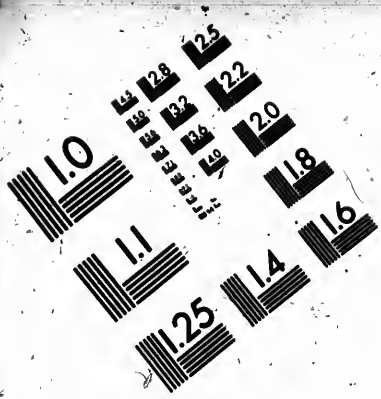

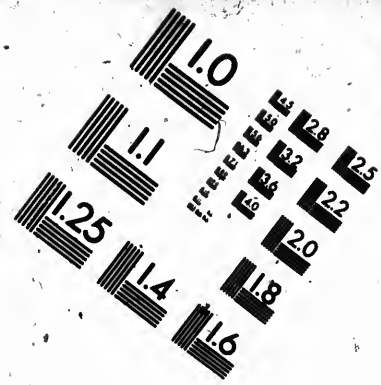

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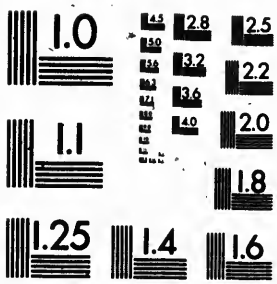

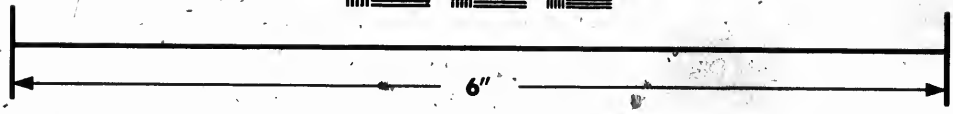

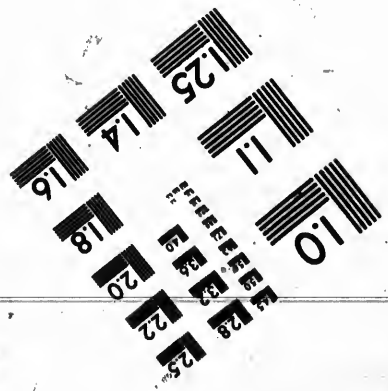

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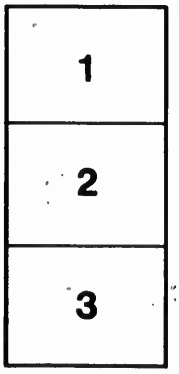
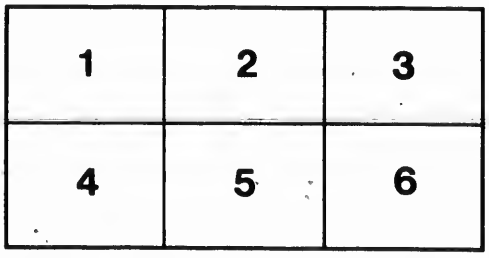




[*From the* QUARTERLY JOURNAL *of the* GEOLOGICAL SOCIETY *for November* 1864.]

ON THE

GEOLOGY OF ARISAIG, NOVA SCOTIA.

BY

THE REV. D. HONEYMAN, F.G.S.

CONTENTS.

§ 1. *Introduction.*

THE district which is the subject of this paper is situated on the north-east side of Nova Scotia, on the Gulf of St. Lawrence, and from ten to fourteen miles south-west of Cape St. George. Several years since, this locality was brought under the notice of the Society by Dr. J. W. Dawson.

Its characteristic strata were then considered by him to be of Silurian age (Quart. Journ. Geol. Soc. vol. vi p. 347). Subsequently in his 'Acadian Geology,' guided by the opinion of Sir Charles Lyell, he pronounced these deposits to be equivalent to the Hamilton and Chemung (U. S.) groups, and consequently to be of Devonian age.

Having made the locality a special study for a great part of two years, and having compared the fossils obtained from the strata occurring there with those figured in Sir R. I. Murchison's 'Siluria,' I was convinced, beyond all doubt, that they were for the most part equivalent to the Upper Ludlow*. In the following year Dr. Dawson communicated a paper to the same Society, "On the Geology of Nova Scotia," in which, besides confirming my opinion, he separated the strata in question into an upper and a lower series†. Further progress was afterwards made by Professor Hall's determination of many of the Arisaig fossils‡.

* See my paper "On the Fossiliferous Rocks of Arisaig," Trans. Lit. and Sci. Soc. Nova Scotia, 1859.

† Trans., &c., 1860.

‡ See Hall's Appendix to Dawson's Paper "On the Silurian and Devonian Rocks of Nova Scotia," Canadian Naturalist and Geologist, vol. v. pp. 144 *et seq.*

A

Professor Hall and Dr. Dawson have again confirmed my opinion in regard to the age of the upper member of this series, pronouncing it to be the equivalent of the Lower Helderberg group, and the lower to be the equivalent of the Clinton, U. S.; for one of its characteristic organisms is a Graptolite, not distinguishable, according to Professor Hall, from *Graptolithus Clintonensis*, Hall.

Having examined another locality somewhat particularly, at the East River, I found, *in situ*, fossils similar to those of the upper member of the Arisaig series; and others, also *in situ*, which I considered were of a different age. I had found organisms similar to the latter, in boulders on the Arisaig shore, in abundance. I was therefore led to infer the existence of a member of the Arisaig series between the equivalents of the Upper Ludlow and the Clinton, which I considered to be equivalent to the Wenlock. This belief was confirmed by my examination of new localities, in one of which occurred Upper Ludlow and Lower Helderberg and Clinton strata, without the intermediate formation; in another occurred Upper Arisaig beds, and strata which had not been found in any of the other localities, but which I considered as possibly also of Wenlock age. In a paper on these new localities, read in 1860 before the Natural History Society of Montreal, this opinion was expressed by me. Dr. Dawson suggested that the new fossils were possibly Devonian*. In the same paper I announced the discovery of fossils in a part of the Arisaig series which was before considered as non-fossiliferous, and in a position considered by Dr. Dawson and myself as lower than the Clinton group. Still later I discovered at Arisaig, *in situ*, and in a position somewhat perplexing, fossils similar to those which I had considered as doubtfully Wenlock, and Dr. Dawson as possibly Devonian. Another perplexing circumstance was stated by Dr. Dawson, in the note referred to, namely, that my newly discovered localities tended to confirm an opinion that he had elsewhere expressed, to the effect that the Silurian and Devonian strata, of which the Arisaig series formed a part, had been thrown into synclinal and anticlinal folds on the formation of the metamorphic mountain-ranges, on the skirts of which the various Silurian and Devonian localities are situated. Regarding this opinion as correct, it appeared to me that the dip of the Arisaig series was in the wrong direction, and diminished in proportion as it receded from the mountain-range, with the possible exception of the last-discovered part of the series. Supposing this last to be the upper bed, as it must be if its equivalent at the lately discovered locality, Lochaber, were Devonian, it should overlie the uppermost instead of the lowest member of the Silurian series.

This was the state of matters relative to this admirable and typical section in our Nova-Scotian geology, when I was engaged to make a collection of the rocks and fossils of our province for the International Exhibition of 1862. Sir Roderick Murchison, at my request, very kindly asked Mr. Salter to examine it, who accordingly inspected my divisions of fossils, and, studiously avoiding all inquiry

* See paper with Dawson's note, Canad. Nat. and Geol. vol. v. pp. 293 *et seq.*

into the opinions already entertained, he unhesitatingly referred my Upper Ludlow to the Ludlow Tilestone, my Wenlock (?) to the Aymestry Limestone, and Hall and Dawson's Clinton to a repetition of the Ludlow Tilestone. He could not decide on the fossils of No. 5 (?). With regard to No. 4, the equivalents of which had been regarded by Dr. Dawson as possibly Devonian, and by myself as possibly Wenlock, Mr. Salter at once referred them to the Mayhill Sandstone age, qualifying the whole with "*approximately*." The matter was thus, to me at least, cleared of doubt, except on one point where a difference of opinion existed, arising chiefly, as it appeared to me, from a difference of opinion regarding the Graptolite already referred to,—Hall considering it as *Graptolithus Clintonensis*, and Salter as *G. Ludensis*, the containing strata being accordingly considered by the one as equivalent to the Clinton group, and by the other to the Ludlow Tilestone. So much light having been thrown upon the subject by Mr. Salter, the two uppermost and the lowest members of the series having been determined by him, it at once occurred to me that a thorough examination of the locality would now be sufficient to determine what still remained doubtful, and the results of that examination I now beg to lay before the Society.

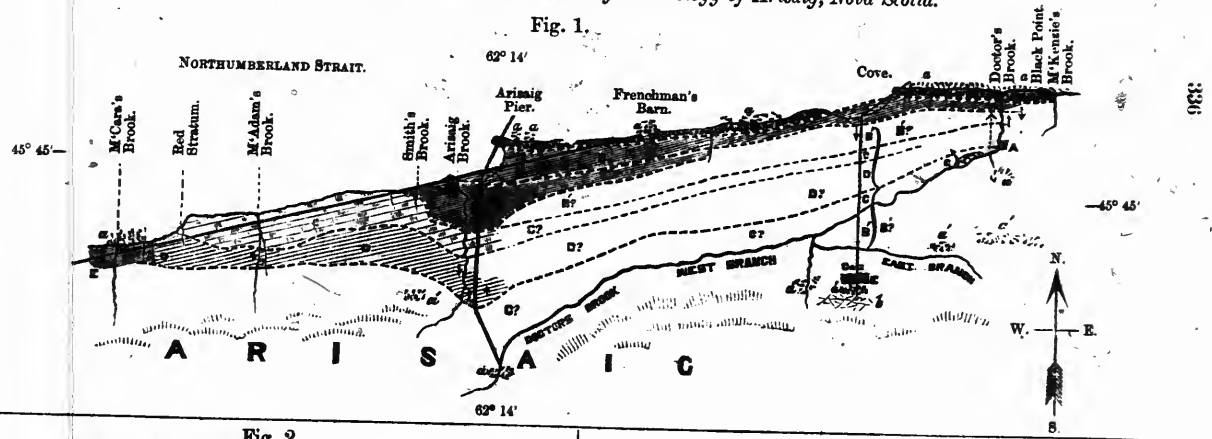
§ 2. *General Description of the Arisaig District.*

The extreme length of the Silurian rocks at Arisaig is about three and a half miles, and their breadth three-quarters of a mile. The group is thoroughly representative of all the known Silurian localities in the eastern half of Nova Scotia, and, as far as I know, it is the only district in the eastern part of the province where every member of our Upper Silurian series exists*. Here we have the whole in an apparently uninterrupted succession, and easy of examination, much of it being exposed in vertical and horizontal sections, on a shore subject to violent storms, accumulations of ice, and other degrading agencies. It is also bounded and intersected to a considerable extent by streams, two of which rise in the elevated metamorphic range which bounds the group on the south. The general position of the Silurian strata here is that of a synclinal axis, although it appears to be altogether different from any of Dr. Dawson's synclinal and anticlinal folds. But I do not mean to say that an anticlinal never skirted the mountains that form the great southern boundary of our Silurian group. I would rather suppose that such had existed, and that it had been removed by denudation during the early part of the Carboniferous period. Possibly the detrital matter resulting from that process formed the Lower Carboniferous conglomerate which we find associated with limestone (D)

* In England it is very common for the Llandovery group to be absent; but the rarest of all cases is to find the Wenlock (or Niagara) group missing. It is with us a thicker series than the Ludlow, and is often present where that is altogether absent. See Salter's Report on the Nova-Scotian Silurian collection. In the western part of the province, the equivalent of the Wenlock or Niagara Limestone exists, according to Hall and Dawson, at New Canaan. (Dawson's Paper, Canad. Nat. and Geol. vol. v. p. 139.)

Figs. 1–4.—*Map and Sections illustrating the Geology of Arisaig, Nova Scotia.*

Fig. 1.



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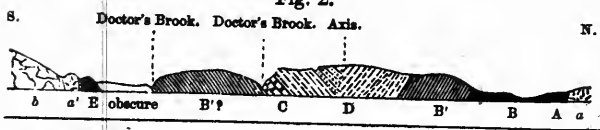


Fig. 3.

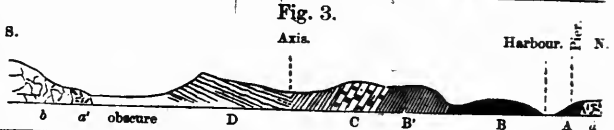
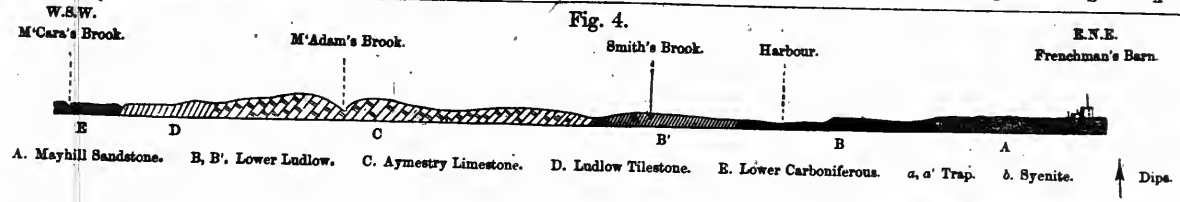


Fig. 4.

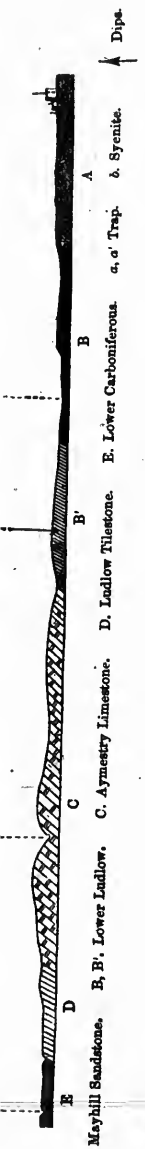


A. Mayhill Sandstone. B, B'. Lower Ludlow. C. Aymestry Limestone. D. Ludlow Tilestone. E. Lower Carboniferous. *a*, *a'* Trap. *b*. Syenite. Dips.

at Doctor's Brook, and intervening between the said mountains and a considerable part of our Silurian strata. An examination of the natural section in the line of this stream, which proceeds, with its branches, from the mountains, and traverses the rear of the group, for fully one half of its length, in a deep valley, revealed no traces whatever of the supposed old anticlinal axis.

The formation of the present synclinal axis is evidently of still later date, these strata having been elevated and thrown into a synclinal fold by the augitic trap (*a* and *a'*, fig. 1), which has also altered and upheaved the adjoining Lower Carboniferous conglomerate and limestone.

The trap (*a*) on the north, or shore, side of the group extends in an almost continuous line from Black Point to Arisaig Pier. There is one interruption where a cove has been formed, and where the strata have been left comparatively unaltered. The trap-rocks may be traced for some distance into the sea, making the shore rough and dangerous. To the west of Arisaig Pier the line of trap is interrupted, and a small bay has been formed by the denudation of the strata. The strata on the shore are consequently inclined more or less in proportion to their distance from the pier. At a certain distance they are inclined at low angles, and in some cases they are horizontal. About a mile from the pier, the strata on the shore again give evidence of disturbance, at no great distance seaward, although the cause is not visible. At the extreme of the group, south-west of the pier, trap (amygdaloid) again appears in immediate contact with strata of the uppermost member of the series, upheaving and overlying the strata at the point of contact. It again appears at intervals, constituting the shore-boundary of the Carboniferous formation: the trap (*a'*) on the opposite side of the group appears between the mountain-range and the intervening Carboniferous conglomerate and limestone, and again between a part of the latter and our Silurian strata. I also observed it at other points on this side, between the strata and the mountain-range, as indicated in the Map. At varying distances from these intruded rocks I found the strata particularly disturbed, so that the group may be regarded, on the whole, as synclinal, the direction of the axis being very irregular and generally obscure; but the axis is seen approximately near the mouth of Doctor's Brook, at Arisaig Brook, and M'Adam's Brook. I purpose now to illustrate the subject more fully by means of three sections.



§ 3. *Section from North to South.*

The first section (fig. 2) intersects the district from north to south, at about one mile from its eastern side. The trap (*a*) of the north of the section is well exposed along the shore, and forms an interesting study. It is often vesicular, amygdaloidal, and porphyritic, and is frequently associated with tufa and tufaceous conglomerate, and interesting alterations of the sedimentary strata are seen at its various exposed points of contact with them. These sedimentary rocks lose all semblance of stratification, being sometimes hardly

distinguishable from the trap itself, sometimes assuming a somewhat granitoid aspect, at others jaspideous, or beautifully turbinated, as if replete with organisms, in every case signs of organic existence being thoroughly obliterated.

The upper part of the bed A (fig. 2) has an interest of a different kind; it lies in the cove opposite the break in the line of trap, to which I have already referred, and, although tilted, the stratification is preserved, and contains many organisms. The lower part contains several patches of fossiliferous limestone; the vertical sections of these are generally plano-convex, with a maximum thickness of six inches. This limestone is very much hardened, and contains throughout beautiful crystals of iron-pyrites. These strata, which are about 200 feet thick, have, in addition to the fossils found in the beds just referred to, separate organisms, scattered abundantly through them from the bottom to the top. The fossils of this member of the group were first discovered by me in 1860, in the form of casts, at the top of the much-altered and disrupted strata at Doctor's Brook. The prolific portions of the strata of this section, and those to the west of it, were only discovered by me during the past summer. In the red-limestone beds of our section the fossils are abundant and in good preservation.

The following are the principal genera, &c., of this group:—*Orthoceras* (3 species); several species of *Murchisonia*, *Strophomena*, *Orthis*, and *Rhynchonella*; *Calymene*, *Crinoidea*, *Cornulites*, *Tentaculites*, *Petraia* (*Forresteri*, Salt.), and *Petraia*, sp.

The lithological characters of A and B of the section are so different that there is not the least difficulty in determining the termination of the one and the commencement of the other.

Strata A, where little altered, are generally hard, slaty, grey, argillaceous, and arenaceous, and therefore assume the variety of aspect already referred to when altered. Strata B are in the lowest part shaly, black, ferruginous, and argillaceous, and in the upper part they are finely laminated. The horizontal section of them in the cove, which can generally be seen only at ebb-tide, is so black, that it has often been considered by the people of the district to indicate the existence of coal. A singular and characteristic feature of these rocks is the occurrence of concretions, lying often in beds conformable with the stratification, and contrasting strikingly with the finely laminated shale in which they are enclosed. These occur from the beginning to the end of the horizontal section in the cove, for a length of about 1848 feet. They also occur in the vertical section of the same strata at Doctor's Brook, and at Arisaig Pier, or through a total length of about two miles. The conditions under which strata B have been formed appear not to have been of the kind most favourable for the existence and development of life. The thickness of strata exposed in the line of section is 170 feet, yet, after a diligent search, I only found a few *Lingulæ* in nodules, and a specimen in one of the concretions already referred to, and one or two remarkable beds of Graptolites; of the latter I extracted several hundred specimens more or less perfect. These Graptolites are of

five or six forms, all different from *Graptolithus Clintonensis*, discovered by Dr. Dawson in the beds above the portion of the series under consideration. In the line of section we have also, beyond doubt, the upper members of the series B′, C, D of the other sections, obscured by drift. I found characteristic fossils of C, the equivalent of the Aymestry Limestone, at Doctor's Brook, and of B′ in a very small brook to the west of the Frenchman's Barn; and in surface-stones in the line of section I found several specimens of *Avicula Honeymani*, Hall, which is only found in D of the series, or the equivalent of the Ludlow Tilestone. At the side of Doctor's Brook, in the same line, is a bluff, which has only yet yielded a few *Lingulæ*; they are not characteristic species. We have then another part of the group, which is also obscure. This is possibly a repetition of B′ of the series. The strata of the bluff, as well as of B′ (?), dip towards the north; and so do the others on this side, as has already been observed. It is obscure where we might have expected to find a repetition of B and A. Those formations only appear on this side of the synclinal, at the eastern part of Doctor's Brook, where its course is north and south.

We have now reached the boundary of the Silurian formation, and the section next passes through E, which is Lower Carboniferous. Here we have, first, compact limestone, and then hardened conglomerate, raised to a considerable elevation by an equally elevated mass of trap (*a′*), which succeeds it. This trap is pervaded by numerous veins of specular iron-ore, which are, however, too small to be of any economical value; succeeding this trap is (*b*) the syenite of the mountain-range.

§ 4. *Section from the East of Arisaig Pier to Doctor's Brook.*

The next section (fig. 3) begins at a point east of Arisaig Pier, and, after it reaches the south side of the harbour, its course is due south until it reaches Doctor's Brook Valley; it then passes on, and meets Doctor's Brook in the mountain. This section is very interesting, as it unquestionably passes through the whole group, and as there is very little uncertainty in the course which it traverses. We have first (*a*) a part of the line of trap, which is here amygdaloid. Succeeding this is an elevated mass of (A) the equivalent of the Mayhill Sandstone, which has been very much altered by the trap. It is now a rock of porcellanous jasper, having often a beautiful riband-like appearance. To the westward are the pier-rocks, consisting of an elevated mass of A, in like manner converted into a jaspideous rock, and of a great mass of trap lying on the south-east of the former. Between the trap of the point of section and this there is a break, opposite to which we have strata of the group A, very little altered, consisting of layers of red and yellow sandy shale, evidently similar to the strata which on either side have been converted into jaspideous rock; after these we have a low section of the group B; this is the continuation of the black laminated and concretionary shale, with *Lingulæ* and *Graptolites*, already referred to. At ebb-tide we find this shale continued farther on the shore at the

mouth of Arisaig Brook, on ascending which it is seen exposed in an interesting manner on the sides and bottom of the brook, being here black and ferruginous, and apparently destitute of organisms. This passes into the group B′, where the ground becomes elevated, the strata at the mill showing many specimens of a characteristic *Orthis*, associated with *Graptolithus Clintonensis* (?), Hall. The passage from B to B′ is very apparent here, as well as at Doctor's Brook. The shale of B′ is more compact than that of B; it is less ferruginous, being generally of a lighter colour, and it was probably deposited under conditions more favourable than the other for the existence of life.

The foregoing observations are of interest as they demonstrate the sequence, hitherto unknown, of the lowest members of the series, and prove the identity of the group A of the various sections, whether in its highly altered and apparently non-fossiliferous state or in its less altered and fossiliferous condition. Ascending we find on either side of Arisaig Brook lofty exposures of shale, with characteristic fossils of B′. Succeeding them are seen slate-rocks, forming hills of still greater elevation; on the summit of the highest of which is an outcrop of these strata, where I found *in situ* the largest *Lingula* that I have yet seen, and abundance of fragments of stems of Crinoids. I consider this to be the beginning of the equivalent of the Aymestry limestone (Salter), or the C member of our series. There is an interesting bed of this group exposed on the side of the brook; it is very ferruginous, almost constituting an ore of iron; it is from six to nine inches thick, and replete with casts of *Strophomena* (various species), *Athyris tumida*?, *Homalonotus*, *Cornulites*, &c. We now evidently approach the synclinal axis, as the strata exposed on the sides of the brook become distorted. A valley which extends from this part in a westerly direction appears to correspond with this axis. The ground through which our section now passes becomes removed from the brook; it begins to rise without exhibiting an outcrop of any importance until we reach the summit of a hill still higher than any through which the section has passed, and the highest formed by the Silurian strata. The strata outcropping on the top, and towards it, belong to the group D, or the Ludlow Tilestone (Salter), and are inclined at a low angle and with a northerly dip. Here I found *in situ* characteristic species of this member, namely, *Dalmania Logani*, Hall; *Phacops Downingia*, Salt.; *Homalonotus Dawsoni*, Hall; *H. Knightii*, Salt.; *Beyrichia*, sp.; *Crania Acadiensis*, Hall. The rocks which doubtless underlie the above do not appear in any way on the hill-side or in the valley, and there is no trace whatever of the old anticlinal; we have trap (*a′*) at a considerable distance up Doctor's Brook, at the extreme of our section, succeeded by syenite.

§ 5. *Section from the Frenchman's Barn to M'Cara's Brook.*

This section (fig. 4) passes through all the members of the north side of the synclinal in an oblique direction, its course being from N.N.E. to S.S.W., corresponding generally with the section on the

shore. It commences with what is known locally, and from maps of Nova Scotia, as the Frenchman's Barn, on the N.N.E., and terminates at M'Cara's Brook, or about $\frac{1}{4}$th of a mile beyond what I at present consider as the termination of the group. This is the most interesting of the three sections, as it includes the chief sphere of Dr. Dawson's researches and of my own. From localities embraced in this line of section the fossils have been derived which have enabled us to solve the problem of its relative age.

The Frenchman's Barn is a lofty oblong mass of jaspideous rock, with a broad and somewhat flat summit. North of this, trap is visible. On either side similarly altered strata (A) are seen rising in bold and striking masses. Large and numerous blocks of these rocks are scattered on the surface. Sometimes they are transported to a considerable distance to the south, the whole deceiving the cursory observer into the belief that they are derived from the underlying rocks; but an examination of adjoining brooks, as well as of outcrops, shows that the underlying strata include B and B′ of the series. South of the pier we find equally large masses of similar rock, transported to as great a distance and to a still more elevated position, on a hill composed of the group B′. With regard to the distinction that I have made between B and B′, I may observe that I have not found any strata about the same parallel in other localities so strongly marked as the group B; so that I am disposed to consider the peculiar characteristics of B as local, and that the mark (′) of B′ may be dropped when the group is regarded as typical.

From the position of B and B′, and their general character, I have inferred that these members of the series are our approximate equivalent of the Lower Ludlow; they undoubtedly lie between the equivalents of the Mayhill Sandstone and of the Aymestry Limestone. B of our section is generally shaly, sometimes slaty; it is exposed on the shore in horizontal and vertical sections, and also in a small brook (Smith's Brook) which passes over them nearly in the line of their dip. In those strata the organisms often form thin beds of limestone; they are sufficiently numerous as individuals, but of few species; the variety that we find in a position parallel to this in another locality, Merigonish, being here wanting. The most highly developed organism that I found here is the Lamellibranch, *Grammysia*; it here makes its first appearance in the series. In the following table the principal fossils are given:—

Grammysia triangulata, *Salt.*	Calymene.
Grammysia cingulata, *Hisinger.*	Asaphus.
Isocardia?	Crinoidea.
Strophomena depressa, *Dalm.*	Tentaculites.
Orthis.	Graptolithus Clintonensis, *Hall.*
Chonetes.	Bryozoa?
Lingula.	Worm-tracks.

Above the Graptolite-strata there occur what I call the Crinoid- and Cornulite-strata, the lithological characters of which, as well as their fossils, are so different from those of the former, that I am disposed to regard this as the commencement of the group C, or the equi-

valent of the Aymestry Limestone. The strata are so extremely hard that it is in general very difficult to extract the fossils from them. A distinguishing feature of these strata is the abundance of Crinoidal fragments and of unusually large Cornulites. It is from them, also, that I suppose we derived the beautiful *Palæaster* which was found in a water-worn boulder on this part of the shore. This interesting fossil, which I gave to Dr. Dawson, is now in his collection. It is also worthy of notice that the genera of Mollusca which, existing in *a*, had, according to our present knowledge, disappeared in B and B′ of this locality, reappear in these strata. It is also the earliest stage of the appearance of the genus *Bellerophon* in Nova Scotia. The following is a list of the principal fossils:—

Orthoceratа.
Bellerophon trilobatus, *Sow.* (*Bucania trilobata*, Hall.)
Murchisonia.
Pleurotomaria.
Clidophorus.
Avicula.
Strophomena.
Rhynchonella.
Phacops.
Crinoidea.
Palæastræa parviuscula, *Billings.*
Cornulites.

Strata of the same character continue beautifully exposed in a horizontal section on the shore under high-water mark until we reach the mouth of M'Adam's Brook. In these I found only indistinct fossils until I reached this point, where there are many specimens of a large and peculiar species of *Orthis*. Up this brook the various strata above the last are seen, with their characteristic organisms, the synclinal axis being again approximately apparent. The strata of C under examination are not only exposed on the shore and in the brooks through which the line of section passes, but also in numerous and considerable outcrops throughout the breadth of the group. On the shore at the mouth of the brook, and a little above the bed with *Orthis*, there is a stratum with *Homalonotus*, Crinoidea, and *Tentaculites*. Immediately above this, the strata at the brook, and onward to a considerable distance, become shaly, and contain numerous nodular blocks, generally of large size. These are often coated with fossils, especially *Strophomena*. Then we have hard, uniform, light-coloured argillaceous strata, which, on comparison with those of other localities, I am disposed to regard as the typical strata of the group C. A remarkable feature of these beds is the great development of the species of *Orthoceras*. It occurs here of a size unequalled either before or after, and unusually numerous. In the other locality referred to—East River, Pictou country—where this subdivision was first recognized by me, and on this horizon, I found the largest *Orthoceras* that has yet been found in Nova Scotia. In the same strata of our section there is also a characteristic species of *Homalonotus*.

The following is a list of the principal fossils:—

Orthoceras (several species).
Bellerophon expansus?, *Sow.*
Bellerophon trilobatus, *Sow.*
Bellerophon carinatus, *Sow.*
Clidophorus.
Murchisonia.
Platyschisma helicites, *Sow.*
Acroculia haliotes, *Sow.*
Avicula, sp.
Strophomena, sp.

Athyris, very like *A. tumida*, Dalm.
Atrypa reticulata, finely and coarsely ribbed varieties.
Spirifer rugæcosta, *Hall.*
Rhynchonella Wilsoni, *Sow.* (*R. Saffordi*, Hall.)
Rhynchonella (other species).
Chonetes.
Orthis.
Discina.
Lingula.
Calymene.
Homalonotus.
Crinoidea (several species).
Favosites.
Stenopora.
Tentaculites.

A little above the Orthoceras-strata are beds with abundance of a species of *Rhynchonella* having coarse wavy ribs, and then we have a stratum of considerable thickness deeply coloured with oxide of iron; the latter may be considered as the line of demarcation between the groups C and D, as there are no characteristic fossils between this and the strata where the characteristic organisms of D become evident. An unknown organism characterizes these passage-(?) beds, and is the only fossil known in them. The strata have a varying strike above the beds B, B′ of the series. From this circumstance the vertical section on the shore appears somewhat perplexing, but the horizontal section shows very distinctly the ascending order of the strata. The undoubted group D, or the approximate equivalent of the Upper Ludlow, is distinguished by its beautiful and variegated stratification, the prevalent colours being red, grey, and green. The strata are inclined 40° S.W., except where the strike becomes east and west. This is the case with the uppermost strata, which have been thrown in this direction by the amygdaloid trap, by which it is partly overlain. Here our Silurian fauna has attained its greatest development as regards genera, species, and individuals. The fossils are not, however, so well preserved as in other parts of the series. Of the class *Cephalopoda*, individuals have diminished in size, while it has received many accessions in genera and species. *Heteropoda*, *Pteropoda*, and *Gasteropoda* abound, the *Gasteropoda* being generally of smaller size than they are in the group C. *Lamellibranchiata* occur in greater numbers than before, especially species of *Clidophorus*. *Brachiopoda* are now generally of smaller species. *Crustacea* are more numerous, both in genera and species, and *Homalonotus* and *Calymene* are of rather unusual size. One pygidium of *Homalonotus Dawsoni*, Hall, must have belonged to an individual six or seven inches in length. An entire *Calymene* is four inches in length, and a glabella of another individual indicates still larger proportions. *Entomostraca* appear here for the first time, and in considerable variety and numbers, near the top of the series. In the earlier members of the series the organisms were generally insulated; sometimes they occurred in small groups, and in thin and small beds of limestone; here they often form limestone-bands five or six inches in thickness, which appear to have been, to a considerable extent, formed of the débris of organisms. In this member of the series the fossils are generally fragmentary, entire specimens being very seldom found. The following list shows the character of the fauna of the group D:—

Lituites.
Phragmoceras.
Ormoceras?
? long, tapering, and recurved.
Orthoceras nummulare, *Sow.*
Orthoceras, very like *O. bullatum*, Sow.
Orthoceras ibex, *Sow.*
Orthoceras exornatum, *Dawson.*
Orthoceras punctostriatum, *Hall.*
Orthoceras, 4 sp.
Bellerophon trilobatus, *Sow.*
Bellerophon carinatus, *Sow.*
Bellerophon striatus, *D'Orb.*
Bellerophon expansus, *Sow.*
Theca Forbesii, *Sharpe.*
Coleoprion?, sp.
Murchisonia Arisaigensis, *Hall.*
Murchisonia aciculata, *Hall.*
Pleurotomaria.
Modiolopsis? rhomboidea, *Hall.*
Modiolopsis subnasuta, *Hall.*
Clidophorus cuneatus, *Hall.*
Clidophorus concentricus, *Hall.*
Clidophorus erectus, *Hall.*
Clidophorus elongatus, *Hall.*
Clidophorus semiradiatus, *Hall.*
Clidophorus nuculiformis, *Hall.*
Clidophorus subovatus, *Hall.*
Avicula Honeymani, *Hall.*
Pterinea retroflexa. [*Salter*).
Orthonota (like many Ludlow species,
Goniophora cymbæformis, *Sow.*
Chonetes Nova-Scotica, *Hall.*
Chonetes tenuistriata, *Hall.*
Orthis, 2 sp.
Spirifer subsulcatus, *Hall.*
Rhynchonella, 3 sp.
Discina rugata, *Sow.*
Discina? lineata.
Discina? tenuilamellata, *Hall.*
Crania Acadiensis, *Hall.*
Lingula, sp.
Homalonotus Dawsoni, *Hall.*
Homalonotus Knightii, *König.*
Dalmania Logani, *Hall.*
Phacops Downingiæ, *Salt.*
Calymene, different from *Blumenbachii*, Brongn.
Proetus Stokesii?
Beyrichia pustulosa, *Hall.*
Beyrichia equilatera, *Hall.*
Beyrichia, 2 sp.
Leperditia sinuata, *Hall.*
Crinoidea.
Tentaculites.
Cornulites serpularius.
Serpulites, n. sp. (in clusters on shell of *Orthoceras*).
Stenopora.
Heliopora fragilis, *var.* Acadiensis, *Hall.*

These Silurian strata (see fig. 4) are succeeded by Lower Carboniferous conglomerate.

§ 6. *Conclusion.*

I have thus directed attention to the results of a detailed examination of the Silurian strata of Arisaig. This being the undoubted type of a very considerable proportion of our Nova-Scotian Silurian system, and bearing so striking a resemblance, as regards its fauna, to the British Upper Silurian, is a sufficient reason for so directing attention to the subject.

The conclusion thus arrived at is, that the members of the series are respectively the approximate equivalents of the Mayhill Sandstone, Lower Ludlow, Aymestry Limestone, and Upper Ludlow. Mr. Salter suggested to me the propriety of distinguishing the respective members of our series by local names. I have not been able to act on the suggestion, on account of the mode of distribution of the several members of the group. I have therefore distinguished them as Arisaig A, B, B', C, and D. I have not yet attempted to measure the entire thickness of the several strata. Supposing Dr. Dawson's estimate of the thickness of the groups B', C, D to be correct, although I consider it much below the reality, we have of them about 500 feet; I found the thickness of B 170 feet, and of A 200 feet; total, 870 feet.

I have observed that strata A have a fauna well developed, too much so, indeed, to warrant the supposition that while there are sedimentary rocks in other parts of the province, which we have every reason to suppose are older than those of the Arisaig group, our A fauna is the first one represented in our Nova-Scotian geology. Before I consulted Sir R. I. Murchison and Mr. Salter, I supposed that certain unaltered strata which I had discovered in another locality, and which had, as their only fossils, hundreds of *Lingulæ*, beautifully preserved in small spherical and elliptical nodules, might be our Nova-Scotian Primordial zone. These appeared undoubtedly to be older than the equivalent in this locality of the Arisaig group B′, or the Clinton (U. S.) equivalent of Hall and Dawson. So that, regarding this determination as correct, I considered the Lingula-bed as Middle or, possibly, Lower Silurian. This bed appears to be about the equivalent of the bed B of Arisaig, and, therefore, is not Primordial. I believe, then, that we must look elsewhere for any earlier fauna than that of the Arisaig group A. The older slates of our Gold-fields, especially in the Peninsula of Halifax, bearing a striking resemblance to the Graptolitiferous slates of Victoria, in Australia, exhibited by Professor M'Coy in the International Exhibition of 1862, that was considered by me the proper region of our Primordial fauna. After a patient search, I believe that I have discovered evidence of the existence of the expected fauna in the capital of our province.