Geology and Ore Deposits of Rouyn-Harricanaw Region, Quebec: Canada, Geol Surv., Mem 166, p. 92.

LA MOTTE - LA CORNE GRANITE

The La Motte - La Corne intrusive underlies an area some 33 miles long and 10 to 12 miles wide, chiefly in Preissac, La Motte, and La Corne townships. West of it there are some small granite bodies in La Pause township which are probably offshoots of the main mass. To the east, in Fiedmont, Courville, and Pascalis townships, there are some large, poorly exposed masses which may also be offshoots of the same underlying body. It exhibits the same range of rock types as the great southern batholith, namely, granite, pegmatite, augite, syenite, and porphyritic syenite, and also some still more basic, which are hereafter termed amphibolite.

Cooke, H.C., James, W.F., Mawdsley, J.B., 1931, Geology and Ore Deposits of Rouyn-Harricanaw Region, Quebec: Canada Geol. Surv., Mem. 166, p. 136-139,

LANDRIENNE (QUARTZ, DIORITE-GABBRO-PERIDOTITE) - Complex Precambrian

The outline of the Landrienne gabbro-peridotite complex has been extended into the eastern part of Landrienne township on the basis of information supplied by recent geomagnetic surveys.

The main intrusive mass of the complex is a greenish-grey gabbro. It is intruded by quartz and feldspar porphyry and multiple peridotite dykes.

Weber, W.W., 1951, La Morandière and Parts of Duverny, Landrienne and Barraute Townships, Abitibi-East County: Quebec Dept. of Mines, P.R. No. 255, p. 11-12, also: Amos-Barraute area: Quebec Dept. of Nat. Res., G.R. 109, pp. 18-20.

LA PAUSE SYENITES

In La Pause township, there are three small masses of syenite, arranged approximately on a line running north-northwest from La Pause Lake. A fourth body of similar composition occurs on the centre line of Bousquet township about 1 3/4 miles from the north boundary. The rocks have the general appearance of quartz-augite syenites, but owing to the presence of a considerable amount calcic feldspar with the acid plagioclase and microcline, are augite-quartz monzonites. The rock is pink with a grain up to 4 mm.

Cooke, H.C., James, W.F., Mawdsley, J.B., 1931, Geology and Ore Deposits of Rouyn-Harricanaw Region, Quebec: Canada, Geol. Surv., Mem. 166, p. 117.

LA REINE GRANITE

The La Reine granite underlies an area about 6 miles from east to west in the extreme northwest corner of the region under consideration. It outcrops on the north shore of Abitibi Lake, and extends northward into La Reine township beyond the limits of the accompanying map. The rock of the amin area is light grey to pink, medium to coarse in grain, and somewhat gneissic in texture. The rock is mad e up of about 25% of quartz, perhaps 4% of biotite, and the remainder mostly albite or albite-oligoclase, with a little interstitial microcline. Apatite, titanite, and zircon are accessory.

Cooke, H.C., James, W.F., Mawdsley, J.B., 1931, Geology and Ore Deposits of Rouyn-Harricanaw Region, Quebec, Canada Geol. Surv., Mem. 166, p. 131-132.

LARCH RIVER FORMATION Proterozoic

Greywackes and possible subgreywackes are interbedded with minor slates or argillites in the southwest corner of the Gerido Lake and Léopard areas. They are part of a group of rocks termed Larch River Formation by geologists of Fenimore Iron Mines Ltd. The formation is poorly exposed and highly sheared in the Gerido Lake area, but is well exposed and generally well preserved in the Léopard Lake area. The argillites and slates are aphanitic and dark grey to greenish grey. The greywackes and possible subgreywackes are, in part, of lighter colour. Dark quartz grains, 1 to 2 mm. in diameter, are visible to the naked eye.

Bérard (1959) uses the name Larch Formation and gives detailed description of the beds.

Sauvé, Pierre, and Bergeron, Robert, 1965, Gerido Lake-Thèvenet Lake Areas, New Quebec: Quebec Dept. of Nat. Res., G.R. no. 104, p.11.

Bérard, Jean, 1959, Géologie de la Région du Lac aux Feuilles, Nouveau-Québec: Univ. Laval, Thèse pour doctorat, p. 192-200.

LA RESURRECTION FORMATION Silurian (?)

A sequence about 2,400 feet thick, overlying the Robitaille Formation near La Résurrection and consisting of a monotonous succession of green to gray, massive, volcanic sandstones and siltstones, with some 100 feet of orthoquartzite at the top, is called the La Résurrection Formation. Probably it is Lower Ludlow.Sandstone, the most abundant rock type, is commonly fine grained but ranges from very fine to coarse. It has not yielded fossils.

Lespérance, P.J., Greiner, H.R., 1969, Squatec-Cabano Area, Rimouski, Rivière du Loup and Témiscouata Counties: Quebec Dept. of Nat. Res., G.R. no. 128, p. 55-56.

LA SARRE AND GUYENNE HORNBLENDE SYENITES Precambrian

Two bodies of rather basic intrusive occur at the extreme northern edge of the region under discussion, and extend northward beyond it. The La Sarre mass is 8 miles o long, measured along the northern boundary of the map-area, and has a maximum width, within the mapped area of 3 miles. It lies mainly in the township of La Sarre and Royal-Rousillon. The Guyenne mass underlies an area of about the same size farther to the east, mainly in Languedoc and Guyenne townships.

Cooke, H.C., James, W.F., Mawdsley, J.B., 1931, Geology and Ore Deposits of Rouyn-Harricanaw Region, Quebec: Canada, Geol. Surv., Mem. 166, p. 130-131.

LAURENTIAN, LAURENTIDE, LAWRENCIAN.

Several spellings of names can be found but all derive ultimately from the name of the river and gulf.

I- LAURENTIDE

F.X. Garneau (1845, p. 179) gave the name Laurentides to the chain of hills parallel to the river and containing the divide between the rivers flowing to St. Lawrence and Hudson Bay. Logan (1863, p. 2, pp. 5-7) extended the term and emphasized the complexity of the ranges in the region. He showed that the unit extended far west of the Canada of 1863 and reached the Artic ocean. With this definition the term assumed the sense now reserved for "Canadian Shield". Few have used the name so broadly and there has been a justifiable tendency to restrict its use to designating the higher parts of the Canadian Shield bordering the St. Lawrence Lowlands or St. Lawrence River.

Garneau, F.X. 1845, Histoire du Canada: v. 1, p. 179.

Logan, W.E., 1863, Geology of Canada: p. 2, pp. 5-7.

II- Lawrentine (mountain) system.

Jules Marcou (1858) gave this form to the low range of hills forming the dividing ridge between the rivers flowing the Hudson Bay and those flowing southeast or south.Laurentine is found in a French 1855 version of this paper.

Marcou, Jules, 1858, Sketch of the geological classification of Mountains of part of North America: p. 72, privately printed. Zurich, Zürcher and Furrer. A French edition was published in 1855.

III- LAURENTIAN SERIES, SYSTEM. Precambrian

Logan (1854, p. 7) decided that "Metamorphic series" was inappropriate for crystalline rocks in the uplands between St. Jerome and Quebec City and substituted "Laurentian" for "Metamorphic". Logan used formation,series, and system interchangeably for these rocks, but there is no doubt that he considered the rocks a stratigraphic unit because in 1850 all layered, gneissic, or schistose rocks were believed to be altered sediments.

During the exploration of Ottawa river below Témiscamingue lake, Logan observed that rocks that would be now recognized as paragneisses together with crystalline limestones and quartzites are more prevalent on the south part of the section than on the north. He recognized a lower Laurentian, later to be known as Fundamental gneiss, or Ottawa gneiss (Hunt, 1878) composed largely of "orthoclase gneiss" and an upper Laurentian or Grenville division.

The two-fold division was soon modified. Mapping northeast of Grenville township encountered the massif of anorthosite now known as the Morin. The anorthosite massif cuts off the extension of the limestone bands and, with the belief that the anorthosite was metasedimentary, an upper division was introduced. This was called upper Laurentian and the Grenville division was combined with the Fundamental gneiss to form a new lower Laurentian or, less commonly, a middle Laurentian.

The name anorthosite having been proposed in 1855, the rocks were termed anorthosite gneiss or labradorite gneiss, and the stratigraphic designation was Labrador Series or Labradorian. In Canada, the last form was commoner in Canada until Norian was proposed by Hunt in 1870. Before 1880, however, the pyrogenic origin of anorthosite was recognized, and by 1895, adequate proof of this contention was forthcoming so the Laurentian System lost its upper division. With the reversion to the original twofold division, Laurentian system gradually became less significant and with the realization that many of the gneisses of the Laurentian were intrusive rocks and therefore perhaps younger than adjacent paragneisses, the term underwent an interval where its use was confused. Ells (1897, p. 124) wrote: "Laurentian non-sedimentary, Basal or Fundamental Gneiss (Ottawa gneiss) representing in altered form the original crust of the earth, and the lowest known series of rocks; without evidence of sedimentary origin".

The definition offered by Ells is so different from Logan's as to be essentially new. An committee of geologists from Canada and U.S.A. studied the field relationships and proposed a classification in which "Laurentian" was used for post-Keewatin or granitic rocks, but A.C. Lawson dissented and proposed that Laurentian be placed above Ontarian, which included Keewatin and Coutchiching. With the recognition of the Temiskaming Series, pebbles in its conglomerates were ascribed to a Laurentian granite, which was believed to cut the Keewatin rocks. Some workers have suggested that Laurentian granite is younger rather than older than Temiskaming.

With the confusion attached to the term, Laurentian has no useful place in formal stratigraphic nomenclature in Quebec. An informal use is possible in the sense of "rocks of the Laurentides" as such the term is essentially the same as "rocks of the Grenville subprovince".

Logan, W.E., 1854, On the geology of the north shore of the St. Lawrence _etc_: Geol. Surv. Can., Rept. of Progress 1852-53, p. 7.

Ells, R.W., 1897, Notes on the Archaen of Eastern Canada: Roy. Soc. Can. Tr. v. 3, sect. IV, p. 124.

Osborne, F. Fitz, 1956, The Grenville region of Quebec: Roy. Soc. Can., Spec. Pub. No. 1, pp. 4-7.

IV- LAURENTIAN, LAURENTIDE.

(Physiographic). - Several descriptive names have been given to the region underlain by rocks of the Grenville Subprovince. It is hardly serviceable to trace all the usages and assign them to authors. Apparently G.M. Dawson in 1897 was the first to suggest that the Canadian Shield has topographic features of a peneplain. A.W.G. Wilson (1903) amplified the concept and, although he described modifications of the original features, he used Laurentian peneplain for the surface of the whole of the shield.

The terms Laurentian Uplands, Laurentian Highlands, Laurentian plateau, Laurentian tableland, were used for the more restricted regions.

The arcuate contact of the older rocks against those of the St. Lawrence Lowlands is a scarp, segments of which have been given local names. The Atlas of Canada, Map. 10, shows the Laurentian Scarp west of St. Maurice river and Laurentide Scarp east of it. Kindle and Burling (1915) have referred to the same feature as Laurentian Plateau scarp.

Wilson, A.W.G., 1903, The Laurentian Peneplain: Jour. Geol. v. 11, pp. 616-659.

Kindle, E.M., and Burling, L.D., 1915, Structural relations of the Pre-Cambrian and Paleozoic rocks north of the Ottawa and St. Lawrence valleys: Geol. Surv. Can., Mus. Bull. No. 18, p. 12.

V- LAURENTIAN PLATEAU FAULT.

Kindle and Burling (1913) postulated a throughgoing fault separating the Canadian Shield from the St. Lawrence Lowlands between Hull and Quebec City. The fault does not exist.

Kindle, E.M., and Burling, L.D., (1913) _op. cit._

VI- LAURENTIDE GLACIER, (CENTRE), (GLACIER SYSTEM).

G.M. Dawson (1890, p. 162) suggested Laurentide Glacier for the ice centering on the Canadian Shield during the Pleistocene epoque. Chalmers (1890, p. 325) suggested Laurentide Glacier System. Chalmers in 1898 (p. 43 .) used "the Laurentide or Labradorean Ice" being thus unwilling to choose between the terms. In "Geology of Quebec", 1944, p. 442, Labradorean (q.v.) is used to the exclusion of Laurentide.

Flint (1943) has proposed to use Laurentide for a large sheet and to consider the Labrador and Keewatin centers low domes on the ice sheet.

For Quebec, Labradorean is preferable to Laurentide: the glacial map of 1967 shows the radial disposition of striae and eskers in Labrador peninsula.

Dawson, G.M., 1890, On the glaciation of the northern part of the Cordillera, with an attempt to correlate the events of the Glacial Period in the Cordillera and Great Plains: Am. Geol. v. 6, p. 162. - Chalmers, same volume, p. 324.

Chalmers, Robt., 1898, Surface geology and auriferous deposits of south-eastern Quebec: Geol. Surv. Can., Summ. Rept. X, p. 42J.

Flint, R.F., 1943, Growth of North American ice sheet during the Wisconsin age: Geol. Soc. Am. Bull., v. 54, p. 328-, p. 322.

VII- LAURENTIAN RIVER (PRE-GLACIAL).

In Geology of Quebec (1944) p. 488, Fig. 32 shows a hypothetical east flowing pre-glacial system. It is shown as flowing along the Trent River valley and tributaries extend into lakes Erie, Michigan, and Superior.

VIII- LAWRENCIAN LOWLANDS.

Ami introduced this synonym for St. Lawrence Lowlands in 1900. Obsolete.

Ami, H.W., 1900, Synopsis of the geology of Canada: Roy. Soc. Can., Tr. VI, Sect. IV, p. 222.

IX LAURENTIAN CHANNEL OR TROUGH **LAURENTIAN 6.**

See "Saint Lawrence Submarine Trough". This feature, which was discussed by Shepard, separates the Grand Banks from the Scotian Shelf and extends beneath the estuary of St. Lawrence river to near the mouth of Saguenay river. Hachey, Lauzier, and Bailey (1956) have discussed its role, in maintaining the Gaspé Current.

Hachey, H.B., Lauzier, L., Bailey, W.B., 1956, Oceanographic features of submarine topography: Roy. Soc. Can., Tr. 50, Oceanographic Committee, p. 68.

LAVAL FORMATION Chazy

Clark (1944, p. 29) gave this name to the formation representing the Chazy Group in the vicinity of Montreal. He, at that time, divided the formation into two members, the Ste-Thérèse (q.v.) and the Caughnawaga, which latter name has now disappeared from use in this sense. Later Clark (1952, p. 43) used the name St. Martin (q.v.), which has been proposed by Wilson for the upper part of the Aylmer Formation, the high calcium limestones occurring near Montreal. He however, reduced the formation to a member, and finally Hofmann (1963, p. 271) reduced it to the status of a lithofacies of the Laval Formation. At the same time Hofmann introduced the name Beaconfield (q v.) for the Rostricellula plena beds at the top of the Laval Formation, and suggested that the Chazy-Black River contact is within rather than at the base of the Pamelia Dolomite.

The Laval Formation is about 280 feet thick at Montreal and is shales, shaly limestones and dolomites, and calcarenites. The Chazy of the

THE APPROPRIATION OF THE NAME LAURENTIAN BY THE CANADIAN GEOLOGISTS

By M.R. WADSWORTH.

(ABSTRACT.)

The name Laurentian was given by Mr. Edward Desor in 1850 to some marine deposits in Maine, on the St.Lawrence River, and Lakes Champlain and Ontario. Mr. Desor's paper was first read before this Society and published in the Proceedings (III, 357-358). With this application the term Laurentian was quite frequently employed by Mr. Desor, (Proc. Bost. Soc. Nat. His., 1851, IV, 29,33; Bull. Soc. Géol. France, 1851 (2), VIII, 420-423; IX, 94-96; Am. Jour. Sci. 1852 (2), XIV, 49-59); and it seems to have passed into current use amongst geologists, especially between 1850 and 1857. In 1854 Sir William Logan appropriated the name to designate the Canadian rocks which he had heretofore called the "Metamorphic Series." Logan's action appears to have been unjustifiable and needless. Needless, because the rocks to which he gave the name Laurentian were the equivalents of the Azoic of Foster and Whitney. It is to be remembered that the term Huronian was not employed until 1855, and this formation was for many years thereafter regarded as Paleozoic. Unjustifiable, because the name Laurentian was in current use for a different formation; to which another name had to be given later on on account of Logan's action, thus further complicating the synonymy. Injustifiable, because Logan knew of Desor's application of the term and had employed it in the same manner himself (Report of Progress Geol. Survey, Canada, 1850-51, p.8). The complications growing out of the deprivation of Desor by Logan of the credit belonging to the former are, first, the use of the name Laurentian in geological literature with two different meanings; secondly, the naming of Desor's Laurentian, Champlain, by Prof. C.H. Hitchcock, and thus giving the term Champlain two distinct significations in geological literature.

So far as the writer is aware, but one American geologist has ever protested against the injustice done Desor by the Canadian geologists (Amer. Jour. Sci. 1857, (2), XXIII, 305-314).

The following literature offers a somewhat curious commentary upon the preceding described action of Logan. "The crystalline limestones of Canada, with those of New York and the New England States, may be divided into four classes, belonging to as many different geological periods. The first and most ancient occur in that system of rocks, named by Mr. Logan the Laurentian Series, which extending from Labrador to Lake Huron, forms the northern boundary of the Silurian System of Canada and the United States". (T. Sterry Hunt, Am. Jour. Sci. 1854.(2), XVIII, 193).

"It was therefore proposed to give the older group a distinctive name, and isasmuch as these rocks form the hills on the north side of the St. Lawrence, to which Mr. Garneau, the Canadian historian, had already given the geographical name of Laurentides, the distinctive appelation of Laurentian proposed by the present writer (Dr. Hunt) was applied to them in the Report of the Geological Survey of Canada for 1852 (page 9) which was published in 1854" (T. Sterry Hunt, Azoic Rocks, Part I, p. 72; Sec, Geol, Surv. Penn. E.)

"In 1854 the writer (Dr. Hunt) in concert with Logan proposed for the ancient crystalline rocks of the Laurentide Mountains ....the name of Laurentian." (T. Sterry Hunt, Proc. Am. Assoc. Adv. Sci., 1879, XXVIII, 283).

(From the Proceedings of the Boston Society of Natural History, Vol. XXI, January 5, 1881).

vicinity of Montreal has long been believed to only the upper part (Valcour) of the Chazy of New York, but Hofmann presents evidence that older beds, Day Point and Crown Point are present.

Clark, T.H., 1944, Structure and stratigraphy in the vicinity of Montreal: Roy. Soc. Can., Tn. 38, Sect. IV, p. 29

Clark, T.H., 1952, Montreal area, Laval and Lachine map areas: Quebec Dept. of Mines, G.R. 46, pp. 39-45.

Hofmann, H.J., 1963, Ordovician Chazy Group in Southern Quebec: Am. Assn. Pet. Geol., v. 63, p. 271

LECLERCVILLE SHALE Cincinnatian

The type section for this formation is along Grande Rivière du Chêne. The formation consists of light-grey and dark-grey siliceous shales in thin beds. Buff weathering beds and concretions are absent.

Clark states the formation is 1,000 feet thick and is underlain by Utica Shales viz the Lotbinière Shale. He assigns the formation to the Lorraine.

However, in 1948, he included this formation within the *Cryptolithus* zone (Breault member) of the Nicolet River Formation rather than placing it below it as done in 1947. Of two reports published in 1964, that, the Yamaska-Aston area states that the Breault member follows the Utica Shale and that of the Upton area mentions it only as a possible component of the St. Germain Complex.

Clark, T.H., 1947, The St. Lawrence Lowlands south of St. Lawrence river: Quebec Dept. of Mines, P.R. 204, p. 5, 7.

Clark, T.H., 1948, Portneuf map-area, Portneuf and Lotbinière counties: Quebec Dept. of Mines, P.R. 225, pp. 4-5.

LEPINE LAKE FAULT.

It branches away from the Porcupine - Destor fault 4,000 feet east of the centre line of Duparquet township. The course of the fault is marked by a valley along which local bodies of quartz-feldspar porphyry are exposed. Dips of schistosity along the south branch vary from vertical to 60° north while on the north branch they are vertical.

Graham, R. Bruce., 1954, Parts of Hebecourt, Duparquet and Destor Townships, Abitibi-West County: Quebec, Dept. of Mines, G.R. No. 61, p. 35.

LEPINE LAKE SYNCLINE

"The north limb of this syncline is overturned; the formations dip 75° to 80° north and tops are south. Towards the south, as the axis of the fold is approached, the dips range through vertical to sleeply south. On the south limb of the syncline the beds face north. Dips increase progressively from 15° north near the axis of the syncline to vertical near the contact of the sedimentary rocks with the underlying volcanic formations."

However, evidence to indicate the direction of plunge of the Lépine Lake syncline is scanty. The presence of upper arkose beds towards the west, and of scattered conglomerate outliers beyond the eastern termination of the main band, suggests that there is a general plunge towards the west. -

Graham, R. Bruce, 1954, Parts of Hebecourt, Duparquet and Destar Townships, Abitibi-West County: Québec, Dept. of Mines, G.R. No. 61, p. 32-33.

LERAY FORMATION

Black River Group

The upper formation of the black River Group is 40 feet thick at Ottawa and thins eastward towards Quebec. It is a dark gray or brown rubbly and locally cherty limestone in thin beds. Coral heads are common.

Okulitch, V.J., 1939, The Black River Group in the region between Montreal and Quebec: Am. Jour. Sci., v. 237, pp. 81-93.

Clark, T.H., 1952, Montreal Area: Quebec Dept. of Mines, G.R. 46, pp. 46-57.

LESSEPS SYNCLINE

The Siluro-Devonian and Ordovician formations do not have the same tectonic style, but Robert (1967, p. 11) believes that, as a whole, a large and open syncline plunges slightly to the southwest and trends northeast.

Robert, Jean-Louis, 1967, Geology of Lesseps Creek Area, Gaspé-North County: Quebec, Dept. of Nat. Res., P.R. No. 562, p. 11.

LEVIS FORMATION   Lower and Middle Ordovician

By 1863 Logan had postulated the presence of a thrust fault (Logan's Line) at Quebec and had separated and named two principal formations assigned to the Quebec Group on the southeast side of the fault. These were Levis Formation below and Sillery above. Lauzon Formation between the two formations was set up by Richardson, and this name was used by Logan, 1866.

In "Geology of Canada" (1863, pp. 227-234), Logan lists the beds of the Levis Formation under 17 headings. The accompanying text suggests that the section is on Orleans Island, but the section cannot be recognized now because it is composite with some beds not exposed on the island. In the light of further developments the Orleans section was poorly chosen and in effect has not been used. The type section became that studied by Raymond in the cities of Levis and Lauzon.

The Levis formation consists of dark grey clayey siltstones, which weather buff and alternate with lighter weathering siltstones in very thin layers. Some dolomitic siltstones are found and some beds are massive enough to suggest dolomite.

Some sandy beds occur but these are not abundant and are mostly in the lower part of the formation. Shales either black or grey do not occur in force and "Levis Shale" is a misnomer. At Levis, the upper part of the section has red clayey siltstones, at some places alternating with green siltstones, and at some localities away from Quebec red siltstones occur throughout the formation.

Limestone conglomerates are abundant throughout the formation but are not restricted to it. These conglomerates grade along strike into calcarenites or calcareous sandstones and are extremely lenticular. Some faults were postulated on the hypothesis that the conglomerates are continuous, but these faults do not exist.

Raymond's measured section is 600 feet, and further discovery of fossil shows that another 400 feet can be added to the section.

Hall was of the opinion that the Levis Formation was of the age of the Hudson River Group, but Billings showed that the formation was of the age of the Beekmantown (Calciferous) and the Chazy. Hall and most subsequent workers accepted this determination or at least the Beekmantown (Canadian) age which was the basis for the dating of the Deepkill Formation.

The correlation between the carbonate beds and the shale-silt beds is incomplete. It is uncertain whether the lower beds are to be assigned to the Tremadoc of Great Britain, and whether the beds are Cambrian or Ordovician. There is no question that Arenig beds are found in abundance but the presence of Llanvirn is subject to a difference of opinion.

Raymond, P.E., 1914, The succession of faunas at Lévis, P.Q.: Am. Jour. Sci., v. 38, pp. 523-530.

Billings, Elkanah, 1860, On some new species of fossils from the limestone near Point Levis opposite Quebec: Can. Nat. and Geol., v. 5, pp. 301-323.

Osborne, F. Fitz, 1956, Geology near Quebec City: Nat. Can. v. 27, pp. 181-188. (For bibliography).

LICHEN LAKE GRANITE Precambrian

This rock forms a batholith and has abundant opalescent quartz. The feldspar which is altered is gray which gives the overall color of the rock.

Longley, W.W., 1951, Bachelor Lake Area, Abitibi-East County: Quebec Dept. of Mines, Geol. Rept. 47, p. 16-17.

L'ISLET FORMATION (Wilmarth -1-1191) Lower Paleozoic

No type section is cited for this formation, which is named from L'Islet county. Dresser states that it consists of grey schists and grey quartzites in some exposures the two rocks are intimately interlayed. Map 34A of the Geological Survey of Canada shows it cropping out as a band 5 miles wide between Pohenagamuk Formation and Sillery Formation.

Dresser considered that the formation is lower Sillery, and Knox has mapped Sillery and L'Islet in the Thetford-Black Lake area and assigned them to Cambrian above Bennett Quartzite, which he assigns to Precambrian. In Geology of Quebec, the formation is assigned to Ordovician.

The lack of a type section with consequent uncertainty of the lithology and the structural relationships to other formations makes this name unserviceable.

Dresser, J.A., 1912, Reconnaissance along the National Transcontinental Railway in southern Quebec: Geol. Surv. Can., Mem. 35, pp. 20-25.

Knox, J.K., 1917, Southwestern part of Thetford-Black Lake mining district (Coleraine sheet): Geol. Surv. Can., Summ. Rept., 1916, p. 233.

Dresser, J.A., Denis, T.C., 1944, Geology of Quebec, G.R. 20, p. 339, 346, 388.

LOIS LAKE FAULT.

It lies along the north boundary of the area mapped in Duparquet township. It is believed to be the continuation of a westerly trending shear zone of considerable magnitude which passes through Lois lake. It is marked by a belt of vertically-dipping schists which has a width up to 1,500 feet within the map-area and an additional 1,000 to 2,000 feet beyond its northern limit. Reconnaissance immediatly north of the map-area indicates that this fault has related northeasterly-trending shears which branch away from it.

Graham, R. Bruce., 1954, Parts of Hebecourt, Duparquet and Destor Townships, Abitibi-West County: Quebec, Dept. Of Mines, G.R. No. 61, p. 36.

LORRAIN

This is the name of a township in Ontario west of Témiscamingue lake.

I- LORRAIN (ARKOSES) (SANDSTONES) (QUARTZITES) (FORMATION) (SERIES) (GROUP)

The intensive geological exploration following the discovery in 1903 of silver at Cobalt led to the naming of some rock units in a very informal way. Miller referred to Cobalt and Lorrain units as essentially coordinate units. However, in 1911, Miller, at the same time as Harvie (see Fabre Series), formalized the names using Lorrain Series for Upper Huronian and Cobalt for Lower, whereas, Harvie used Fabre Series for Lower Huronian making Cobalt Middle Huronian.

Lorrain Formation is restricted in its occurrence in Quebec to an area close to Ontario and upper units of the formation found in Ontario are not recognized.

II- LORRAIN GRANITE

Miller called a massive granite underlying the Cobalt Group rocks, Lorrain granite. It was according to his account less strongly layered than the typical Laurentian. The term is only of local use and only casual references to it can be found in writings on Quebec geology.

LORRAINE GROUP — Upper Ordovician

This term derives from a locality in New York and dates from 1842. Its use spread into Ontario and Quebec; in some citations Hudson Formation, or Hudson River Formation refers to these rocks. Logan (Geology of Canada, 1863, p. 198) uses the spelling "Loraine".

Lorraine is a lithologic unit, and, as such, it is generally grey shales or mudstones, dolomitic or calcareous mudstones or siltstones, with some sandstones. There has been a tendency to introduce biostratigraphic divisions, and some confusion has resulted. This tendency has been deplored by Fisher (1956).

The two studies by Foerste are the basis of most of the subsequent work on this group in Quebec and Ontario. The group is Eden and Maysville age.

Fisher, D.W., 1956, Intricacy of applied stratigraphic nomenclature: Jour. Geol. v. 64, pp. 619-621.

Foerste, A.F., 1916, Upper Ordovician formations of Ontario and Quebec: Can. Geol. Surv., Mem. 83, p. 279.

Foerste, A.F., 1924, Upper Ordovician faunas of Ontario and Quebec: Can. Geol. Surv., Mem. 138, p. 255.

LOTBINIERE SHALE

Clark, 1964, has used this name for thin-bedded carbonaceous shale with, at 10 to 20 foot intervals, buff or orange weathering dolomitic interbeds a few inches thick cropping out on the south side of St. Lawrence river. The beds are locally disturbed by tectonism, and he does not give a thickness for them in the Upton area. He points out that the Utica Shales of the St. Jean-Beloeil area resemble these shales but do not have the orange weathering beds. The formation is assigned to Utica, but particularly its upper part has not the typical Utica lithology.

Clark, T.H., 1964, Upton Area: Quebec Dept. Nat. Res., G.R. 100, p. 11.

Clark, T.H., 1964, St.Jean-Beloeil Area: Quebec Dept. Mines., G.R. 66, p. 20

LOWER ALBANEL FORMATION — Proterozoic

Wahl (1953) proposed this name for 5000 to 8000 feet of dolomites, sandy dolomites, with minor clastic beds cropping out in the vicinity of Mistassini

ERA	SYSTEM		SERIES	STAGE	GROUP	ST. LAWRENCE LOWLANDS FORMATIONS: ONTARIO OTTAWA B.	MONTREAL BASIN SOUTH	MONTREAL BASIN NORTH	ANTICOSTI BASIN	LABRADOR BASIN	EUROPEAN STAGES
PALEOZOIC	DEV.	M	ERIAN				ST. HELEN'S ISLAND BRECCIA BLOCKS				GIVETIAN
		L	ULSTERIAN								SIEGENIAN
			HELDERBERGIAN								GEDINNIAN
	SILURIAN	U	CAYUGAN								LUDLOVIAN
		M	NIAGARAN	LOCKPORTIAN TONAWANDIAN ONTARIAN	CLINTON				CHICOTTE JUPITER GUN RIVER		WENLOCKIAN
		L	ALEXANDRIAN		MEDINA				BECSCIE		LLANDOVERIAN
	ORDOVICIAN	U	CINCINNATIAN	GAMACHIAN					ELLIS BAY		
				RICHMONDIAN	QUEENSTON	QUEENSTON	BECANCOUR R.	BECANCOUR R.	VAUREAL		ASHGILLIAN
				MAYSVILLIAN	LORRAINE	RUSSELL CARLSBAD	PONTGRAVE R. NICOLET R.	PONTGRAVE R. NICOLET R.	--- ENGLISH HEAD		
				EDENIAN	UTICA	BILLINGS EASTVIEW	LACHINE	LOTBINIERE	MACASTY		
		M	CHAMPLAINIAN	SHERMANIAN KIRKFIELDIAN ROCKLANDIAN	TRENTON	COBOURG SHERMAN FALL --- HULL ROCKLAND	TETREAUVILLE MONTREAL --- DESCHAMBAULT MILE END OUAREAU	NEUVILLE / GRONDINES ST.CASIMIR DESCHAMBAULT --- PONT ROUGE			CARADOCIAN
				BLACKRIVERAN	BLACK RIVER	LERAY LOWVILLE PAMELIA	LERAY LOWVILLE PAMELIA	LERAY LOWVILLE PRECAMBRIAN			LLANDEILIAN
				CHAZYAN	CHAZY	ROCKCLIFFE	LAVAL		MINGAN		LLANVIRNIAN
		L	CANADIAN		BEEKMANTOWN	OXFORD	BEAUHARNOIS		ROMAINE PRECAMBRIAN		ARENIGIAN TREMADOCIAN
	CAMBRIAN	U	CROIXAN	TREMPEAULEAU'N FRANCONIAN DRESBACHIAN	POTSDAM	MARCH NEPEAN PRECAMBRIAN	CHATEAUGUAY COVEY HILL PRECAMBRIAN				
		M	ALBERTAN								
		L	WAUCOBAN		LABRADOR					HAWK BAY FORTEAU BRAD ORE PRECAMBRIAN	

(Clark, Globensky, Riva & Hofmann; 1972, Int. Geol. Cong., Guidebook C-52) lake, and forming part of the Mistassini group (q.v.). Wahl divided this unit into four members lettered from "a" to "d". Neilson mapping in the adjacent Albanel map area did not divide the formation into members.

Wahl, W.G., 1953, Temiscamie River Area, Mistassini Territory: Quebec Dept. of Mines, G.R. 54, pp. 11-14.

LOWVILLE FORMATION Black River Group

Despite some differences in the use of this name in the United States and the early use of the term in Canada, Lowville has been consistently used for the middle formation of the Black River Group. The Lowville is a limestone of dark grey color with at many locality a "birdseye" structure. The formation is 30 feet at Ottawa, 17 feet at Pointe Claire, but thins eastward where it is only a very few thick near St. Marc.

Okulitch, V.J., 1939, The Black River Group in the region between Montreal and Quebec: Am. Jour. Sci., v. 237, pp. 81-93.

Clark, T.H., 1952, Montreal Area: Quebec Dept. of Mines, G.R. 46, pp. 46-57.

LUCIE LAKE INTRUSIVE LENS - ANORTHOSITE. Precambrian

An anorthositic lens of about 8 square miles lies north of Lucie lake in the southeast corner of the area. The lens is elongated east-west and is surrounded by metamorphic rocks of the Manicouagan upland. The rock of the Lucie Lake lens is commonly anorthositic gabbro, but this grades irregularly to coarse anorthosite and to medium-coarse dark gabbro. The gabbroic facies is more abundant towards the northeast.

Kish, Leslie, 1968, Hart-Jaune River Area, Saguenay County: Quebec Dept. of Nat. Res., G.R. No. 132, p. 63-64.

LUKE HILL LIMESTONE Ordovician

This formation consisting of 160 feet of bluish gray, thin-bedded limestone was mapped by Logan as B_3 of the Philipsburg Series (q.v.) and named by McGerrigle. The formation is Beekmantown.

McGerrigle, H.W., 1931, Three geological formations in northwestern Vermont: Rept. of State Geol., 17th., 1929-30, pp. 184-185.

MACASTEY SHALE, MACASTY SHALE, MACASTI

Logan in the "Geology of Canada" (1863, p. 220) suggests that Jacques Cartier Passage between Mingan and Anticosti islands is underlain by 1700 feet of Black River, Trenton, and Utica beds. He mentions loose blocks of black shale on the north shore of Anticosti. What was apparently a geographic reference to these occurrences by Foerste (1924, p. 2) has been taken as a proposal of a formation name. Foerste used the form Macastey, but Twenhofel (1927, p. 22) who presented the definitive discussion of the geology of the island used the form Macasty.

Roliff (1968, p. 34) gives the result of drilling on Anticosti island, and it shows a diverse thickness, normally less than 300 feet, from hole to hole. Roliff suggests either a Trenton or a post-Trenton uplift or both.

Riva, (1969) has assigned the faunas to a "Canajoharie, Lower Utica, and Upper Utica" of the graptolite sequence.

The Macasty Shale is on Anticosti underlain by about 1,000 feet of limestone and shale. The formation is nowhere exposed.

Foerste, A.F., 1924, Upper Ordovician faunas of Ontario and Quebec: Can. Geol. Surv., Mem. 138, p. 2.

Twenhofel, W.H., 1927, Geology of Anticosti Island: Can. Geol. Surv., Mem. 154, p. 22.

Roliff, W.A., 1968, Oil and gas exploration - Anticosti island, Quebec: Geol. Assn. Can., Pr. v. 19, p. 34.

Riva, John, 1969 Middle and Upper Ordovician graptolite faunas of St. Lawrence Lowlands and of Anticosti Island; A.A.C.G., Memoir 12, p. 539.

MC KENZIE NARROWS FAULT.

This fault was recognized in the Chibougamau Lake area to the southwest, and thrusting to the northwest was postulated (Mawdsley and Norman, 1935). There is no clear evidence that this fault extends into the Bignøll area. However, it could form the southeastern contact of the Chibougamau series as it does in the Chibougamau Lake area. See Doré Lake Fault.

Gilbert. J.E., 1958, Bignell Area, Mistassini and Abitibi Territories Abitibi-East and Roberval Electoral Districts: Quebec, Dept. of Mines, G.R. No. 79, p. 29.

(McKENZIE - **Bouzan Lake fault.**)

See Thompson Creek Fault. This name was used apparently in error by M.E. Wilson (1943) for a fault named by Hawley (1933).

MCLACHLIN-BOOTH SYNCLINE

The axis of this north trending, major syncline extends from the southern border of the area at Booth lake northward beyond Gordon lake , in the northern part of the area.

Lyall, H.B., 1959, Preliminary Report on McLachlin-Booth Area, Temiscamingue Electoral District: Quebec, Dept. of Mines, P.R. No. 391-. p. 9-10.

MCWATTERS GROUP

The rocks of this group which were mapped by Hawley (1934) as "conglomerate agglomerate" assigned to Keewatin, occur in a belt about four miles long and up to ½ mile wide on the south side of the Cadillac-Bouzan Lake fault at McWatters. They consist mainly of andesite tuff, and pyroclastic andesite breccia separated into two bands for almost the entire length of the belt by conglomerate and greywacke in a zone 300-1,000 feet wide. The average dip of the McWatters group is about 70 north, and the maximum thickness after correction for duplication by minor folding is about 1,500 feet.

Hawley, J.E., 1934, McWatters Gold Mine belt, East-Rouyn and Joannes: Quebec Bur. Mines, 1933, Pt. C.

Wilson, M.E., 1943, The Early Precambrian succession in western Quebec: Royal Soc. Canada Trans., ser. 3, v. 34, sec. 4, p. 128-129.

MCWATTERS FAULT.

The McWatters fault lies along the conglomerate-andesite contact in the south limb of the McWatters syncline and apparently provided the channelway along which the gold of the mine was deposited.

Wilson, M.E., 1962, Rouyn-Beauchastel map-areas, Quebec: Canada, Geol. Surv., Mem, 315, p. 42.

MAGOG Middle Ordovician

The name which is applied to a town on the north end of Memphremagog lake as well as to political divisions and physical features in the region, is a diminutive of the name for the lake.

I. Magog Formation- (Wilmarth -1-1267). Ami (1900) proposed the name without designation of a type locality and without a description of the beds other than stating that black shales contain graptolites, He suggested that the formation is similar to the Farnham, and both are "akin" to the Normanskill shales of New York.

Clark (1934) used "Magog slates" for some rocks he had referred to the Memphremagog Series in an unpublished report on the Mansonville area to the Geological Survey of Canada.

Magog is not given as a formation name in "Geology of Quebec", 1944, but "Memphremagog" apparently refers to this formation, which is assigned to the upper part of a Farnham Series.

Fortier (1946) has used Magog Formation for some slates, siltstones, sandstones, as well as other rocks in the Orford map area. St. Julien (1963) has given descriptions and a schematic section of over 6000 feet for the Magog Formation in the Orford-Sherbrooke area.

Cooke (1950) assigned the Magog beds to the Beauceville Group, although he admitted the priority of the name Magog.

Ami, Henry , 1900, Synopsis of the geology of Canada: Royal Soc. Can., Tr., v. 6, Sec. III., p. 200.

Clark, T.H., 1934, Structure and stratigraphy of southern Quebec: Geol. Soc. Am., Bull. 45, p. 11.

Dresser and Denis, (1944), Geology of Quebec: Dept. Mines, Quebec: G.R. 20, p. 401.

Fortier, Y.O., 1946, Geology of the Orford Map-area: Stanford University thesis, pp. 75-103.

St. Julien, Pierre, 1963,Géologie de la région d'Orford-Sherbrooke, Québec; Université Laval, Thèse, pp. 118-144.

Cooke, H.C., (1950), Geology of a southwestern part of the Eastern Townships of Quebec: Geol. Surv. Can., Mem. 257, p. 33.

II. <u>Magog Conglomerate</u>- Dresser (1925) proposed this name for some conglomerates believed to be associated with the Magog Formation and to mark its base. Richardson (1929) has correlated it with the Irasburg Conglomerate of Vermont. As shown by Morin (1954), many conglomerates of the northern Appalachians in Quebec are intraformational and many, including some cited by Dresser, are not at the postulated stratigraphic position.

It is logical that this use of Magog be discontinued.

Dresser, J.A. 1925, The Magog Conglomerate, a horizon marker in the "Quebec Group": Roy. Soc. Can., Tn, 19, Sec. IV, p. 115-121.

Richardson, C.H., 1929, The petrography of the Irasburg Conglomerate, Vermont: Rept. of State Geologist 16, pp. 107-118.

Morin, Marcel, 1954, Conglomerates in the northern Appalachian region: Université Laval, Thèse, pp. 1-74.

III. <u>Magog Shale zone</u>- Ruedemann divided the Ordovician rocks of New York into 19 graptolite zones. Of these, Zone 10 is given the name Magog Shale and placed between Normanskill Shale with zones 8 and 9 and Canajoharie Shale with zones numbered 11 to 15. The fauna of the Magog

Shale is that of the well known Castle Brook locality, and as the summary by H.C. Cooke (op. cit. pp. 46-48) shows, most authors have considered the beds of Trenton age.

Berry (1962) as an outcome of study of the graptolite sequence in Texas, became interested in the fauna of the Castle Brook locality and collected fossils there in 1959 as well as studying some collected from other nearby localities by St. Julien (op. cit. pp. 148-150). Berry, as had earlier investigators, recognized two zones but concluded that both zones are of the age of the Normanskill formation of New York.

Riva (1968) has suggested that Berry has placed undue emphasis on the Texas faunas and would consider that the "Magog fauna" is partly the age of the Normanskill but is partly younger of "upper Magog age".

Ruedemann, Rudolf, 1919, Graptolites of Ordovician slate belt of New York: N.Y. State Mus., Bull. 227-228, p. 125.

Berry, W.B.N., 1962, On the Magog, Quebec, graptolites: Am. Jour. Sci., v. 260, pp. 142-148.

Riva, John, 1968, Graptolite faunas from the Middle Ordovician of the Gaspé north shore: Nat. Can. 95, pp. 1394-1398.

IV. Magog Trough. Kay (1937) has used Magog Trough as a substitute for the name Levis channel which was proposed by Ulrich and Schuchert in the basin of sedimentation east of the Quebec Barrier. He proposed the change because Levis is the name of a formation within the trough but the same objection, if indeed it is a logical objection, applies to the name Magog.

Kay, G.M., 1937, Stratigraphy of the Trenton Group: Geol. Soc. Am., Bull. v. 48, p. 290.

Ulrich, E.O. and Schuchert, C. (1902), Paleozoic seas and barriers in eastern North America: N.Y. State Mus., Bull. 52.

MALARTIC VOLCANICS, GROUP Archean

Gunning and Ambrose (1939) presented a summary of the Archean geology of the Rouyn-Harricanaw region and divided the rocks into four principal units; in descending order these are: Cadillac Group, Blake River Group, Kewagama Group, and Malartic Group. They believe that these are disposed in a syncline whose axis trends east-west.

The Malartic Group is well exposed in Malartic township and consists of metavolcanic rocks including pillowed flows, massive flows, pyroclastic rocks, mostly of andesitic and basaltic compositions but including some acidic lavas. Some beds of metasedimentary rocks are present; one bed of conglomerate is 400 feet thick. The base of the lavas has not been recognized but their minimum thickness is estimated at 10,400 feet.

The group crops out only on the north side of the synclinal structure and the validity of the interpretation has been questioned by Norman and by Wilson. Norman has suggested that the Blake River and the Malartic Groups are the same, and the apparent syncline is partly a result of faults.

Wilson, (1943, p. 135) agrees with some conclusions set forth by Norman and suggests the possibility that the Keewagama belt (Group) Malartic Volcanics, and Cadillac sediments as well as the Blake River volcanics may be but parts of Abitibi Series, for which he suggests a thickness of 29,000 feet.

Gunning, H.C., 1937, Cadillac Area, Quebec: Canada Geol. Surv., Mem. 206, p. 4.

Gunning, H.C., Ambrose, J.W., 1939, The Timiskaming-Keewatin Problem in the Rouyn-Harricanaw Region, North-Western Quebec, Roy. Soc. of Canada, Third Series, Section IV, volume XXXIII, 1939, p. 20.

Norman, G.W.H., 1942, The Cadillac Syncline Belt of North-Western Quebec: Roy. Soc. Can. Proc., Third Series, vol. XXXVI, sec. IV, p. 89-98.

Wilson, M.E., 1943, The Early Precambrian succession in Western Quebec: Roy. Soc. Can. Trans., 1943, Third Serie, Vol. XXXVII, sec. IV, p. 135.

Gunning, H.C. and Ambrose J.W., Malartic Area, Quebec: Can. Geol. Surv.: Mem. 222, p. 8. This gives a measured section in range VI & VII. Malartic of 7600 ± feet of this group.

MALARTIC GRANODIORITE

A peculiar porphyritic granite outcrops on the points and islands along the south shore of La Motte lake, Malartic township, over a distance of about 5 miles. Though equigranular in places, it is commonly porphyritic, with phenocrysts of quartz and feldspar in a blackish or dark green groundmass. The rock is extensively altered and is locally strongly sheared.

Cooke, H.C., James, W.F., Mawdsley, J.B., 1931, Geology and Ore Deposits of Rouyn-Harricanaw Region, Quebec: Canada Geol. Surv., Mem. 166, p. 134.

MALARTIC "BREAK"

The break came into existence early in the sequence of events. As a fault zone of major proportions, it provided the channelway for the magmas of peridotite, diorite and, to a large extent, porphyry. From the distribution of the deposits it is obvious that it also served as the major channelway for the gold-bearing solutions.

Eakins, P.R., 1962, Geological settings of the gold deposits of Malartic District, Abitibi-East County: Quebec, Dept. of Nat. Res. G.R. N o. 99, p. 113

MALBAIE CONGLOMERATE (FORMATION) Lower (?) Devonian

Conglomerates, which are conformable with the Gaspé Sandstones, crop out along and inland from the north flank of Baie de Malbaie in eastern Gaspé. Kindle has proposed Malbaie Conglomerate for these rocks. McGerrigle (1950, p. 50) gives a thickness of 2000 feet to this formation. The formation has been considered Middle Devonian, by most recent workers, but it, like other formations of the Gaspé Sandstones, is probably Lower Devonian.

Kindle, C.H., 1936, A geological map of southeastern Gaspé: Eastern Geologist, No. 1, Mimeographed, no pagination.

McGerrigle, H.W., 1950, The Geology of Eastern Gaspé: Quebec Dept. of Mines, G.R. 35, p. 40-92.

Boucot, A.J., et al., 1967, Contributions to the age of the Gaspé Sandstone and Gaspé Limestone: Can. Geol. Surv., Paper 67-25, pp. 1-3.

MALBAIE SYNCLINE

"Secondary folds are present within this structure. Most dips on the southern limb of the syncline are steeper than these on the north limb and in some sections the beds on the southern limb are overturned. Thus, the fold is not only asymmetrical in general but in some sections it is overturned to the north. Some thrusting appears to be associated with the overturning". The trend of the axis is northwest.

McGerrigle, H.W., 1950, The Geology of Eastern Gaspé: Quebec, Dept. of Mines, G.R. No. 35, p. 106.

MANICOUAGAN UPLAND METAMORPHIC COMPLEX Precambrian

Rocks are either homogeneous or layered and vary in composition from silica-and alumina-rich felsic rocks to pyroxenite. They have anhydrous mineral assemblages, and, because of the absence of platy minerals, the schistosity is generally poorly marked except in the sillimanite and graphite bearing varieties.

Kish, Leslie, 1968, Hart-Jaune River Area, Saguenay County: Quebec Dept. of Nat. Res., G.R. No. 132-, p. 8-9.

MANITOUNU(C)K FORMATION, GROUP, SERIES Proterozoic

Bell (1879, p. 13C) gave the name to some an altered sedimentary rocks from the chain of islands on the east side of Hudson Bay. According to him the formation consists of limestones, some sandstones and quartzites, shales, and amygdaloidal volcanic rocks. Low (1903, p. 80D), in a table, places the 450 feet of the Manitouck (Proterozoic) Series above most of the beds and below the "diabase capping". Bell (1895, p. 351) had called the beds below the Manitounuck "Intermediate Formation".

C.K. Leith (1910, p. 232) visited the area and, being unaware of the two names proposed by Bell, proposed Richmond Group for the clastic beds forming the lower part of the Proterozoic section with Nastopoka Group for an upper part. Unfortunately it is almost impossible to relate the names given by Leith and Bell.

This name has priority and Manitounuk Group should be used for the Proterozoic rocks on the east side of Hudson Bay.

Bell, Robert., 1879, Report on the exploration of the east coast of Hudson Bay, 1877: Can. Geol. Surv. Rept of Prog. 1877-78, p. 17C.

Bell, Robert., 1895, Labrador Peninsula: Scottish. Geog. Maq. July 1895, p. 351, Low, A.P. 1903, Exploration of the east Coast of Hudson Bay: Can. Geol. Surv. Ann. Rept., XIII, p. 80D.

Leith, C.K., 1910, An Algonkian Basin in Hudson Bay, a comparison with the Lake Superior Basin: Econ. Geol., V., pp. 232-233

Stevenson, T.M., 1969, A geological reconnaissance of Leaf Bay map-area, New Quebec and Northwest Territories: Can. Geol. Surv. Mem 356, p. 44.

MANNEVILLE FAULT

The eastern extension of the Manneville fault has been followed by Latulippe (1953) to the east limit of Lacorne township. It is a cross fault striking in a northeast direction.

Jones, Richard E., 1964, Northwest quarter of Fiedmont Township, Abitibi-East County: Quebec, Dept. of Nat. Res., G.R. No. 108, p. 21.

MANSONVILLE SLATE (Wilmarth -1289) Lower Proterozoic

Mansonville Slate (or Series)- The name was used for a series in unpublished reports on work done in the Mansonville area by T.H. Clark in

Table of Formations

Age	Group or Formation	Description
Quaternary		Boulder deposits, gravel, sand, clay
Palaeozoic	Unit 13	Breccia, tuff, dacite; contains limestone inclusions; minor diabase
	Probable unconformity	
Proterozoic	Unit 12	Gabbro dykes, diabasic in part
	Montagnais Group Unit 11	Diorite, gabbro, peridotite, and related rocks. Relationship to 12 unknown
	Intrusive contact	
	Kaniapiskau Supergroup Unit 10	Sedimentary and volcanic rocks undifferentiated. Age relationship to 7, 8, 9 unknown. 10a, quartzite; 10b, iron-formation, may include minor mica schist and quartzite below the iron-formation; 10c, conglomerate, greywacke, arkose; 10d, dolomite; 10e, metasedimentary rocks; 10f, massive lava, tuff
	Manitounuk Group Unit 9	9B: Iron-formation, dolomite, slate, chert, greywacke, quartzite, basalt; basalt flows and sills overlying dolomite and quartzite
		Unconformity
		9A: Arkose, conglomerate; andesite flows and sills, arkose, quartzite; gabbro Relationship to 7, 8, 10 unknown
	Cape Smith – Wakeham Bay belt Unit 8	8B: Mainly andesitic flows, gabbro 8A: Shale, quartzite, dolomite, limestone, iron-formation; minor intercalated volcanic rocks Relationship to 7, 9, 10 unknown
	Sakami Lake Formation Unit 7	Quartzite; minor arkose, pebble-conglomerate Relationship to 8, 9, 10 unknown
	Major unconformity	
Archaean	Unit 6	6a, gabbro; 6b, pyroxenite; 6c, hornblendite; metamorphosed equivalents. May be Archaean or younger
	Intrusive contact	
	Unit 5	Undivided granite and granite-gneiss. Alternate areas of distinct gneisses and massive granites
	Unit 4	Black and white banded gneisses of sedimentary origin

Table of Formations—*Cont'd*

Age	Group or Formation	Description
		Gradational or structurally conformable contact
	Unit 3	Granite, quartz monzonite, granodiorite, diorite, pegmatite; massive to poorly foliated, may be porphyritic, commonly contains fragments of amphibolite
		Structurally conformable contact
	Unit 2	Yellowish green granodiorite and granodiorite-gneiss containing pyroxene. 2a, amphibolitic gneiss; 2b, gneiss derived mainly from sedimentary rocks
		Structurally conformable contact
	Unit 1	Predominantly granitic rocks, with pronounced foliation, gneissosity normally well developed. 1a, derived mainly from sedimentary rocks; 1b, derived mainly from volcanic rocks; 1c, hornblende-biotite gneiss with minor granitic material; 1d, meta-gabbro and related rocks; 1e, contains numerous basic inclusions; 1f, metamorphosed iron-formation; 1g, migmatites, veined gneisses, *lit-par-lit* gneisses

Note: Units 1–5 not necessarily in chronological order.

(Stevenson, 1968, G.S.C. Mem. 356) p. 18,19

1930-31. It consists of slates and quartzites according to the paper (Clark, 1934) in which the name was published and was there referred to as a formation. Ambrose and later Fortier added to it or described other members so that the designation as slate is shown to be inappropriate. Cooke (1950) assigned the rocks to the Caldwell Group. St. Julien (1963) following a suggestion by Fortier, shows that the Mansonville Formation becomes more homogeneous if the distinctive beds called "Brompton rocks" be considered a formation separate from the Mansonville.

No fossils have been recognized as belonging to this formation. It is Cambrian or Lower Ordovician or both.

Clark, T.H., 1934, Structure and stratigraphy of southern Quebec: Geol. Soc. Am., Bull. v. 45, p. 11.

Ambrose, J.W., 1942, Preliminary map of Mansonville Map-area: Geol. Surv. Can., Paper 42.1.

Fortier, Y.O., 1946, Geology of the Orford Map-area in the eastern townships of the Province of Quebec, Canada: Stanford University thesis. pp. 61-69.

Cooke, H.C., 1950, Geology of a southwestern part of the Eastern Townships of Quebec: Geol. Surv. Can., Mem. 257, p. 5.

St. Julien, Pierre, 1963, Géologie de la région d'Orford-Sherbrooke, Quebec: Université Laval, Thèse, pp. 50-65.

MANSVILLE PHASE (of Oak Hill Group) Cambrian (?)

Clark (1934, p. 11) uses "Mansville Phase" for a part of the Oak Hill outcrop in which the thickness of the whole group above the Tibbit Hill is reduced to less than one tenth of the normal. He favors the hypothesis that the thinning is a result of metamorphism. Eakins

(1963, p. 1) proffers the same explanation with the more specific information that the formation is thinned along the limbs of the Richford-Sutton syncline. Because the fabric of the deformed rock does not show evidence of ten-fold thinning, the plausibility of a depositional thinning must be considered.

Clark, T.H., 1934, Structure and stratigraphy of southern Quebec: Geol. Soc. Am, Bull. v. 45, p. 11.

Eakins, P.R., 1960, Sutton Map Area: Can. Geol. Surv., Paper 63-34, p. 1.

MARIA LATITE — Lower Devonian (?)

The southwestern part of Maria mountain in ranges II and III, Maria township, consists of latite in the form of a volcanic neck and associated flows. The rocks are pinkish and fine grained minerals with the exception of small patches of limonite.

Aleock, F.J., 1935, Geology of Chaleur Bay Region, Canada Geol. Surv., Mem. 183, p. 72-73.

MARCH FORMATION — Cambrian (?)

These beds, in the vicinity of Ottawa, were named by A.E. Wilson, and consist of alternating gray sandstone and sandy dolomite or blue-gray dolomite, all weathering dark rusty brown. The sand grains are large, generally rounded, and commonly loosely cemented. Some of the thick dolomite beds contain pockets, 1 inch to 3 inches in diameter, filled with large crystals of pink or white calcite. The formation represents a transition from the Nepean sandstone to the Oxford dolomite, the sand content being most evident at the base.

Clark, T.H., 1966, Châteauguay Area, Châteauguay, Huntingdon, Beauharnois, Napierville and St. Jean counties: Quebec Dept. of Nat. Res., G.R. no. 122, p. 20.

MARSAC LAKE SYNCLINE.

Marsac Lake Syncline is a well defined structure extending to a locality seven miles south of Kipawa lake where it seems to dominated by a northwest trending structure.

Robert, Jean-Louis., 1963, Geology of Kipawa Lake Area, Témiscamingue County: Quebec, Dept. of Nat. Res., P.R. No. 502, p. 7.

MARSOUIN SERIES Ordovician

J.W. Dawson (1896) was apparently the first to use this name for the Diplograptus and Nemagraptus beds at Marsoui, Griffon Cove, and White River, Gaspé. Riva (1968) has shown the complexity of the graptolitic faunas. Lapworth (1886) has used Marsouin River Zone. Jones (1934) mapped the Marsoui area and used no formation or series name but referred the shales, limestones, chert, and conglomerate to Middle and Lower Ordovician.

This name for a formation or series can no longer be considered valid.

Dawson, J.W., 1896, Additional notes on fossil sponges and other organic remains from the Quebec Group at Little Métis on the lower St. Lawrence: Roy. Soc. Can., Tn. v. 2, Sec. IV, p. 93.

Riva, John, 1968, Graptolite faunas from the Middle Ordovician of the Gaspé North Shore: Nat. Can., v. 95, pp. 1381-1384.

Lapworth, Chas., 1886, Preliminary report on some graptolites etc.:

Roy. Soc. Can., Tn. v. 4, pp. 169-171.

Jones, L.W., 1934, Marsoui Map-area, Gaspé Peninsula: Quebec Bur. Mines, Ann. Rept., 1933, D, pp. 20-29.

MATAGAMI SERIES Archeozoic

J. Austen Bancroft (1913) gave this name to metasedimentary rocks cropping out along part of the east arm of Matagami lake. The series has a well marked conglomerate. Bancroft assigned it to Huronian (?), but more recent workers have considered it Archean. Cooke (1919) has described several sequences of Archean metasedimentary rocks using names like Pontiac, Broadback, Brock, Mattagami, Nemenjish, and Lucky Strike and expressed the belief that they are post Keewatin. With the exception of Pontiac (q.v.) these names are of use only locally.

Cooke has recorded a pebble of anorthosite in the Matagami of the Lucky Strike area, and it is significant that boulders of the meta-anorthosite of Chibougamau have been found in rocks correlated with the Nemenjish Series.

Bancroft used the spelling "Matagami", but Cooke and "Geology of Quebec" use "Mattagami". Since 1926, Mattagami Series, now Formation, has been used for Lower Cretaceous rocks of the Hudson Bay Lowlands, in Ontario.

Bancroft, J.A., 1913,... Headwaters of Harricanaw and Nottaway Rivers...: Quebec, Dept. Col. Mines, and FIsheries, Rept on Mining Op. 1912, p. 150, 157.

Cooke, H.C., 1919, Some stratigraphic and structural features of pre-Cambrian of northern Quebec: Jour. Geol. v. 27, pp. 266-266.

MATANE SERIES, SHALE, FORMATION Ordovician

J.W. Dawson (1889, p. 33) refers to the Matane Series as older than the "Marsouin River Zone" and as a lower part of the Quebec Group. Ruedemann (1937) refers to the Matane Shale as the country rock of that Anisograptid fauna, which was the first described from North America. Geology of Quebec (1944, p. 295) cites Matane Shales and Cape Rosier beds as parts of the Quebec Group. I.W. Jones (cited as I.W. Johnson by Ruedemann, 1937, p. 62) collected the fauna from Cape Rosier, and the identity of its fauna to that of the Matane Shale was commented on. The same rocks have been referred to by Bulman (1950) as "Dictyonema shales".

The emphasis has been almost entirely on the fauna, which is of the age of the Tremadoc in Britain, so that the lithologic units have not been established. The term should be abandoned or a definition with a standard section should be set up.

Dawson, J.W., 1889, On new species of fossil sponges from the Siluro-Cambrian at Little Mētis etc.: Roy. Sco. Can., Tn. v. IV, p. 33.

Ruedemann, Rudolf, 1937, A new North American graptolite fauna: Am. Jour. Sci., v. 33, p. 57-62.

Bulman, O.M.B., 1950, Graptolites from the Dictyonema shales of Quebec: Q.J. Geol. Soc. London, v. 106, pp. 63-99.

MATANE RIVER GROUP Lower Paleozoic

Ollerenshaw (1967) has proposed Matane River Group for unsubdivided Quebec Supergroup. Its relationship to the Shickshock Group has not been determined.

This term can cause only confusion. See Matane Series.

Ollerenshaw, N.C., 1967, Cuoq-Langis Area: Matane and Matapedia Counties: Quebec Dept. of Nat. Res., G.R. 121, pp. 18-27.

MATAGAMI GNEISS Precambrian

Freeman (1938, p. 685) gave this name to gneisses, mostly gray, with hornblende biotite oligoclase (An_{15}), and quartz. Some of the varieties no calls quartz diorite. Freeman suggests that the gneisses are migmatites. See Matagami.

The name should be abandoned.

Freeman, B.C., 1938, Replacement shells around batholiths in the Waswanipi district, Northwestern Quebec: Jour. Geol. vol. 46, pp. 685-691.

MEACH LAKE PSEUDOCONGLOMERATE, CONGLOMERATE Precambrian

Mawdsley (1930) gave the name Meach Lake Conglomerate to irregular bodies of brecciated and metasomatised fragments of quartz syenite rocks enclosed within the same kind of rock. He considered the bodies to be conglomerates and probably Huronian. Béland (1952)showed that the rocks are a result of the brecciation induced by emanations derived from parts of the containing rock.

Mawdsley, J.B., 1930, The Meach Lake Conglomerate. A conglomerate of Huronian age occurring within the Grenville Sub-Province: Roy. Soc. Can., Tr. 24, Sect. IV, pp. 99-117.

Béland, René., 1952, Le pseudo-conglomérat du lac Meach: Nat. Can., 78, p. 361-366.

MELBOURNE LIMESTONE - (Wilmarth -2-232) - Cambrian

Cooke (1954) gave the name Melbourne, from the locality on St. Francis river, to black limestones which he considered transitional into and stratigraphically above Sweetsburg Formation. Logan and Ells had observed the limestones and Dresser (1906) has presented a map showing the "dolomites" intercalated **with** the slates which were later referred to the Sweetsburg Formation as well as the black limestone. He also pointed out that the now discredited fossils (Bryozoa), which had been described by Dawson in 1879 and were supposed to indicate an Ordovician age, were in the "dolomite". Osberg (1965) presented a detailed structural map of the belt showing the structural relationship of the limestone.

Cooke, H.C., 1954, The Green Mountain Anticlinorium in Quebec: Geol. Assn. Can., Pr. v. 6, pt. 2, p. 41.

Dresser, J.A., 1906, Igneous rocks of the Eastern Townships of Quebec: Geol. Soc. Am., Bull. v. 17, Pl. 68, p. 507.

Osberg, P.H., 1958, Structural Geology of the Knowlton-Richmond area, Quebec: Geol. Soc. Am., Bull. v. 76, Pl. 1.

MEMPHREMAGOG FORMATION, SLATE, GROUP, COMPLES Paleozoic.

In "Geology of Quebec." (1944, p. 401) Memphrémagog Formation is considered to be in the upper part of the Farnham Series, which is assigned to Middle Ordovician. Clark (1934, p. 11) has used "Memphrémagog complex" as a heading in a publication but has given no description of it.

Richardson introduced in 1906 the name for slates in Vermont. In 1924 he raised the formation to a group to include Montpelier and Northfield Slates. These are now believed to be Silurian rather than Ordovician, In light of these observation Memphrémagog should be dropped from use in Quebec.

Clark, T.H., 1934, Structure and stratigraphy of southern Quebec: Geol. Soc. Am. v. 45, p. 11.

MEMPHREMAGOG, GLACIAL LAKE.

C.H. Hitchcock used this name for a glacial lake.

Hitchcock, C.H., 1908, Glacial Lake Memphremagog: Geol. Soc. Am. Bull. v. 18, pp. 641-642.

MIGUASHA GROUP — Upper Devonian

Williams and Dineley (1966) proposed that the Fleurant Conglomerate and the Escuminac Formation be referred to the Miguasha Group. The locality Miguasha is that famous for its fossil fish. This group name is not necessary.

Williams, B.P., and Dineley, D.L., 1966, Studies of the Devonian Strata of Chaleur Bay, Quebec: Maritime Sediments, v. 2, No. 1, p. 8.

MILDALE GABBRO — Precambrian

"On the Middle property, a small gabbroic mass is exposed on the last ledge of outcrops on lot 50, range V, Duverny township. Mottled greenish-grey diorite, very similar to the New Goldvue quartz diorite, was encountered in drill holes. It has been assumed that the two occurrences above are facies of one intrusive mass.

Weber, W.W., 1951, La Morandière and Parts of Duverny, Landrienne and Barraute Townships, Abitibi-East County: Quebec Dept. of Mines, P.R. No. 255, p. 11.

MILE END FORMATION Trenton Group

This name was proposed without description in 1944 by T.H. Clark for 25 feet of beds overlying the Leray Formation. The description of the formation was given in 1952 when the sections in the quarries in the north-eastern part of Montreal were given. The formation is thin bedded and has both coarse and fine grained limestone. Clark (1952, p. 62) suggests a correlation with the Hull Formation of Raymond, which beds were once known as the "Crinoid beds". In later publications this formation is assimilated to the Deschambault Formation.

Clark, T.H., 1952, Montreal area: Quebec Dept. of Mines, G.R. 46, pp. 62-64.

MILL CREEK FAULT.

The Mill Creek Fault strikes northeasterly and a valley trending in that direction is its trace. Diamond drill holes show it is about 60 feet thick.

Auger, P.E., 1952, Belleterre Area, Guillet Township: Quebec, Dept. of Mines, G.R. No. 55, p. 29.

STRATIGRAPHIC SUCCESSION IN THE LAVAL, LACHINE, BELŒIL, AND ST. JOHNS MAP-AREAS

Ordovician

RICHMOND GROUP
- Queenston formation
- Marine Richmond formation

LORRAINE GROUP
- Pholadomorpha zone
- Proetus zone
- Leptaena zone
- Cryptolithus zone

UTICA GROUP
- Lachine formation

TRENTON GROUP
- Terrebonne formation
- Tetreauville formation
- Montreal formation
  - Rosemount member
  - St. Michel member
- Mile End formation

BLACK RIVER GROUP
- Leray formation
- Lowville formation
- Pamelia formation

CHAZY GROUP
- Laval formation
  - Caughnawaga member
  - Ste. Thérèse member

BEEKMANTOWN GROUP
- Beauharnois formation
- Theresa formation

Cambrian

UPPER CAMBRIAN SERIES
- Potsdam formation

(Clark, 1944, Roy. Soc. Can. Tr. v. 38, Sect IV) p. 29

MILLENARY EVENTS Precambrian

Millenary was introduced for the event that caused the potassium-argon dates clustering around 950 X 10^6 years ago. It is equivalent to Grenville Thermal Event (q.v.).

Osborne, F. Fitz, 1961, Millenary a name for geological events of about 1000 mega-years ago: Nat. Can. V. 86, pp. 31-32.

MINGAN FORMATION Chazy

The "Geology of Canada" records the investigations carried out on Mingan islands prior to 1863. In it the essential characteristics and ages of formations that would be named in 1910 by Schuchert and Twenhofel are given. No continuous exposed section has been recognized for Mingan formation (Twenhofel, 1938, p. 23). A composite section gives less than 150 feet of calcarenite, and sublithographic limestone with minor shale and sandstone.

The fossils indicate a Chazy age, but the fauna has some Black River aspects.

Six drill holes on Anticosti island penetrated this formation. In five of the holes the thickness is of the order of 600 feet, but in the sixth hole, viz that at Carleton point, the formation does not appear. Roliff (1968, p. 34) suggests that the absence of the Mingan Formation at Carleton Point is a result of uplift and erosion at the end of Chazy time.

Schuchert, C., Twenhofel, W.H., 1910, Ordovicic-Siluric Section of the Mingan and Anticosti Islands, Gulf of Saint-Lawrence, Geol. Soc. Am., Bull., vol. 21, p. 688.

Twenhofel, W.H., 1938, Geology and paleontology of the Mingan islands, Quebec: Geol. Soc. Am., Sp. Paper, No. 11, p. 23.

Roliff, W.A., 1968, Oil and gas exploration - Anticosti island, Quebec: Geol. Assn. Can., Pr., v. 19, pp. 31-36.

MISTASSINI

Largest lake in Labrador Peninsula

I- MISTASSINI GROUP (FORMATION) (SERIES). Proterozoic

It is probable that the limestones in the vicinity of Mistassini were known prior to 1855, but the first geologist to note the limestone was Richardson in 1870 (Richardson, 1872, p. 295), who described the black limestones with chert near the Hudson's Bay Company Post. He found "an orthoceratite and an obscure coral" neither of which could be determined. The Cryptozoons of the limestone were not mentioned. Selwyn on page 8 of the report cited comments on the similarity of the rocks to those of the Quebec Group. Exploration by McOyat and by Low showed the wide distribution of the limestone, but no formal designation appears to have been given until 1900 when Ami (1900, p. 197) used "Mistassini Formation" and considered the rocks Cambrian in the modern sense. "Cambrian limestone" had earlier been used to designate the formations, but it was used with the understanding that it implied correlation with rocks now considered Upper Huronian. Barlow, on the map accompanying the Chibougamau report of 1911 of the Quebec Dept. of Colonization, Mines and Fisheries, states his opinion that the limestones are Ordovician, possibly Chazy.

In Geology of Quebec (1944, p. 247) the several suggested dates for

"Mistassini Lake Sediments" are mentioned, by no conclusion is stated, however, by this time the Proterozoic age for the rocks had come to be largely accepted.

The Mistassini Series was divided into three formations by Wahl. (1953,6). These are, in ascending order: Lower Albanel Formation consisting of four members, largely coloured dolomites, with a total thickness of 7000 feet; Upper Albanel Formation with about 2000 feet of grey dolomite and sandy dolomite in two members; and the Témiscamiscamie Formation with three members. Neilson (1953, 7) used essentially the same divisions in the Albanel area but could not separate some of the members mapped by Wahl. In a report on the Takwa area Neilson (1966, p. 9) places Pépeshquasati Formation (q.v.) and Rivière Chéno Formation below the Lower Albanel in the Mistassini Group.

Richardson, Jas., 1872, Country north of Lake St. John: Geol. Surv. Can. Rept. of Prog. 1870-71, p. 295.

Ami, H.W., 1900, Synopsis of the geology of Canada: Roy. Soc. Can., Tn. v. 6, Sec. IV, p. 147.

Wahl, W.G., 1953, Témiscamie River Area, Mistassini Territory: Quebec Dept. Mines, G.R. 54, p. 6.

Neilson, J.M., 1953, Albanel Area, Mistassini Territory: Quebec Dept. Mines, G.R. 53, p. 7.

Neilson, J.M., 1966, Takwa River Area, Mistassini Territory: Quebec Dept. Nat. Res., p. 9.

II- MISTASSINI FAULT

Norman (1936) suggested that a fault intervened between the Mistassini Group and the rocks of the Grenville Subprovince and this fault or zone of faulting extended to Lake Huron. He suggested that it might be later than the Penokean folding and diffidently that it is "perhaps the first effect of the Appalachian orogeny". Authors (Wilson 1949) have referred to this zone

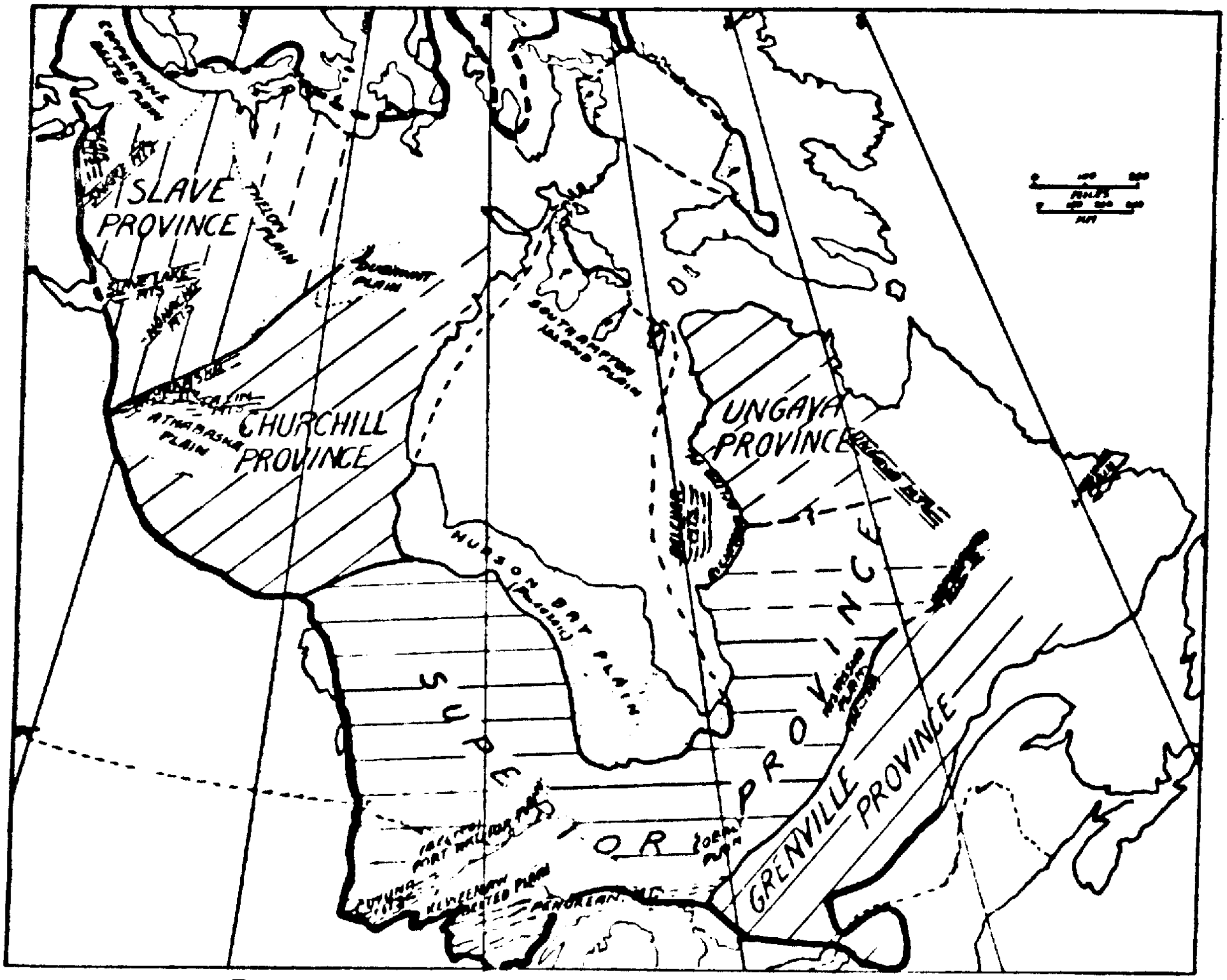


FIGURE 3.—Structural provinces and subprovinces in the Canadian shield.

(Gill, 1949, Roy. Soc. Can. Tr., V. 43, Sec. IV)

Province	*Subprovince*	*Dominant Trend*
Slave		north-south
	Coppermine Belted Plain	northwest
	Thelon Plain	horizontal
	Bear Mountains	northwest
	Snare Mountains	N 25° E
	Slave Lake Mountains	N 55° E
	Nonacho Mountains	N 30° E
Churchill		northeast
	Dubawnt Plain	horizontal
	Tazin Mountains	N 60° E
	Athabaska Mountains	N 40° E
	Athabaska Plain	horizontal
Superior		east-west
	Port Arthur Belted Plain	N 60° E
	Cuyuna Mountains	N 60° E
	Keweenaw Belted Plain	N 60° E
	Penokean Mountains	E to NE
	Cobalt Plain	horizontal
	Mistassini Belted Plain	northeast
Grenville		northeast
Ungava		northeast (?)
	Belcher Mountains	north
	Richmond Belted Plain	north
	Wapussakatoo Mountains	northeast
	Ungava Mountains	N 30° W
	Lake Melville Plain	horizontal

The name "Churchill Province" was adopted from Wilson (1939), though the boundaries placed on it are somewhat different.

The name Grenville has also been retained, but it is now called a province instead of a subprovince because it includes a substantial part of the Shield. Dr. Wilson's other divisions transgress structures and differ markedly from those used in this paper. To avoid confusion, new names have been applied to the remaining divisions.

Features of limited extent like the Chibougamau series have been omitted, since the purpose is to focus attention on the broader divisions. The Chibougamau series was, no doubt, quite extensive at one time, but only a few remnants of a former "plain" are now left. The deformed remnant with a northeast trend, north of Lake Chibougamau does not, apparently, represent a former geosynclinal belt, because the underlying formations maintain their strikes without deviation, on both sides of it.

(Gill, 1949, Roy. Soc. Can. Tr., V. 43, Sec. IV) p. 65

as that of the Huron-Mistassini fault. It is the same as the Grenville or the Grenville Front fault (q.v.) and a more appropriate name.

Norman, G.W.H., 1936, The northeast trend of late Precambrian tectonic features in the Chibougamau district, Quebec: Roy. Soc. Can. Tn. vol. 39, Sect. IV, pp. 119-128.

Norman, G.W.H., 1940, Thrust faulting of Grenville gneisses northwestward against the Mistassini Series of Mistassini lake Quebec: Jour. Geol. v. 48, pp. 512-525.

Wilson, J.I., 1949, Some major structures of the Canadian Shield. Can. Inst. Min. Met, Tr, 52, p. 239.

III- MISTASSINI BELTED PLAIN.

Gill (1949, p. 65) has given this name to a structural subprovince of the Superior Province of the Canadian Shield.

The term is of doubtful use fulness.

Gill, J.E., 1949, Natural divisions of the Canadian Shield: Roy. Soc. Can., Tr. v. 43, Sec. IV, p. 65

MISTAWAK BATHOLITH

Rocks of the Mistawak batholith, which consists mainly of coarse-grained gray, biotitic to leucocratic granodiorite, occupy a large portion of the east and northeast parts of the area. Other varieties of rocks include a medium-grained biotite granodiorite of apparently younger age, ubiquitous dikes of pink aplite, rare pegmatites, and, in lot 48 of range V, a coarse-grained muscovite granodiorite.

Bozach, Ronald, 1967, Geology of the south half of Perron Township, Abitibi-West County: Quebec Dept. of Nat. Res., P.R. No. 561, p. 9-10.

MONT ALEXANDER SYNCLINE

"The Malbaie syncline is succeeded to the south, in the southwestern part of the area, by the Mount Alexander syncline. The anticline which should intervene between these two down-folds is cut out almost completely by faulting".

McGerrigle, H.W., 1950, The Geology of Eastern Gaspé: Quebec, G.R. No. 35, p. 112.

MONTEREGIAN HILLS PETROGRAPHICAL PROVINCE.

The group of hills cored by igneous rocks intrusive into the sedimentary rocks of the St-Lawrence Lowlands, near Montreal were referred to as the "Montreal System" by Marcou (1855-p.7-8). According to Adams (1903, p. 242), Sterry Hunt in 1860 referred to the same group of hills as the Montreal Group, although the reference cited does not give this name.

Adams (1903,) in the discussion introducing his paper is somewhat inconsistent. The introduction shows that the definition was intented to be topographic. However, the term is applied to the petrographic province characterized by the distinctive alkaline rocks. Monteregian Hills Petrographical Province has given way to Monteregian Province of some authors; or simply Monteregian Hills.

The post-Lower Devonian age for the intrusive rocks has been accepted, but until 1935 the age was normally considered to be late Paleozoic. Osborne suggested that the rocks are substantially younger because of the absence of pleochroic halos around radioactive nuclei. The Mesozoic age has now been confirmed by several methods.

Marcou, Jules., 1855, Esquisse d'une classification des montagnes d'une partie de l'Amérique du Nord: Ann. des Mines, Paris, v. VII, p. 7.

Adams, F.D., 1903, The Monteregian Hills, a Canadian petrographical province: Jour. Geol. v. 11, pp. 239-282.

Geology of Quebec, 1944, p. 455-482.

MONTREAL

I- MONTREAL SYSTEM

Marcou (1855) used this term to designate the Monteregian Hills (q.v.)

Marcou, J., 1855, Esquisse d'une classification des chaines de montagnes d'une partie de l'Amérique du Nord: Annales des Mines, Paris, v. VII, p. 7.

II- MONTREAL, FORMATION, SAXICAVA SAND.

In the atlas accompanying Geology of Canada, 1863, Map VI shows the distribution of superficial deposits between Lake Superior and Gaspé. In Quebec, two units are shown. The upper one has, St. Maurice and Sorel sand, Montreal Saxicava sand, Upper Sand of Beauport.

Apart from one reference to this map (Ami, 1900) no use of "Montreal" in this context can be found.

Ami, H.W., 1900, On the geology of the principal cities in Eastern Canada: Roy. Soc. Can., Pré v. 6, Sec IV, p. 163.

III4 MONTREAL, LIMESTONE, FORMATION.

References to Montreal limestone or limestones can be found particularly in older writings, e.q. Logan in 1847, but they can be considered but casual use and are generally in a context where emphasis is placed on the commercial use of the stone. The beds so referred to are Chazy, Black River, and Trenton. They are essentially the same range as beds of the "Ottawa limestone" (q.v.), and are the Trenton Series of J.W. Dawson, (1880, p. 58).

Clark (1944 and 1952) has made a formal proposal that about 370 feet of Trenton limestone in the Montreal district be referred to a Montreal Formation, which he states is equivalent to Sherman Fall. The Montreal consists of a lower Saint-Michel member less than 120 feet thick and an upper member, Rosemont, which is 250 feet thick. According to Clark the distinction is based on fossils.

Dawson, J.W., (1880) Lecture Notes on Geology; Montreal Dawson Brothers, 96 pp.

Clark, T.H., 1952, Montreal area, Laval and Lachine map-areas: Quebec, Dept. of Mines, G.R. 46, p. 65.

MOOSE CREEK FAULT.

It crosses the granite gneiss in tunnel section No. 1. The rocks are cut with a red, epidote-bearing pegmatite. It strikes northeasterly.

Morin, Marcel., 1956, Labrievelle Area, Saguenay County: Quebec, Dept. of Mines, P.R. No. 333, p.7.

MOOSE LAKE GRANITE

The Moose Lake granite is a mass about 2 miles long and ½ mile wide in the southern part of Hébécourt township. The northern part of the body is not well exposed. The composition of the rock varies a good deal, and tends to be more basic near the margins. The more acid varieties are pink or light grey rocks of granitic texture with an average grain of 3 to 4 mm. The more basic varieties are darker in colour, and differ from the acidic facies in their greater content of chlorite.

Cooke, H.C., James, W.F., Mawdsley, J.B., 1931, Geology and Ore Deposits of Rouyn-Harricanaw Region, Quebec: Canada Geol. Surv., Mem. 166, p. 128-129.

MOOSE LAKE GRANITE Precambrian

The Moose Lake granite crops out in an area two miles long and ½ mile wide in the southern part of Hébécourt township. The composition of the rock is diverse. The more acidic rocks are pink or light grey, coarse with granitic fabric and an average grain of three to four mm. They are made up of about 25% of quartz, 70% of albite, more or less altered to white mica, zoisite, et., and 5% of chlorite probably secondary after hornblende. The more basic (marginal) facies, is darker.

Cooke, H.C., James, W.F., Mawdsley, J.B., 1931, Geology and Ore Deposits of Rouyn-Harricanaw Region, Quebec: Canada Geol. Surv., Mem. 166, p. 128-129.

MORGAN CORNERS DOLOMITE Ordovician

This is the upper part of the A_3 division of the Philipsburg Series (q.v.) of Logan and consists of dolomite. The formation was named by McGerrigle and assigned to Beekmantown.

McGerrigle, H.W., 1931, Three geological formations in northwestern Vermont: Rept. of State Geol., 17th., 1929-30, p. 185.

MORIN ANORTHOSITE, MORIN SERIES Precambrian

This rock is composed principally and in places almost entirely of plagioclase feldspar, more calcic than oligoclase, but often varied considerably in structure from place to place, being schistose, coarse, or fine.

The Morin Series includes anorthosites and rocks, mostly with hypersthène and augite, believed to be comagmatic with the anorthosite.

Adams, Frank D., 1896, Report on the geology of a portion of the Laurentian Area lying to the North of the Island of Montreal, Canada Geol. Surv., pp. 91-118.

MORIN SERIES

Adams, in mapping the area north of Montreal, gave the name Morin Series, from the township of that name, to the complex of rock, including gabbro and anorthosite, found in this area.

Osborne, F.F., 1936, Sainte-Agathe - Saint-Joseph Map Area: Quebec Bureau of Mines, Part C, p. 63.

MOUNTAIN HOUSE WHARF LIMESTONE Devonian

A few acres of a blue gray limestone are found at a cove on the west side of Memphremagog lake about 4 miles north of the Vermont border. The thickness of the limestone is not known but the beds have yielded collections of fossils which are considered to support an early Middle Devonian (Eifel) age.

Table of Formations

Cenozoic	Pleistocene			Gravel, sand, clay
Mesozoic-Cenozoic	Monteregian			Alkaline intrusions
PALAEOZOIC	Ordovician	Trenton	Middle Lower	Montreal argillaceous limestone Deschambault limestone Ouareau limestone
		Black River		Limestone
		Chazy		Limestone
		Beekmantown		Shale, dolomite, limestone
	Upper Cambrian	Potsdam		Sandstone
PRECAMBRIAN	Late Precambrian	Chatham-Grenville stock		Granite, syenite, some dykes
				Quartz-diabase dykes
	Middle Precambrian	Morin Series	Pine Hill	Porphyritic and equigranular syenites and granites, predominantly pink or buff. Some augen gneisses
			Buckingham	Anorthosite, green quartz-monzonite, pyroxene diorite
	Early Precambrian	Trembling Mountain gneiss		Pink to red, fine-grained leucocratic gneiss
		Grenville series		Metasedimentary rocks Metavolcanic rocks

(Osborne & Clark, 1960, Q.D.N.R., G.R. 91). p. 9

Boucot, A.J., and Drapeau, G., 1968, Siluro-Devonian rock of Lake Memphremagog etc..: Quebec Dept. Nat. Res., Special Paper 1, pp. 12-13.

MOUNT AYLMER GRANITE — Devonian (?)

Burton (1932, p. 101) referred to this granite as that of the St. Gérard area. It crops out in an area 6 by 4½ miles and is a medium-grained gray with oligoclase, microcline, biotite, and muscovite. Cooke (1937, p. 75) has used the name Mount Aylmer Granite as has also Duquette (1961, pp. 171-173).

Burton, F.R., 1932, Commercial Granites of Quebec, Part 1, South of St. Lawrence river: Quebec Bur. of Mines, Ann. Rept. 1931, Pt. D, p. 101.

Cooke, H.C, 1937, Thetford, Disraeli and Eastern Half of Warwick Map-Areas, Quebec: Canada Geol. Surv., Mem. 211, p. 75.

Duquette, G., 1961, Geology of the Weedon Lake area and its vicinity, Wolfe and Compton Counties, Quebec: Universite Laval, thèse pour doctorat, pp. 171-173.

MOUNT ORFORD AND BALDFACE MOUNTAIN COMPLEX — Paleozoic

Coarse-grained to fine-grained gabbro and diorite make up most of these hills. A quartz bearing facies of unknown origin forms irregular masses within the complex.

St-Julien, P., 1961, Fraser Lake Area, Shefford and Stanstead Counties: Quebec Dept. of Mines, P.R. No. 439, p. 8.

MT. WRIGHT SYNCLINE

"The structure of the Mt. Wright area is very complex. One of the largest and best exposed structures is the Mt. Wright syncline, a northeast-plunging fold whose axial plane dips northwest. In the southern part of the area, the folding is seen to be complex. Here, the structures have a dominant northwest trend, and many folds are overturned northeast. A less pronounced, and possibly older, northeast structural trend may be observed locally".

Murphy, Daniel L., 1959, Mount Wright Area, Saguenay Electoral District: Quebec Dept. of Mines, P.R. No. 380, p. 6.

MUD LAKE FAULT.

Mud Lake Fault crops out at the bottom of the lake. It is a vertical shear zone about 100 feet thick. Its strike is N60°E.

Auger, P.E., 1952, Belleterre Area, Guillet Township: Quebec, Dept. of Mines, G.R. No. 55, p. 29.

MURPHY CREEK FORMATION | Upper Cambrian

The Cambrian fauna of the one inch beds of grey limestone separated by beds of shaly limestone cropping out along Murphy River in Eastern Gaspé was found by Kindle,but the name was first published by Alcock. Kindle used Murphy's Creek.

Alcook, F.J., 1935, Geology of Chaleur Bay Region: Can. Geol. Surv., Mem. 183, pp. 12-13.

Kindle, C.H., 1936, A geological map of southeastern Gaspé: Eastern Geologist, No. 1, Mimeographed, no pagination.

McGerrigle, H.W., 1950, The Geology of Eastern Gaspé: Quebec Dept. of Mines, G.R. 35, pp. 25-26.

MUSCOCHO STOCK

The Muscocho stock, some 10 square miles in extent, is situated near Muscocho lake. Outcrops are abundant along the southwestern shores of the lake and in low hills one mile south of the northern arm of the lake. The rock is a medium-grained pinkish-grey granodiorite. It is very uniform in composition, and consists of 40 to 50% albite-oligoclase, 10 to 15% hornblende, and 25 to 30% quartz. The Muscocho stock displays two well developed sets of steeply dipping joints, one of which strikes northwest and the other, to the northeast.

Holmes, Stanley W., 1959, Fancamp-Hauy Area, Abitibi-East, Electoral District: Quebec Dept. of Mines, G.R. No. 84, p. 9-10.

MYSTIC FORMATION OR CONGLOMERATE (Wilmarth -1-1455)

Logan used Stanbridge Conglomerates (q.v.) for certain beds which he assigned to division D_1 of the Philipsburg Series, "Stanbridge Centre" having been changed to "Mystic", Ells uses "Mystic and Bedford limestones and slates" for a unit on the Montreal sheet (# 571) of the Eastern Townships map. He places it in the Chazy below the Trenton, which is represented by the Farnham limestone. These beds are now called Mystic and Stanbridge Formations.

T.H. Clark, (1934) and Clark and McGerrigle (1954) used Mystic Conglomerate for a formation beneath the Stanbridge Shale, but they assign it only a thickness of 75 feet rather than the 300 of Logan's tabular summary. They consider it to Chazy, but G.A. Cooper tentatively suggests that it is Trenton, and it is so indicated on the correlation chart for the Ordovician.

Clark, T.H., 1934, Structure and stratigraphy of southern Quebec: Geol. Soc. Am., v. 45, pp. 6,7.

Clark, T.H. and McGerrigle, H.W., 1944, Geology of Quebec, pp. 400-401.

Cooper, G.A.,(1954) in Correlation of the Ordovician formations of North America: Geol. Soc. Am., Bull. v. 65, p. 278 and chart.

NAPIERVILLE SYNCLINE

In the southwestern part of the St. Jean sheet, rocks of Chazy, Black River, and Trenton ages are disposed in a syncline whose axis trends northeast-southwest. Farther south, in the Lacolle sheet, this axis passes close to the village of Napierville (4 miles south of the St. Jean map border).

Clark, T.H., 1955, St. Jean-Beloeil Area, Iberville, St. Jean, Napierville-Laprairie, Rouville, Chambly, St. Hyacinthe and Verchères Counties: Dept. of Mines, G.R. No. 66, p. 50.

NASTAPOKA GROUP Proterozoic

A.P. Low (1903, p. 14 D.D.) used "Nastapoka group" for the half-mile thick sequence of sedimentary and igneous rocks of the Nastapoka Islands. Unaware of proposals by Low and Bell, Leith (1910, p. 232) proposed the same name for the same rocks. Low makes only casual mention of Manitounuck Formation (q.v.) but (1903, p. 80 D) apparently considered it a part of the Nastapoka Group. The group consists of iron formation rocks, basaltic flows, limestone, and quartzite. The limestone and dolomite have algal structures.

Bell called these rocks lower Cambrian as was customary at that time. Low suggests (1903, pp. 15-16 D) that the rocks are unmetamorphosed equivalents of the Laurentian and Huronian formations. Leith suggests a correlation with Animikie of Lake Superior region.

The lithologically similar rocks of Belcher Islands, N.W.T., have been assigned to the Belcher Series but precise correlation is a matter of doubt (Young, 1922, p. 17 E)

Low, A.P. (1903), Geology and physical characters of Nastapoka Islands, Hudson Bay: Can, Geol. Surv, Ann. Rept. XIII,p. 14 DD.

Bell, Robert., 1879, Report on the exploration of the east coast of Hudson Bay, 1877: Can. Geol. Surv. Rept of Prog. 1877-78, p. 17C

Bell, Robert., 1895, Labrador Peninsule Scottish. Geog. Mag. July 1895, p. 351.

Leith, C.K., 1910, An Algonkian Basin in Hudson Bay, a comparison with the Lake Superior Basin: Econ. Geol. V, pp. 232-233.

Low, A.P., 1903, Exploration of the east Coast of Hudson Bay: Can, Geol. Surv., Ann, Rept. , XIII, p. 80 D.

Young, G.A., 1922, Iron bearing rocks of Belcher Islands, Hudson Bay: Can. Geol. Surv., Summ. Rept. 1921, p. 17 E.

NAYLOR LEDGE FORMATION Ordovician

McGerrigle gave this name to the upper 30 feet of division B_2 of Logan's section of the Philipsburg Series (q.v.), of Beekmantown age.

McGerrigle, H.W., 1931, Three geological formations in northwestern Vermont: Vermont, Rept. of State Geol., 17th., 1229-30, p. 185.

NELSON LAKE GRANITE

The Nelson Lake granite forms a mass about a mile in diameter on the east side of Nelson lake in the southeast quarter of Montbray township. It is a light-coloured, very coarse-grained albite granite with albite crystals up to 3 mm. and quartz crystals up to 6 mm. in diameter. It is composed of about 30% quartz, some of which shows wavy extinction; 65% albite, $Ab_{95}An_5$ somewhat altered to calcite, epidote, and white mica; and about 5% of chlorite. Magnetite, pyrite, and apatite are accessory.

Cooke, H.C., James, W.F., Mawdsley, J.B., 1931, Geology and Ore Deposits of Rouyn-Harricanaw Region, Quebec: Canada Geol. Surv., Mem. 166, p. 129.

NEMENJISH SERIES Archean

Cooke (1919, p. 188) named the Nemenjish Series from a locality on the north shore of the lake of that name. The series is described as garnetiferous and non-garnetiferous mica gneisses with hornblende gneisses. Cooke regards the rocks as northern equivalent of the Grenville Series. He (1919, p. 269) apparently considers the garnets as having pecular value in correlation, but the modern development of facies petrography would make garnets of minor significance.

Cooke regarded this series as pre-anorthosite. He did not distinguish between the dominal bodies of the Grenville subprovince and the stratiform bodies. However, rocks of the lithology of the Nemenjish have conglomerates with boulders of Chibougamau anorthosite in the Dollier - Charon area not far from the type locality. This term should be abandoned.

Cooke, H.C., 1914, Some stratigraphic and structural features of the pre-Cambrian of northern Quebec: Jour. Geol. v. 27, p. 188.

NEUVILLE FORMATION Trenton

Clark has used this name for the middle and upper Trenton of the Grondines Neuville area with the suggestion that if it is desirable to divide the Trenton that Neuville be used for the lower division that is the Sherman Fall equivalent. The beds are grey rubbly limestones.

Clark does not give the correlation of this formation with the 193 feet of *Rafinesquina deltoidea* and the 117 feet of *Prasopora zones*. (Raymond 1914)

Clark, T.H., 1959, Stratigraphy of the Trenton Group, St. Lawrence Lowland, Quebec: Geol. Assn. Can., Pr., v. 11, p. 18.

Raymond, P.E., 1914, The Trenton Group in Ontario and Quebec: Can. Geol. Surv., Summ. Rept., 1912, pp. 342-343.

TABLE OF FORMATIONS

ST. LAWRENCE LOWLANDS						APPALACHIAN			
SYSTEM	SERIES	GROUP	FORMATIONS Members *Zones*	THICKNESS	EQUIVALENTS (North Am.)	SERIES	GROUP	FORMATIONS	EQUIVALENTS (Europe)
ORDOVICIAN	CINCINNATIAN	RICHMOND	BECANCOUR PONTGRAVE	2000' 164'	Queenston Waynesville	CANAJOHARIE		Boulder clay	
		LORRAINE	NICOLET Saint-Hilaire *Pholadomorpha* Chambly *Prostus-Leptaena* Breault *Cryptolithus*	2491' 591' 880' 1020'	 Pulaski Frankfort Eden				
	CHAMPLAIN	UTICA	LOTBINIERE Delisle Graywacke strata	400'	Utica			Basalts and gabbros SAINT-FLAVIEN (Normanskill or younger) ?	
		TRENTON	NEUVILLE Grondines *Rafinesquina deltoidea* *Cryptolithus lorettensis* Saint-Casimir DESCHAMBAULT PONT-ROUGE	432' 256' 176' 92' 30'-40'	 Cobourg Sherman Fall Hull Rockland	NORMANSKILL	LAURIER	AUBIN BOURRET fault contact	Caradoc
		BLACK RIVER	LERAY LOWVILLE	20'-25'		DEEP~~S~~KILL	LEVIS	MURETTE fault contact	Llanvirn Arenig
LOWER CAMBRIAN	WAUCOBAN						SILLERY	SAINT-NICOLAS and SAINTE-FOY undifferentiated	
		Angular unconformity							
PRECAMBRIAN	GRENVILLE SUB-PROVINCE								

(Clark & Globensky, 1973, Q.D.N.R. G.R. 198)

NEWBEC BRECCIA   Precambrian

On the Newbec property, northeast of the shaft, and in a triangular-shaped area about ½ mile long and 2,000 feet wide extending from the shaft westward to the Macamic highway and southward to the Lake Dufault granodiorite, there are outcrops of a breccia composed of angular to round fragments of rhyolite, andesite, and quartz diorite. The composition of the breccia and the size of the fragments vary greatly in different parts of these areas. At places northwest of the shaft, porphyritic rhyolite appears to form the matrix around fragments of diorite and andesite. The origin of this breccia has not been established. Is it a diatreme filling?

Wilson, M.E., 1941, Noranda District, Quebec: Canada Geol. Surv., Mem. 229, p. 43-45.

NICOBI LAKE GRANITE

It consists of white feldspar, between 4 and 6% hornblende, between 5 and 15% quartz, from 0 to 1% biotite, from 0 to 4% chlorite and accessory amounts of epidote, sphene and in places, magnetite. The hornblende is in well-formed, long, individual prisms. The quartz content appears to decrease northward.

Remick, J.H., 1959, Margry-Prévert Area, Abitibi-East Electoral District: Quebec Dept. of Mines, P.R. No. 394, p. 8-9.

NICOLET RIVER FORMATION   Cincinnatian

The basic studies of the stratigraphy and fauna of the Lorraine Formation were by Foerste, who divided the beds exposed on Nicolet River into four zones based on the fossils. His zones were called from the top downward: Pholadomorpha, Proetus, Leptaena, and Trinucleus. Clark gave names to the divisions thus the zone of Pholadromorpha was called the St. Hilaire member with a thickness of 539 feet. The Chambly member is made up of the Proetus zone with a thickness of 287 feet and part of the Leptaena zone 569 feet thick. The Breault member is 962 feet thick and is the Cryptolithus zone and the rest of the Leptaena zone.

The unit consists of shales and sandy or silty shales commonly grey and non petroliferous.

This formation is commonly considered equivalent to the Frankfort and Pulaski and including both Edenian and Maysville stages.

Foerste, A.F., 1916, Upper Ordovician Formations in Ontario and Quebec: Canada, Geol. Surv., Mem. 83, pp. 14-65.

Foerste, A.F., 1924, Upper Ordovician Faunas of Ontario and Quebec: Canada Geol. Surv., Mem. 138, p. 255.

Clark, T.H., 1947, St. Lawrence Lowlands south of St. Lawrence river: Quebec Dept. of Mines, P.R. 204, pp. 5-9.

Clark, T.H., 1964, Yamaka-Aston area: Quebec Dept. Nat. Res., G.R. 102, pp. 32-62.

Table of Formations

<table>
<tr><td colspan="2"></td><td colspan="3">West of Champlain fault</td><td>East of Champlain fault</td></tr>
<tr><td colspan="2"></td><td>Group</td><td colspan="2">Formation and Member</td><td>Formation</td></tr>
<tr><td rowspan="7">P A L E O Z O I C</td><td>Post-Ordovician</td><td></td><td colspan="2"></td><td>St. Flavien (igneous)</td></tr>
<tr><td rowspan="5">Ordovician</td><td>Richmond</td><td>Bécancour River
Carmel River
Pontgravé River</td><td rowspan="2">St. Germain Complex</td><td rowspan="5"></td></tr>
<tr><td>Lorraine</td><td>Nicolet River
St. Hilaire
Chambly
Breault</td></tr>
<tr><td>Utica
Trenton
Black River</td><td colspan="2" rowspan="3">Found in well borings only</td></tr>
<tr><td>Chazy</td></tr>
<tr><td>Beekmantown</td></tr>
<tr><td>Cambrian</td><td>Potsdam</td><td colspan="2"></td><td>"Sillery"</td></tr>
</table>

(Clark, 1964, Q.D.N.R., G.R.-102) p.6

Nicolet River Formation

Because of the magnificent section of Lorraine beds exposed with hardly a break along Nicolet river, yielding a thickness of nearly half a mile, these beds are designated the Nicolet River formation (Plates IB, IV A,B,C). Although the section is very thick there is no justification for splitting it into separate formations. There is, however, as was well demonstrated by Foerste (1916; 1924), a faunal zoning, which, combined with recognizable lithological differences, has made it desirable to divide the formation into three members, corresponding very closely with Foerste's faunal zones, as follows:

Formation	Faunal zones	Members
Nicolet River (2491+')	Pholadomorpha	St-Hilaire (61')
	Proetus (including Leptaena)	Chambly (860')
	Cryptolithus	Breault (1020+')

Beds of this formation are abundantly displayed along the banks of Bécancour, Nicolet, Pontgravé, and St. Francis rivers. The most nearly complete section, along Nicolet river, will be treated first, and will be used as a basis for the correlation of the sections along the other rivers.

(Clark, 1964, Q.D.N.R., G.R.-102) p. 32

NOMANS STOCK Precambrian

This name has been given to the granitic mass occupying the south-central part of the map-area, astride the boundary between Monviel and La Rouvillière townships. Exposures are numerous in the eastern half of the mass, where the country is hilly. It consists of a grey, medium-grained, gneissic biotite granite.

Imbault, P.E., 1954, Maicasagi Area, Abitibi-East County: Quebec Dept. of Mines, G.R. No. 60, p. 20-22.

NORANDA ANTICLINE

"From the Hêré Creek syncline southward to the Horne Creek fault, the attitudes of flow contacts and these of stratified tuff show the strike to be northwesterly; and the dips to the northeast at angles of 60° to vertical, The volcanic rocks in this part of the area, therefore, form the north limb of an anticline".

Wilson, M.E., 1949, Noranda District, Quebec: Canada, Geol. Surv., Mem, 224, p. 50.

NORANDA LAKE GRANITE

A band of granite some 300 feet wide is found on the south shore of Noranda lake, Rouyn Township, bordering the north side of the band of quartz diorite that runs east through Rouyn village. The granite is light to dark grey, medium-grained (1.5 mm), and highly siliceous.

Cooke, H.C., James, W.F., Mawdsley, J.B., 1931, Geology and Ore Deposits of Rouyn-Harricanaw Region, Quebec: Canada Geol. Surv., Mem. 166, p. 128.

NORIAN SERIES — Precambrian

This term was introduced in 1870 by T.S. Hunt to replace Upper Laurentian. It was applied to the plagioclase bearing rocks ranging from gabbro to anorthosite at a time when these rocks were believed to be metasedimentary. The igneous origin of the rocks was recognized soon after the introduction of the term, which derived from norite introduced by Jens Esmark in 1823. This term is not in use.

Hunt, T.S., 1870, On norite or labradorite rock: Am. Jour. Sci, vol. 49, p. 180. Hunt cites this as first mention in his "Chemical and geological essays" p. 279.

NORMANSKILL SHALE Middle Ordovician

This formation name was proposed for shales, grits, and cherts from a locality south of Albany in New York by R. Ruedemann. He used the graptolite fauna in the definition and did not indicate either the lithologies or the type sections with reasonable precision. Furthermore, Ruedemann as well as other workers have assigned the Normanskill to several positions in the Middle Ordovician.

Ruedemann himself has examined many collections of graptolites from Quebec and assigned the containing beds to the Normanskill. In some cases the faunas are not those believed to belong to the original Normanskill. At present the use of local names is indicated for formations in Quebec, and the graptolite fauna should be given. In general, Normanskill has implied Middle Ordovician age, perhaps Black River to Lowest Trenton, of the rocks belonging to the shale facies.

NORMETAL SCHIST Precambrian

A belt about 700 feet wide consisting largely of schist extends N 65 W from the mine and constitutes the country rock of the Normetal ore body. A narrow band of siliceous agglomerate was the locus of mineral deposition. The dominant rocks of the Normetal schist are fine-grained sericite and chlorite schists. The sericite schists are more prevalent in the southwestern part of the band near the Normetal ore body, and chlorite schists prevail to the northeast.

Tolman, Carl, 1952, Normetal Mine Area, Abitibi-West County: Quebec Dept. of Mines, G.R. No. 34, p. 6-8.

NORTH GRAND -PABOS FAULT.

This west-striking (?) fault, so named by Ayrton because it is seen along North Grand-Pabos river can be traced easily westward on aerial photographs to the Honorat West area where it was first recognized by Skidmore (1958). It extends as far west as Nouvelle river in southwest Gaspé and has a total known length of approximately 85 miles. To the east, it strikes out to sea at Petit-Pabos bay, approximately 4 miles east of Chandler.

Ayrton, W.G., 1964, Chandler - Port -Daniel Area, Bonaventure and Gaspé-South Counties: Quebec Dept. of Nat. Res., G.R. No. 120, p. 68-69.

NORTH LAMELEE HILL (SYNCLINE) Precambrian

This structure is interpreted as an overturned isoclinal syncline with a northward dipping axial plane, which has been refolded about a north-south synclinal axis. The lower bed of the sequence have been removed by erosion, but one oxide member containing as much as 30% magnetite and specularite remains.

Phillips, L.S., 1959, Peppler Lake Area (East Half), Saguenay Electoral District, Quebec, P.R. No. 401, p. 10.

NOUVELLE DACITES Devonian

North of Chaleur Bay and east a finely crystalline rock characterized by a brownish colour and rusty, limonitic pits crops out. The rock is a fine-grained dacite which in thin section is seen to contain biotite in some specimens and hornblende in others. Most of the original ferromagnesian minerals have been converted to chlorite, quartz, and brownish iron oxides. There are in some specimens phenocrysts of plagioclase and less commonly, some of quartz and orthoclase.

Alcock, F.J., 1935, Geology of Chaleur Bay Region-Canada, Geol. Surv., Mem. 183, p. 73

OAK HILL

I- Oak Hill Slice. -The Oak Hill Slice is bounded on the east by the Brome Thrust and on the west by the Oak Hill Thrust and involves about 4000 feet of beds.

Clark, T.H., 1934, Structure and stratigraphy of southern Quebec: Geol. Soc. Am., Bull. v. 45, p.9.

II- Oak Hill Thrust. -Clark (op. cit. p. 9) has given this name to a fault of unknown attitude separating the Oak Hill from the Rosenberg and Philipsburg slices. This is presumably the Cowansville fault named by Harvie, who was one of the first to recognize the presence of numerous fault slices in the Appalachian region.

III- Oak Hill Series (Group) (Sequence) - Cambrian (?)

Clark (1934, op. cit., p. 6) listed several formations as belonging to the Oak Hill Series of Cambrian age but he placed Tibbitt Hill Schist in the Precambrian. In 1936 he added the latter to the Oak Hill series, and the list of formations is, from oldest to youngest, Tibbitt Hill Schist, Pinnacle Graywacke, White Brook Dolomite, West Sutton Slate, Gilman Quartzite, Dunham Dolomite, Oak Hill Slate, Scottsmore Quartzite, Sweetsburg Slate. Not only is the Gilman Quartzite the thicknest formation of the group, but also it has brachiopods identified as Kutorgina which is considered diagnostic of Lower Cambrian. This is the oldest formation of the group dated by fossils.

Formation of the Oak Hill Group can be traced northward: Tibbitt Hill Schist can be seen near Chaudière river. To the south the lower part of the Group can be recognized in Vermont. Booth (1950) has provided very good discussion accompanied by the best descriptions of the lithology for the "succession".

Harvie, Robt., 1915, Brome and Missisquoi Counties, Quebec: Can. Geol. Surv. Sum. Rept. 1919, p. 99.

Kay (1951) states that the Oak Hill Group belongs to the Champlain belt, but Logan assigned the beds to what is now called the Quebec Supergroup.

Clark, T.H., 1936, A Lower Cambrian series from southern Quebec: Roy. Can. Inst., Tr. v. 71, pp. 135-151.

Booth, V.H., 1950, Stratigraphy and structure of the Oak Hill succession in Vermont: Geol. Soc. Am., Bull. v. 61, pp. 1131-1168.

Kay, G.M., 1951, North American Geosynclines: Geol. Soc. Am., Mem. 48, p. 50.

IV- OAK HILL SLATE Lower Cambrian

The section at Oak Hill shows a hard gray siltstone overlying the Dunham Dolomite but this formation, which is less than 25 feet thick, is absent in many sections elsewhere. Booth (1950, p. 1151) correlates this slate with the Parker Slate in Vermont.

Clark, T.H., 1936, A Lower Cambrian Series from Southern Quebec: Roy. Can. Inst., v. 21, Pt. 1, p. 148.

Booth, V.H., 1950, Structure and Stratigraphy of the Oak Hill Succession in Vermont: Geol. Soc. Am., Bull., v. 61, p. 1151.

O'BRIEN STOCK

The O'Brien stock is a composite body consisting of albite granite with porphyritic phases containing phenocrysts of feldspar or quartz or of both these minerals. It has a maximum length of 3,500 feet and an average width of 1,500 feet. Small dykes and offshoots from thestock occur in the surrounding volcanic rocks. In general, the specimens examined are pink and medium to medium-coarse grained.

Graham, R. Bruce, 1957, Southwest part of Lesueur Township, Electoral District of Abitibi-East: Quebec Dept. of Mines, G.R. No. 72, p. 9-10.

OKIKESKA -

This is a lake in Figuery and la Motte Townships about 10 miles south of Amos.

Okikeska Series Precambrian

Bain gave the name Okikeska Series to 4000 to 6000 feet of carbonaceous slate, cross-bedded sandstone, silicated limestone, and "graywacke gneiss" which he considered to underlie Keewatin volcanics. The composition of the meta-lavas becomes more acidic upward viz. away from the Okikeska series.

The name is valid as defined and proposed, but it has not been used.

Bain, G.W., 1925, Pre-Keewatin sediments of the upper Harricana basin, Quebec: Jour. Geol. v. 33, p. 728.

Okikeska syncline

Cooke, H.C. et al. use Okikeska syncline for an ill defined structure inferred to pass through the lake.

Cooke, H.C., Jame, W.F., Mawdsley, J.B., 1931, Geology and ore deposits of Rouyn Harricanaw region, Quebec: Geol. Surv. Can., Mem. 166, pp. 91-92.

OLGA QUARTZ DIORITE Precambrian

Freeman (1938), has given this name to a 2 to 3 mm. grained aggregate of 65 per cent oligoclase (An_{20}), 25 per cent quartz.

Later workers have used granite, quartz monzonite, oligoclase granite, for this rock. The name serves no useful purpose. See Matagami Gneiss.

Freeman, B.C., 1938, Replacement shells around batholiths in the Waswanipi district, Worthwestern Quebec: Jour. Geol., vol. 46, pp. 691-695.

Claveau, Jacques, 1951, Iserhoff River Area, Abitibi East County: Quebec, Dept. of Mines. G.R. 49, p. 31.

Claveau, Jacques, 1953, Waswanipi Lake Area (West Half), Abitibi East County: Quebec, Dept. of Mines. G.R. 58, pp. 14-16.

ONSLOW SYENITE Precambrian

M.E. Wilson (1924) gave the name to a pink, fine- to medium-grained syenite to quartz syenite cropping out mostly north of Eardley escarpment in Onslow Township. The body is noteworthy as the host of the ore body of the Moss Mine, which until 1918 was the largest exploited molybdenite body in the world. Osborne mapped the complex in 1941, and some of his results are incorporated in a report by Sabourin (1965). Osborne favors the view that the Onslow Syenite is a facies of the Wakefield Syenite. This syenite has some features in common with the Chatham-Grenville stock but is pre-quartz diabase rather than post-quartz diabase.

Wilson, M.E., 1924, Arnprior, Qyyon and Maniwaki Areas, Ontario and Quebec: Canada Geol. Surv., Mem. 136, p. 40.

Sabourin, R.J.E., 1965, Bristol-Masham Area, Pontiac and Gatineau Counties: Quebec Dept. of Nat. Res., G.R. 110, p. 24.

OPEMISCA (SERIES) (Wilmarth - 1- 1553) Archean

This name was given by Tolman (1931, p. 232) to about 10,000 feet of clastic and immature metasedimentary rocks conformably contained within Abitibi volcanics at a time when there was uncertainty whether a thick meta-sedimentary rocks older than any part of the metavolcanic rocks assigned to the Keewatin existed.

With the present knowledge, this name, like Matagami Series, and Nemenjish Series, serves only for local use and means only a thick sequence largely of metasedimentary rocks inferred to be Archean.

Tolman, Carl., 1931, Opemiska Series: Geol. Soc. Am., Bull. 42, p. 232 (abs).

Tolman, Carl., 1932, An early pre-Cambrian sedimentary series in Northern Quebec: Jour. Geol. v. 40, p. 355.

Dresser, J.A., Denis T.C., 1944, Geology of Quebec., vol. 2., G.R. 20., p. 127.

OPEMISCA GRANITE

Tolman (1932, op. cit. p. 356) uses this name for rocks from syenite to diorite cropping out near Opemisca lake. Analyses are given in "Geology of Quebec" (1944, p. 137) He includes this in Chibougamau Complex (q.v.)

OSISKO LAKE RHYOLITES Precambrian

The Osisko Lake Rhyolites consist of flows, agglomerate and tuff to a thickness of over 2,000 feet.

This is useful as a local name.

Conolly, H.J., Hart, R.C., 1936, Structural Geology of the Osisko Lake Area, Quebec: Canada Inst. Mining and Metallurgy, Trans., v. 39, p. 11.

OTISH MOUNTAINS.

These mountains are near the height - of - land in Chicoutimi County, 130 miles northwest of Manicouagan - 5.

I. OTISH MOUNTAINS GROUP Proterozoic.

The name was first published by Bergéron (1957, p. 120) This group in the East Peribonca River area is represented by two main divisions: the lower one has a pebble conglomerate grading upward into white quartzite with gray and red mudstones and some red sandstones forming thin beds in grey sandstones with dolomitic cement; the lowest 50 to

100 feet of the upper division is a red subarkose with white interbeds and white spots, which are caused by decolorized spheres less the two inches in diameter. Above this are red medium - to coarse - grained subarkoses with some siltstones and conglomerates. The thickness has not been determined but is probably between 7000 and 9000 feet.

The cross-bedding suggests that the currents depositing the sands moved northwesterly.

The Otish Mountains is apparently on the continuation of the structure containing the Mistassini Group, and the Otish Mountain Group has been tentatively correlated in part or in whole with the Pepeshquasati Group. It is probably the same as Indicator Lake Series mentioned by Robinson (1956, p. 16)

Bergéron, Robert., 1957, Late Precambrian rocks of the north shore of St. Lawrence river and of the Mistassini and Otish Mountains areas, Quebec: Roy. Soc. Can., Spec. Pub. No. 2, p. 129.

Chown, E.H., 1965, The East Peribonca River area, Chicoutimi county: Quebec, Dept of Nat. Res., P.R. .535, p. 4,5.

Robinson, W.G., 1956, Grenville of New Quebec: Roy. Soc. Can., Spec. Pub. No. 1, p. 17,

II. OTISH MOUNTAINS GABBRO — Proterozoic.

Chown (1965 <u>op. cit.</u> p. 6) has used this name for rocks intrusive into the sedimentary rocks of the Otish Mountains Group.

This name can be confused with that for the group and should be abandoned.

OTTAUQUECHEE FORMATION (Wilmarth -1-1575) — Cambrian

This formation name was proposed in 1927 for a black phyllite or slate with thin layers of fine-grained sandstone cropping out in Vermont

On tracing northward, it appears to pass into the Sweetsburg Formation (q.v.) of the Oak Hill Group. The Lower Cambrian assignment of the Sweetsburg has been questioned: the formation is perhaps Middle Cambrian.

Osberg, P.H., 1965, Structural geology of the Knowlton-Richmond area, Quebec: Geol. Soc. Am., Bull. v. 76, p. 226.

OTTAWA

The river, city, and county have given names to geological and to topographic features. Many of the names after being suggested, appear to have passed from use.

I- OTTAWA GNEISS (Wilmarth -1-1575) Precambrian

The lower part of the Laurentian System was referred to as Fundamental Gneiss or equivalent expression, but Ottawa Gneiss or Gneisses or Formation or Series came into use before 1878. It was mentioned in that year by T.S. Hunt and also by ARC Selwyn in a report dated 1878 but issued 1879.

The name is not useful now and may be properly abandoned.

Hunt, T.S., 1878, Special report on the trap dykes and Azoic rocks of southeastern Pennsylvania: Pt. 1, Second geological survey of Pennsylvania, p. 155E.

II- OTTAWA MOUNTAINS GRANITE.

M.E. Wilson has used Ottawa Mountain on an equivocal way. He has applied the name to a belt of granitic gneisses cropping out between the Temiskaming and Grenville subprovinces of the Superior Province of the Canadian Shield. He inferred that the gneisses were the core of a mountain range. The use of "Ottawa Mountains granite" suggests a formation. The relationship of these rocks to the Ottawa gneiss is not clear.

Wilson, M.E., 1956, Early Precambrian rocks of the Timiskaming region, Quebec and Ontario, Canada: Geol. Soc. Am. Bull. v. 67, p. 1414.

III- OTTAWA - ST. LAWRENCE LOWLAND.

Miss Wilson (1946) has used this name for a "basin" underlying 7,900 square miles of the St. Lawrence Lowlands. The lowland is mostly in Ontario but some is in New York and a part is in Quebec west of Montreal.

Wilson, A.E., 1946, Geology of the Ottawa - St. Lawrence Lowland: Can. Geol. Surv. Mem. 241, p. 7. Also, fig. 3.

IV- OTTAWA FORMATION, MEGAGROUP. Middle Ordovician

A.E. Wilson has used Ottawa Formation for the Trenton and Black River beds in the Ottawa - St. Lawrence Lowland in marginal notes to Geological Survey of Canada maps 414 A and 852 A as well as in Memoir 241 (1946, p. 9, p. 21). The beds are mostly limestone with the exception of shale partings and the lower part of the Black River and aggregate 690 to 700 feet.

Miss Wilson's use of formation for a sequence of rocks which have been assigned to two groups raises a vexing problem in nomenclature. "Ottawa Formation" would seem to serve little purpose, but Ottawa Limestones might prove of use as an economic designation.

Swann and Willman (1961, p. 478) have proposed "Ottawa Limestone Megagroups" for the same beds. Megagroup seems to be unnecessary and "Trenton-Black River Limestones or Groups" will serves the purpose.

Wilson, A.E., 1946, op. cit. p. 7, p. 29.

Swann, D.H. and Willian, H.B., 1961, Megagroups in Illinois: Am. Assn. Pet. Geol., Bull. v. 61, p. 478.

OTTMAN FAULT

It branches from the Porcupine - Destor fault 4,000 feet west of the centre line of Duparquet township. It strikes easterly and dies out in Destor township in a series of northeasterly trending horse-tails. On the Ottman group the brecciated, schistose zone has an average width of 70 feet and dips 80° north.

Graham, R. Bruce., 1954, Parts of Hebecourt, Duparquet and Destor Townships, Abitibi-West County: Quebec, Dept. of Mines, G.R. No. 61, p. 35

OUAREAU (transition beds) Formation Trenton

Okylitch (1939, pp. 83, 85, 86) referred to 19 feet of thin-bedded dark bluish limestone occurring between the typical Leray and the Lower Trenton on Ouareau river four miles west of Joliette as Ouareau Formation or transition beds because the fauna shows elements characteristic of both the underlying and overlying formations. Clark (1959, p. 16) calls these beds Oureau Formation and correlates them with part of the Hull Formation. At the same time he suggests that they may be equivalent to the ten feet of unfossiliferous limestone overlying Leray at Montreal.

Okylitch, V.J., 1939, Black River Group in the region between Montreal and Quebec: Am. Jour. Sci., v. 237, pp. 83, 85, 86.

Clark, T.H., 1959, Stratigraphy of the Trenton Group, St. Lawrence Lowland, Quebec: Geol. Assn. Can., Pr. v. 11, p. 16.

PACHI (GROUP) Member Proterozoic

Woodcock (1960) applied this name to 100 feet of andesitic flows with 500 or more feet of arkose and arkosic quartzite forming the lower part of the Proterozoic section on Richmond Gulf. In view of the fact that he seems to have been unaware of Young's modification of Richmond Group as proposed by Leith , confusion results. The problem may be resolved by reducing the Pachi Group to Pachi member and restricting it to the andesites.

Woodcock, J.R., Geology of the Richmond Gulf area, New Quebec: Geol. Assn. Can., Pr. v. 12, pp. 21-39.

PALMAROLLE GRANODIORITE

It underlies an area about 17 miles long and 4 to 12 miles wide, mainly in the townships of Palmarolle and Poularies. The mass is here termed granodiorite rather than granite because dioritic types appear around its margins, as in the Dufault mass. The central parts of the intrusive consist of a rather coarse-grained (3-4 mm.) white, or light grey granite of very uniform composition. It contains a large proportion of quartz, and the remainder consists of about equal parts of feldspar and ferromagnesian minerals.

Cooke, H.C., James, W.F., Mawdsley, J.B., 1931, Geology and Ore Deposits of Rouyn-Harricanaw Region, Quebec: Canada Geol. Surv., Mem. 166, p. 129-130.

PAMELIA FORMATION | Black River (?)

This formation with a type locality in New York underlies the Lowville Formation of the Black River Group. In southern Quebec it is 16 feet of dolomitic rubbly limestone. On the Ouareau river, the thickness is about 8 feet.

The formation was originally assigned to the Chazy but in Canada, Raymond in 1911-1913, assigned it to Black River. Clark and Okulitch followed Raymond, however, Hoffman places the contact between Chazy and Black River within the limit of the formation.

Okulitch, V.J., 1939, Black River Group in the region between Montreal and Quebec: Am. Jour. Sci., v. 237, p. 94.

Hofmann, H.J., 1963, Ordovician Chazy Group in southern Quebec: Am. Assn. Pet. Geol. v. 63, pp. 285-889.

PAPASKWASATI, PAPACHOUESATI,

See PEPSHQUASATI

PASCALIS-TIBLEMONT GRANODIORITE Precambrian

This intrusive mass, which extends far to the north of Vauquelin Township, where it consists mainly of albitic granite, but with basic differentiates. In places the rock is considerably sheared and is a granite or quartz monzonite and a more basic dioritic rock.

Tolman, Carl, 1940, West Part of Vauquelin Township, Abitibi County: Quebec Dept. of Mines, G.R. No. 6, p. 8.

PATTEN RIVER PLUTON

The bulk of the Patten River pluton is in the west part of the map-area. Only 2 facies of the pluton outcrop in this region: a massive, homogeneous medium-to coarse-grained variety occurs in the central part, and in the southeast a more leucocratic variety parallels the border of the intrusion.

Bozach, Ronald, 1967, Geology of the South Half of Perron Township, Abitibi-West County: Quebec Dept. of Nat. Res., P.R. No. 561, p. 11.

PAULINE LAKE STOCK

The Pauline Lake stock, which is a coarse-grained pink granite, has strikingly forced a large portion of the gabbro-sediments complex aside, pushing it northward and eastward. The northward push is well illustrated in the shape of the sills and sedimentary beds which terminate against the northern border of the stock, and the eastward push by the deflection of the numerous sills and the abnormally steep dips east of the stock.

Claveau, Jacques, 1949, Wakeham Lake Area, Saguenay County: Quebec Dept. of Mines, G.R. No. 37, p. 43, p. 50.

PELLETIER LAKE FAULT.

The Pelletier Lake fault zone strikes east and northeast beneath and beyond the south bay of Pelletier Lake. The maximum thickness of the carbonatized schist along the fault is 100 feet. It dips steeply north.

Wilson, M.E., 1962, Rouyn-Beauchastel map-areas, Quebec: Canada, Geol. Surv., Mem. 315, p. 40.

PENTECOTE GRANITE Precambrian

Masses of granite, which Faessler considers to be of one age, occur at Steamship point, near the church at Pentecote, and Charles cove, two miles below Pentecote, a well as on the east side of des Homards bay. It is possible that the granitic masses near Shelter Bay, which are mapped as part of the Morin series, belong to this group. At Steamship point, this granite intrudes rocks of the Grenville series and the granitic gneiss; in the other localities mentioned, it intrudes anorthosite. The contacts are everywhere very definite and are marked by a clearly exposed zone of contact breccia. The granites in these several occurrences resemble one another very closely in that they are red, coarse-grained, and in places faintly gneissic.

Faessler, Carl, 1942, Sept-Iles Area North Shore of St. Lawrence, Saguenay County: Quebec Dept. of Mines, G.R. No. 11, p. 18-19.

PEPESHQUASATI (FORMATION), GROUP, SANDSTONE. Proterozoic

The original form of the formational name is Papaskwasati, but the spelling has been changed to the French form.

Neilson proposed the name in 1951 in the preliminary report on the Takwa River area when he referred to the rocks as "Papaskwasati Group". In The final report (1966) on the area the rocks are called "Papaskwasati Sandstone Formation", and the formation is assigned to the Mistassini Group. This assignment is accepted by Chown (1960, p. 7). In 1963 Neilson presented a paper in which the classification follows that given by Quirke, Goldich, and Krueger (1960), and the unit is considered a group older than but coordinate with the Mistassini Group.

The group called a formation in the Papachouesati River area (Chown 1960) is 500 to 1000 feet thick there and can be divided into three parts:

Dirty sandstone passing into "graywacke"

Sandstone 10% feldspar, some shale.

Conglomerate with pebbles of

vitreous quartzite to one inch diameter (bottom)

Neilson says the sandstone of the Takwa River area is light green to buff and has 75% of quartz grains 1 to 3 mm diameter.

The question of the rank of the Pepeshquasati is debatable. In views of the extent of the outcrop, 1/3 of the map area, found by Chown without other formations recognized as belonging to the Mistassini Group it seems advisable to consider it a group. Also Neilson and others have recognized the resemblance to the beds of the "Chibougamau Series", and with the postulated position for the Pepeshquasati in the Mistassini Group, the Chibougamau Series would be older than the Mistassini Group, a conclusion that is possibly true but is unverified. Furthermore, some work, mostly unpublished, suggests an unconformity between the sandstones of the Pepeshquasati and the overlying Rivière Chéno Formation. The unconformity may mark the base of the Mistassini Group.

In the Hippocampe Lake area Hashimoto (1961) has mapped 250 square miles underlain by sandstones, arkosic sandstones, and purple mudstones, which he refers to as Monts Otish Group. In the area to the east, Chown refers similar rocks to the Pépeshquasati Formation of the Mistassini Group or, in brackets, "Monts Otish Group".

Neilson, J.M., 1966, Takwa River Area, Mistassini Territory: Quebec, Dept of Nat. Res., G.R. 124, p. 25. (1951, P.R. 254, p. 6)

Chown, E.H., 1960, Papachovesati River Area, Mistassini Territory: Quebec Dept. Mines, P.R. 415, p. 7.

Neilson, J.M.. 1963, Lake Albanel iron range, Northern Quebec: C.I.M.M., Bull. v. 56, pp. 35-41. (In. v. 66, pp. 21-27)

Hashimoto, T., 1961, Hippocampe Lake Area, Mistassini Territory: Quebec, Dept, of Mines, P.R. 438, p. 2.

Chown, E.H., 1961, Shigami Mountains Area, Mistassini, Territory: Quebec, Dept. of Mines, P.R. 440, p. 3.

PERIODS AND SYSTEMS

In Geology of Canada (1863) p. 20, Logan has a table in the chapter with the title "Geological Nomenclature". In this table he lists the Paleozoic periods corresponding to rocks in Canada East and Canada West and gives them the names derived from localities in Britain. An examination of the table shows that the series included within the divisions have North American names, but the assignment of series to periods and the periods are not those now used.

CARBONIFEROUS.

20. Bonaventure formation.

Devonian

19. Portage and Cheming group.
18. Hamilton formation
17. Corniferous " Upper Helderberg group.
16. Oriskany "

Upper Silurian

15. Lower Helderberg group.
14. Onondaga formation.

Middle Silurian

13. Guelph formation.
12. Niagara "
11. Clinton " Anticosti group.
10. Medina "

Lower Silurian

9. Hudson River formation.
8. Utica "
7. Trenton
6. Birdseye and Black River Formation.
5. Chazy = Sillery? "
4. Calciferous = Lévis " Quebec group.
3. Potsdam group.

Azoic

2. Huronian series.
1. Laurentian system.

"Silurian" includes not only series so assigned now but also part of the Devonian and at least part of the Ordovician. Cambrian is not mentioned in "Geology of Canada" (1863) but Billings in the first number of Canadian Naturalist and Geologist had used the term as early as 1856 for Potsdam and Huronian. The use of Cambrian for Proterozoic rocks such as those of Mistassini Series and the Labrador Trough continued until somewhat after 1895.

In 1880 A.R.C. Selwyn (p. 5) in commenting on the work in New Brunswick on Bailey, Matthew, and Ells gives his views on nomenclature.

> "The term Cambro-silurian, is used for the formations constituting the Trenton group, viz., Bird's Eye, Black River and Trenton limestones, Utica slates, Lorraine or Hudson River shales; while in the term Cambrian are included the Chazy, Calciferous, Quebec group, Potsdam, St. John and Menevian groups, down to the summit of the Huronian."

A pasted in revision places Chazy in the Cambro-Silurian.

By 1905 Cambro-Silurian had been generally superseded by Ordovician, and the timetable assumed its present form. This does not mean that no adjustments have taken place. The boundaries of systems have been modified and rocks transferred from one period to another. The upper and lower limits of the Ordovician, for example, have been adjusted, and even for these, agreement is not complete.

The Taconic System of Emmons was like the system of Werner not of importance in the official or semi official publications, but Marcou published papers on aspects of Quebec geology and used this system. As an example of these, a synoptic table published in 1889 is given below.

Marcou, Jules, 1889, Canadian Geological Classification for the Province of Quebec.

STRATIGRAPHY OF THE PROVINCE OF QUEBEC. MARCOU

Break.		Unconformity.
Silurian system.		Some patches of Silurian Deposits exist from Memphremagog to Gaspe.
Break.		Unconformity.
Cambrian or Champlain System.		UTICA, from Rouse's Point to St. John Lake. Fourth zone of graptolites. TRENTON, including Chazy and Calciferous.
Break.		Unconformity, at Chazy Beauharnois.
TACONIC SERIES	UPPER TACONIC	POTSDAM.
		Break. overturn of all the strata and strong unconformity.
		CITADEL HILL AND QUEBEC CITY OR SWANTON SLATES.
		Third zone of graptolites and colonies.
		POINTE LEVIS AND PHILLIPSBURGH. Second zone of graptolites with compound graptolites. Colonies.
	MIDDLE TACONIC	GEORGIA, from Highgate (Vermont) to St. Denis, Bic Harbor, etc.; first zone of graptolites. Olenellus belt.
		ST. ALBANS, much developed on the Chaudière river and around Actonvale and Richmond.

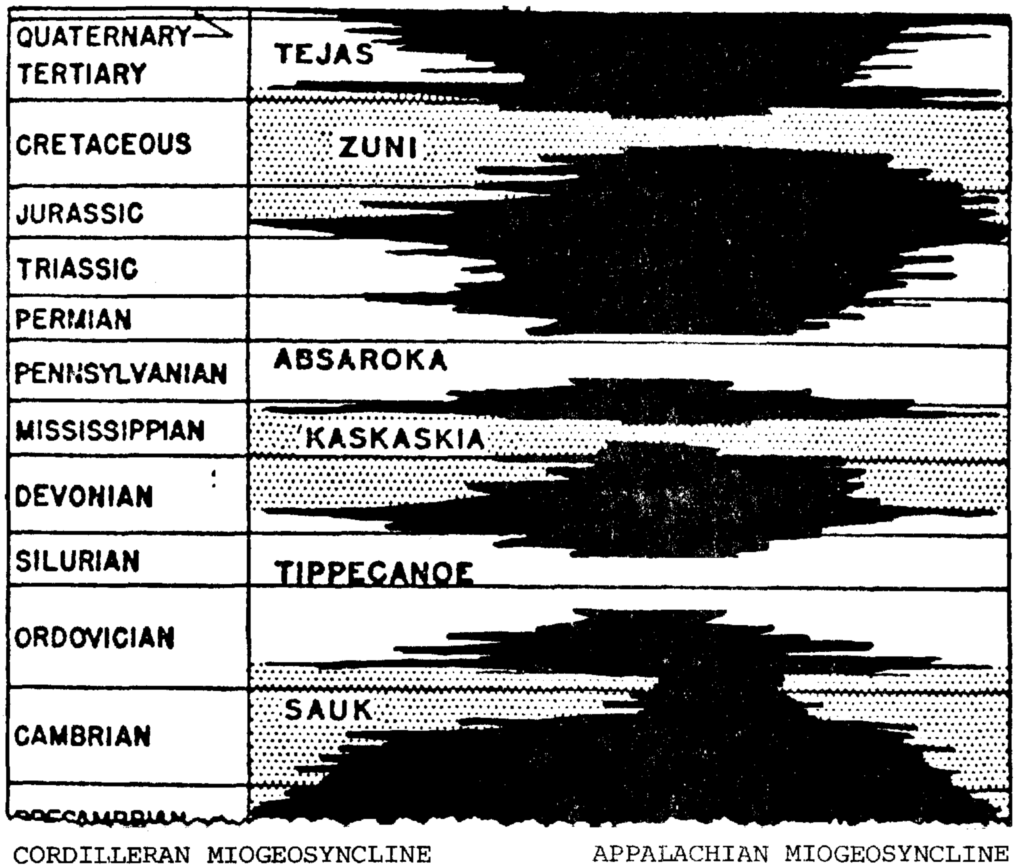
The changes in use of names as sketched above show how a modern worker can inadvertantly misrepresent a writer's opinions. For example, Logan (1863, p. 932) places Gaspé Limestone in a lower Helderberg group, which is in "Upper Silurian" in his system. The lower Helderberg group in now considered Lower Devonian and the change from Silurian to Devonian represents no modification of Logan's views.

Billings, Elkanah, 1857, European and American Formations, distribution...:

Can. Nat. and Geol. v. 1, p. 19.

Selwyn, A.R.C., 1880, Report of Progress 1878-79; Geol. Surv. Can., p. 5.

Marcou, Jules, 1889, Canadian Geological Classification for the Province of Québec: Boston. Soc. Nat. Hist., Pr. v. 24, p. 79.



Time stratigraphic relationships of the sequence in the North American craton. Black areas represent nondepositional hiatuses; white and stippled areas represent deposition. (Stippling introduced only to differentiate successive depositional episodes.)

Precambrian Time and Rock Units of the Canadian Shield

C.H. Stockwell (G.S.C. paper 64-17)

EON	ERA	SUB-ERA	TYPE OROGENY M M in m.y.	ROCK-STRATIGRAPHIC UNITS In any one category not necessarily contemporaneous nor in order of age			
			600				
	HADRYNIAN			Double Mer Chatham-Grenville stock		Upper Keweenawan Lower and Upper Coppermine River	
			880				
PROTERC IC	HELIKIAN	NEOHELIKIAN	GRENVILLE	Killarney, Doloro and other granites Seal	Ulukan	- - - - - - - - - Duluth, Muskox, Logan, Lackner, and Coldwell intrusions	
			1280 ?	Wakeham	Equalulik	Lower and Middle Kewenawan	
		PALAEOHELIKIAN	ELSONIAN	Granite, adamellite and anorthosite Martin Dubawnt Sims Chukotat	Athabasca Et-Then	Hornby Bay	
			1640				
	APHEBIAN		HUDSONIAN	Kaminis and other granites, Sudbury irruptive.			
				Huronian	Epworth		
				Animiki	Nonacho		
				Kaniapiskau	Tazin		
				Povungnituk	Hurwitz		
				Belcher	Chantry		
				Great Slave	Great Island	Nipissing diabase	
				Snare	Cross Lake		
				Echo Bay - Cameron Bay	San Antonio		
				Goulburn	Grenville	Matachewan diabase	
			2390				
AI LEAN			KENORAN	Algoman, Giants Range, Prosperous, and other granites			
				Knife Lake	Sickle, Kisseynew, Missi	Timiskaming	Ridout Windigokan
			- - - ? - -	Saganaga Granite	Cliff Lake Granite		Rice Lake Seine
				Keewatin - Coutchiching	Wasekman, Kisseynew, Amisk	Abitibi, Pontiac	Yellowknife

PHILIPSBURG SERIES Lower Paleozoic

Logan gave the name "Phillipsburgh Series" to the part of the Quebec Group exposed east and northeast of lake Champlain, and gave in "Geology of Canada" (1863, pp. 8) a section of the rocks from what has been termed the Philipsburg slice. (Clark, 1934, p. 5). This slice is believed to be limited on the west by the Philipsburg thrust and on the east by Rosenberg thrust and Oak Hill thrust.

"Geology of Quebec" (1944, p. 396) gives the local names assigned to formations of this series together with an estimate of thicknesses and correlations with Logan's divisions.

Group		Formation	Logan's Division	Thickness
Trenton		Stanbridge shale	D_2 and D_3	2,000 ± ft.
Chazy		Mystic conglomerate	D_1	75 "
Beekmantown	Philipsburg "Series"	Basswood Creek shale	C_2	70 "
		Corey limestone	C_1	275 "
		St-Armand limestone	B_5	200 "
		Solomon's Corner limestone	B_4	300 "
		Luke Hill Limestone x	B_3	160 "
		Naylor Ledge limestone x	Top of B_2	30 "
		Hastings Creek limestone x	B_1 and most of B_2	315 "
		Morgan Corner dolomite x	} A_3	150 "
		Wallace Creek limestone x		250 "
		Strites Pond limestone x	A_2	400 "
Upper Cambrian		Rock River dolomite	A_1	500 "
			Total:	4,725 ± ft.

x Clark, T.H., 1934, The structure and stratigraphy of southern Quebec: Geol. Soc. Am., Bull. v. 45, p. 8.

Formations marked with asterisk named by H.W. McGerrigle (1931), other formation names published by T.H. Clark (1934).

The commercial characteristics of the limestones and marbles of the Philipsburg Series has been given by Goudge (1935).

McGerrigle, H.W., 1931, Three geological series in northwestern Vermont: Vermont, Rept. of State Geologist, 17th, 1929-30, pp. 184-186.

Clark, T.H., 1934, The structure and stratigraphy of southern Quebec: Geol. Soc. Am., Bull. v. 45, p. 8.

Goudge, M.F., 1935, Limestones of Canada, Part III: Canada Mines Branch, No. 755, pp. 206-225.

PHILLIPS LAKE FAULT

"A thrust fault with a large displacement is clearly present east of Phillips lake in the Freneuse Lake area. . . This fault must pass about 3/4 mile east of the north of Gelinas lake. There is a narrow valley from there to Rachel lake and the fault possibly extends to that lake or even farther south".

Sauvé, Pierre, Bergeron, Robert., 1965, Gerido Lake-Thévenet Lake Area, New Quebec: Quebec Dept. of Nat. Res., G.R. No. 104, p. 81.

PILLAR SANDSTONES Canadian

Although Logan had used Pillar Sandstones prior to 1860, in a way that suggested he intended it to be considered a formation, in "Geology of Canada" (1863), the name does not appear. In its original sense it was applied to sandstones occurring with shales and siltstones on the north coast of Gaspé. The rocks resembled those to which Sillery was applied in 1855, the formation being regarded as Silurian. Ells (1883, pp. 24-26) refrains from using "Pillar sandstones" in a formal way.

McGerrigle (1954) in the discussion of the Tourelle area mentions no formal name but in another publication suggests "Tourelle Sandstone". Fossils show that the formation is the age of the Lévis Formation of the Quebec Group.

Ells, R.W., 1883, Report on the geological formations in the Gaspé Peninsula: Ann. Rept. 1882, pp. 24-26, DD.

McGerrigle, H.W., 1954, The Tourelle and Courcelette areas: Quebec Dept. of Mines, G.R. 62, pp. 30-32.

McGerrigle, H.W., 1954, An outline of the geology of Gaspé Peninsula: Can. Min. Jour., v. 75, p. 60.

PINNACE GRAYWACKE Cambrian (?)

The Call Mill Slate or Tibbit Hill Schist of the Oak Hill Group is overlain by the Pinnacle Graywacke of Clark (1936, pp. 141-143). This rock is essentially a sandstone locally with some feldspar and a clay cement less than 20 per cent of the rock. Inclined bedding is common and local layers rich in magnetite, fossil black sands, are found. The formation is as much as 400 feet thick in the Sutton Map area and southward in Vermont, however, near Richmond, Osberg (1965, p. 226) assigns the three formations, Call Mill Slate, Pinnacle Graywacke, and White Brook Dolomite, a thickness from 10 to 600 feet. Booth (1950) records the presence of pebble and boulder conglomerates in this formation in Vermont. Boulders include granite and quartz syenite.

Clark, T.H., 1936, A Lower Cambrian Series from Southern Quebec:

Roy. Can. Inst., v. 21, Pt. 1, pp. 141-143.

Osberg, P.H., 1965, Structural geology of the Knowlton-Richmond Area, Quebec: Geol. Soc. Am., Bull. v. 76, p. 226.

Booth, V.H., 1950, Structure and Stratigraphy of the Oak Hill Succession in Vermont: Geol. Soc. Am., Bull., v. 61, pp. 1141-1142.

PINNACLE MOUNTAIN ANTICLINE

Eakins has given this name to a northeast trending anticline in the Sutton Map area. The anticline was called "Enosberg Falls" by Cady and Tibbitt Hill by Richard (1965), The Cambridge Syncline separates this structure from Sutton Axis. Essentially the same syncline has been called Sutton-Richford.

Eakins, P.R., 1963, Sutton Map Area: Can. Geol. Surv., Paper 63-34, p. 1.

Cady, W.M., 1960, Stratigraphic and geotectonic relationships in northern Vermont and southern Quebec: Geol. Soc. Am., Bull., v. 71, Pl. 1.

POHENAGAMUK (POHENEGAMUK) FORMATION Ordovicain (?)

(Wilmarth -1-1690)

Dressler (1912) gave the name Pohenagamuk, on the map accompanying the report "Pohenagamuk", to graphitic grey slates, calcareous slates, conglomerates and feldspathic quartzites cropping out in a band lying along and partly across the Maine border in Temiscouata and Kamouraska counties. Few details were given on the formation, and on very feeble evidence it was considered Middle Ordovician. In "Geology of Quebec" page 354, the spelling of the formation name is Pohénégamuk and the belief is stated that it is part of the Farnham Series. The name has priority over "Beauceville Series", but has not had general acceptance. It may be of use locally.

Dressler, J.A., 1912, Reconnaissance along the National Transcontinental Railway in southern Quebec: Geol. Surv. Can., Mem. 35, p. 25

POINTE-AUX-TREMBLES FORMATION Lower Silurian

It is made up of volcanic sandstones, conglomeratic sandstones, rare lava flows and even rarer tuffs. There are complete gradations from sandstones to conglomerates. The color of the rocks ranges from gray to green, and in places is dark gray. The material composing the formation is exclusively volcanic detritus, which has been slightly reworked by the sea. The Lake Castor member is 2,000 feet of conglomerate near the lake of that name.

Lespérance, P.J., Greiner, H.R., 1969, Squatec-Cabano Area, Rimouski, Rivière du Loup and Témiscouata Counties: Quebec Dept. of Nat. Res., G.R. no. 128, p. 35-40.

PONTGRAVE RIVER SHALES Richmond

Foerste recognized in Quebec a section of about 150 feet of green calcareous shale as the lower Richmond and correlated it with the Waynesville of Ohio. Clark (1947, p. 7) has called these beds the Pontgravé River Formation. However, Belyea (1952, p. 26) extends the limits of the formation slightly downward to give a section of 220 feet. This limit is petrographic and is based on the lower limit of calcareous siltstones.

Foerste, A.F., 1916, Upper Ordovician Formations in Ontario

and Quebec: Canada Geol. Surv. Mem. 83, p. 149.

Clark, T.H., 1947, The St. Lawrence Lowlands south of St. Lawrence river: Quebec Dept. of Mines, P.R. 204, p. 7.

Clark, T.H., 1964, Yamaska-Aston area: Quebec Dept. Nat. Res., G.R. 102, pp. 17.

Belyea, H.R., 1952, Deep wells and subsurface stratigraphy of part of the St. Lawrence Lowlands, Quebec: Can. Geol. Surv. Bull. 22, p. 26.

TABLE OF FORMATIONS

LOWLAND STANDARD CLASSIFICATION			STRATIGRAPHIC UNITS OUTCROPPING OR OCCURRING IMMEDIATELY BELOW OVERBURDEN		
PERIOD	GROUP	FORMATION MEMBER	WESTERN AREA	ST-DOMINIQUE SLICE	GRANBY SLICE
ORDOVICIAN	Richmond	Bécancour River (Queenston)	Present		
		Pontgravé River	Present		
	Lorraine	Nicolet River			
		St. Hilaire	? Present	St.	
		Chambly	Present		
		Breault		Germain	
	Utica	Lachine	St. Germain Complex		
	Trenton	Tétreaultville		Complex	
		Montreal			
		Rosemount		Present	
		St. Michel		Present	
		Mile End		Present	
	Black River	Leray		Present	
		Lowville		Present	
		Pamelia		Present	
	Chazy	St. Dominique			
		St. Dom. ls.		Present	
		St. Dom. ss.		Present	
	Beekmantown	Beldens		Present	
? CAMBRIAN					Sillery

(Clark, 1964, Q.D.N.R., G.R. -101) p.7

Table 4 - Correlation of the Trenton Strata

FORMATIONS Members *Zones*	THICKNESS (in feet)	LOCATIONS	APPROXIMATE EQUIVALENTS	
			NEW YORK	MONTREAL
NEUVILLE				
Grondines	326'	Neuville shore	COBOURG	TERREBONNE
Rafinesquina deltoidea				
Cryptolithus lorettensis			SHERMAN FALL	MONTREAL
St-Casimir	106'	Neuville shore Railway cut	-	-
DESCHAMBAULT	92'	Railway cut Fields and woods	HULL	DESCHAMBAULT
PONT-ROUGE	14'	Jacques-Cartier river	ROCKLAND	ROCKLAND

(Clark & Globensky, 1973, Q.D.N.R., G.R. -148)

PONT-ROUGE FORMATION Trenton ?

On the section along Jacques Cartier river at Pont-Rouge, 32 feet of fine-grained limestone underlie the Deschambault Formation. Sinclair has give a faunal list from this locality and suggested a "possible basal Trenton" assignment. Clark, (1959, p. 17) considers these beds as Rockland.

Sinclair, G.W., 1945, An Ordovician faunule from Quebec: Can. Field Nat., v. 59, pp. 71-74.

Clark, T.H., 1959, Stratigraphy of the Trenton Group, St. Lawrence Lowland, Quebec: Geol. Assn. Can., Pr. v. 11, p. 17.

PORCUPINE -DESTOR FAULT.

It strikes easterly across Hébécourt township from the Ontario border to the north end of Duparquet lake. From there to the Macamic road its strike is S.75°E. The trace of the fault is marked by a valley about a mile wide.

The shear zone is 50 to 250 feet wide and is made up of carbonatized chlorite, talc and sericite schists, locally bleached and silicified and in places containing green mica. The dip varies from 50° to 80° south,

Graham, R. Bruce., 1954, Parts of Hebecourt, Duparquet and Destor Townships, Abitibi-West County: Quebec, Dept. of Mines, G.R. No. 61, p. 34

PORT-DANIEL FORMATION Lower Paleozoic

This formation, named after Port-Daniel township, is the middle formation of the Maquereau Group and is unconformably overlain by the Newport and in fault contact with the Chandler. It is especially well exposed at Maquereau Point and along North Port-Daniel and West Grand-Pabos rivers. It is heterogeneous and believed to be more than 18,000 feet thick. Graywackes quartzites, conglomerates and volcanics occur in it. More than half of the area underlain by the Port-Daniel Formation shows well-foliated, dark green, quartzose graywackes.

Ayrton, W.G., 1967, Chandler-Port-Daniel Area, Bonaventure and Gaspé-South Counties: Quebec Dept. of Nat. Res., G.R. No. 120, p. 13.

PORT - DANIEL FAULT.

This long curving fault bounds the southwestern and western limit of the Maquereau Group in Port-Daniel township and marks the contact with the Mictaw Group and the North Port-Daniel River complex. The fault dips vertically where observed, but a strong northeasterly-dipping foliation in the southern basal(?) Mictaw conglomerate suggests that possibly the Maquereau Group may have been thrust southwestward over the conglomerate.

Ayrton, W.G., 1967, Chandler-Port-Daniel Area, Bonaventure and Gaspé-

South Counties: Quebec Dept. of Nat. Res., G.R. No. 120, p. 66-67.

POTSDAM SANDSTONE (GROUP) Cambrian

Potsdam has been in use as a formational name in New York since 1838. Although it was used to designate a group it is now commonly considered a formation. It is commonly recognized as the oldest Phanerozoic formation on the stable shelf east of Frontenac axis, but this is not strictly true. It consists of sandstones commonly with well rounded grains of quartz and siliceous cement, but calcareous cements and arkosic and conglomeratic beds are found. The beds show shallow water features such as ripple marks, rain impact marks, and cross-bedding and are the result of the transportation of weathered products derived from Precambrian rocks.

The Potsdam sandstone is stated to extend as far east as St. Maurice river in Quebec, but the exposures along the river are younger than the Potsdam at Montreal. The age assigned to the Potsdam is commonly Upper Cambrian, but Nepean has been used for similar beds in Ontario with the suggestion that the rocks are possibly Ordovician.

POULARIES ANTICLINE

"It is situated southwest of the Privat tuff where nearly all the lavas are dark-coloured "basalts" and "andesites", with which a very distinctive, light-coloured rhyolite is interbanded. Its strike is thus closely determined as north 74 degrees west".

Cooke, H.C., James, W.F., Mawdsley, J.B., 1931, Geology and Ore Deposits of Rouyn-Harricanaw Region, Quebec: Canada, Geol, Surv. Mem, 166, p. 90

POVUNGNITUK GROUP Precambrian

Povungnituk group lies unconformably on the Archean rocks. This group is made up of sedimentary and volcanic rocks that were invaded, before being folded, by a great number of gabbroic sills, as well as by some of an ultrabasic nature. These latter are now serpentinites. All of these rocks are fairly well deformed and metamorphosed.

BERGERON, Robert, 1959, Povungnituk Range Area, New Quebec: Quebec Dept. of Mines, P.R. No. 392, p. 2.

POWELL GRANITE

It is a mass about 3 miles long and ½ mile to 1 mile wide in the northwest quarter of Rouyn township. It is bounded on the south by the extension of the Horne Creek fault. It is a rather fine-grained, light grey or pinkish rock, with a tendency to porphyritic texture.

Cooke, H.C., James, W.F., Mawdsley, J.B., 1931, Geology and Ore Deposits of Rouyn-Harricanaw Region, Quebec: Canada, Geol. Surv., Mem. 166, p. 128.

Wilson, M.E., 1949, Noranda District, Quebec: Canada Geol. Surv., Mem. 229, p. 33-34.

PREISSAC SYENITES (GRANITE) Precambrian

In the northwestern corner of Preissac township a few small bodies of porphyric syenite intrude the metamorphosed sediments. They are petrographically similar to the small masses already described in the north-eastern part of Clericy township. Norman described a biotite-garnet microcline albite granite under this name.

Cooke, H.C., James, W.F., Mawdsley, J.B., 1931, Geology and Ore Deposits of Rouyn-Harricanaw Region, Quebec: Canada, Geol. Surv. Mem. 166, p. 117.

Norman, G.W.H., 1945, Molybdenite deposits and pegmatites in the Pressiac - Lacorne area: Abitibi County, Quebec: Econ. Geol. v. 40, p. 4.

PRIVAT SYNCLINE

"Its strike is north 53 degrees west; at the extreme south end, the strike swings east to north 70 degrees west."

Cooke, H.C., James, W.F., Mawdsley, J.B., 1931, Geology and Ore Deposits of Rouyn-Harricanaw Region: Canada, Geol. Surv. Mines, Mem, 166, p. 90.

-----PROTAXIS

Protaxis can be found preceded by different names such as Archean, Precambrian, Laurentian, or Northern. It was in most contexts synonymous with Canadian or Precambrian Shield. The term is no longer in use but may be found in publications prior to 1910.

QUEBEC

Quebec, both province and city, has been used for several geological features.

I- QUEBEC GROUP (SUPERGROUP) Cambrian and Ordovician

After the founding of the Geological Survey of Canada in 1842, Logan began the study of the geology of Gaspé where he found shales and sandstones as well as other clastic rocks that he recognized as belonging to a major stratigraphic unit. References to localities using phrases like "Quebec formations" appearing before 1860 can not be interpreted as proposal of stratigraphic names. The "Esquisse Geologique du Canada" of 1855 by Logan and Hunt has references to the Quebec formation of the city and Levis and a statement that the Sillery and Quebec formations in Gaspé are overlain by 700 meters of Upper Silurian limestone. A paper published in 1861 (Logan) contains unequivocal evidence of the intention to use Quebec Group.

In "Geology of Canada" (1863) Quebec Group is used as a heading for a chapter, and the group is stated to consist of the Levis and Sillery formations. Quebec Formation is not mentioned.

Selwyn, Logan's successor, was opposed to the concept of the Quebec Group and presented (1882) a now largely discredited interpretation of the geology of the Eastern Townships. Ells (1889) suggested that Quebec Group be dropped, although Ami among others urged retention of the term.

The development of interpretations of sedimentary rocks and studies made largely since 1940 show the desirability of retaining Quebec Group and indeed changing its status to Supergroup. It is the designation for the Paleozoic clastic rocks formed in orthogeosynclinal environment before the Taconic Orogeny and occurring in the Appalachian Province. The name is historically justified and nothing is gained by substituting another name or using "complex".

Logan, W.E., 1861, Considerations relating to the Quebec Group, and the copper-bearing rocks of Lake Superior: Can. Nat. and Geol. v. 6, pp. 199-207.

Selwyn, A.R.C., 1882, The Quebec Group in Geology ....: Roy. Soc. Can. Tn. v. 1, pt. IV, pp. 1-13.

Ells, R.W., 1889, Second Report on the geology of a portion of the province of Quebec: Can. Geol. Surv. Summ. Rept. 1887-1888, vol. 3, pt. 2, p. 6K.

II- QUEBEC FORMATION, QUEBEC CITY FORMATION. Middle Ordovician

Logan and Hunt in "Esquisse Géologique du Canada" (1855) suggested Quebec Formation and Sillery Formation for rocks in and near Quebec city. It is possible that Quebec Formation was intentionally superseded by Quebec Group because no mention is found of Quebec Formation until 1890. At that time the rocks of Quebec city, having been recognized as younger than the Levis Formation, were given the name Quebec by Ami. (1900, p. 141), who used it first in a paper read before the Geological Society of America. He states that its fauna enables it to be equated to "Hudson River Formation", "Utica-Lorraine", "Utica-Trenton", and "Utica" of American Geologists (Ami, 1900, op. cit. p. 142).

Raymond (1912, p. 356) used without comment Quebec City for the same formation. He lists a fauna collected from the conglomerates of this formation and dates it as lower Trenton.

Since 1965 graptolites from several localities in Upper Town Quebec have been collected and have yielded a fauna permitting correlation with the Normanskill Formation of New York. With this determination, according to current opinion, the beds are older than Trenton.

Ami, H.W., 1900, On the geology of the principal cities in eastern Canada: Roy. Soc. Can., Tn. v. 6, Sec. IV, p. 141.

Raymond, P.E., 1912, Paleontological Division, Invertebrate, "Report": Can. Geol. Surv. Summ. Rept. 1911, p. 356.

III- QUEBEC BARRIER (Axis).

Logan's interpretation of the stratigraphic and structural relationships near Quebec led him to the view that the loci of deposition of formations of the lowlands were separated from those of the Appalachians by a barrier. This view was elaborated by Ulrich and Schuchert (1902) and troughs and barriers were for a time the vogue. The Quebec Barrier, which is northwest of the Green Mountain Barrier and separated from it by the Levis Channel has approximately the position of Logan's Line. This is apparently the Quebec axis of Kay (1942, p. 1605). See Vermont-Quebec barrier.

Ulrich, E.O., and Schuchert, C., 1902, Paleozoic seas and barriers in Eastern North America: N.Y. State Mus. Bull. 52, p. 639.

Kay, G.M., 1942, Development of the Northern Allegheny Synclinorium and adjacent regions: Geol. Soc. Am., Bull. v. 53, pp. 1644-46.

IV- QUEBEC GEOSYNCLINE.

In 1913, F.D. Adams (1915, p. 52) gave the first description of a Precambrian geosyncline. This structure was supposed to trend parallel to St. Lawrence river and to contain Proterozoic rocks. According to Adams it is separated from the northern belt (now Temiscaming subprovince by a zone of intrusive granitic rocks.

Schuchert (1924, p. 149) used "Quebec Geosyncline" for a structure in the same position but inferentially older than that described by Adams. He states that the Ontaric Trough developed from it in Proterozoic time. The term is obsolete.

Adams, F.D., 1915, Problems of the Canadian Shield, the Archaeozoic: Problems of American Geology, Yale University Press, p. 52.

Schuchert, Charles, 1924, Historical Geology: 2nd Ed., Wiley, p. 149.

V- QUEBEC DISTURBANCE.

Kay (1937, p. 290) has proposed that "Quebec Disturbance" be substituted for "Green Mountain Disturbance" and "Vermont Disturbance". This disturbance affected the "Quebec Barrier" (q.v.) in Middle (?) Ordovician time.

Kay, G.M., 1937, Stratigraphy of the Trenton Group: Geol. Soc. of Am., Bull. 48, p. 290.

VI- QUEBECAN SUBSTAGE. - of Wisconsin Stage.

In 1941 Leighton proposed that the Wisconsin deposits of the upper Mississippi Valley be assigned Hudsonian, Quebecan, and Manitoban substages. In 1933 he withdrew these names and submitted, again, in descending order, Mankato, Cary, Tazewell, and Iona.

Leighton, M.M., 1931, The Peorian loess and the classification of glacial drifts sheets in the Mississippi Valley: Jour. Geol. v. 39, pp. 52-53.

Leighton, M.M., 1933, The naming of the subdivisions of Wisconsin Glacial age: Science, v. 77, p. 168.

VII- QUEBEC BASIN

Belyea (1952, p. 1) has used this term to designate the St. Lawrence Lowlands in Quebec and east of the Beauharnois Anticline which extends from St. Jerome towards the Adirondacks.

Belyea, H.R., 1952, Deep wells and sub-surface stratigraphy of part of the St. Lawrence Lowlands, Quebec: Can. Geol. Surv., Bull. 22, p. 1.

QUEBEC - COPPER ANTICLINE

"It is clearly indicated by the trend of the contacts of the Amulet rhyolite belt. This southeastward striking anticline is situated in the northwestern part of Waite map-area. The contact of the rhyolite and the overlying andesite is not exposed on the axis of the fold, but the rhyolite is known to dip under the andesite at an angle of about 30°. Quebec - Copper anticline is interrupted to the eastward by the Dufresnay belt of dioritic rocks."

Wilson, M.E., 1949, Noranda, District, Quebec: Canada, Geol. Surv. Memoir, 229, p. 49.

RACHEL LAKE STRUCTURAL COMPLEX.

"The main structural characteristics are a disordered map-pattern, irregular but steep plunges of the fold axes, intense shearing, and flexed axial planes of folds. The direction of plunges of minor fold axes vary from north to east but average N. 50° - 65°".

Sauvé, Pierre., Bergeron, Robert., 1965, Gerido Lake-Thévenet Lake Area, New Quebec: Quebec, Dept. of Nat. Res., G.R. No. 104, p. 81-82.

RAUDIN FAULT.

It bounds the northern limit of the Maquereau Group and forms the southern boundary of the Silurian graben. It is named after Raudin township. Two spectacular zones of tectonic breccia are exposed along the fault:one is along West Grand-Pabos river in Raudin township, and the other is in the hills approximately 2 miles northwest of Chandler. It strikes easterly.

Aryton, W.G., 1967, Chandler, Port-Daniel Area, Bonaventure and Gaspé-South: Quebec Dept. of Nat. Res., G.R. No. 120, p. 67-68.

RAUDOT LAKE MASSIF Precambrian

Rocks of this massif are variably altered and deformed, the intensity increasing from south to north across three miles. The slight changes in alteration are noticeable only in thin-sections, and are marked by transformation of the olivine to pale bluish green amphibole. In the more altered rock the feldspar is light gray and the mafic mineral forms very fine-grained clusters.

Kish, Leslie, 1968, Hart-Jaune River Area, Saguenay County: Quebec Dept. of Nat. Res., G.R. No. 132, p. 56-61.

REDOUTE LIMESTONE (boulder) Cambrian

Marcou gave this name to a massive light gray limestone forming the core of the prominent hill 1,000 feet south of St. Joseph Church in Lauzon. He made extensive collections of fossils from it and it was later shown to a block. Rasetti gave it the number 32 and described Upper Cambrian trilobites from it. The immediately overlying siltstones of the Levis Formation has Caryocaris, Clonograptus, and Bryograptus.

Marcou gives the following table:

Calciferous (Lower Silurian)		Blue schistose marl in conglomerate and limestone - Compound graptolites . Citadel, City of Quebec, Point Levi.
Georgia Slate (Lower Silurian)		
(St. Albans Group	b)	Green and brown slates with large lenticular masses of limestone. Gilmour Wharf, Harlake, Redoute.
	a)	Sillery and Chaudière red slate and Sandstone.

Marcou, Jules, 1862, Taconic and Lower Silurian rocks of Vermont and Canada: Boston Soc. Nat. Hist., vol. 8, p. 239, p. 248.

Rasetti, Franco, 1945, Description supplémentaire de trois genres de trilobites cambriens: Nat. Can., v. 72, pp. 118-119.

RICHFORD-SUTTON SYNCLINE

Eakins has used this term instead of "Cambridge Syncline" proposed by Cady for the synclinal axis northwest of Sutton Axis. The double name has no advantage over Cambridge.

Eakins, P.R., 1963, Sutton Map Area: Can. Geol. Surv., Paper 63-34, p. 1.

Cady, W.M., 1960, Stratigraphic and geotectonic relationships in northern Vermont and southern Quebec: Geol. Soc. Am., Bull., v. 71, Pl. 1.

RICHMOND BELTED PLAIN **Precambrian**

Gill gave this name to the arcuate subprovince lying east of Richmond Gulf, Hudson Bay, and he considers it a part of Ungava Province. The presumably equivalent rocks cropping out in Belcher islands are termed Belcher Mountains.

Gill, J.E., June 1949, Natural Divisions of the Canadian Shield, Transactions of the Royal Society of Canada, Volume XLIII, Series III, Section four, p. 65.

RICHMOND GULF GROUP Proterozoic

G.A. Young (1921, p. 16 E) gave this name to the rocks termed Richmond Group by Leith (1910, p. 232). The formation is probably about 2500 feet thick and consists of sandstones, arkoses, shales and grits with considerable section of basic volcanics. Low believed that a fault separates this group from the overlying Nastapoka Group, but Leith is of the opinion it is an unconformity It is stated that the Richmond Gulf and Nastapoka rest in places on the old granites or gneisses.

The precise relationship of these rocks to the Belcher Series and the South Hopewell Group (q.v.) remains unknown.

Young, G.A., 1922, Iron bearing rocks of Belcher Islands, Hudson Bay: Can., Geol. Surv., Summ. Rept. 1921, Part E, p. 16.

Leith, C.K., 1910, An Algonkian Basin in Hudson Bay, a comparison with the Lake Superior Basin: Econ. Geol. V., pp. 232-233.

RICHMOND GULF FORMATION   Proterozoic

Woodcock seems to have been unaware of Young's use of Richmond Gulf Group (q.v.) and proposed a formation of the same name. He also proposed Pachi as a name for a group below Richmond Gulf Formation. It is suggested that Pachi be reserved for a member consisting of andesitic flows and sills separating the lower arkoses from the upper arkoses and conglomerates having an aggregate thickness of 1,500 feet.

Woodcock, J.R., 1960, Geology of the Richmond Gulf area, New Quebec: Geol. Assn. Can., Pr. v. 12, pp. 29-32.

RIVIÈRE CHÉNO FORMATION   Proterozoic

Neilson (1966, p. 27) has proposed this name for sandstones, conglomerates, and dolomitic clastic rocks which overlie either the Pépeshquasati sandstone or Archaean gneisses in the region northeast of Mistassini Lake.

He assigns it to the Mistassini Group.

Neilson, J.M., 1966, Takwa River Area, Mistassini Territory: Quebec Dept. Nat. Res., G.R. 124, 27. (The first mention of the formation name was in P.R. 254 (1950).

ROBERVAL FORMATION (Granite) Precambrian

Dresser, 1916, gave the name Roberval to massive coarse - to medium - grained granite with some gneiss varieties intrusive into Grenville, Laurentian, and Saguenay formations in the Lake St. John district.

Dresser, J.A., 1916, Geological structure of the basin of Lake St. John, Quebec: Roy. Soc. Can., vol. 10, Sect. IV, p. 127.

Dresser, J.A., 1916, Part of the District of Lake St. John, Quebec: Can, Geol. Surv., Mem 92, p. 21.

ROBITAILLE FORMATION Middle Silurian

The base of the type section of the Robitaille Formation is a few hundred feet to the west of the Squatec-Cabano road, and the section extends from there southeastward. Outcrops are numerous but discontinuous. Siltstone (red and massive), siltstone(green) quartzite, siltstone (gray) limestone (gray) and sandstone (gray), are found.

Lespêrance, P.J., Greiner, H.R., 1969, Squatec-Cabano Area, Rimouski, Rivière-du-Loup and Têmiscouata Counties, Quebec Dept. of Nat. Res., G.R. No. 128, p. 46-52.

ROCKCLIFFE FORMATION Chazy

Ells recognized that the Chazy west of Ottawa had a lower sandy and shaly part with an overlying thinner limy part. Raymond called the two parts Aylmer Formation (q.v.) . A.E. Wilson recognized the predominance of clastic rocks and proposed Rockcliffe for the shaly sandy part. For the upper and more calcareous part she proposed St. Martin for Cap St. Martin in Quebec. The work of Hofmann showed that the St. Martin is a lithofacies of the Laval Formation and has diverse stratigraphic positions. With these observations, it is logical to abandon Rockcliffe and continue the use of Aylmer in Quebec.

Wilson, A.E., 1937, Erosional intervals indicated by contacts in the vicinity of Ottawa, Canada: Roy. Soc. Can., Tn. 31, p. 46. Also: Geol. Surv. Can., Mem. 241, pp. 17-21.

Hofmann, H.J., 1963, Ordovician Chazy Group in Southern Quebec: Am. Assn. Pet. Geol., v. 63, p. 278.

This name has been used by Deland for beds on the north side of Ottawa river between Carillon and Grenville.

Deland A.N. 1964 North bank of Ottawa river between Carillon and Grenville; Argenteuil County; Que. Dept. of Nat. Res. P.R. 528, pp. 7-9.

ROCK RIVER FORMATION (Wilmarth -1-1833) Upper Cambrian

McGerrigle (1931, p. 184) gave the name Rock River to the 500 feet of dark grey and yellowish grey dolomites with some limestones that Logan assigned to the lower division, A_1, of the Philipsburg Series (q.v.).

McGerrigle, H.W., 1931, Three geological series in northwestern Vermont: Vermont, 17th Rept. of the State Geologist, 1929-30, p. 184.

ROMAINE FORMATION Beekmantown

Schuchert and Twenhofel (1910, p. 686) named these, the lowest

Ordovician beds recognized by Logan on the Mingan islands. The formation on the islands is about 260 feet of dolomites and dolomitic shales with some sandstones (Twenhofel, 1938, p. 15). The formation is Beekmantown.

Roliff has given data on this formation from the subsurface of Anticosti island. There it has the same lithology as on the Mingan islands, but its thickness is in excess of 1,000 feet.

Schuchert, C., Twenhofel, W.H., 1910, Ordovicic-Siluric Section of the Mingan and Anticosti Islands, Gulf of Saint-Lawrence: Geol. Soc. Am., Bull., vol. 21, p. 686.

Twenhofel, W.H., 1938, Geology and paleontology of the Mingan islands, Quebec: Geol. Soc. Am., Sp. Paper, No. 11, p. 15.

Roliff, W.A., 1968, Oil and gas exploration - Anticosti island, Quebec: Geol. Assn. Can., Pr. v. 19, pp. 31-36.

ROMANET LAKE ANTICLINORIUM

"It is very complicated structurally. Complex folds with northwesterly trends predominate and folds in north-south and east-west directions are superposed on them".

Dimroth, Erich., 1966, Geology of Dunphy Lake Area, New Quebec Territory: Quebec, Dept. of Nat. Res., P.R. No. 557, p. 14.

ROSAIRE GROUP (Wilmarth -2-314) Cambrian

Béland (1952, 1957) has given this name to white, grey, black and buff quartzites with subordinate interbedded colored slates cropping out near the village of Notre-Dame du Rosaire, Montmagny.

This formation is assigned to the Cambrian, and Béland states that it is equivalent to part of L'Islet Group (q.v.). He considers (1957, p. 14) the rocks were deposited in a shallow stable basin. A diagram by Hubert (1967, p. 38) suggests that the Rosaire and Caldwell were laid down in a eugeosyncline.

Béland, Jacques, 1957, St. Magloire and Rosaire-St. Pamphile areas, Electoral Districts of Dorchester, Bellechasse, Montmagny and L'Islet: Quebec Dept. of Mines, G.R. 76, 13-15, First published note P.R. 279, p. 38.

Hubert, Claude, 1967, Tectonic of part of the Sillery Formation in the Chaudière-Matapédia segment of the Quebec Appalachians: Roy. Soc. Can., Special Publ. 10, p. 38.

ROSEMOUNT MEMBER Trenton Group

This name was proposed for the upper part of the Montreal Formation at Montreal and is named from the ward in Montreal. Although the name was proposed by Clark as early as 1941, a reasonably complete description was published by Clark in 1952 (pp. 67-75). It is described as 250 to 360 feet of thin bedded limestone with substantial amounts of shale. It is easily eroded and thick continuous sections are not exposed. The Rosemount Member contains beds with abundant Prasopora and are probably the equivalent of Sherman Fall.

Clark, T.H., 1952, Montreal area: Quebec Dept. of Mines, G.R. 46, pp. 67-75.

Tab. 1 – TABLEAU DES FORMATIONS – *TABLE OF FORMATIONS*

QUATERNAIRE *QUATERNARY*	HOLOCENE	Accumulations de tourbe / *Peat accumulations* Dépôts éoliens et alluvionnaires / *Eolian and alluvial deposits* Sable, argiles marines de la mer Champlain / *Champlain Sea marine clay, sand* Dépôts d'eau douce / *Freshwater deposits*	
	PLEISTOCENE	Dépôts glaciaires. Till du Wisconsin, etc. / *Glacial deposits. Wisconsin till, etc.*	
CRETACE *CRETACEOUS*		Série ignée des Montérégiennes, consistant en gabbro, syénite à néphéline, filons-couches, dykes et brèches. *Monteregian igneous series, consisting of gabbro, nepheline syenite, sills dikes, and breccia.*	
DEVONIEN *DEVONIAN*		Calcaires d'Oriskany et d'Helderberg (blocs dans la brèche de l'île Sainte-Hélène) / *Oriskany limestone, Helderberg limestone (blocks in Sainte-Hélène Island breccia)*	
ORDOVICIEN *ORDOVICIAN*	CINCINNATIEN *CINCINNATIAN*	Groupe de Lorraine / *Lorraine Group*	350'
		Groupe d'Utica / *Utica Group*	400'
	CHAMPLAINIEN *CHAMPLAINIAN*	Groupe de Trenton / *Trenton Group*	812'
		Formation de Tétreauville / *Tétreauville Formation* ... 400'	
		Membre de Terebonne / *Terrebonne Member*	
		Formation de Montréal / *Montréal Formation* ... 375'	
		Membre de Rosemont / *Rosemont Member*	
		Membre de Saint-Michel / *Saint-Michel Member*	
		Formation de Deschambault / *Deschambault Formation* 15'	
		Formation de Mile End / *Mile End Formation* ... 12'	
		Lits de Rockland / *Rockland beds* ... 10'	
		Groupe de Black River / *Black River Group*	50'
		Formation de Leray / *Leray Formation*	
		Formation de Lowville / *Lowville Formation*	
		Formation de Pamelia / *Pamelia Formation*	
		Groupe de Chazy / *Chazy Group*	280'
		Formation de Laval / *Laval Formation*	
		Membre de Saint-Martin / *Saint-Martin Member*	
		Membre de Sainte-Thérèse / *Sainte-Thérèse Member*	
	CANADIEN *CANADIAN*	Groupe de Beekmantown / *Beekmantown Group*	814'
		Formation de Beauharnois / *Beauharnois Member*	
		Membre de Saint-Lin / *Saint-Lin Member*	
		Membre de Huntingdon / *Huntingdon Member*	
		Membre de Sainte-Clothilde / *Sainte-Clothilde Member*	
CAMBRIEN *CAMBRIAN*	CROIXIEN *CROIXAN*	Groupe de Potsdam / *Potsdam Group*	2000'
		Formation de Châteauguay / *Châteauguay Formation*	
		Formation de Covey Hill / *Covey Hill Formation*	
PRECAMBRIEN *PRECAMBRIAN*		Séries de Grenville et du Précambrien plus récent *Grenville and later Precambrian Series*	

(Clark, 1972, Q.D.N.R. - 152) p. 9

ROUGEMONT LAKE SYNCLINE

"This syncline is steep but is not overturned. It plunges south in its northern part, has a nearly horizontal axis in the southern part of the Gerido Lake area, and plunges about 30° south in the Léopard Lake area."

Sauvé, Pierre, Bergeron, Robert., 1965, Gerido Lake-Thévenet Lake Area, New Quebec: Quebec, Dept. of Nat. Res., G.R. No. 104, p. 80.

ROUYN LAKE SYNCLINE

"The Rouyn Lake syncline, which lies along the northern margin of the south-east Rouyn map-area, is composed of Abitibi andesite overlain by cherty Timiskaming greywacke. The attitude of pillows in the andesite and of greded bedding in the greywacke show that the syncline is slightly overturned toward the south".

Wilson, M.E., 1962, Rouyn-Beauchastel map-areas, Quebec: Canada, Geol. Surv. Mem, 315, p. 39.

ROUYN LAKE SEDIMENTS Precambrian

The Rouyn Lake Sediments outcrop at the extremities of Osisko Lake Area, and little is known about it.

This term seems of minor use.

Conolly, H.J., Hart, R.C., 1936, Structural Geology of the Osisko Lake Area, Quebec: Canadian Inst. Mining and Metallurgy Trans., v. 39, p. 11.

ROUYN-MERGER FAULT.

The Rouyn-Merger fault lies on the same contact as the McWatters (q.v.) and may be its continuation.

Wilson, M.E., 1962, Rouyn-Beauchastel map-areas, Quebec: Canada, Geol. Surv., Mem, 315, p. 42.

RUISSEAU ALLEN BRECCIA

Clark (1966, p. 48, 49) has given a description of a possible ring brecciated structure one mile north of Havelock. Blocks of lower Ordovician sandstone are in a paste composed of fragments of the same rock. The reconstructed ring is 150 feet diameter, and it is possibly the outcrop of the filling of a cylindrical diatreme.

Clark, T.H., 1966, Châteauguay Area, Châteauguay, Huntingdon, Beauharnois, Napierville and St. Jean Counties: Quebec, Dept. of Nat. Res., G.R. No. 122, p. 48-50.

RUISSEAU NORTON SYNCLINE

"This fold, complicated by faulting, is considered to be the northernmost expression of the Havelock fault. It is matched to the east and west by distribution indicating anticlines with axes trending and plunging NNE."

Clark, T.H., 1966, Châteauguay Area, Châteauguay, Huntingdon, Beauharnois, Napierville and St. Jean Counties: Quebec, Dept. of Nat. Res. G.R. No. 122, p. 46.

RUPERT FORMATION — Quaternary

This term was apparently introduced by Ami for till deposited by ice from the Keewatin center on the west side of Hudson Bay. The till supposedly deposited by ice from the Labrador centre is called Labrador Formation by Ami.

Ami, H.W., 1900, Synopsis of the geology of Canada: Roy. Soc. Can., Tn. v. 6, Sect. IV, p. 222.

SAGARD DIORITIC PLUG Precambrian

A small hill of diorite overlooks the Deschênes river valley two miles south-southeast of Sagard. The rock, here exposed over a quarter of a mile, is composed of about 30% mafic minerals, and feldspar rocks up to 1 cm. long.

Rondot, Jehan, 1966, Geology of l'Anse Saint-Jean Area, Chicoutimi and Charlevoix Counties: Quebec Dept. of Nat. Res., P.R. No. 556, p. 6-7.

SAGUENAY(FORMATION)ANORTHOSITE Precambrian

The extensive areas of anorthosite and related rocks have long been known and have been referred to informally as the Lake St. John anorthosite or the Saguenay anorthosite. It was not until 1916 that Dresser proposed Saguenay Formation for the anorthosite.

Dresser, J.A., 1916, Geological structure of the basin of Lake St. John, Quebec: Roy. Soc. Can., vol. 10, Sect. IV, p. 126,

Dresser, J.A., 1916, Part of the District of Lake St. John, Quebec: Can, Geol. Surv., Mem 92, p. 21,

SAGUENAY TRENCH (Graben)

The publications by Dresser cited above contain reference to the trench bounded by faults.

ST. ALBAN FORMATION Trenton?

This name was applied to five feet of dark limestone overlying Leray Limestone on Ste. Anne river. The beds contain fragments of Dalmonella, from which Clark is inclined to infer a Trenton Age. The name is already in use and should be abandoned.

Clark, T.H., 1959, Stratigraphy of the Trenton Group, St. Lawrence Lowland, Quebec: Geol. Assn. Can., Pr. v. 11, p. 16.

ST. ARMAND LIMESTONE (Wilmarth -1-1870) Upper Beekmantown

This 200 feet of yellow-grey weathering, black, argillaceous limestones with shale interbeds is part of the Philipsburg Series (q.v.).

Cady (1960) has pointed out the similarity, except for the amount of dolomite, between the St. Armand and Corey Limestones and the Beldens of Vermont.

Geology of Quebec, 1944, pp. 399-400.

Cady, W.M., 1960, Stratigraphic and tectonic relationships in northern Vermont and southern Quebec: Geol. Soc. Am., Bull. v. 71, p. 573.

ST. BARNABE FAULT

It is one of the major faults affecting the lowland south of the St. Lawrence. Striking about north-northeast, it passes west of St. Hyacinthe and east of St. Barnabé, presumably dying out within the Beloeil map-area on the south and the Upton area to the north. In the vicinity of St. Barnabé, the displacement with the downdrop on the west is of the order of about 1,100 feet.

Clark, T.H., 1955, St. Jean-Beloeil Area, Iberville, St. Jean, Napierville-Laprairie, Rouville, Chambly, St. Hyacinthe and Verchères Counties: Quebec Dept. of Mines, G.R. no. 66, p. 53.

Clark, T.H., 1964, Upton Area, Bagot, Drummond, Richelieu, St. Hyacinthe and Yamaska Counties: Quebec Dept. of Mines, G.R. No. 100, p. 23.

ST. CASIMIR FORMATION　　Trenton

Clark gave this name to 180-190 feet of limestone in the region of Neuville Grondines. The formation is commonly thin bedded and limestones of crystalline aspect are common in the section of heterogeneous limestones. The formation is apparently to be correlated with the Hull Formation and is more closely related to the Deschambault than the succeeding Neuville Formation. The formation has not been recognized southwest of St. Maurice river.

Clark, T.H., 1959, Stratigraphy of the Trenton Group, St. Lawrence Lowland, Quebec: Geol. Assn. Can., Pr., v. 11, p. 17.

SAINT-DIDACE GRANITE

In the district south-east of St.Didace, the granite also appears to break through the gneiss. The granite beyond the eastern limit of the sheet is cut by a small area of anorthosite, so that if the anorthosite intrusions within the map are of the same age, the granite was intruded before them.

Adams, Frank D., 1896, Report on the geology of a portion of the Laurentian Area lying to the North of the Island of Montreal: Canada Geol. Surv., Ann. Rept. VIII, 1895, J., p. 29-30.

SAINT-DIDACE GRANITE Precambrian

The Saint-Didace granite is an orthomagmatic intrusive rock, at least in the circumscribed masses. The uniformity of the rock preludes the metamorphism of the gneisses as the mode of origin. Furthermore, swarms of paragneiss and granulite inclusions are observed at the center of the masses, as well as at the periphery. The most remarkable swarm is located exactly at the center of a straight line drawn through Saint-Gabriel and Saint-Edmond.

Béland, René, 1967, Saint-Gabriel de Brandon Area, Joliette and Maskinongé Counties: Quebec Dept. of Nat. Res., G.R. No. 133, p. 11-14.

ST. DOMINIQUE FORMATION

This name for a formation of the Chazy Group was first published by Belyea (1952, p. 12) but was proposed by Clark for, at St. Pie, 110 feet of calcareous sandstones overlain by 230 feet of gray dolomite, dolomitic limestone, and sandy limestone in the St. Dominique Fault slice east of St. Hyacinthe. Clark comments that the sandstone member may be prove to be the equivalent of the St. Thérèse Member and the limestone of the St. Martin Member of the Laval Formation. Kay in 1945 suggested that the sandstones are to be correlated with the Carman Formation and the limestones with the Youngman, but in 1958, he follows Clark's use of St. Dominique Formation. Hoffman considers that the sandstone member is equivalent to lower Laval.

Belyea, H.R., 1952, Deep wells and subsurface stratigraphy of part of the St. Lawrence Lowlands, Quebec: Can. Geol. Surv., Bull. 22, p. 12.

Clark, T.H., 1964, St. Hyacinthe area (west half): Quebec Dept.

Nat. Res., G.R. 101, pp. 16-25.

Kay, G.M., 1958, Ordovician Highgate Springs Sequence of Vermont and Quebec and Ordovician classification: Am. Jour. Sci., v. 256, pp. 82-85.

Hoffman, H.J., 1963, Ordovician Chazy Group in Southern Quebec: A.A.P.G., Bull. 63, p. 276.

ST. DOMINIQUE FAULT

ST. DOMINIQUE FAULT SLICE

T.H. Clark in 1947 gave the name St. Dominique Fault slice to the crescentic outcrop of Lower Paleozoic formations lying in front of Logan's Line east of St. Hyacinthe. He inferred that the block composed of limestone was brought into contact with the surrounding shales as a result of movement associated with those along the Champlain Fault. Kay (1958) relates the structural unit to fault bounded units to the south and, in general, concurs in and amplifies Clark's explanation. Kumarapeli suggests that the St. Dominique is a normal rather than a thrust fault. He does not cite the work by Kay concerning the relationship to other structures, a relationship that obviously weakens his contention.

Clark, T.H., 1947, St. Lawrence Lowlands: Quebec Dept. of Mines, Map No. 642, in P.R. 204.

Kay, G.M., 1958, Ordovician Highgate Springs Sequence of Vermont and Quebec and Ordovician classification: Am. Jour. Sc. v. 256, pp. 65-66.

Kumarapeli, P.S., 1969, St. Dominique fault: a new interpretation: Can. Jour. Earth Sc., v. 6, p. 775-780.

ST. FLAVIEN FORMATION Paleozoic

Logan and later workers have described dyke-like and stratiform bodies of basic igneous rocks occurring close to Logan's Line, but on the Appalachian side. Dresser (1906) has provided the most adequate summary of the information on these and other igneous rocks. Some of the bodies are dykes, and of these some are related to the Monteregian Hills intrusives. Other bodies are subalkaline, commonly of an albite-rich igneous rock, and are in places amygdaloidal or in a very few places pillowed. Some of the bodies are probably lavas but others are intrusive. Dresser (1910, p. 516) mentions the body at St. Flavien as being a dyke and one of the largest bodies. Clark (1948, p. 3) uses the name "St. Flavien Basic Eruptive", suggesting an effusive origin. This was later changed (1964) to "igneous series." At Drummondville the basic rocks are lavas and are interbedded with shales carrying fossils of the age of the Normanskill Formation in New York.

Dresser, J.D., 1906, Igneous rocks of the Eastern Townshipsoof Quebec: Geol. Soc. Am., Bull. v. 17, pp. 497-522.

Clark, T.H., 1948, Yamaska-Aston Area: Quebec Dept. of Nat. Res., G.R. 102, p. 69 (PR. 225, p. 3).

Riva, John, 1966, New assemblages of Middle Ordovician graptolites from the Appalachian region, Quebec: Nat. Can., v. 93, p. 156.

ST. FRANCIS - ST. FRANÇOIS

This river flows northwest across part of the eastern townships to enter St. Pierre lake.

I- St.Francis Thrust.

Cooke (1950, p. 13) has given this name to a thrust fault believed to strike northeast through Fitch Bay of Memphremagog lake, through lake Massawippi, and near Lennoxville. He tentatively suggests that the Weedow Thrust (q.v.) is its continuation. Although faults may be present along this line, the evidence indicates that a throughgoing thrust is not present.

Cooke, H.C., 1950, Geology of a southwestern part of the Eastern townships of Quebec: Geol. Surv. Can., Mem. 257, pp. 13-14, 114-115.

II- St. Francis Fault Slice.

H.C. Cooke (op. cit. pp. 13-14), has named the an 18 miles wide area southeast of the hypothetical St. Francis Thrust, St. Francis Fault Slice. The region is synclinal and is underlain by rocks of the Gaspé Supergroup and is part of the Gaspé-Connecticut Valley Synclinorium (q.v.)

III- ST. FRANCIS (ST. FRANÇOIS) SERIES (GROUP) Silurian (?) Devonian

(W.S.K - 319)

T.H. Clark in Cooke (1937, pp. 37-42) proposed St. Francis series for a rather heterogeneous lithologic unit cropping out in what was later to be termed the St. Francis Fault Slice. Some volcanics, some sandstones, calcareous and argillaceous and silty beds were found, and on insubstantial evidence the beds were referred to the Ordovician. Since 1950, evidence summarized by Cady, 1960, shows that the group is a part of the Gaspé Supergroup and is in part if not entirely Devonian.

Clarke, T.H., in Cooke H.D., 1937, Thetford, Disraeli and eastern half of Warwick map-areas, Quebec: Geol. Surv. Can., Mem. 211, pp. 37-42.

Cady, W.M., 1960, Stratigraphy and geotectonic relationships in northern Vermont and southern Quebec: Geol. Soc. Am., Bull. v. 71, p. 575.

ST. GERMAIN COMPLEX

This unit is, according to the proposer of the name (Clark), a convenience that serves to group rocks that can not now easily be assigned to other formations. Clark has suggested that this unit is tectonic and involves formations of the foreland facies close to Logan's Line. Clark believes that the formations involved are principally Utica and Lorraine with some Trenton. However, at some lacalities, rocks already mapped as St. Germain have yielded fossils similar to those of the Normanskill and at one locality Levis. See Stanbridge Complex.

It is possible that at some localities, the complex is not entirely the result of the proximity to the main faults.

Clark, T.H., 1964, Upton area, Bagot, Drummond, Richelieu, St. Hyacinthe and Yamaska counties: Quebec Dept. Nat. Res., G.R. 100, pp. 10-19.

ST. JEAN DE MATHA ANORTHOSITE

About ½ mile south-west of the village of St. Jean de Matha, the road running toward the River l'Assomption, large exposures of garnetifefous quartzose gneiss are succeeded by others of anorthosite. The latter rock is exposed for a width of about one hundred yards along the road and is succeeded by drift. It shows considerable variation in size of grain, weathers white, and is without foliation. When examined under the microscope, it is found to be a typical anorthosite composed almost entirely of plagioclase. The iron-magnesia constituent is augite. Biotite and apatite, both in very small quantities, with a little titaniferous iron ore and pyrite complete the list of constituents. The rock has undergone a certain amount of granulation.

Adams, Frank D., 1896, Report on the geology of a portion of the Laurentian Area lying to the North of the Island of Montreal: Canada Geol. Surv., Ann. Rept. VIII, 1895, J., p. 125.

ST. JEROME ANORTHOSITE

The anorthosite or gabbro, as it should more properly be called, is best seen in the large exposures on either side of the Canadian Pacific railway track a few hundreds yards south of the railway station at St. Jérôme. Here the rock is fine-grained, usually foliated in structure, and weathers brownish-gray.

Adams, Frank D., 1896, Report on the geology of a portion of the Laurentian Area lying to the North of the Island of Montreal: Canada Geol. Surv., Ann. Rept. VIII, 1895, J., p. 118

SAINTE-JULIENNE FAULT

It crosses the eastern edge of the area a half mile north of fault Saint-Lin. It is quite definitely located to the east of the area, being marked by a "prominent escarpment that runs at about 25° through Sainte-Julienne and Bissonnette". (Clark, 1954). To the east, this fault marks the contact between Precambrian and Paleozoic rocks. In the present area, however, its trace is more hypothetical. It strike would be northeasterly.

Osborne, F.F., Clark. T.H., 1960, New Glasgow-St-Lin Area, Electoral Districts of Montcalm, Terrebonne and l'Assomption: Quebec Dept. of Mines, G.R. No. 91.

ST. JUSTE GROUP (W-S-K-H-320) Silurian (?) Devonian (?)

Béland introduced the name St. Juste Group in 1952 for dark grey to black "slates" and gray sandstones, the latter at some localities being calcareous. Volcanic detritus is found in some clastic rocks. Beds are from ½ inch to a foot thick, and the rocks as a whole resemble those of part of the Beauceville Series at the type locality. Indeed MacKay and Tolman mapped some of this group as Beauceville. The St. Juste slates are somewhat "softer" than those of the Beauceville Series.

The age of part of this group near St.Georges has been established as Middle Devonian, but the complexity of the structure prevents an adequate determination of stratigraphy and Silurian beds may be involved elsewhere. The relationships of formations and the names to be applied in the Gaspé Supergroup (q.v.) are discussed elsewhere.

Béland, Jacques, 1957, St. Magloire and Rosaire-St.Pamphile areas, Quebec: Dept. Mines, G.R. 76, p. 24, also see: P.R. 279, p. 6-7. 1952.

ST. LAURENT, ST. LAWRENCE.

United States Geological Survey Bulletin 896 (pp. 1878-1880) lists some uses of this name or variants of it. It is used for a Hamilton limestone in Missouri, for Upper Cambrian limestone and dolomite in the midwest United Stated in addition to its use as a Pleistocene stage or terrane.

With the many uses of this term and "Laurentian" it is advisable to avoid any increase in names involving them.

I- ST. LAWRENCE AND CHAMPLAIN FAULT.

Logan described the "dislocation" which he supposed separated the

Appalachian rocks from those of the St. Lawrence Lowlands and Canadian Shield in 1860, but he did not give it a name. The cumbersome name evolved prior to 1890, but a tendency grew to use "Logan's Line" for the outcrop of the fault plane or the fault zone and to use "Logan's Fault" for the fault itself.

The studies of the fault zone since 1950 show that no single fault can be recognized, but that the belt is composed of slices bounded by faults and even more complex sedimentary-tectonic structures.

Logan's Fault, or Logan Fault or Logan Fault Zone, can be used to describe the "dislocation".

Clark, T.H., 1951, New Light on Logan's Line: Roy. Soc. Can., Tn. v. 45, pp. 11-22.

II- ST. LAWRENCE LOWLANDS.

This is the accepted designation for the region lying between Logan's Line and the edge of the Canadian Shield in Quebec and adjacent parts of Ontario and New York. The division is defined here geologically, but other definitions based on topography result in extending the boundaries to cover the margins of the limiting geological divisions. Furthermore, much of the lowlands is mantled by deposits of the Champlain Sea.

III- ST. LAWRENCE PLAIN.

This is essentially the older name for the lowlands based on the definition by topography. The name is obsolete.

IV- ST. LAWRENCE LOWLAND.

"The St. Lawrence Lowland comprises that part of New York State northward from the Adirondack upland and the Tug Hill Plateau to the St. Lawrence River, and from Lake Ontario eastward to the international boundary north of Malone, roughly 25 by 120 miles, or approximately 3,000 square miles in area."

This division overlaps the Ottawa-St. Lawrence Lowland (q.v.).

MacClintock, P., and Stewart, D.P., 1965, Pleistocene Geology of St. Lawrence Lowland: New York State Museum and Science Service, Bull. No. 394, p. 1.

V- ST. LAWRENCIAN TERRANE.

This modification of the term Lawrencian or Laurentian of Desor was suggested to avoid conflict with Laurentian of Logan. It has priority over but has been superseded by Champlain (q.v.).

VI- ST. LAWRENCE PLATFORM.

Poole (1967, p. 15) has divided part of the Grenville subprovince and its extension beneath the St. Lawrence Lowlands into an eastern and western division. There were the cratonic parts of the Precambrian overlapped by Paleozoic beds.

This is not an essential use for overburdened "St. Lawrence".

Poole, W.H., 1967, Tectonic evolution of the Appalachian region of Canada: Geol. Assn. of Canada, Special Paper No. 4, p. 15.

V- GLACIAL LAKE ST. LAWRENCE.

Goldthwait (1932, p. 60) used Upham's (1895, pp. 78) name for the body of fresh water occupying the Ontario basin, the Champlain basin, and parts of the St. Lawrence Lowlands after the draining of Lake Iroquois but before the incursion of the Champlain sea. The use of the has been far from consistent and synonyms for it as well as other definitions are found.

Goldthwait, J.W., 1932, The St. Lawrence Lowland (sic): Geological Survey of Canada - Manuscript.

Upham, Warren, 1895, Late-glacial or Champlain subsidence and reelevation of St. Lawrence River Basin: Minn. Geol. and Nat. Hist. Surv., Ann. Rept 23, p. 178.

VI- SAINT LAWRENCE SUBMARINE TROUGH.

F.P. Shepard (1931, p. 854) has summarized the data on the Saint Lawrence (Cabot Strait) Submarine Trough, which according to his interpretation extends seaward from the mouth of Saguenay river and is the result of glaciation. An alternative interpretation is that it is a graben. See Laurentian Channel.

Shephard, E.P., 1931, The Saint Lawrence (Cabot Strait) Submarine Trough: Geol. Soc. Am., Bull., v. 42, pp. 853-864.

VII- ST. LAWRENCE ICE LOBE

Coleman (1922, p. 12) has used this name for a part of the Labrador ice sheet, which he believed was deflected to pass seaward along the St. Lawrence valley.

Coleman, A.P., 1922, Physiography and glacial geology of Gaspé Peninsula, Quebec: Can. Geol. Surv. Bull. No. 34, p. 12, p.2

ST. LUC FORMATION Silurian (?)

W.A. Gorman (1954) shows as 4a, 4b, 4d of map 1037, conglomerates, slates and quartzites, which crop out in an area 8 miles long and 1½ miles wide extending beyond the map. In an unpublished thesis (1958) he gives a section of the formation southeast of St. Luc and in the Ste. Justine area.

ST. LUC FORMATION - SECTION ON LOTS 5-6-7, RANGE 9. WARE TOWNSHIP

	Feet
7. Slate, grey-green and red.	50 +
6. Quartz sandstone, dark-grey, impure, grading downward into strongly cross-bedded light-brown, white or lighy-grey pure quartz sandstone. Minor interbeds of slate and lenses of conglomerate.	600
5. Slate, light-grey, minor red slate and siltstone. Fossiliferous.	100
4. Pebble conglomerate, green, with interbeds of quartz sandstone and slate grading down to a dark-green boulder conglomerate.	100
3. Slate, grey; minor interbeds of siltstone.	Up to 50
2. Boulder conglomerate, massive, polymictic.	100
1. Acidic flows, minor interbedded tuffs.	0-500
	1,500 +

The acidic lavas are albitic and resemble some belonging to the underlying Beauceville Group. The lavas are missing at some localities and the polymictic boulder conglomerate rests directly on bevelled edges of Beauceville Group.

The fossils in the slate are molds of brachiopods and are not diagnostic. The age of the formation is not fixed because adjacent formations of the Gaspé Supergroup are lithologically dissimilar. Similarity to the Glenbrooke suggests a late Silurian age.

Gorman, W.A., 1954, Ste. Justine area, Montmagny, Bellechasse and Dorchester counties: Quebec Dept. of Mines, P.R. No. 297, p. 2.

SAINT MARC LIMESTONE

St. Marc has been used as a commercial name for high-calcium limestone quarried near St. Marc des Carrières. It is reasonable to reserve this name for its commercial application.

Goudge, M.F., 1933, Canadian Limestones for building purposes: Canada Mines Br., Pub. 733, p. 42.

STE-MARGUERITE VOLCANIC ROCKS Paleozoic

Volcanic rocks crop out in a belt near the northern boundary of the Fortin Formation. They are well exposed on a knoll about ¼ mile south of the village of Ste-Marguerite. The band of volcanic rocks enters the area from the east near the headwaters of Creux brook and forms cliffs along both sides of this stream. The volcanic rock is dark greenish to bluish grey, dark grey weathering andesite. Some of the andesite is compact but much is vesicular and amygdaloidal.

Stearn, C.W., 1965, Causapscal Area, Matapedia and Matame Counties: Quebec Dept. of Nat. Res., G.R., No. 117, p. 32-33,

SAINT-MAURICE FAULT

It is called by this name because of its magnitude and geographical relationship to the Saint-Maurice river. It has been mapped over a length of at least 100 miles and may be as much as 200 miles long. The general attitude of this fault is N15°E, but between the point where it leaves the Saint-Maurice 10 miles south of La Tuque and the southern part of the present area, it follows a large easterly convex arc. The strike of N45°E which the fault has in the present area, is therefore, characteristic only of the lower part of this arc. Pseudotachylite from this fault gave a K/Ar age of 900 x 10^6 years.

Philpotts, A.R., 1967, Belleau-Desaulniers Area, Saint-Maurice

Maskinongé and Laviolette Counties: Quebec Deot. of Nat. Res., G.R. No. 127, p. 42-45.

ST. MAURICE SAND — Quaternary

This name was used by Logan in "Geology of Canada" (1863) for extensive deposits of Saxicava Sand. Not now current.

Ami, H.M., 1900, Synopsis of the Geology of Canada: Roy. Soc. Canada, Proc. and Trans. 2nd ser., vol. 6, sect. 4, p. 225.

SAINT-MICHEL — Trenton Group

About 100 feet of beds of fine-grained limestone of crystalline aspect interbedded with shales is exposed in the quarry by National Quarries Company, Côte St. Michel. With possibly 20 additional feet this is considered the lower part of the Montreal Formation. The limestones locally have Cryptolithus tesselatus, which according to Clark is the guide fossil for this member.

Clark, T.H., 1952, Montreal area: Quebec Dept. of Mines, G.R. 46, pp. 65-67.

ST. MICHEL MONZONITE

Monzonitic rocks occur in the igneous complex in the southeast corner of the area, and in 3 separate bodies in the northwest quarter.

The monzonites are green (color index of 10-20) and weather white to light buff. They consist of feldspar, quartz, pyroxene, amphibole, magnetite and rare biotite, in grain from 2 to 5 mm.

Schryver, Kees, 1966, Geology of Saint-Michel-des-Saints (West) Area, Joliette, Berthier and Maskinongé Counties: Quebec Dept. of Nat. Res., P.R. No. 552, p. 4-10.

SAINT-PIE FAULT

This probable strike fault crosses the western edge of St-Pie hill, where the dark grey Trenton limestone has been brought against the Beldens dolomite, St-Dominique sandstone, St-Dominique limestone, the Black River beds, and possibly the lower part of the Trenton limestone. It strikes northerly.

Clark, T.H., 1964, St-Hyacinthe Area (West Half), Bagot, St-Hyacinthe and Shefford Counties: Quebec Dept. of Nat. Res., G.R. No. 101, p. 45.

SAINT-RENE-GOUPIL FAULT

It is a zone of excessive shearing and displacement marked by numerous thick calcite veins most of them one foot or more thick. This zone be recognized along Petite Matane river and as far southwest as Johnson creek, where it apparently truncates a wide unit of the Kamouraska facies. It strikes northeasterly.

Ollerenshaw, N.C., 1967, Cuoq-Langis Area, Matane and Matapédia Counties: Quebec Dept. of Nat. Res., G.R. No. 121, p. 142.

SAINTE-SOPHIE FAULT

It is presumed to mark the Precambrian-Paleozoic contact from the southwestern corner of the map to Sainte-Sophie. It strikes northeast and dips southwest.

Osborne, F.F., Clark, T.H., 1960, New Glasgow-St-Lin Area, Electoral Districts of Montcalm, Terrebonne and l'Assomption: Quebec Dept. of Mines, G.R. No. 91, p. 33.

STE-THERESE MEMBER Chazy

Clark used this name for the lower 42 feet of Chazy section (Laval Formation) in the Mallet well near Ste-Thérèse north of Montreal. The member there consists largely of sandstone with shale and some limestones. The Ste-Thérèse Member is perhaps equivalent to part of the Aylmer Formation. In his discussion of the Chazy, Hofmann suggests a division into lower, middle, and upper parts for the Laval Formation and he postulates a Lower Chazy age for this part of the Laval Formation.

Clark, T.H., 1944, Structure and stratigraphy in the vicinity of Montreal: Roy. Soc. Can., Tn. 38, Sect. IV, p. 29.

Clark, T.H., 1952, Montreal area, Laval and Lachine map areas: Quebec Dept. of Mines, G.R. 46, p. 40.

Hofmann: H.J., 1963, Ordovician Chazy Group in Southern Quebec: Am. Assn. Pet. Geol., v. 63, p. 291.

SALINIC DISTURBANCE Silurian

A disturbance between the Taconic and Acadian orogenies named from the Salina Group of New York. The date is different (Siegenian) in eastern Gaspé from that in Western Gaspé (Emsian).

Boucot, A.J., 1962, Appalachian Siluro-Devonian; Some aspects of the Variscan fold belt; Manchester University Press, pp. 156 and 161.

SALMON-HOLE BROOK BEDS Silurian (?)

Rocks believed to be of Silurian age were found in 1934 along Salmon-hole brook, in the northeastern corner of Galt township. Volcanics are overlain by a 7-foot band of conglomerate containing pebbles of quartz, quartzite, and volcanic material. The conglomerate grades quickly to a greenish-grey sandstone, and, in a thickness of thirty feet, grades upward to calcareous sandstone, arenaceous limestone, and then massive, light grey to almost white, crystalline limestone containing abundant fossils. A short distance farther up the stream, the limestones are of the dark grey type more characteristic of the Devonian.

McGerrigle, H.W., 1950, The Geology of Eastern Gaspé, Quebec; Dept. of Mines,
G.R. No. 35, p. 38.

SALMON-HOLE BROOK BEDS Silurian

Salmon-hole brook, 3,520 feet above crossing of Galt and Gaspé Bay South township line, seven feet of conglomerate grading through sandstones to white limestone with fossils are found. The fossils indicate a late Silurian age.

Jones, I.W., 1935, Darmouth River Map-Area, Gaspé Péninsula: Québec Bureau of Mines, Ann. Rept. 1934, Part D, p. 27.

SAM GUNNER GROUP Precambrian

This term has been used for metasedimentary and metavolcanic rocks of the Superior Province northeast of Mistassini Lake, The term is perhaps justified in local mapping but should not be applied in an extensive area.

Quirke, T.T., Jr., Goldich, S.S., and Krueger, H.W., 1960, Composition and age of the Témiscamie Iron Formation, Mistassini Territory, Quebec, Canada: Jour. Econ. Geol., v. 55, pp. 312-315.

SAVANNE RIVER FAULT.

It is continuation of faults mapped by Eade _et al_. (1959) to the north. Its topographic expression is a deep linear valley.Exposures of granite and gabbro near this fault are strongly sheared. It strikes northeast and dips southwest.

Chown, E.H., 1964, Geology of Boivin Lake Area, Chicoutimi County: Quebec, Dept. of Nat. Res., P.R. No. 520, p. 9.

SCAUMINAC FORMATION Upper Devonian

Ami, (1900, p. 208) proposed this name for Upper Devonian beds carrying fossil fish outcropping on the west end of Chaleurs Bay. Parks (1931, p. 795) proposed Scaumenac "Fish beds" for the same rocks. See Escuminac.

Ami, H.W., 1900, Synopsis of the geology of Canada: Roy. Soc. Can., Tn. VI, Sect. IV, p. 208.

Parks, W.A., 1931, Geology of the Gaspé Peninsula: Geol. Soc. Am., Bull. v. 42, p. 787, p. 795.

SCOTTSMORE QUARTZITE Lower (?) Cambrian

This formation is above the Oak Hill Slate, but elsewhere it overlies Dunham Dolomite. The omission of the Oak Hill in some sections lends support to the view that erosion followed the deposition of the Oak Hill and hence that the Dunham Dolomite and the Scottsmore Quartzite are distinct formations. Cook has used the hybrid name Dunmore (q.v.) for the formation consisting both of dolomite and sandstone.

At most localities the Scottsmore is a dolomitic sandstone with cross bedding and is less than 25 feet thick. Conglomerates containing boulders of underlying formations are found at some places.

Clark, T.H., 1936, A Lower Cambrian Series from Southern Quebec: Roy. Can. Inst., v. 21, Pt. 1, pp. 148-149.

SEBOOMOOK FORMATION Devonian (?)

This formation was named and dated in Maine, and it has only been recognized recently in Quebec. Perkins proposed the name for dark bluish slate with,at some places,interbeds of sandstone. The best Quebec exposures of this formation are on lot 7, Range VII of Woburn Township and of dark gray slates and fine-grained sandstones. This formation includes at least part of the Compton Formation (q.v.), It is presumably equivalent to the Cold Stream of the Moose River Group in Maine.

The formation has not yielded fossils in Quebec but Pavlides et al. (1964) date it as lower Devonian (Gedinnian and Siegenian) with some possibility of Silurian beds being present.

Marleau, R.A., 1968, Woburn-East Megantic-Armstrong Area, Frontenac and Beauce Counties: Quebec Dept. of Nat. Res., G.R. No. 131, p. 13-16.

Pavlides, L., Menscher, E., Naylor, R.S., and Boucot, A.J., 1964, Outline of the stratigraphy and tectonic features of northeastern Maine: U.S. Geol. Surv., Prof. P. 501-C, p. 33.

SENATOR-ROUYN-FAULT

The Senator-Rouyn fault strikes northwest, dips 40 to 60 degrees northeast and occurs almost entirely in diorite. The ore in the Senator-Rouyn occured where the fault changes strike abruptly. This relationship suggests that the fault has been folded in places.

Wilson, M.E., 1962, Rouyn-Beauchastel map-areas, Quebec 8. Canada, Geol. Surv., Mem. 315, p. 40.

SERPENTINE SERIES Paleozoic

The serpentinized ultrabasic rocks of the Appalachian region in Quebec have been referred to in several ways and assigned to different formations. In addition, Serpentine Belt has been used as a name for one poorly defined division of the region. A tendency has grown up to use the term for complexes of granite, gabbro, diorite, quartz, syenite, pyroxenite, peridotite and serpentinite. A few workers have included greenstones, obviously metavolcanic with the intrusive rocks.

The term has no precise use and should be abandoned, but can be used in a non-technical sence.

Burton, F.R., 1931, Vicinity of Lake Aylmer, Eastern Townships: Quebec Bur. Mines, Ann. Rept., 1930, D. pp. 107-109.

SHERBROOKE ANTICLINE

This major anticlinal structure overturned to the northwest and plunging southeast at an angle of about 40 degrees, is formed by the beds of the Ascot Formation. It is called "Sherbrooke anticline" because Sherbrooke lies on its axis. This anticlinal structure is bounded to the northwest by a thrust fault, which separates it from the Sherbrooke anticline, and to the southeast by rocks of the St. Francis Group.

St-Julien, P., Lamarche, R.Y., 1965, Geology of Sherbrooke Area, Sherbrooke County: Quebec, Dept. of Nat. Res., P.R. No. 530, p. 12.

SHERBROOKE GROUP, FORMATION Upper Ordovician (?)

Cooke proposed this name for conglomerates, grits, and slates of the vicinity of Magog Lake south of Sherbrooke. He recognized that the group overlies unconformably the rocks referred by him the Beauceville, but not finding fossils he referred these beds to the Silurian.

More detailed mapping, largely by St. Julien but also by Lamarche, made necessary a redefinition of the group, and at the same time it was reduced in rank to a formation. The northeast plunging syncline at the type locality southwest of Sherbrooke was recognized by Cooke, but he did not observe that to the northeast the fold bifurcated,and he, therefore, included beds belonging to the Magog Group in the Sherbrooke. The formation is about 1700 feet thick and consists of poorly sorted conglomerates at the base. These conglomerates are 150 to 500 thick and are followed by gritty and sandy beds with about 1,000 feet of silt and shale at the top.

The conglomerate is polymictic and pebbles of the older metasedimentary formations are found. Albite granites, granophyre, albite porphyries are not rare as cobbles, and picotite was confirmed among detrital minerals.

The lower beds are fossiliferous, and much material was collected for study. Unfortunately the fossils are fragmentary or not diagnostic. Bryozoans and pelecypods suggest an upper Ordovician age which is neither contradicted nor confirmed by brachiopods and gastropods.

Cooke, H.C., 1950, Geology of the southwestern part of the Eastern Townships of Quebec: Can. Geol. Surv., Mem. 257, pp. 44-52.

Lamarche, R.Y., 1962, Etudes des conglomérats de la Région Orford-Sherbrooke: Université Laval, Thèse, pp. 10-21.

St. Julien, Pierre, 1963, Géologie de la Région d'Orford-Sherbrooke: Université Laval, Thèse pour Doctorat, pp. 152-159.

SHERMAN FALL Trenton Group

Raymond (1914, p. 348) used the name Trenton Formation to designate 100 to 200 feet of limestones with shales bearing the Prasopora simulatrix fauna. He (1914, p. 342) mentions 117 feet as the thickness of the Prasopora zone at Neuville. It is probable that the 250 feet of massive limestone making up the Rosemonnt member are correlatives of the restricted Trenton of Raymond.

Kay in 1929 published the name Sherman Fall for the beds referred by Raymond in the restricted sense of Trenton. In 1937 he proposed that two members be recognized, the lower or Shoreham member being characterized by Cryptolithus tesselatus and the upper member or Denmark which embraces most of the Sherman Fall Formation. The distribution of fossils is not the same as that of the Montreal Formation.

Sherman Fall is of greater use in Ontario than in Quebec.

Raymond, P.E., 1914, The Trenton Group in Ontario and Quebec: Can. Geol. Surv. Summ. Rept. 1912, pp. 342, 348.

Kay, G.M., 1937, Stratigraphy of the Trenton Group: Geol Soc. Am. v. 48, pp. 264-268.

SHICKSHOCK Lower Paleozoic

The well defined mountain chain in Gaspesia has given its name to a stratigraphic unit and has been mooted as a designation for an orogenic event.

I- Shickshock Formation, (Series, Group). Wilmarth -1-1986.

Crickmay (1932) gave the name Schickshock Formation to arkosic quartzites with intercalated volcanic rocks and designated a type section at Matapedia lake. He considered it younger than the Quebec Group. In the "Geology of Quebec" (1944) the unit is called a series. Mattinson (1964) and Ollerenshaw (1967) have used the term group for the rocks, and Ollerenshaw has assigned the rocks to two facies: on the west slightly metamorphosed arkoses with subordinate volcanics form the "Lake Matapedia facies"; and eastward the sequence dominated by more metamorphosed volcanics is the "Duvivier facies".

There is no obvious stratigraphic reason for making these rocks a unit of higher rank than formation. The age is still a matter for debate: Ollerenshaw (1967, pp. 12-18), has summarized the views of earlier workers, and the balance of probability seems to indicate a Cambrian or Ordovician age. Ollerenshaw places the "group" in the "Quebec Complex" which is "Quebec Supergroup".

Crickmay, G.W., 1932, Evidence of Taconic Orogeny in Matapedia valley, Quebec: Am. Jour. Sci., v. 24, p. 373.

Dresser, J.A., Denis, T.C., 1944, Geology of Quebec: p. 295.

Mattinson, C.R., 1964, Mount Logan area, Matane and Gaspé-North Counties: Quebec Dept. Nat. Res., G.R. 13, p. 23.

Ollerenshaw, N.C., 1964, Cuoq-Largis area, Matane and Matapedia Counties: Quebec Dept. of Nat. Res., G.R. 117, pp. 1-192.

II- Shickshockian Orogeny, Disturbance, Folding Deformation.

Geology and economic minerals of Canada, 1947, p. 133, states "At the close of the Lower Devonian epoch and continuing into Middle Devonian time earth movements again affected much of the Canadian Appalachian region. This deformation, known as the Shickshockian disturbance was accompanied by the intrusion of large masses of granite and associated rocks.... The Shickshockian deformation like the Taconic resulted from thrusts from the southeast, which produced folding and overthrust faulting". Shickshockian in this usage is a junior synonym for Acadian. Authors have urged that "Acadian" be abandoned on the grounds that Acadian is an epoch of the Cambrian. The same argument can be urged against Shickshockian.

Geology and Economic Minerals of Canada, 1947, Geol. Surv. Can., Econ. Geol. Ser. No. 1, p. 133.

SHIPSHAW BEDS Trenton Group

60 feet of thin bedded limestone with thick partings of shale yielded fossils suggesting Late Sherman Fall date.

Sinclair, G.W., 1953, Middle Ordovician beds in the Saguenay valley, Quebec: Am. Jour. Sci., v. 251, pp. 847-849.

SILLERY FORMATION Cambrian

The eventful history of the term Sillery, which was proposed by Logan and Hunt in 1855, has been summarized by Melihercsik (1954). Bigsby in 1827 assigned the anthraxolitic sandstones with shales to the Carboniferous, and Logan and Hunt considered them Silurian. Marcou had reservations about the age as early as 1860, but it was not until 1889 that Ells placed the sandstones and siltstones below the Levis Formation and in the Cambrian. Some later writers considered the formation the downward continuation of the Levis and assigned it to the Ordovician.

The small pebble conglomerates, dirty sandstones, and red, green, and black shales or siltstones were considered diagnostic for the Sillery Formation, and beds, particularly if they did not have the characteristic Levis graptolites, were referred to the Sillery so that at many localities, Sillery became a synonym for Quebec Group.

In 1938, Ulrich and Cooper stated that Acrothele pretiosa, which is found in the Sillery Formation near Quebec, is Botsfordia pretiosa and is indicative of a Lower Cambrian age. Whether or not the Botsfordia can extend into Middle or even Upper Cambrian is still a matter for debate. Rasetti (1946, p. 699) proposed that Charny Formation be used for the beds containing Botsfordia to replace Sillery. Further study shows that Charny is not distinctively defined and it is proposed that Sillery be raised to a group. Botsfordia is found in several of these groups. The formations are St. Nicolas, Breakeyville, and Ste. Foy.

Melihercsik, S., 1954, A history of the formation names in the Quebec Group with special reference to the Charny Formation: Can. Nat. v. 81, pp. 165-180.

Ulrich, E.O., and Cooper, G.A., 1938, Ozarkian and Canadian brachiopods: Geol. Soc. Am., Spec. Paper, No. 13, p. 45.

Rasetti, Franco, 1946, Cambrian and Early Ordovician stratigraphy of the lower St. Lawrence Valley: Geol. Soc. Am., Bull., v. 57, p. 699.

SIMARD BEDS — Trenton Group

A section of about 60 feet of gray to blue gray limestone in the Simard region north of Ste Anne has been constructed from poor exposures. The fauna is considered correlative of that at Paquette Rapids of the Ottawa Valley section.

Sinclair, G.W., 1953, Middle Ordovician beds in the Saguenay valley, Quebec: Am Jour. Sci., v. 251, pp. 844-847.

SIROIS FORMATION — Silurian

The Sirois formation includes probably all the Silurian rocks of the northern half of the area. It overlies the White Head along both sides of the St. John River anticline, except where it is faulted out on the south side. In addition, it is partly exposed on two anticlines farther northwest. It is best exposed along St. Jean river and St. Jean Sud river. There is a clear lithologic distinction between the upper and lower parts of the formation, which merit description as separate members. Burk, working farther eastwards on the St. John River anticline, recognized 2 separate formations, using the name Sirois for the upper formation, and the name Laforce for the lower. Skidmore, prefers to regard the whole sequence as a single formation, partly because of the practical difficulty of mapping the 2 divisions separately, and partly because of a suggestion that the lower division thins rapidly towards the west in the present area, and may wedge out completely. An attempt has, nevertheless, been made to map in the contact, and Burk's name Laforce is retained for the lower member.

Skidmore, W.B., 1965, Castonguay-Mourier Area, Gaspé-North, Gaspé-South and Bonaventure Counties: Quebec Dept. of Nat. Res., G.R. No. 105, p. 25.

Burk, C.F., Jr., 1964, Silurian stratigraphy of Gaspé Peninsula: Am. Assn. Pet. Geol., v. 48, p. 448.

SISCOE GRANODIORITE Precambrian

The north part of Siscoe island, De Montigny lake, is occupied by a basic granodiorite or quartz diorite, that resembles the Bourlamaque granodiorite in containing eyes of opalescent quartz though otherwise it is much darker and more basic. The grain varies from fine to very coarse.

Cooke, H.C., James, W.F., Mawdsley, J.B., 1931, Geology and Ore Deposits of Rouyn-Harricanaw Region, Quebec: Canada Geol. Surv., Mem. 166, p. 133.

SLADEN FAULT.

It extends from the western end of the Canadian Malartic stock, eastward along the Sladen fault breccia zone to the East Main ore zone shear, where it turns and continues along the contact between the graywacke and the talc-chlorite schist of the Greenstone Belt. It appears to feather out into several small faults at the eastern end of the East Main ore zone. It strikes northeasterly.

Eakins, P.R., 1962, Geological Settings of the gold deposits of Malartic District, Abitibi-East County: Quebec, Dept. of Nat. Res., G.R. No.99, p. 50.

SMOKY CREEK FAULT

This fault can be traced for at least 44 miles by inference from the nature of the topography. Striking southeasterly, it follows the courses of Mouilleuse river up to Flavrian lake in Duprat township and of Kinojevis river in Vaudray township.

Hogg, W.A., Dugas, J., 1965, East half of Montbray Township, Rouyn, Noranda County: Quebec Dept. of Nat. Res., G.R. No. 115, p. 25.

SOLOMON'S CORNER LIMESTONE (FORMATION) (Wilmarth -1-2025) Upper Beekmantown

This is a formation of the Philipsburg Series (q.v.) and consists of about 300 feet of black limestone with shale interbeds. The weathered surface is yellowish-gray. The fauna of this and the succeeding St-Armand Limestone show an Upper Beekmantown age.

Geology of Quebec, 1944, p. 399.

SOMA ANTICLINE, Sequence - Precambrian

The Soma anticlinal structure has been traced through discontinuous exposures from the northwest corner of the map sheet southeasterly to the eastern limits of the map in the central partof range V, La Morandière Township.

On the flanks of this structure, a sequence of basic volcanic rocks , estimated to have a thickness between 12,000 and 16,000 feet, underlies the greater part of the northern sector.

Along the southern flank of the anticline rock outcrops are sparse. In Duverny Township, pillowed basaltic lavas, interbedded with narrow, fine-grained, massive basic lavas extend across lots 32 to 36, range VII, on the Southvue property. It trends N-W.

Weber, W.W., 1951, La Morandière and Parts of Duverny, Landrienne and Barraute Townships, Abitibi-East County: Quebec Dept. of Mines, P.R. No. 255, p. 4-5.

SOREL SAND Quaternary

The Atlas accompanying "Geology of Canada" (1863) has a map showing the distribution of superficial deposits. The Montreal Saxicava (sand) formation, the Beauport sands and gravels, the Macoma sands, the St. Maurice and Sorel sands, are shown as a unit overlying Leda Clay.

Ami, A.M., 1900, Synopsis of the Geology of Canada, Roy. Soc. Canada, Proc. and Trans., 2nd ser. vol. 6, sect. 4, p. 225.

SOUART STOCK Precambrian

It crops out in a few places on the extreme western side of the map-area, near the surveyed county-line. The rock is a light coloured, coarse-grained granite, slightly gneissic in structure, and as a rule it is much weathered. The feldspar, albite-oligoclase, is altered to an aggregate of sericite and calcite, and the biotite is partly altered to chlorite. The shape of the mass could not be determined, but its nature and location suggest that it is an off-shoot of the Barry Lake gneiss, and as such it may be of interest to prospectors.

Milner, R.L., 1943, Barry Lake Area, Abitibi- County and Abitibi Territory: Quebec Dept. of Mines, G.R., No. 14, p. 13.

SOUTH HOPEWELL GROUP (FORMATION) Proterozoic

From 80 to 240 feet of sedimentary rock overlain by diabase sill and basalt flow have been given the name South Hopewell Group. The beds consist of slate, chert, iron formation, quartzite and are possibly correlatives of the Kipalu Formation of the Belcher Group. Although only 25 miles separates the Nastapoka Islands from the Hopewell Island chain, correlation with the Nastopako Group is unsure.

This unit should not be of higher rank than formation.

Lee, S.M., 1965, Inussuaq - Pointe Normand area, New Quebec: Quebec, Dept. of Nat. Res., G.R. 119, p. 69.

Table of Formations

Era	Group	Map-unit	Lithology	Thickness (feet)
Cenozoic (Recent)			Silts, sands, gravels, beach deposits	
Angular unconformity				
Proterozoic	Belcher	16	Arkose, quartzite, argillite, conglomerate	700+
		15	Greywacke, argillite, lithic and arkosic quartzites, tuff	7,000+
		14	Diabase, feldspar porphyry sills and dykes	
		Intrusive contact		
		13	Basalt, tuff, agglomerate, feldspar porphyry	960-6,400
		Kipalu formation (12)	Ferruginous 'argillites', ferruginous jasper and chert, some containing ferruginous carbonate, ferruginous quartzite	200-380+
		11	Quartzite, feldspathic quartzite	130-475+
		10	Upper: Interbedded quartzites and dolomites	620-1,000
			Lower: Dolomite, arenaceous dolomite	150-280

Table of Formations

(cont'd)

Era	Group	Map-unit			Lithology	Thickness (feet)
Proterozoic	Belcher	9			Upper: Argillite, quartzite, dolomite	660±
Proterozoic	Belcher	9			Lower: Interbedded argillite, limestone, dolomite	425±
Proterozoic	Belcher	8	8a	7	Interbedded limestone, dolomite, argillite; slate, argillite at base	800-1,200
Proterozoic	Belcher	8	8a	6	Dolomite with stromatolite zones	450-550+
Proterozoic	Belcher	8	5		Upper: Interbedded argillite, limestone, dolomite Lower: Argillite, dolomite, quartzite	200-230
Proterozoic	Belcher	8	4		Upper: Dolomite with stromatolite zones Middle: Dolomite with few stromatolite zones, quartzite Lower: Interbedded dolomite and quartzite	1,200-1,420
Proterozoic	Belcher	3			Argillite, quartzite, dolomite, tuff, arkose, basalt	1,200-2,000

Table of Formations

(cont'd)

Era	Group	Map-unit	Lithology	Thickness (feet)
Proterozoic	Belcher	2	Basalt, feldspar porphyry, argillite, tuff, agglomerate, granular jasper	0(?)-3,000+
		1	Dolomite with stromatolite zones, limestone, argillite	4,000

(Jackson, 1960, G.S.C. Paper 60-20) p. 5

SOUTH SHICKSHOCK FAULT

It is a major fault of unknown displacement. Its surface trace trends generally N60°E across the Cuoq-Langis area, and it continues many miles to the northeast along the south front of the Shickshock mountains (Mattison, 1964), with a possible continuation beyond the tabletop mountains (Béland, 1960)

The attitude of the fault is obscure, but it probably dips steeply to the southeast and downthrows normally in that direction. Some lateral movement is possible.

Ollerenshaw, N.C., 1967, Cupq-Langis Area, Matane and Matapédia Counties: Quebec Dept. of Nat. Res., G.R. No. 121, p. 141-142.

SQUATEC-CABANO SYNCLINE

It is a broad, open, symmetrical fold. The eastern limb of the syncline, particularly in its southern part, is thinner than the western limb, by an average of 2,000 feet horizontally. This thinning, indicates that the axial plane of the fold dips west. The deepest section of the fold (i.e., the point of 0 plunge) is between the two arms of Croche Lake and both extremities plunge approximately 11° toward this deepest section.

Lespérance, P.J., Greiner, H.R., 1969, Squatec-Cabano Area, Rimouski, Rivière du Loup and Témiscouata Counties: Quebec Dept. of Nat. Res., G.R. no. 128, p. 95-97.

STADACONA FAULT.

The Stadacona fault strikes northeast to east-northeast. Its dip is 70 degrees NW in its western part and nearly vertical eastward, where its strike is more easterly. A lamprophyre dyke associated with the fault cuts diagonally across the veins of quartz and the schistosity, yet is itself displaced at an acute angle to the veins for 8 feet in one place. These relationships indicate that some displacement along the fault has occured since vein deposition.

Wilson, M.E., 1962, Rouyn-Beauchastel map-areas, Quebec: Canada, Geol. Surv. Mem, 315, p. 40.

STADACONA SYNCLINE

"The Stadacona syncline consists wholly of Abitibi volcanic rocks with steep dips and tops continuously to the north as far as the Rouyn Lake syncline in the eastern part and the Horna Creek fault in the western part of the Rouyn-Beauchastel area".

Its axis trends easterly.

Wilson, M.E., 1962, Rouyn - Beauchastel map-areas, Quebec: Canada, Geol. Surv., Mem 315, p. 39.

STANBRIDGE Ordovician

Stanbridge is a village and a township north of Missisquoi Bay, Lake Champlain.

I- Stanbridge Conglomerates - Logan (1863) described conglomerates under this name as part of the "Philipsburgh" section. He designated it as Division D1. He stated that blocks of dark limestone are abundant and tightly packed with a carbonate paste. Ells (1889) has used the same term for these rocks. Mystic conglomerate (q.v.) of Clark is essentially a junior synonym for this formation.

Logan, W.E., 1863, Geology of Canada: p. 852.

Ells, R.W., 1888, Second report on the geology of a portion of the Quebec: Geol. Surv. Can: Sum. Rept. III, p. 39K.

II- Stanbridge shale or slate - (Wilmarth -1-2052) - Logan's divisions D_2 and D_3 of the Philipsburg section (Logan, op. cit. pp. 845-846) consisting of shales and calcareous shales and were assigned a thickness of 2500 feet measured above the Stanbridge Conglomerates. Clark called these beds Stanbridge Slates in 1934, but in the Geology of Quebec, the same beds are called shale. They are considered to be part of Farnham Slate and to be Middle and Upper Ordovician. A list of graptolites from an unstated locality suggests that some beds as young or younger than the Normanskill are present.

P.R. Eakins in 1962 showed part of the area occupied by Logan's D_2 and D_3 divisions as St. Germain Complex and suggests that the rocks are of the ages of the Trenton, Utica, and Lorraine Groups. However, Riva showed that graptolites from Rioux quarry near Cowansville are D zone of Lévis Formation. On a map (Eakins, 1964) published in 1964, the region is mapped as underlain by Stanbridge.

Clark, T.H., 1934, Structure and stratigraphy of southern Quebec: Geol. Soc. Am., Bull. 45, p. 8.

Eakins, P.R., 1962, Guide Book, New England Intercollegiate Geological Conference, Montréal, p. 82.

Riva, John, 1966, Upper Lévis graptolites from Cowansville, southern Quebec: Jour. Pal., v. 40, pp. 220-21.

Eakins, P.R., 1964, Sutton Map Area: Geol. Surv. Can. Paper 63-34, p. 2.

III- Stanbridge Complex - In the preceding section on the shale and slate, Eakins, is noticed as applying both St. Germain and Stanbridge to the same rocks. Although a complex can be considered a stratigraphic unit because it is mappable, the definition offers some difficulty. Thus, the Eakins' opinion that the Stanbridge involves only rocks of the lowlands facies is shown to be in error as a result of the age of the fossils described by Riva.

Clark and Eakins have suggested that two complexes be recognized, however, this solution seems unsatisfactory because of the difficulty of distinguishing the two where they are in contact. Furthermore, parts of the St. Germain Complex as mapped involve beds of the same age as those of the Stanbridge Complex.

Clark, T.H. and Eakins, P.R., 1969, in studies of Appalachian geology: Stratigraphy and structure of the Sutton area of southern Quebec, p. 167. Interscience Publishers, New York.

STANSTEAD GRANITE Paleozoic

Although this term has been used in contexts suggesting it is a stratigraphic name, in most references it is used to refer to the medium-grained gray granite exploited near Stanstead or as a group name for gray commercial "granites" from the Eastern Townships.

STELLA LAKE SYNCLINE

This north-northeast-trending syncline, which is between Stella and Pillow lakes, is overturned northwest so its axial plane dips southeast. It could be the northeastward extension of a sinous, east-trending synclinal mapped by Imbault (1959) in the Queylus area to the west".

Neale, E.R.W., 1959, Dollier-Charron Area, Abitibi-East and Roberval Electoral Districts: Quebec, Dept. of Mines, G.R. No. 82, p. 35.

STEWART LAKE DOME

The Stewart Lake dome was the only fold identified with certainty. It is inclined to the northeast. Many minor folds complicate the southeast end.

Gélinas, Léopold, 1960, Gabriel Lake Area (East Part) and the Fort Chimo Area (West part) New Quebec: Quebec, P.R. No. 407, p. 8-9

STOCKWELL FAULT

It is of more limited extent and may even die out within the Chateauguay map-area. As with the Havelock break no direct evidence has been recognized except a slight tendency for the joints to depart from the normal NW-SE strike. The Stockwell fault is, therefore, a hypothetical break, but nonetheless highly probable. The vertical dislocation would be the same as that of the Havelock fault where the two faults meet, decreasing westward possibly to zero within a mile or two of the southwestern corner of this map-area.

Clark, T.H., 1966, Châteauguay Area, Châteauguay, Huntingdon, Beauharnois, Napierville and St. Jean Counties: Quebec Dept. of Nat. Res., G.R. no. 122, p. 45.

STOKE GRANITE Paleozoic

This name was given to a granitic body (hypothetical) contributing boulders to the Weedon conglomerate.

Douglas, G.W., 1941, Eustis Min.-Area, Ascot townships: Quebec Dept. of Mines, G.R. 8, pp. 17-18.

STONY POINT FORMATION Middle Ordovician

Ruedemann named this shale in 1921 and considered it to be of Trenton age. Clark (1934, p. 4) introduced the formation name in Quebec in the Lacolle map-area where he stated that this formation underlies the Utica equivalent for which he proposed Iberville (q.v.). The descriptions by Hawley (1957, pp. 58-62) for region in northern Vermont are the best published. The shale part of the Senigon Well (Clark and Strachan, 1955, p. 688) are presumably in this formation. The formation is apparently 1,200 feet or more thick, and its lower part is Trenton age but most of it is younger than this.

Clark, T.H., 1934, Structure and stratigraphy of southern Quebec: Geol. Soc. Am., Bull., v. 45, p. 4.

Hawley, David, 1957, Ordovician shales and submarine slide breccias of northern Champlain valley in Vermont: Geol. Soc. Am., Bull. v. 68, pp. 58-62.

Clark, T.H., and Strachan, I., 1955, Log of the Senigon Well, southern Quebec: Geol. Soc. Am. Bull., v. 66, p. 688.

STRANGWAY GRANITE Precambrian

The eastern end of the Strangway batholith enters the western part of the map-area in Laas township and extends eastward as a blunt lobe to occupy also the southwestern quarter of Tonnancourt township. Its eastern boundary is four to five miles east of Bell River. The rock is medium-grained and is from pink to gray. In general, it is massive, but locally the structure is somewhat gneissoid. In hand specimen, hornblende and biotite are conspicuous, each making up 15 to 20% of the rock.

Longley, W.W., 1946, Tonnancourt-Holmes Map-Area, Abitibi County: Quebec Dept. of Mines, G.R. No. 24, p. 12.

SUTTON

Sutton is the name for a mountain or mountain range, a village, and a townships in the southern part of the Eastern Townships.

I- SUTTON, GROUP, SERIES. (Wilmarth -1-2094)

The rocks on the prolongation of the Green Mountain anticlinorium into Quebec underlie the Sutton Mountains in Quebec and have been referred to by many names in addition to "Green Mountain Gneiss" as used in the Veromont from 1845 or Green Mountain Series as used by Hunt (1871). Other names were more current in Canada. Geology of Quebec (1944, p. 340) lists: Altered Quebec Group, Schists and Gneisses of Sutton Mountain, Crystalline Schist Series, Sericite Schists, Hydromica Schists, and Rocks of the Sutton Mountain Anticline. To these must be added Sutton Mountain Gneiss or Gneisses, Sutton Mountain Series, Sutton Series, Sutton Group.

In Geology of Quebec (1944, pp. 372-378), Sutton Series is considered to have two parts: Early Volcanics is the older, but investigations since 1950 have shown that the divisions includes metavolcanic rocks with several stratigraphic positions. The upper division is composed of paragneisses and paraschists and includes Bennett Schist (q.v.).

These rocks have been assigned to both Precambrian and Cambrian as well as to Ordovician. However, the rocks are metamorphic and the original formations were of diverse ages. As such the name Sutton Group has a local value.

Logan, W.E., 1863, Geology of Canada, p. 251.

Hunt, T.S., 1871, Geognosy of the Appalachians and the Origin of crystalline rocks: pre-print Am. Assn. Adv. Sci., pp. 7-8.

Dresser, J.A., 1911, Serpentine belt of southern Quebec: Geol. Surv. Can. Summ. Rept. 1910, p. 210.

Cooke, H.C., 1954, The Green Mountains "Anticlinorium" in Quebec: Geol. Assn. Can., Pr. v. 6, pt. II, p. 47.

II- SUTTON, Anticline, Anticlinorium Syncline, Axis, Geanticline.

The structural interpretation of the region near Sutton mountain is essential to the understanding of the geology of an extensive tract in the southern part of the Eastern Townships. Logan (1849 , p. 52) mentions that the mountain is between two anticlines and therefore might be expected to have a synclinal structure although such an interpretation does not match all the relationships observed or inferred. Logans perplexity is expressed again in Geology of Canada (1863, p. 251) and as stated by Ells (1887, p. 33J) "a double inverted synclinal" would be required. Selwyn (1882) developed the hypothesis that the structure is anticlinal and in an illustration shows the intriguing structure referred to by Ells would be two synclines with axial planes overturned towards each other. Ells and most later workers accepted the Selwyn interpretation, but H.C. Cooke (1954, loc. cit.) says that the "true structure" of the schists at Sutton is synclinal.

Logan, W.E., 1849, south side of St. Lawrence: Geol. Surv. Can. Rept. Prog. 1847-1848, p. 52.

Ells, R.W., 1887, Geology of a portion of the Eastern Townships: Geol. Surv. Can. Summ. Rept. 11, p. 33J.

Selwyn, A.R.C., 1882, The Quebec Group in Geol: Roy. Soc. Can. Tn., v. 1, pp. 1-13. especially folded diagram.

SUTTON ANTICLINE

"It is the main structural feature of the Appalachian uplands. The anticlinal structure is a broad arch plunging about 15° northeasterly over most of the St. Magloire area. Near the west boundary of that area it plunges about 10° southwesterly. The crest of this anticline is quite irregular and, here and there, it rolls into a series of minor folds. This anticlinal structure as actually based on schistosily and may not necessarily be that of the bedding."

Béland, Jacques., 1957, St-Magloire and Rosaire - St. Pamphile Areas, Electoral Districts of Dorchester, Bellechasse, Montmagny and l'Islet: Quebec, Dept. of Mines, G.R. No. 76, p. 31-32.

The logical procedure is to abandon Sutton as a structural term and use the Vermont nomenclature of Green Mountain Anticlinorium and Green Mountain Axial Anticlines (Cady, 1960). Clark and Eakins (1968) use Sutton Mountain Axis for this anticline.

Cady, W.M., 1960, Stratigraphy and geotectonic relationships in northern Vermont and southern Quebec: Geol. Soc. Am. Bull. v. 71, Plate 1.

Clark, T.H., and Eakins, P.R., 1968, The stratigraphy and structure of the Sutton area of southern Quebec: in "Studies of Appalachian Geology" p. 164.

III- SUTTON FAULT SLICE

Cooke (1950, p. 16) has proposed this name for a thrust slice between the Oak Hill Slice on the west and the Beauceville Slice on the east. On the west the Brome thrust as named by Clark is the boundary whereas on the east it is the Caldwell thrust (Cooke 1954, op. cit. p. 45).

This is probably best regarded as a nonce name.

Cooke, H.C., 1950, Geology of a southwestern part of the Eastern Townships of Quebec: Geol. Surv. Can. Mem. 257.

SWANTON Lower Paleozoic

This name has been used for several things in Vermont, but J.B. Berry used the name from 1868 for a thick sequence of slates. Marcou (1885) suggested correlations with rocks at Quebec City. He gave the following table (p. 224):

Upper Swanton: Quebec Group of the city and citadel of Quebec, Charlesbourg, and Montmorency Falls.

Lower Swanton: Ferry Road Pointe Levis, Ste Anne River, Gros Maule.

Phillipsburg or Point Levis Group.

Marcou, Jules, 1885, The Taconic system and its position in stratigraphic geology: Am. Acad. Arts and Sci., Pr. 12, p. 224.

SWEETSBURG SLATE Lower (?) Cambrian

This formation of the Oak Hill Group is stated by Clark to have a thickness of 250 to 300 feet and is composed of a bluish gray to black "slate" which breaks into wedge shaped blocks. Thin beds of white siltstone or fine sandstone give the exposure a striped appearance and the rusting of porphyroblasts of pyrite makes many of the joint surfaces brown. Osberg describes the formation in the Knowlton-Richmond area as a quartz muscovite phyllite with some layers of quartz muscovite chlorite phyllite, the whole formation having a thickness of 1050-1300 feet.

Although Clark has assigned all the Oak Hill Group to the Lower Cambrian, it is possible that this part is Middle Cambrian, the evidence for this conclusion is derived from studies in Vermont.

Clark. T.H., 1936, A Lower Cambrian Series from Southern Quebec: Roy. Can. Inst., v. 21, pp. 149-150.

Osberg, P.H., 1965, Structural geology of the Knowlton-Richmond Area, Quebec: Geol. Soc. Am., Bull. v. 76, p. 226.

SWEETSBURG SLATE (Wilmarth -1-2098) Cambrian

This is one of the formations of the upper part of the Oak Hill Group Clark (1934) in proposing the name suggests that the gray phyllite or slate with thin layers of fine-grained sandstone have an approximate thickness of 300 feet near the type locality. Osberg (1965) estimates, in the Knowlton-Richmond area, that the Sweetsburg, Scotsmore, and Dunham Formations have a combined thickness of 1050 to 1300 feet. He shows the numerous occurrences of gray limestone within the formation particularly near Richmond. Cooke (1954) has called the same limestone Melbourne (q.v.) but refers to it as black.

Clark, T.H., 1934, Structure and stratigraphy of Southern Quebec: Geol. Soc. Am. Bull., v. 45, p. 6.

Osberg, P.H., 1958, Structural Geology of the Knowlton-Richmond area: Geol. Soc. Am., Bull. v. 76, p. 226.

TACHE LAKE FAULT

This fault was recognized in the Chibougamau Lake area to the southwest, and thrusting to the northwest was apparent (Mawdsley and Norman, 1935).

Gilbert, J.E., 1958, Bignell Area, Mistassini and Abitibi Territories, Abitibi-East and Roberval Electoral Districts: Quebec Dept. of Mines, G.R. No. 79, p. 29.

TACONIC Paleozoic

The Taconic Mountain range along the east side of Hudson River valley has given its name to many things geological including what is probably the most acrimonious controversy of American geology. Taconic or Taconian has been applied to series, epoque, group, system, period, formation, klippe, or allochthon as well as to an orogeny or disturbance; and the mere tracing of the usages would demand a long essay: United States Geological Survey Bulletin 1174 is a lexicon of some "Taconic stratigraphic names" and is a publication of 95 pages. Some usages even by one worker have changed with time. Fortunately, for Quebec most references are to Taconic orogeny or disturbance.

I- Taconic Orogeny, (Disturbance Revolution, Folding) Wilmarth -1-2107) -

"Taconian" is used in the same sense by authors including Schuchert and Rodgers (1967) but has no advantage over Taconic in referring to the orogenic event. Very diverse opinions have been expressed concerning the extent and even the reality of a Taconic Orogeny within the Appalachian belt in Québec. An extreme view has been expressed by Clark (1921), who tried to show that in Quebec there is little stratigraphic evidence for an orogeny. Abstracts of papers by A. Keith published in 1935 and 1937 support a similar conclusion, but Crickmay (1932) demonstrated that the stratigraphic evidence for an orogeny is clear along the Matapedia valley. Reconsideration of older information and data gathered between 1930 and 1969 lead to the conclusion that a very significant orogeny occurred (Pavlides, Boucot, and Skidmore, 1968; Rodgers 1967). The possibility is envisaged that the orogeny was in pulses perhaps from late Middle Ordovician through Early Silurian, and that the unconformities may represent different times at different localities. In addition to unconformities some authors have suggested that chaotic structures, presumably the result of sliding of beds downslope, are indicative of orogeny.

Clark. T.H., 1921, A review of the evidence for a Taconic Revolution: Boston Soc. Nat. Hist., Pr. v. 36, pp. 135-163.

Crickmay, G.W., 1932, Evidence of Taconic Orogeny in Matapedia valley, Quebec: Am. Jour. Sci., v. 24, pp. 368-386.

Rodgers, John, 1967, Chronology of tectonic movements in the Appalachian region of eastern North America: Am. Jour. Sc. v. 265, pp. 412-415.

Pavlides, L., Boucot, A.J., and Skidmore, W.B., 1968, Stratigraphic evidence for the Taconic Orogeny in the northern Appalachians: Studies in Appalachian Geology, Interscience Publishers, pp. 61-82.

TAKWA INTRUSIVE COMPLEX Precambrian

This is a local name used to describe gneisses, mostly granitic, and acidic plutonic bodies in the region, northeast of Mistassini Lake. Biotite from a grey to pink granite gneiss from northwest of Sam Gunner lake gave a potassium-argon age of 1.60 X 10^9 years and a rubidium-strontium age of 1.67 X 10^9 years. The significance of these dates is not known.

This name is not necessary and there is some confusion in its use. Neale, in an unpublished thesis used Toqueco (Takwa) for rocks referred to as Sam Gunner Group (q.v.).

Quirke, T.T., Jr., Goldich, S.S., and Krueger, H.W., 1960, Composition and age of the Témiscamie Iron Formation, Mistassini Territory, Quebec, Canada: Jour. Econ. Geol., v. 55, p. 314, p. 320-21.

TALON FORMATION (Wilmarth -1-2112) Paleozoic

Dresser (1912, p. 29) gave the name to diabase, péridotite, and pyroxenite in Talon Township. He included some greenstones of the Caldwell Group. The term is no longer current.

Dresser, J.A., 1912, Reconnaissance along the National Transcontinental Railway in southern Quebec: Geol. Surv. Can., Mem. 35, pp. 29-31.

TAMAGODI (SEDIMENTS) SANDSTONES Paleozoic

Unusual sandstones outcrop in 3 localities along the middle section of Tamagodi river. Several poor outcrops about 1½ miles downstream from Chantepleure brook consist of fine-to medium-grained, locally coarse- to very-coarse-grained, calcareous, quartz sandstones. They are medium to slightly greenish gray where fresh and weather brownish gray. Beds are probably very thick or massive. Sorting is locally poor and numerous small, scattered, gray slate fragments occur. Some fragments are identifiable as derived from the Shickshock Group.

Ollerenshaw, N.C., 1967, Cuoq-Langis Area, Matane and Matapedia Counties: Quebec Dept. of Nat. Res., G.R. No. 721, p. 27-30.

TEMISCOUATA - PETIT BIENCOURT LAKES FAULT

This fault probably joins the fault in the La Résurrection area, although its trace is covered by Pleistocene and Recent deposits south of Témiscouata lake. The topographic expression of this fault east of Sauvagesse lake and north of Bédard lake is a well-marked absequent fault line scarp, but elsewhere the fault is not marked topographically. It is interpreted as a normal fault with a 65° western dip. It has a minimum throw of 7,400 or 7,800' depending on the interpretation adopted.

Lespérance, P.J., Greiner, H.R., 1969, Squatec-Cabano Area, Rimouski, Rivière du Loup and Témiscouata Counties: Quebec Dept. of Nat. Res., G.R. No. 128, p. 93-95.

TEMISCAMIE FORMATION Proterozoic

Wahl (1947, 1953) proposed Témiscamie as the name of a group, later reduced to a formation, part of the Mistassini Group (q.v.). The "a" or lower member consists of 35 feet of quartzite overlain by 50 feet of black slate. The quartzite locally has boulders of dolomite, quartzite and chert, and this facies is probably equivalent to the Boulder Bay Quartzite named in an unpublished report by Neilson but mentioned by Quirke, Goldich, and Krueger (1960, p. 316). According to Wahl, the "b" or iron formation unit is 620 feet thick, but Quirke, Goldich, and Krueger give 700 feet and divide it into 6 units, whereas Wahl divided into two. The Quirke, Goldich, and Krueger divisions are:

Upper siderític chert, oolites, little minnesotaite.	300 ± ft
Magnetite iron silicate, chert stilpnomelane, minnesotaite.	100 ± ft
Upper argillite, ankerite, siderite and minnesotaite.	5 to 45 ft
Magnetite chert, magnetite, hematite.	73 to 195 ft
Lower sideritic chert, siderite, stilpnomelane.	20 to 100 ft
Lower argillite black, thin-bedded, micaceous.	9 to 40 ft

The "c" member of the Témiscamie Formation is black or gray slate. This member was called Kallio Formation (q.v.) by Neilson.

Since about 1940, the Témiscamie Formation and the Mistassini Group have been assigned to the Proterozoic and considered contemporaneous or approximately so with the iron formations and related rocks of the Labrador Trough. The lower argillite has yielded a K/Ar age (Quirke, Goldich, and Krueger, 1960, p. 321) of 1.29 X 10^9 years but the material was poor and the significance of the age uncertain.

Wahl, W.G., 1953, Témiscamie River Area, Mistassini Territory: Quebec Dept. of Mines, G.R. 54, pp. 16-18. (Témiscamie Group is referred to in P.R. 211, p. 8, 1947).

Quirke, T.T. Jr., Goldich, S.S., and Krueger, H.W., Composition and age of the Temiscamie Iron Formation, Mistassini Territory, Quebec, Canada: Econ. Geol., vol. 55, pp. 311-326.

TEMISCAMIE VALLEY FAULT ZONE

The Témiscamie River valley is the locus of a fault zone that here separates the Superior and Grenville provinces. Its topographic expression is the valley in which the thick Témiscamie Valley outwash deposit is located. The only evidence bearing on the dip of the Témiscamie Valley fault zone is the dip of the shear planes and slickensided surfaces in outcrops along Témiscamie river. These structures dip 45° to 75° southeast and east-southeast, suggesting that the fault plane (or group of planes) dips southeast at moderate to steep angles.

Neale, E.R.W., 1965, Béthoulat Lake Area, Mistassini Territory, Quebec Dept. of Nat. Res., G.R. no. 112, p. 42-46.

Temiskaming, Timiskaming, Temiscamian, Témiscamingue, Témiscaming.

"Temiskaming" with diverse spelling has been applied to a lake separating Ontario and Quebec, to a county in Quebec, and to a district in Ontario.

I- Timiskaming Subprovince,

M.E. Wilson used Timiskaming to designate the part of the St. Lawrence Province of the Canadian Shield northwest of the Grenville Subprovince (q.v.). J.T. Wilson, and J.E. Gill in 1949 presented schemes for the tectonic stratigraphic divisions of the shield and substituted Superior Province for the region essentially that of M.E. Wilson's Timiskaming Subprovince.

a) Wilson, M.E., 1941, Pre-Cambrian: Geol. Soc. Am. Fiftieth Anniversary Volume: p. 274.

b) Gill, J.E., 1949, Natural Divisions of the Canadian Shield: Roy. Soc. Can., Tr. 43, Sect. IV, pp. 61-69.

c) Wilson, J.T., 1949, Some major structures of the Canadian Shield: Can. Inst. Min. and Met., Bull. No. 450, pp. 543-554 and Transaction pp. 231-242.

II- Timiskaming lineament.

J.T. Wilson has given this name to faults extending through Temiscamingue

Lake to Porcupine, Ontario, and forming the northeast limit of a hypothetical Cobalt graben.

Wilson, J.T., 1949, op. cit. p. 238.

III- TEMISKAMING SERIES (GROUP) Archean

W.G. Miller (1911) proposed that metaconglomerates and other metasedimentary rocks occurring near Témiscamingue lake and west of it be referred to a Temiskaming Series to separate them from a less metamorphosed group of beds, the conglomerates of which he proposed to designate Cobalt. Almost from the time of its proposal the Temiskaming Series has been the subject of disagreement, and the scope and spelling of the name has been changed. A.P. Coleman in publications soon after the proposal of the name used the form "Temiscaming", and in Geology of Quebec (1944) only "Temiscamian" is used. Publications by the Geological Survey of Canada and by Ontario Department of Mines of Canada have "Timiskaming".

Some workers, have placed "Temiskaming Series" within a "Temiscaming Group". Most workers now agree that Temiskaming is pre-Huronian and is part of the Archean, but this is practically the limit of agreement.

If Temiskaming Series is to apply to a single stratigraphic unit, it can be above or below or between metavolcanic rocks. Authors have described the series in all these positions, but because of the original description it is generally placed above metavolcanics. However, if two or more sequences of metasedimentary rocks have been referred to a Temiskaming Series, the problem is more complex and of course the use of Temiskaming as a series name becomes improper for at least one sequence . Workers assigned altered conglomerates, dirty sandstones and siltstones to Temiskaming without regard for their stratigraphic position. Some writers have attempted to retain Timiskaming as a system of the upper part of the Archean by assigning lavas to a Temiskaming Series or System and using "Temiskaming sedimentary rocks" and "Temiskaming volcanics". Similarly Keewatin volcanics and Keewatin sedimentary rocks are used for a Keewatin series or system.

M.E. Wilson (1962), whose experience with these rocks extends over many years, has,in the Rouyn-Beauchastel areas, Quebec, indicated the occurrence in force of Temiskaming rocks,although some workers have given other names to the same units. He suggests that the rocks are unconformably above metalavas and some rocks intrusive into lavas as well as above the Pontiac Group of meta-sedimentary rocks. If the implied correlation with the type locality can be maintained this is a correct use of the term, but if not local names for rock units would be preferable.

Miller, W.G., 1911, Notes on the Cobalt Mining Area: Eng. and Mining Jour. v. 92, pp. 647-648.

Wilson, M.E., 1962, Rouyn-Beauchastel Map-areas, Quebec: Geol. Sirv. Can. Mem. 315, p. 7, pp. 19-25.

IV- Temiscamian-type.

In "Geology of Quebec" (1944) the phases Temiscamian-type rocks and Keewatin-type rocks occur frequently. The use of these names in 1944 as well as since is a result of the problems and uncertainties regarding the use of the stratigraphic terms. The meaning attached to Temiscamian- type rocks is that metamorphosed clastic rocks particularly conglomerates, dirty sandstones (graywackes), and siltstones resemble those ascribed to the Temiskaming Series and being "Archaen-like" (Geology of Quebec, 1944, pp. 52-53), are considered to be Early Precambrian. Similarly "Keewatin-type rocks" are metamorphosed volcanic, flows, tuffs, and agglomerates.

The "type" terms are lithofacies terms and are legitimate but they are not stratigraphic terms in a restricted sense. Their use does avoid giving local names in separate areas.

V- TIMISKAMING SYNCLINORIUM.

"The south limb of the Timiskaming synclinorium includes a maximum thickness of about 11,000 feet of basal conglomerate passing transitionally upward to the north into greywacke. The synclinorium also possibly includes the wide belt of Pontiac rocks that unconformably underlies the Timiskaming basal conglomerate.

Wilson, M.E., 1962, Rouyn-Beauchastel mpa-areas, Quebec: Canada, Geol, Surv., Mem. 315, p. 39,

TERREBONNE (FORMATION MEMBER) FACIES Trenton Group

This name was proposed for thin bedded dark limestones believed to be the highest formation of the Trenton Group. The name was first published in 1944 by Clark and the description of the formation in 1952, but subsequently it was found that the beds assigned to this formation are lentils with the Tetreaville Formation and hence the formation is reduced to a member.

Clark, T.H., 1952, Montreal area: Quebec Dept. of Mines, G.R. 46, p. 74.

TETAGOUCHE SERIES Middle Ordovician

The Tetagouche series is characteristically developed along Tetagouche river, New Brunswick. The part of it whose age is definitely known, consists of black slates which outcrop on the north bank of the Tetagouche immediately to the west of the railway bridge. Volcanics called Fournier Group are associated with the Mictaw. The rocks have yielded a graptolite fauna of Middle Ordovician age.

The formation is not ordinarily mapped in Quebec, where Mictaw Group is only slightly younger than the Tetagouche.

Alcock, F.J., 1935, Geology of Chaleur Bay Region: Canada Geol. Surv., Mem. 183, p. 15-18.

THERESA FORMATION Beekmantown Group

This is the lower part of the Beekmantown Group. The beds consist of sandstones and dolomitic sandstones and is in Quebec of variable but inconsequential thickness. It is possibly equivalent to the March Formation of the Ottawa district.

Clark, T.H., 1952, Montreal Area: Quebec Dept. of Mines, G.R. 46, p. 25.

THETFORD SERIES Paleozoic

The rocks of the Thetford Series consisting of; peridotite and serpentine, pyroxenite, gabbro, diabase, granite, make up the greater part of the"serpentine belt". They extend southwesterly from Broughton mountain in the township of Broughton, through Thetford, Coleraine, Ireland, Wolfestown, and Garthby to Big Ham mountain. Note this use of "serpentine belt".

This name is abandoned. See Broughton Series.

Dresser, J.A., 1910, Serpentine belt of Southern Quebec: Canada Geol. Surv., Summ. Rept. 1909, p. 188.

THEVENET FORMATION Precambrian

The Thévenet formation overlies the Hellancourt volcanics. It is definitely recognized only in the core of the syncline southwest of Thévenet Lake, but may be present east of Rachel lake (Thévenet Lake area). The top of the formation is not exposed but its thickness exceeds 2,000 feet. The formation consists of zones of massive argillites and quartzites or of both interbedded. The argillites are usually dark grey, well indurated, thickly bedded and, in many places, well laminated. The essential minerals are quartz and feldspar in angular silt-sized grains with interstitial stitial chlorite sericite, and biotite.

Sauvé, Pierre, Bergeron, Robert, 1965, Gerido Lake - Thévenet Lake Area, New Quebec: Quebec Dept. of Nat. Res., G.R. No. 104, p. 32-33.

THIRD LAKE FAULT

This fault extends southeasterly from the northern part of Larocque township across York river, Third lake, and Saint-Jean (John) river to extend almost through the township of York. The downthrown side is on the northeast. The amount of displacement evidently is variable and probably is at its greatest where the fault crosses York river, and is estimated to be 3,000 feet.

McGerrigle, H.W., 1950, The Geology of Eastern Gaspé: Quebec, Dept. of Mines, G.R. No. 35, p. 107.

THOMPSON CREEK FAULT

Following the depression occupied by Thompson creek from its mouth on the Kinojevis river, this fault may be traced west and a little south to near survey-tag 48 on the Rouyn centre-line. This fault appears to be of a thrust type, dipping steeply north. Wilson (1943, p. 123) present evidence that this fault is continuous with the Bouzan Lake fault and part of the Cadillac break. uses McKenzie as a name for it or McKenzie - Bouzan Lake.

Hawley, J.E., 1933, McWatters Mine Gold Belt, East Rouyn and Joannes Townships: Quebec Bureau of Mines, Part C, p. 26.

Wilson, M.E., 1943, The Early Precambrian succession in western Quebec: Roy. Soc. Can. Tr. 37, Sect. IV, p. 123.

TIBBIT HILL FORMATION, SCHIST, GREENSTONE Cambrian (?)

Clark (1936, p. 137) gave a brief description of the Tibbit Hill Schist, which he had referred to briefly in 1934, The type locality is west of Brome Lake in the Sutton Map Area, but the formation can be traced southward and northeastward from there.

The rocks are commonly chlorite, albite, epidote schists, or locally phyllites, with relic amygdules and knots with epidote and quartz. The bulk composition is that of andesites and basalts, although at a very few localities, rhyolites can be found. At many localities glistening porphyroblasts of magnetite are scattered through the rock.

In 1934 (p. 10) Clark assigned this formation to Precambrian, but in 1936 (p. 136) he placed it in the Oak Hill Series and considered it Lower Cambrian. The base of the Tibbit Hill has not been recognized. See "Waterloo Lavas".

Clark, T.H., 1934, Structure and stratigraphy of southern Quebec: Geol. Soc. Am., Bull. v. 45, p. 10.

Clark, T.H., 1936, A Lower Cambrian Series from Southern Quebec: Roy. Can. Inst. v. 21, Pt. 1, pp. 137-138.

I- TOMIFOBIA SERIES — Silurian or Devonian

Clark (1934, p. 10) published this name,which was originally proposed by F.A. Kerr, who mapped the eastern part of the Memphremagog area in Quebec. The formation or series consists of dark gray slates with some dark limestones and resembles the Magog group. Clark considered that the rocks were dated by graptolites, but as stated by Cady (1960, p. 556) the "graptolites" are probably non-biogenic. The more recent view is that the beds are perhaps in part Silurian but certainly in part Devonian, as shown by the discovery of fossil plants. The same rocks have been assigned to the St. Francis Group.

Clark, T.H., 1934, Structure and stratigraphy of Southern Quebec: Geol. Soc. Am., Bull., vol. 45, No. 1, pp. 10.

Cady, W.M., 1960, Stratigraphy and geotectonic relationships in northern Vermont and southern Quebec: Geol. Soc. Am., Bull. v. 71, p. 556.

Cooke, H.C., 1957, Coaticook-Malvina area, electoral districts of Stanstead and Compton: Quebec Dept. of Mines, G.R. 69, pp. 9-11.

II- TOMIFOBIA SLICE

Clark (_op. cit._ p. 4) has used this name for a fault slice lying east of the Bunker Thrust in the Memphremagog area. Although the fault may exist, the slice is composed of rocks of the Gaspé Supergroup. This slice is the same as St. Francis Fault Slice (_q.v._).-

TONNANCOURT QUARTZ MONZONITE — Precambrian

An irregular stock of granite rock crops out in the southeastern corner of Tonnancourt township. Its eastern margin lies at and closely follows the eastern boundary of the township, and, after reaching its maximum north-south width of rather more than 3 miles, it wedges out at a point about 4½ miles west of the township lines. The rock is massive, medium-grained, light gray to pink, and is characterized by an abundance of quartz. Some of the quartz is in euhedral grains. In many places, there is an unusually well developed, closely spaced, sheet-joints in this rock.

Longley, W.W., 1946, Tonnancourt-Holmes Map-Area, Abitibi County: Quebec Dept. of Mines, G.R. No. 24, p. 14.

TOULADI FORMATION Lower Devonian

It includes limestones, sandstones, and conglomerates of the beds of the Temiscouata Formation. Its maximum thickness is 350 feet only one half or less of which is exposed.

Lespérance, P.J., Greiner, H.R., 1969, Squatec-Cabano Area, Rimouski, Rivière du Loup and Témiscouata Counties: Quebec Dept. of Nat. Res., G.R. No. 128, p. 77-82.

TOURELLE SANDSTONE Canadian

McGerrigle gave this name to sandstones, black shales, red and green shales, with limestone conglomerates occurring adjacent to St. Lawrence river in Gaspé peninsula. Graptolites have shown that this formation is the age of the Levis Group or the Deepkill Shales of New York. The anglicized form of the name "Pillar" was used by Logan, and the formation was correlated with the Sillery for a time.

McGerrigle, H.W., 1954, The Tourelle and Courcelette areas: Quebec Dept. of Mines, G.R. 62, pp. 30-32.

McGerrigle, H.W., 1954, An outline of the geology of Gaspé Peninsula: Can. Min. Jour., v. 75, p. 60.

TRACY BROOK FAULT

This fault which strikes N20°E was named in the Lacolle map area. As mapped in the St. Jean area, it is merely a northward extrapolation of the structure in the Lacolle map-sheet to the south. It is shown on the St. Jean sheet as terminating against the Delson fault, though there is it must be said no visible evidence of its presence within the St. Jean area. It strikes northeast. See Lacolle Conglomerate.

Clark, T.H., 1934, Structure and stratigraphy of southern Quebec: Geol. Soc. Am., Bull. 45, p. 14.

Clark, T.H., 1955, St. Jean-Beloeil Area, Iberville, St. Jean, Napierville-Laprairie, Rouville, Chambly, St. Hyacinthe and Verchères Counties: Quebec Dept. of Mines, G.R. No. 66, p. 51.

TREMBLAY BEDS Middle Ordovician

At a locality three miles northwest of Ste Anne, which is on Saguenay river, seven feet of limestone contain possible Lowville fossils.

Sinclair, G.W., 1953, Middle Ordovician beds in the Saguenay valley, Quebec: Am. Jour. Sci., v. 251, p. 44.

TREMBLING LAKE CRYSTALLINE LIMESTONE Precambrian

A heavy band of limestone runs through Trembling Lake, which lies immediately west of Trembling Mountain, being exposed on the islands in the lake as well as it its outlet.

Adams, Frank D., 1896, Report on the geology of a portion of the Laurentian Area lying to the North of the Island of Montreal: Canada Geol. Surv., Ann. Rept. VIII, 1895, J. p. 22.

TREMBLING MOUNTAIN GNEISS Precambrian

This gneiss is rather fine in grain, and has a distinct though not very striking foliation, marked by the presence of a series of thin, interrupted black lines, seen on surfaces broken at right angles to the foliation. On large weathered surface a slight variation in size of grain can occasionally be seen in thin bands parallel to the foliation, and at long intervals, thin bands of a black pyroxenic amphibolite are met with. The gneiss has a pale reddish colour when fresh, and weathers brownish-gray.

Adams, Frank D., 1896, Report on the geology of a portion of the Laurentian Area lying to the North of the Island of Montreal: Canada Geol. Surv., Ann. Rept. VIII, 1895, J. p. 42.

TRENTON LIMESTONE, GROUP, SERIES

The name Trenton is derived from Trenton Falls, New York, and has been used as a stratigraphic term since 1842. Since then the name has been used in various ways to an extent that many apparent inconsistencies have developed. The name in its formation form, viz as Trenton Limestone, is probably the most serviceable of the several uses. Goudge (1935, p. 19) gives a good summary of the Trenton as a source of commercial limestone and describes its lithology. Belyea (1952, pp. 17-21), in a discussion of the deep wells of part of Quebec, describes the Trenton limestones as two principal lithologic units viz. formations, although using the term Trenton succession to describe them. It is obvious then that Trenton is a useful name for the limestone in a general sense and to change or abandon it would result in confusion.

In "Geology of Canada" (1863, p. 136) Logan refers the Birdseye and Black River Formation and the Trenton Formation to the Trenton Group. J.W.

Dawson (1880, 58) in his geology notes lists Trenton Series as containing Chazy, Black River, and Trenton Limestones. This was the Montreal Limestone of Logan's usage prior to 1863.

By 1900, the Trenton Formation was regarded as distinct from the underlying Black River Limestone, but later some doubts arose concerning its upper limit. For example, in "Geology of Quebec" (1944, p. 263) it is stated that the Utica Shale should be considered part of the Trenton. This problem does not rise if the Trenton is restricted to use as a lithostratigraphic unit.

A history of the studies of the Trenton Group has been given by Kay (1937) and, particularly for Quebec, by Clark (1959). As pointed out by both authors the original designations by Raymond were derived from prominent fossils in beds in Ontario. The beds are listed in Table I.

d. Rafinegquina deltoidea and Hormotoma beds

c. Prasopora beds

b. Crinoid beds

a. Dalmanella beds

In 1914, the biologically identified beds were given geographic names and treated more or less as formations. The term Trenton was applied to the Prasopora beds, which beds were later to designated as Sherman Fall. Rockland was introduced for the Dalmanella beds and Hull for the Crinoid beds.

Parks (1931, p. 23D) used the fossils to describe zones in the Trenton exposed on the Oureau and Assomption rivers near Joliette. His composite section is:

Rafinesquina deltoidea zone	70 feet
Prasopora simulatrix zone	105 feet

Rafinesquina alternata zone 59 feet

The general features of these zones can be recognized at localities between Montreal and Quebec and, although the thicknesses are diverse, the sequence is as listed.

T.H. Clark began a study of the St. Lawrence Lowlands in 1938 and by 1959 presented the following tabular summary for the Trenton (op. cit.)

ROCK STRATIGRAPHIC UNITS

	Ontario	Montreal	Grondines-Neuville
TRENTON GROUP	Cobourg	Tetreauville incl. Terrebonne	Neuville
	Sherman Fall	Montreal	
	Hull	Deschambault	St. Casimir
			Deschambault
	Rockland	Ouareau	Fontaine St. Alban-Pont-Rouge

For further details reference should be made to the formation or members mentioned.

Naming of the geological units has been complicated by the failure to distinguish rock and time units. Kay (1960) has proposed that a Trentonian series be divided into three stages, Nealmontian, Shermanian, and Pictonian, the last being the youngest.

Goudge, M.F., 1935, Limestones of Canada, Pt. 3: Canada Mines Branch, Pub. No. 755, pp. 19.

Belyea, H.R., 1952, Deep wells and subsurface stratigraphy of part of the St. Lawrence Lowlands, Quebec: Can. Geol. Surv., Bull. 22, pp. 17-21.

Dawson, J.W., 1880, Lecture notes on geology: Dawson Bros., Montreal, p. 58

Kay, G.M., 1937, Stratigraphy of the Trenton Group: Geol. Soc. Am., v. 48, pp. 237-241.

Clark, T.H., 1959, Stratigraphy of the Trenton Group, St. Lawrence Lowland, Quebec: Geol. Assn. Can., Pr. 11, pp. 13-21.

Parks, W.A., 1931, Natural gas in the St. Lawrence valley, Quebec: Que. Bur. Mines, Ann. Rept. 1930, Pt. D., p. 23.

Kay, G.M., 1960, Classification of the Ordovician system in North America: Int. Geol. Cong. XXI, Pt. VII, p. 32.

TRIVIO GROUP — Precambrian

It consists of heterogeneous beds of volcanic and sedimentary material which lie along the top of the volcanic pile. The rocks are not well exposed but the main members appear to be discontinuous beds of tuffaceous sedimentary rock, graywacke, arkose, graphitic phyllite, conglomerate, tuff, chert and lava. There is a possibility that a regional fault zone extends along the south edge of the group, separating it from the Pontiac rocks to the south.

Sharpe, John I., 1968, Louvicourt Township, Abitibi-East County: Quebec Dept. of Nat. Res., G.R. No. 135, p. 11-12.

TURGEON LAKE GRANITE — Precambrian

It underlies approximately .55 square miles in the western half of the map-area and extends beyond the western limit of the area. Two small bodies are exposed along the coast. At Johan Beetz, biotite granite extends from Mine bay to a point 2½ miles northwest of the village. It is divided into two parts by a band of quartzite and schist, which outcrops east of the village. The second mass extends westward along the coast from the mouth of Corneille river to about 1 mile east of Appititatte bay, a distance of four miles. It has a maximum exposed width of one mile.

Cooper, Gerald, E., 1957, Johan Beetz-Area, Electoral District of Saguenay: Quebec Dept. of Mines, G.R. No. 74, p. 39-41.

UNGAVA MOUNTAINS

Gill has used this name for the folded rocks forming part of the Labrador Trough. He places it within the Churchill-Ungava Province.

Gill, J.E., 1949,. Natural Divisions of the Canadian Shield, Transactions of the Royal Society of Canada, Volume XLIII, Series III, Section four, p. 65.

UNISON GRANODIORITE (W-2- 379) Precambrian

An outcrop of "quartz diorite" near Ynison mine in Dubyison ts hp.may indicate a the presence of a small body of granodiorite.

Cooke, H.C., James, W.F., and Mawdsley, J.B., 1931, Geology and Ore Deposits of Rouyn-Harricanaw Region, Quebec.Canada, Geol. Survey, Mem, 166, p. 133.

UPPER ALBANEL FORMATION Proterozoic

Wahl (1953) assigns two members to this formation of the Mistassini Group (q.v.). The lower member, "e" is 700 feet thick and consists of sandy dolomite and dolomitic sandstone with crossbedding. It passes gradationally upward into "f" member, which is 1300 feet of fine-grained dark gray dolomite and argillaceous dolomite.

Lesperance in a manuscript dated 1965 notes the presence of Cryptozoon in "e" and "f" member, but believes that at least some of the structures reported from "d" member of Lower Albanel Formation are concretions.

Wahl, W.G., 1953, Temiscamie River Area, Mistassini Territory: Quebec Dept. of Mines, G.R. 54, pp. 14-15.

UTICA SHALE (GROUP) Ordovician

From its type locality in New York, this formation can be traced into Quebec and Ontario, where the name has been used consistently for more than a century to designate a dark carbonaceous shale separating a limestone formation (Trenton) from a shale formation (Lorraine). The proper use of this name for a lithostratigraphic unit has been shown by Fisher (1956, p. 620) who demonstrates that the formation is not of one age from locality to locality.

Clark has used the name for a group, although in the Montreal area the group has only the Lachine Formation. Other formations considered Utica are Iberville, Lotbinière, Stony Point. Clark appears to vacillate between the lithostratigraphic interpretation and a biostratigraphic use of the name. However, Riva (1968) states his view unequivocally. "In the Mohawk valley and in parts of the St. Lawrence lowlands, the Utica and Canajoharie shales are actually biostratigraphic units that can be separated only on the basis of their strikingly dissimilar graptolite content". Riva has given zonal names: Corynoides calicularis var. americana for the lower zone of the Canajoharie followed upward by a

Climacograptus minimus zone. The Utica has a lower zone of *Climacograptus spiniferus* followed by a zone of *Climacograptus pygmaeus*.

Gloucester has been used in part and locally for shales of Utica aspect and Billings Formation is 300 feet of black shale equivalent to Gloucester and part of Collingwood (Wilson, 1946, p. 8).

Utica has been used, therefore, both in its lithostratigraphic significance and in a biostratigraphic sense. The context may help to determine the use. The formation is assigned to the Mohawkian by some workers but to the Cincinnatian by others.

Fisher, D.W., 1956, Intricacy of applied stratigraphic nomenclature: Jour. Geol. v. 64, p. 620.

Riva, John, 1968, Graptolite faunas from the Middle Ordovician of the Gasp. north shore: Nat. Can., V. 95, p. 1396.

Wilson, A.E., 1946, Geology of the Ottawa-St. Lawrence lowland, Ontario and Quebec: Can. Geol. Surv., Mem. 241, p. 8.

VAIL SLATE MEMBER (of Sweetsburg Formation) Cambrian

Clark (1936, p. 150) gave this name to a member consisting of thinly layered darker and lighter gray mudstone. He assigned it to the upper part of the Sweetsburg Slate, but in 1934, he had given it formational status.

The formation has not yielded fossils.

Clark, T.H., 1934, Structure and stratigraphy of southern Quebec: Geol. Soc. Am., Bull. v. 45, p. 10.

Clark, T.H., 1936, A Lower Cambrian Series from Southern Quebec: Roy. Can. Inst., v. 21, Pt. 1, p. 150.

VAUREAL FORMATION -VAURIAL Ordovician

Division "B" of Richardson overlies the English Head Formation (q.v.) on Anticosti and was assigned a thickness of 730 feet with gray and reddish gray limestones and some shaly beds. Schuchert and Twenhofel (1910, p. 695) named the beds of "B" division Charleton Formation, but in 1920 Twenhofel changed the name to Vaurial(Vauréal)because Charleton point is not underlain by division "B". He (1927, p. 23) states that this formation is 541 feet thick on Vauréal river. This formation, like the English Head thickens southward and may be 1,600 feet thick or even more.

The similarity of the Vauréal to the English Head has been generally recognized and both are considered Richmond.

Richardson, James, 1857, Report for year 1856: Can. Geol. Surv., Rept. of Progress 1853-1856, pp. 210-211.

Schuchert, C., Twenhofel, W.H., 1910, Ordovicic-Siluric Section of the Mingan and Anticosti Islands, Gulf of Saint. Lawrence, Geol. Soc. Am., Bull., vol. 21, p. 695.

Twenhofel, W.H., 1927, Geology of Anticosti Island: Can. Geol. Surv., Mem. 154, p. 23.

Roliff, W.A., 1968, Oil and gas exploration - Anticosti island, Quebec: Geol. Assn. Can., Pr. v. 19, p. 34.

VAUZE CREEK-WAITE LAKE FAULT ZONE

In the northern part of the district, a depression largely filled with clay extends across Waite and Newbec map-areas by way of Waite Lake and the lower part of the valley of Vauze Creek. North of this depresssion, to the east of the Dufresnoy diorite belt, siliceous rhyolite, underlain to the west by alternating belts of rhyolite and andesite, is present. All these lavas strike northwesterly and dip northeast.

Wilson, M.E., 1949, Noranda District, Quebec: Canada, Geol. Surv., Mem. 229, p. 51.

VENTURES TYPE GABBRO Precambrian

Duquette and Mathieu have used this name for a coarsed-grained to medium-grained aggregates of hornblende and plagioclase occurring at the tops of ultrabasic sills. They point out the similarity of this rock to that forming the country of ore shoots at Opemiska Copper Mines.

Duquette, G., and Mathieu, A., Northeast quarter of Mckenzie Township, Abitibi-East County: Quebec Dept. of Min. Res., P.R. 551, p. 7-8.

VERNEUIL STOCK Precambrian

The two southernmost bays on the western boundary of the map-area are parts of Verneuil lake. In the more northern bay, there is a low reef of light grey, medium-grained, massive biotite granite.

This holocrystalline, equigranular rock consists of plagioclase (40%), microcline (25%), quartz (20%), biotite (10%), and epidote (5%) with some sphene.

Imbault, P.E., 1959, Queylus Area, Abitibi-East and Roberval, Electoral Districts: Quebec Dept. of Mines, G.R. No. 83, p. 21.

Holmes, Stanley W., 1959, Fancamp-Hauy Area, Abitibi-East, Electoral

District: Quebec Dept. of Mines, G.R. No. 84, p. 10.

VIGNON (WINDSOR) LAKE ZONE (of Shickshock Group) Lower Paleozoic

Most of the rocks of this zone are similar to those of Bardey (Man) Lake. They are medium to fine grained, dark grey on fresh surfaces and brownish grey on weathered surfaces. Bedding is apparent in an outcrop southwest of Côté Lake. Foliation like that of the Bardey Lake zone is everywhere present and presumably is generally parallel to the now obliterated bedding. Metavolcanic rocks are adjacent to this zone or interbedded with its rocks.

Mattinson, C.R., 1964, Mount Logan Area, Matane and Gaspé-North Counties: Quebec Dept. of Nat. Res., G.R. No. 118, p. 39-43.

WABASSEE GROUP Precambrian

It underlies half of the area and is made up of thick flows of light-colored pillowed feldspathic lavas and contrasting dark mafic lavas. Abundant exposures of the feldspathic varieties are found along the Allard river and in the vicinity of Wabassee lake in Daniel township. Excellent exposures of the mafic varieties are scoured by wave and sand abrasion on the islands and shores of Matagami lake.

Sharpe, John I., 1968, Geology and Sulfide Deposits of the Matagami Area, Abitibi-East County: Quebec Dept. of Nat. Res., G.R. No. 137, p. 17.

WACONICHI LAKE FAULT

It branches from the Mistassini Lake fault near the outlet of Waconichi lake and extends southwestward beyond the western limit of the map-area, closely paralleling the south side of Waconichi lake. Its general strike is S. 60° W., and its dip is 75° south. The only evidence that this fault may extend east of the Mistassini Lake fault is a small shear zone, also with northeast strike, in gneiss about 5,000 feet southwest of the northeast corner of the area.

Gilbert, J.E., 1958, Bignell Area, Mistassini and Abitibi Territories Abitibi-East and Roberval electoral districts: Quebec, Dept. of Mines, G.R. No. 79, p. 30-31.

WAITE ANTICLINE

"In the rock ridge southwest of the Waite - Ackerman - Montgomery Mine the eastward dipping Amulet rhyolite belt extends to the east about 1 mile. An anticline (Waite) is therefore present in this locality. The approximate average eastward plunge of this anticline is estimated to be about 30 degrees."

Wilson, M.E., 1949, Noranda District, Quebec: Canada, Geol. Surv. Mem. 229 - p. 49-50.

WAITE HILLS FAULT.

Northeast of Beaver Hill, this fault extends northwest across Waite Hills. It strikes northeasterly.

Wilson, M.E., 1949, Noranda, District, Quebec: Canada, Geol. Surv., Mem, 229, p. 52.

WAKEHAM LAKE, SEDIMENTS, SERIES, LAC WAKEHAM SERIES, WAKEHAM SERIES.

Claveau (1948) used the term Wakeham Lake sediments for quartzites, and slates. He did not use the name in the table of formations and hence the name was informal. Beland who served as assistant to Claveau in 1943, in mapping the Wakeham Lake area, used both Wakeham Lake Series (1950, p. 291) and Wakeham Series (1950, p. 294).

The quartzites, and schists of most of the series are less strongly crystalline than the rocks of similar composition in the Grenville Series, however near the borders of the sedimentary sequence, the grade is higher, and the rocks have been assigned to the Grenville. Beland has suggested that the Wakeham Lake Syncline is a southeastern extension of Labrador Trough.

Claveau, Jacques, 1949, Wakeham Lake area, Saguenay County: Quebec Dept. of Mines, Geol. Rept. 37, p. 24-25.

Béland, René, 1950, Le synclinal du Lac Wakeham et la Fosse du Labrador: Nat. Can., vol. 77, p. 291-294.

WALLACE CREEK | Ordovician

This name is applied to 200 to 250 feet of interbedded thin layers of shaly limestone and thicker limestone equivalent to the lower part of Logan's A_3 division of the Philipsburg Series (q.v.).

McGerrigle, H.W., 1931, Three geological formations in northwestern Vermont: Rept. of State Geol., 17th., 1929-30, p. 185.

WAPUSSAKATOO MOUNTAINS

This range of hills lies mostly northeast and east of the divide between the streams flowing to the Hamilton River and those flowing to St. Lawrence River.

I- WAPUSSAKATOO SERIES

This name was given (Gill *et al.*, 1937) to quartzites, "mica gneisses" and schists, and recrystallized iron formation. With the development of the area the series was reduced to a formation known as the Wapussakatoo Quartzite and made part of the Gagnon Group.

The quartzites are derived from sandstones or cherts or both.

Gill, J.E., 1937, Bannerman, H.M., and Tolman, C., 1937, Wapussakatoo Mountains, Labrador: Geol. Soc. Am., Bull. v. 48, pp. 573-575.

Gastil, G., and Knowles, D.M., 1960, Geology of the Wabush Lake Area, southwestern Labrador and eastern Quebec, Canada: Geol. Soc. Am., Vull. v. 71, p. 1247.

Clarke, P.J., 1967, Gras Lake-Felix Lake Area, Saguenay County: Quebec Dept. Nat. Res., G.R. 129, pp. 30-32.

II- WAPUSSAKATOO MOUNTAINS.

Gill has used this term for one of the "natural divisions" of the Canadian Shield. The term has tectonic but not physiographic significance. Some uncertainty exists as to the classification of this unit: Gill (1949, p. 65) makes it a subprovince of the Ungava Province and also (p. 68) a subprovince of the Churchill-Ungava Province.

Gill, J.E., 1949, Natural Divisions of the Canadian Shield: Roy. Soc. Can., Tn. 43, Sec. IV, pp. 61-69.

WASA LAKE FAULT.

The Wasa Lake fault extends from western Beauchastel township eastward across the eastern part of the Wasa Lake, the northwestern part of the Wakeko, the southern part of the Wingait, and the southwestern part of the Horne Fault properties. Its dip is about 60 degrees N.

Wilson, M.E., 1962, Rouyn-Beauchastel, map-areas, Quebec: Canada, Geol. Surv. Mem, 315, p. 40.

WASWANIPI GRANITE Precambrian

Longley (1951, p. 16) named the granite that extended into the west central and northwestern part of the Bachelor Lake map area, but Gilbert (1951, p. 32-33) has given the best description of the rocks, which occupy most of the southern third of the Capisisit Lake area. The rock is a medium-to coarse-grained leucocratic granite with one third to two thirds albite, some of which is contained poikilitically in microcline. Extensive areas show a cataclastic texture with development of augen of plagioclase.

Imbault refers to the equivalent of the Waswanipi Granite in the Maicasagi Area as "Southern Granite". Undoubtedly this is intended as a nonce name.

Longley, H.W., 1951, Bachelor Lake Area, Abitibi-East County: Quebec Dept. of Mines, G.R. 47, pp. 16-17.

Gilbert, J.E., 1951, Capisisit Lake Area, Abitibi-East County: Quebec Dept. of Mines, G.R. 48, pp. 32-34.

Imbault, P.E., 1954, Maicasagi Area, Abitibi-East County: Quebec Dept. of Mines, G.R. 60, pp. 22-25.

WATERLOO LAVAS Paleozoic

Cooke gave this name to lavas of undetermined stratigraphic position outcropping as a band up to 4½ miles wide and extending northwesterly close to the town of Waterloo. The rocks were largely basaltic and andesitic although acidic lavas are found. Cooke favors slightly the possibility that the lavas are Bolton (q.v.), but the evidence indicates that they are, largely if not entirely Tibbit Hill (spelled Tibbet by Cooke) Schist.

Cooke, H.C., 1950, Geology of a southwestern part of the Eastern Townships of Quebec: Can. Geol. Surv., Mem. 257, p. 20, p. 93-94.

WEEDON SCHISTS, SERIES Paleozoic

Burton (1931, p. 111) gave this name to deformed but recognizably metavolcanic rocks near Aylmer lake. The chlorite schists are equivalent to basalts and andesites but much more acidic lavas were also present. Duquette (1961) has made a comprehensive study of the rocks in the Weedon Lake area and has called them "Weedon Schists Formation". He has recognized crystal tuffs, agglomerates, cherty beds, tuff, greenstones, and a variety of crush conglomerate. In the Weedon Lake area Duquette believes that the formation may be as much as 12,800 feet thick, but it thins both northward and southward.

The age of the rocks has been debated. Logan considered the formation the age of the Quebec Group; Selwyn in 1882 considered them Keweenawan; Ells in 1884 assigned them to Huronian; and Dresser, 1906, and Bancroft, 1913, noted their similarities to rocks assigned to the Precambrian in Pennsylvania.

Burton suggested that the formation could be the same as volcanics west of Aylmer lake, and Cooke later correlated these with the Caldwell Group. Clark assigned part of these rocks to the base of the St. Francis Group and, like Burton, considered them Middle Ordovician. Still later Cooke assigned at least some of them to the Sherbrooke Group, which he considered Silurian.

Although, Duquette suggests the possibility of a late Ordovician age, the correlation and age of the formation is not known. The presence of abundant acidic pyroclastics, erroneously interpreted by some workers as intrusive rocks, makes this formation different from the Caldwell.

Burton, F.R., 1931, Vicinity of Lake Aylmer, Eastern Townships: Quebec Bur. of Mines, Ann. Rept., 1930D, pp. 111-114.

Duquette, Gilles, 1961, Geology of Weedon Lake area and its vicinity: Université Laval, Thèse pour Doctorat, pp. 33-70.

Duquette, Gilles, 1959, Le Groupe de Québec et le Groupe de Gaspé près du Lac Weedon, Nat. Can. v. 30, pp. 247-252.

WEEDON (THRUST) FAULT

Burton (1931, p. 125) recognized the thrust fault crossing the Aylmer Lake area, but he did not name it. He refers to "the fault", "the overthrust fault" in his report. Cooke and others have suggested southwest extensions of it. It is believed to postdate Acadian folding. Hawley et al. ,in the discussion of the Moulton Hill ore deposit,use the term "Weedon Type of faulting". By this they mean a pre-ore fault with overthrusting to the northwest.

Burton, F.R., 1931, Vicinity of Lake Aylmer, Eastern Townships: Quebec Bur. of Mines, Ann. Rept. 1930-D, p. 125.

Hawley, J.E., Fritzsche, K.W., Clark, A.R., and Honeyman, K.G., 1945, The Aldermac Moulton Hill Deposit, Eastern Townships, Quebec: Can. Inst. Min. & Met., Tr. v. 48, p. 383.

WEEDON PORPHYRY Paleozoic

Vibert Douglas has used this name for intrusive rocks near Weedon mine with the implication that it is equivalent to the Stoke granite. Although he has named the Eustis and Suffield sills there is grave doubt whether the units are intrusive (Hawley et. al.). The use of these names is inadvisable.

Vibert Douglas, G., 1941, Eustis Mine Area, Ascot Township: Quebec Bur. Mines, G.R. 8, p. 17.

Hawley, J.E., Fritzsche, K.W., Clark, A.R., and Honeyman, K.G., 1945, The Aldermac Moulton Hill Deposit, Eastern Townships, Quebec: Can. Inst. Min. & Met., Tn. v. 48, pp. 373-374.

WEIR FORMATION Lower Silurian

It is a thin wedge of Lower Silurian strata conformably beneath the Clemville Formation. The unit crops out only along the headwaters of Mictaw brook and "La Grande-Fourche" brook (local name). The Weir Formation which is on Mictaw Brook 2180 feet thick is made up of dark-green siltstones, locally interbedded with quartz-pebble conglomerate, reddish gray arkosic sandstones, and minor silty limestone. The green siltstones are characteristically well bedded and locally calcareous and fossiliferous. The interbedded conglomerates are up to 1 foot thick and contain subangular pebbles of jasper and milky quartz set in a dark green graywacke matrix; minor amounts of smaller white-weathering feldspar grains are present.

This formation is, if not the oldest, among the oldest Silurian in Gaspé. It is according to brachiopods lower to upper Llandovery.

Ayrton, W.G., 1967, Chandler-Port-Daniel Area, Bonaventure and Gaspé-South Counties: Quebec Dept. of Nat. Res., G.R. no. 120, p. 36-39.

WEIR BROOK ZONE (of Shickshock Group) Lower Paleozoic

The Weir Brook zone extends northeastward from Bieil brook 11 miles to Bauvas (Behrend) brook with a maximum width of about one mile. Most of the rocks are metasedimentary, but there is considerable metavolcanic material as well as sills of albitic diorite and albitic quartz diorite.

Mattinson, C.R., 1964, Mount Logan Area, Matane and Gaspé-North Counties: Quebec Dept. of Nat. Res., G.R. No. 118, p. 44-46.

WEST SUTTON SLATE Cambrian

The West Sutton Slate of the Oak Hill Group is from 40 to 100 feet thick at most localities but exceptionally it reaches 250 feet. It is a mudstone or siltstone or their metamorphic equivalents at most localities. It s outstanding characteristic is the presence of iron oxide minerals, particularly hematite. At some localities the lower part of the formation has been used as an iron ore but at most places hematite contributes to the red colour or purplish cast of the rocks. Parts of the formation may be dark gray. Osberg (1965, p. 226) includes this unit in Bonsecours Formation.

Clark, T.H., 1936, A Lower Cambrian Series from Southern Quebec: Roy. Can. Inst., v. 21, Pt. 1, pp. 143-144.

Osberg, P.H., 1965, Structural Geology of the Knowlton-Richmond Area, Quebec: Geol. Soc. Am., Bull. v. 76, p. 226.

WHEELER COMPLEX Precambrian

Granitoid gneisses, amphibolites, and related rocks occurring east of Labrador Trough are given this name which corresponds to Ashuanipi Complex west of it.

Dimroth, Erich, 1968, The evolution of the central segment of the Labrador Geosyncline: N. Jb. Geol. Palaont. Abh., v. 132, pp. 26-27.

WHITE BROOK DOLOMITE

This is the lower dolomite of the Oak Hill Group and is from 20 to 75 feet thick in the Sutton map-area. The rock, which is composed of minute crystals of white or gray to pale pink dolomite with in places enough sand grains to be a dolomitic sandstones, weathers dun to chololate brown. It is intersected by irregularly bounded masses of high calcium rock, which although, being similar in fabric to the dolomite, weathers gray.

Clark, T.H., 1936, A Lower Cambrian Series from Southern Quebec. Roy. Can. Inst., v. 21, Pt. 1, p. 143.

WIACHUN SILL Proterozoic

Woodcock uses this name to a much altered basic sill two hundred feet thick that cuts the Richmond Gulf Group.

Woodcock, J.R., 1960, Geology of the Richmond Gulf area, New Quebec: Geol. Assn. Can., Pr. v. 12, pp. 34.

WILSON GRANITE Precambrian

The northeastern corner of Cuvillier township is underlain by gneissic granite, part of a body of such rock that extends to the east and north for a considerable distance. It has been described by Longley as a "gneissic hornblende-biotite granite" although owing to the absence of potash feldspars, it can be appropriately termed an albite granite. The rock usually exhibits a gneissic structure. It is medium- to fine-grained in texture and is light pink in most outcrops. It is composed essentially of quartz, albitic plagioclase, and microcline, with small amounts of hornblende and biotite.

Longley, W.W., 1946, Tonnancourt-Holmes Map-Area, Abitibi County: Quebec Dept. of Mines, G.R. No. 24, p. 12.

Table of Formations

Age	Group	Formation (Approximate thickness, in feet)	Member	Lithology
Pleistocene and Recent				Sand and gravel
Permo-Carboniferous	Canso?	Cap-aux-Meules 1250 +		Red and greyish green sandstone
		Unconformity		
Mississippian	Windsor	Havre -aux-Maisons 2500 ±	Bassin-aux-Huîtres (Upper Windsor)	Fossiliferous limestone and calcareous shale; red and grey argillite; gypsum.
			Cap Adèle (Lower Windsor)	Brecciated basalt, tuff and agglomerate interstratified with conglomerate, sandstone, siltstone, fossiliferous limestone and calcareous shale, argillite and gypsum.

(Sanschagrin, 1964, Q.D.N.R., G.R.-106) p. 16

WINSLOW GRANITE Acadian (?)

Cooke (1937, p. 75) gave the name Winslow to a granitic body with an outcrop of about 50 square miles lying southeast of St. François Lake. According to Duquette (1961, p. 173), the granite is medium-grained with a greenish color and weathers rapidly. It has about 25 per cent quartz with potassic feldspar and oligoclase making up 50 per cent of the rock. The dark minerals are augite, hornblende, and biotite. The plagioclase is zoned from An_{27} at the cores to An_{17} at the rims and is in laths about 4 mm long. Cooke (1937, p. 76) states that the plagioclase is labradorite, although terming the rock granite.

Cooke, H.C., 1937, Thetford, Disraeli and Eastern Half of Warwick Map-

Areas, Quebec: Canada Geol. Surv., Mem. 211, p. 75-76.

Duquette, Gilles, 1961, Geology of the Weedon Lake area and its vicinity, Wolfe and Compton Counties, Quebec: Université Laval, Thèse pour doctorat, pp. 173-178.

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Juin 1975