

TRANSACTIONS

OF THE

Nova Scotian Institute of Natural Science.

ART. I.—NOVA SCOTIAN GEOLOGY—ANNAPOLIS COUNTY continued. — BY THE REV. D. HONEYMAN, D. C. L.,
*Curator of the Provincial Museum and Professor of
Geology in Dalhousie College and University.*

(Read Nov. 10, 1870.)

INTRODUCTION.

ABOUT the middle of July last I resumed my investigations in the Geology of Annapolis county. My main object, however, was the investigation of the geological relations of the Iron deposits of Moose river. They have already been connected and correlated with the Iron deposits of Nictaux. Both have been assigned to the Devonian period.

I have in a preceding paper referred the Nictaux deposits to the Middle Silurian age (*Transactions, 1877-8*), and for the time in a manner separated them from the Iron deposits of Moose river. I was prepared, however, for a reunion of both. The fact that the gigantic trilobite, *Asaphus ditmarsia*, was found in the magnetite of Moose river had led to the belief that it too was of Middle or possible Lower Silurian age.

DIARY.

Tuesday, 15th.—On my way to Moose river I observed granites to the south of the Lawrencetown Railway station. This is almost due north of the approximate western limit of the Nictaux Iron bearing strata. From Lawrencetown onward to Annapolis the only rocks observed outcropping are granites.

I had an opportunity of observing the granites to a distance

four miles south of Annapolis Royal. Through the kindness of one of Dr. Gilpin's friends we had a delightful carriage ride into the South Mountain. Reaching, apparently, the highest elevation on turning, the panorama beheld, on the north, was enchanting and extensive. The granite is known to extend 50 miles south of Annapolis. Dr. Gilpin has observed it thus far, and he believes that it connects with the Granites of Shelburne, on the Atlantic coast. This is important testimony, in its relation to the identity and age of the Annapolis and Shelburne Granites, as well as those of Halifax and other localities on the Atlantic Coast.

I found also a kind invitation awaiting me, from the Rev. Mr. Godfrey, of Clementsport, through his brother-in-law, Dr. Gilpin, offering me the hospitalities of the "Rectory." This was found to include very efficient assistance in the prosecution of my most important investigations. I have also to acknowledge my obligations to Mr. Church, for a copy of his excellent map of Annapolis county, plain and unvarnished. This was of very great assistance in prosecuting and locating my work.

Wednesday, 16th, Dr. Gilpin took me to Moose River, by the South Mountain Road, a very rough, but admirable geological road. Here I had an opportunity of observing the transition from the Granites to the stratified rocks, containing the Moose River Iron ores. We passed from the one into the other, about Beiler's Lake (Church's Map). The transition did not appear in outcrops, but from the contour, and the change from granite boulders, *debris* and roughness, to slaty, clayey and soft roads.

There were occasional outcrops of stratified rocks seen, before reaching the "New Mines" of Moose River ("Iron quarry" of Church's Map).

At the New Mines were observed considerable excavations, all perfectly dry and fresh in appearance. Great piles of slaty material with *Magnetite*, were exposed, so as to be satisfactorily examined. Several hours were spent collecting specimens of fossils. Dr. Gilpin showed me the *situs* of the *Asaphus ditmarsicæ*, as indicated to him by the superintendent of the mines. The rock and the matrix of the *Asaphus* correspond, both being largely composed of *magnetite*.

We afterwards proceeded through the Valley of Moose River, observing numerous outcrops of rocks on the road side and in the river, and at length reached Clementsport, at the mouth of the river. I received a hearty welcome from the worthy Rector and his family. It surprised me agreeably to find, that my head quarters were beside the Iron works, and consequently convenient for work.

The same evening I went to call upon Mr. Ditmars, the collector of H. M. customs, and of geological and other interesting curiosities. As I expected of a collection, of which the *Asaphus ditmarsiae* was once a specimen, other objects interesting to the geologist formed a part, one of these was a large piece of *quartzite*, with a singular *cruciform* and other organisms. Mr. Ditmars kindly presented this very interesting specimen to the Provincial Museum. I shall yet refer to it in the sequel.

I was then taken to see the "Ditmars Falls." Here was observed, a fine exposure of metamorphic rocks and a really picturesque water fall. When the brook is well supplied with water, they are said to be somewhat imposing.

Thursday, 17th, the morning.—Examined the ruinous Iron works and the interesting section of rocks adjoining. The date of the erection of the Furnace, as seen from the keystone of an arch, was "A. D. 1831." The most extensive and useful part of the works that survives is the great dam and viaduct.

Forenoon.—Went with Mr. Godfrey to the "Old Iron Mines," at Milner's, (Church's map), traversed the same road which Dr. Gilpin and I travelled on the day before, a length of three miles. I examined the numerous outcrops of rocks, which I had already noticed in passing. Turning to the right we travelled upwards of a mile, crossing the extension of the Iron bearing rocks of the New Mines, without observing any outcrop of rocks. Turning again to the right, we travelled the Hessian Line road about three-quarters of a mile. We then walked in a northerly direction about a quarter of a mile, and reached the Old or Milner Mine.

No rocks were observed *in situ* from the time we left the Moose river road until we came to the Mines. I examined the

old trenches, which are two in number, running parallel on two *beds* of ore, twenty feet apart.

These have the same course as the trench of the New Mines, and are one or other doubtless a continuation of the Iron bearing strata of the latter. Fossils were collected, of forms similar to those of the *Asaphus ditmarsiae strata*, and others not found there. Returning we kept on the Hessian Line road until we reached the Moose river road, by which Dr. Gilpin and I came to the New Mine. I had thus an opportunity of examining the other outcrop already referred to, also of re-examining the New Mine and of adding to my collection of fossils. I thus found the Moose river road presenting a good cross section of the greater part of the rocks of the area under examination.

Friday, 18th, Morning.—Engaged in locating on Church's map, the positions of the several outcrops examined, and in studying their relations.

Forenoon.—We went to Bear River Village, travelling the Digby Road at a distance of two and half miles, *Strata*, *deep* red and *soft* of considerable thickness, were observed and examined in "Deep Brook." Half a mile farther, on the left, we came to the Bear River Road, at the Temperance Hall and School House. Proceeding along this road we found an interesting outcrop of rocks; just before reaching the summit of the mountain (Purdy's) other outcrops were observed, especially after reaching the road which follows the course of Bear River on the east. Outcrops were observed occurring very frequently between the cross roads and the village. Still keeping on the east side of Bear River, a short distance above the bridge, I found and examined an interesting outcrop of rocks, on the river side. The rocks are black slate with limestones, much metamorphosed and very hard. This is particularly the case with the limestones, which are fossiliferous. I could only get fossils out of them, where they were weathered, I collected some at the southern side of the outcrop, consequently in the lower *strata*. On the Digby county side of the river, the same *strata* are seen outcropping in a ship-yard where a large ship was being built. Farther up the river we crossed at the bridge at Rice's mill; here we found a splendid

outcrop of rocks, which at first sight seemed gneissoid, on closer examination they were found to be highly fossiliferous. I collected a few fossils and traced the outcrop southwards, until the rocks became obscure. Beyond, heights were observed with large granite boulders. In the village, on the Digby side, north of the bridge and below the wharves, another important outcrop of rocks was examined, on the road and river side. Returned to Clements-port by the way we came.

Saturday, 19th.—Examined an interesting outcrop of strata, at and north of the wharf, on the shore of Clements-port and opposite the Iron works: afterwards walked along the Moose river road to the New Mine, examining in succession and detail the outcrops of rocks already noticed, with a view to the proper understanding of the geology of the district.

Sabbath, 20th.—Attended service in Mr. Godfrey's churches, at Clements-port and Bear river village; went to Digby in the evening; attended services at Mr. Ambrose's.

Monday, 21st.—We travelled the road to Waldee, which branches from Moose river road about half a mile from Clements-port; observed several outcrops of rocks similar to those exposed on the Moose river road, and examined the strata exposed in a deep brook at Waldee; proceeded to the mouth of Bear river and Digby road by the old post road, on which were observed interesting outcrops of rocks. Returned to Clements-port by the Digby road.

Tuesday, 22nd.—We returned to Bear river for the purpose of examining certain rocks exposed in a brook and on the river side, about half way between Bear river village and the Victoria bridge; observed strata between the cross roads already referred to (Friday, 19th), and the rocks of which we were in quest. We found the rocks in the brook, somewhat obscured by *debris*, but collected fossils. On the side of the river we examined a fine clear section of the same rocks; collected fossils, and also observed the rocks underlying. We returned by the road we came.

Wednesday, 23rd.—In the morning I went to the point, east side of Clements-port, with the expectation of finding *strata ex-*

posed at low water. I passed over the beach, teeming with life, searched for *strata* among luxuriant sea vegetation, and found only a great accumulation of rock masses and boulders, from the mountains on the north side of the basin (Annapolis). Under a pouring rain I made a collection of marine *fauna*, which lay in my way. I reached the rectory after a walk of a mile, wet enough. The rain was very much desiderated by the farmers, and upon the whole a rainy day was not very objectionable to myself. I had thus leisure to make up my notes, locate my work on the map, run my lines into, and even to forecast the geological arrangements of Digby county, especially on the coast of Saint Mary's bay, to await confirmation in another season.

Thursday, 24th.—I proceeded to revise and complete the Moose River section by making probable additions, whose existence was inferred from occurrences at Bear River, *i. e.*, I expected to find the extension at Moose River of the fossiliferous rocks, found above the Bear River Bridge and Rice's Mill.

Friday, 25th.—About a mile S. E. of the New Iron Mine we found a fine exposure of the rocks sought for. From this outcrop to a sawmill on the west branch of Moose River, $1\frac{1}{4}$ miles, nothing was to be seen but the *evidence of Granite*, *i. e.* a change of *contour*, granite *debris* and boulders. Under the guidance of Mr. Godfrey, I believe that I have examined every important exposure of rocks in the district. The whole area traversed is $7 \times 5\frac{1}{2}$ miles = 38 square miles. The greatest width of the strata examined seems to be from Digby to some point west of Bear River, along the line of strike of Bear River strata, being 5.5 miles. Along Bear River, the width is 4.3 miles; along Moose River and road extension, 4.3 miles (the measurements are according to Church's map).

PETRA.

1. *Granites*.—We have seen that the stratified rocks of the region are bounded on the east and south by granites. The granites are a continuation of those of Nictaux, and the same as to general character and age, *i. e.* in age they are Lower Cambrian with Lower Silurian alteration. Here they have not been observed in contact, or even in close proximity to the strata as at

Nictaux, consequently this element has not been available in the matter of mutual correlation.

2. *Gneissoid rocks*.—Dr. Gilpin informed me of the existence of gneissoid rocks in the Granite Mountain, south of Annapolis, not far from the point of Panorama, (Diary Tuesday). Since then he has given me specimens of the rocks referred to. They correspond with the gneissoid rocks at Nictaux and are doubtless of the same age, (Upper Cambrian). Masses and boulders of similar rocks were observed in the region of Moose River. Some of the masses looked as if they might be *in situ*, but they were evidently transported. It is possible that the rocks may intervene between the fossiliferous quartzites of the extreme south of Moose River section and the granites, without making their appearance by outcrops.

3. *Diorites*.—As at Nictaux these are of frequent occurrence.

The greatest exposure of Diorite (1) is on the Digby side of the Bear River, (Victoria) Bridge. This may be regarded as the first of the Bear River section of rocks. Diorite (2) was observed on the Old Post Road near Bear River. (Diary, Monday,) Diorite (4) is near the summit of Purdy's Hill. (Diary, Tuesday,) Diorite (5) is on the Moose river road about a mile and a half from Clementsport. Diorite (6) is on the same road section about an eighth of a mile from the preceding. Diorite (7) is about a third of a mile from Diorite (6), and at the lower end of Bear River Village, (Diary, Thursday,) at a distance of about three and a half miles from Diorite (1), at Victoria bridge. It is not far below the extension of the strata of the New mines in the same locality. If this Diorite 7 were to be extended to Moose river its position in the section would not be far to the north of the New mine. If the others were in like manner to be extended, we should have Diorites occurring in the section the same number of times as in the Nictaux river and Cleveland mountain section.—*Vide Paper*.

4. *Quartzites and Sandstones*.—The Quartzite which seems to be *first* in order is exposed on the Annapolis side of Bear river, about one-eighth of a mile from Diorite [1] (Diary, 2nd Tuesday). Mr. Godfrey informed me that an attempt had been

made to improve the river road, which is certainly very steep where it passes over this quartzite and its associate rocks, but had to be abandoned on account of the hardness of the rocks. The outcrop on the river certainly indicates considerable thickness and flinty hardness. The *second* quartzite is exposed at T. Bogart's, in great masses on the east side of the road. The road makers seems to have shunned this. It is of equal hardness with the preceding. It occurs 1.1 miles from it. The *third* quartzite is at Rice's mill. This is fossiliferous (Diary, Thursday, 17th). It is more like a sandstone. It is metamorphic, but not in the same degree as the two preceding. It has cleavage but is of inferior hardness. Its extension is at Moose river, which is also fossiliferous (Diary, Thursday, 24th). This is highly metamorphic and of equal hardness with Quartzites (1 and 2).

5. *Micaceous Slate*.—A thick band of highly micaceous and black Slate succeeds the *first* diorite (3) of the Moose river road section. The outcrop of this is very striking. It looks like roofing slate and divides very regularly into rhomboidal forms. When split the surfaces are coated with scales of mica, giving an unctuous touch.

Another micaceous black slate was observed in connection with the great quartzite of Bear River.

These slates very much resemble the micaceous strata of Nictaux Falls, except in compactness. As this properly may be viewed as accidental, the resemblance may be regarded as indicating the co-temporarity of the Nictaux slates, which I was led to regard as of *age prior* to the strata with which they are associated. *Vide Paper in Transactions.*

STRATA.

Argillites.—In describing these I shall sketch the Moose River section.

1st.—We have the red and grey strata north of the wharf of Clementsport. The same appears in sections on the Digby side of Bear River, at the Victoria Bridge. This is above diorite, (1.) They are also seen in Deep Brook, at Ditmars farm, between Victoria Bridge and Clementsport. Here they extend from the post road to the beach of Annapolis basin. They

are all very red, so much so that when ground they may be used as *red ochre*. Part of the strata of light colour are said to act like soap when used in washing. The softness of the band and its position leads to the inference that it has suffered very much from denudation in previous periods as well as the present. It doubtless added its *quota* to the formation of the New Red Sandstone (Triassic). Its colour should be taken into account on speculations "On the colouring of the New Red Sandstone" of Annapolis and Kings Counties. I have already credited a part of this colouring to the *Red hematite* of Torbrook, Nictaux. The red slates of Kentville and Wolfville should not be overlooked. In the outcrop at Clementsport the red and grey argillites have interbedded quartzites and quartz veins, the latter attaining to a thickness of three inches. Following these are slates of various shades of grey and black, on them the wharf is built.

The next in order are the strata of the Iron works on the other (E.) side of the harbour. These extend as far as the Bridge according to the outcrops. They are highly metamorphic, having slaty cleavage joints. They are very hard, micaceous and crumpled. Their colours are grey and black.

Beyond the Bridge are the slaty strata of Ditmars's Falls (Diary Wednesday). On the road the outcrops of these are often bold cuttings. This is especially the case at the beginning of the road to Waldec. About a seventh of a mile beyond the Bridge a fine outcrop is seen in the river. They present a beautiful banded appearance, and are very hard. After this comes the micaceous slate, already described. Beyond these, after an obscure interval, we have the slates of the New Mines, also described. These extend to Milner's Mine, westward they outcrop on the Annapolis side of Bear River, and also on the Digby side above the Diorite. As the quartzite with fossils, at the end of the Moose River section, has been shewn to be the extension of the Fossiliferous sandstones at Rice's Mill, Bear River, we may assume that the outcrops extending between New Mines and the Quartzite are of strata, which are the extension of the fossiliferous strata between Rice's Mill and Bear River (village) Bridge. I think that I may also assume that Bogart's Quartzite (No. 2), Bear

River, extends eastward to the north of Milner's Mine, and may even be concealed in the obscure interval noticed in the Moose River section. My additional reason for supposing its existence near Milner's is, that the specimen of quartzite containing the singular forms already referred to (Diary Wednesday), as received from Mr. Ditmars, was found there. On comparing the specimen with others from Bogart's quartzite, I find that they are *identical* even in *accidental structure*, such as quartz veins. The position of this quartzite relative to the *Asaphus ditmarsia* strata, according to this analogy, will be about a quarter of a mile north, and therefore (geologically) considerably *lower*. Supposing the former to be of Middle Silurian, the latter may be assigned to the Lower Silurian period.

There is considerable variety in the strike and dip of the strata of the area.

The red slates in Deep Brook (Ditmars's) have a strike N. 55 E., S. 55 W., and a vertical dip.

The red and grey slates of Clementsport have a strike N. 60 E., S. 60 W., and a dip 43 S.

The strata of the Iron works have a strike N. 55 E., S. 55 W., and a dip S. 51 S., also a strike N. 40 E., S. 40 W., and a dip 40 N. They seem to be folded.

The same below the Bridge of Moose River have a strike N. 45 E., S. 45 W., and a dip 48 S.

The strata in Moose River have a strike N. 60 E., S. 60 W., and a dip 65, S. 30 W.

The strike of the micaceous slates in the vicinity of Diorite (3) is N. 75 E., S. 75 W., dip 74°.

The strata of the outcrop of Purdy's Mountain (diary Friday) have a strike N. 50 E., S. 50 W., and a vertical dip.

The black fossiliferous slates of the outcrop in Bear River, above bridge, have a vertical dip, and also a dip 68, N. 30 W.

The fossiliferous sandstones at Rice's Mill, Bear River, have a strike S. 60 W., N. 60 E., and a vertical dip.

The formation of these crystalline Diorites here, as elsewhere, e. g., and East river, Pictou, and Nictaux, Annapolis, have been the cause of the prevailing metamorphism and disturbance of the

stratified rocks. Two of the Diorites present the same phenomena at their point of contact with the strata, as are found in the localities specified, coalesce as if from contact while the Diorites were in fusion. There is in fact a blending of the crystalline and uncrystalline rocks. To the same cause the peculiar condition (magnetic) of some of the bedded ores is also to be assigned.

Quartzose and Micaceous.—This seems to indicate in a peculiar manner the origin of the strata as well as their relation to the associated rocks. The material has such a granitic character as to impress the conviction that it has been derived from the associated granite. It thus teaches the same lesson as the *condition* of the uncrystalline rocks in contact with granites at Nictaux.—*Vide Paper on Nictaux, Transactions, 1877-8.*

Red and gray argillites of the Moose river section, Bear river and Deep brook, seem to throw light on the geological relations of similar strata at Wolfville and Kentville. Here we have palæontological aid, which was much desiderated, especially at Wolfville (*Paper in Transactions, 1878-9.*)

FAUNA.

*Coelenterata.**Corals.*

1. *Stenopora.*
2. *Petraia sp?*
Annuloida.
3. *Crinoidea.*
Annulosa.
4. *Cornulites flexuosus.*
5. *Beyrichia 2 sp.*
Trilobita.
6. *Asaphus ditmarsicæ.*
7. *Dalmanites gilpini.*
8. *Calymene?*

*Mollusca.**Brachiopoda.*

9. *Strophomena alternata.*
10. *Athyris sps.*

11. *Spirifera* sps.
Lamelli branchiata.
12. *Modiolopsis* sp ?
Gasteropoda.
13. *Pleurotomaria* ?
14. *Maclurea* ?
Heteropoda.
15. *Bellerophon trilobatus.*
Pteropoda.
16. *Theca* sp.
17. *Tentaculites* sp.
Cephalopoda.
18. *Orthoceras* ?
Incertæ sedes.
19. *Arthrostauros godfreyi.*

Notes on *Fauna.*

2. *Petraia* sp? This coral is small, having a diameter 10 m. m. It seems to be a cast of the top of the calyx. The *septa* are numerous, being distinct around a fourth of the circumference, where the number is twelve, making a total of 48. A *carapace* valve of a *Beyrichia* covers the half of it.

5. *Beyrichia* 2 sps. These are numerous. We have *Carapace* valves of at least four distinct forms, representing, possibly, *two species*. At Nictaux two indistinct valves were found which were supposed to resemble *Beyrichia kloedeni*.

Here they are decidedly different and undetermined.

6. *Asaphus ditmarsia*.—This trilobite, which I described and named in the last year's *Transactions*, is one of those giant forms which appear and culminate in the Lower Silurian, and survive to the middle or intermediate Silurian period. Its bedding here is *magnetyte*.

7. *Dalmanites gilpini* is also from the mines, of this I have only a *glabella*. This however is in good preservation. It is broken off at the *occipital* furrow. From this to the front, the length is 19 m. m. This is equal to the width of the *frontal* lobe. The width of the *anterior* lobes is 16 m. m. of the *median* 14 m.

m., of the *posterior* 12 m. m. There is a deep *fossette* on the back part of the frontal lobe, a little above the anterior furrow. It is *papillose* or coarsely granular except in the space between the lateral furrows, there being only two tubercles from the curve of the *fossette* to the occiput. All the species that have been found in the "Upper Arisaig series" with the exception of *Dalmanialogani* occur in B' or Clinton, none of them are *papillose*. Regarding the species as new, I have named it *Dalmanites gilpini*.

9. *Strophomena alternata* does not occur in our "Upper Arisaig series" but it is of frequent occurrence in the "Wentworth series" of the Cobequid mountains, which I have correlated with the Hudson river or Cincinnati period (Lower Silurian).

10. *Athyris* of several species are found in the forms of casts. This *genus* prevails in the lowest part of the "Upper Arisaig series," being generally associated with corals, which were referred to the genus *Petraia* by Mr. Salter. The *Athyris* then disappears to reappear in great force in the Lower Carboniferous Limestone.

11. *Spirifera* are abundant here as at Nictaux, especially in the Iron mines. It is the prevalence of *Spirifera* that makes me hesitate in placing the *Asaphus strata* lower than the middle Silurian. In the "Upper Arisaig series" *Spirifera* are most numerous in the Middle Silurian division.

14. *Maclurea*, s. p.—The form which I referred to the genus *Maclurea* occurs in the specimen of quartzite referred to in my Diary (Tuesday, 15th), associated with the *Cruciform* organism. It is a cast of the top of the shell or *whorl*. The width of the cast is 2.7 x 2 inches, its depth .7 inches.

15. *Bellerophon trilobatus*. Several specimens of this *Heteropod* were found at the mines. It differs from the *Bellerophon trilobatus* of Arisaig in the form of its middle lobe. It is not so rounded, being rather acute, so that it may be regarded as an older variety. *Bellerophon trilobatus* is not found in the Middle Silurian of the "Upper Arisaig series." Its first appearance is in its *crinoid strata*, at the base of C, the Upper Silurian.

16. *Theca*, s p. is very much like *Theca triangularis* of the

Upper Silurian. This is its first occurrence in Nova Scotia, away from Arisaig. It appears to be a *prior* occurrence.

17. *Tentaculites*, s. p.—This is a small *species* like that of B, "Upper Arisaig," Middle Silurian.

19. *Arthrostauros godfreyi*.—This is the *Cruciform organism*, associated with *Maclurea*. Its obvious form is that of a Roman cross, not altogether straight in the body, the lower part of it being bent to the left. It is jointed. The number of joints is eleven. The ninth has two branches or arms of equal length proceeding from it in opposite directions. The right one has a tendency upward, not being altogether at right angles to the straight part of the stem. The joints are compressed bead shaped, and are generally half an inch in diameter. The only form that I have seen figured, which has any thing in common with it, is the *Arthroclema pulchella*, Billings. Of this the joints are differently shaped, and the branches are more numerous. While *Clema* signifying a *twig* is sufficiently appropriate as representing the shape of the latter, *Stauros* is more appropriate to the specimen before us.

The *Maclurea* and *Arthroclema* are Lower Silurian forms in Canada.

Localities.

The localities in the Moose and Bear rivers area, having fossils are: 1st the New Mines. 2nd the Old Mines. 3rd Beaver river above the bridge and at Rice's mill. 4th the continuation of Rice's mill strata, at Moose river. 5th Bear's river midway between the Village bridge and Victoria bridge.

Inferences.

We are thus led to the conclusions—

1. That the *magnetyte* strata of Moose River are not newer than the Middle Silurian Period.

2. That the Quartzites at Bogart's and their eastern extension are of Trenton, if not Calciferous, age.

I have already on lithological considerations, regarded the great quartzites of Gaspereaux River, Kings County, and their associated argillites as possibly of Lower Silurian age.—*Transactions* 1878-9.

Palæontological evidence was in the case of these quartzites and argillites much desiderated. The *Maclurea* and *Arthrostauros* of Moose River may be considered, in a measure, as supplying the *desideratum*.

Certain quartzites and argillites, in Cleveland Mountain, Nictaux, may be included in the same category, as well as other quartzites at Beaver River, *e. g.*, at the joint locality No. 5.

CÆTERA.

I searched for Triassic strata resting on the red and grey strata, as at Wolfville and Kentville, but did not find any. The only formation met with was post-pliocene drift and clays. Red and tough clays were found on the shore and river banks. On the sides of Moose River were observed sections of lofty red banks of drift. In these were abundance of boulders from the North Mountain. Boulders of Basalt and Amygdaloid were found scattered everywhere. Great granite masses were also observed transported from the granite region on the east or south.

Cambrian gneissoid boulders and masses were also found as far north as Clementsport. One mass on the road from Moose River to the Milner Mine, (Diary *Thursday*), was so large as to seem *in situ*. The original rocks were not found. They may lie concealed on the borders of the granite region, as this was their position at Nictaux.

At Lawrencetown we have observed that the South mountain presents a granite front. Behind this the mountain continues to rise, including the extension of the Nictaux stratified rocks and diorites, wedged between the Lawrencetown and New Albany granite.—(Vide previous paper, Trans. 1877-8.)

Succeeding are the granite heights of Paradise, from which proceeds its river to join the Annapolis river. As Annapolis is approached the South mountain with its granite, and the North mountain with its traps, converge; the valley narrows and the Annapolis river widens into the French and Annapolis Basins. Between these lies Annapolis Royal on a peninsula.

Its Triassic strata, if such there be, lie concealed; no outcrop appearing all around to give evidence of their existence. The Archean granite and Triassic Traps are only evident. The two

periods, separated by time of duration inconceivable are thus in space, brought into close contiguity.

From Annapolis the Basin begins to widen, and the mountains to separate. The route is continued along the south side of the Basin over the border skirting the granite rising ground and mountains on the south, which at length abruptly terminate and retreat, to make room for the area of stratified and igneous rocks which has been examined.

Approaching Clementsport, the flat border is widened and becomes on the east side of the port, an area with farms of considerable extent adorned with large and elegant houses.

On the back of this area the ground rises—the soft, red, grey and black slaty strata, as I have observed, being succeeded by the hard strata of the Iron Works. The Episcopal Church is seen crowning the height, while the Rectory is seen peeping out among the beautiful trees on the less elevated ground below.

From the Rectory front through an opening among the acacias, pines and fruit trees, the prospect is beautiful. The port and mouth of Moose River, with its village, wharves and wood crowned heights, is seen extending into the basin, whose wide expanse is bounded on the north by the North Mountain. Over the woody point on the east side of the river mouth Digby town is well seen, and its wonderful mountain gap (Gut) which opens into the Bay of Fundy. The inmates of the Rectory, with the aid of a neat little *Dollond* spy-glass, are able to render the view still more interesting by bringing the distant mountains nearer, by seeing steam boats and ships on their way to and from Annapolis, and by bringing Digby, its churches, residences and inhabitants within sight of the observer.

Going from Clementsport to Bear River the flat and fertile border is still farther traversed.

At Mr. Ray's farm it has its greatest width, his elegant residence seeming at a great distance. The width here is little short of a mile. A great beauty is the abundance of cherry trees with a good crop of cherries. This is the introduction to a celebrated product of this part of Annapolis and Digby Counties.

The story of the early settlement of the district is interesting

A few Refugees—four in number—had all the flat country between Clementsport; as a grant, and part of the hilly region extending to the distance of a mile from the shore. The back hills were afterwards granted to disbanded German soldiers. Hence we have the names Waldec and Hessian Line in the mountains. It appears that a feeling somewhat akin to Jew-Samaritan prevailed between the two classes of settlers.

On the road to Bear river village which turns to the south of the main road, an ascent is made into the mountain. Near the first summit the outcropping rocks diorite, quartzite and slate indicate the origin, age and constitution of this part of the mountain, and its continuation. From this elevation and various parts of the mountain road, (Waldec) which runs on the tract and ridge of the mountains. A panorama to the north, north-east and north-west of Annapolis, the Basin, North mountain, Digby, its gut and neck with St. Mary's bay is truly enchanting. The mountains of course have their vallies, the rocks outcropping in the brooks, in these, account for their existence.

The road on the east side of Bear river, half way between the village and mouth of the river, presents a lovely view. The river somewhat broad winds beautifully on either side, it is mountainous, the heights over the quartzite with its fossiliferous argillite rise abruptly, covered with forest, the long Victoria bridge is seen spanning the river near its mouth, beyond which is a part of Annapolis basin; North mountain closes the view.

Bounding the south side of the district is a long valley, behind which rises parallel after parallel of mountains, which seem to be granitic from the all prevailing spread of granite masses and boulders, without any other rock appearing, or are seen to be granite from the prevalence of solid granite.

At the Bear River end of the great valley, Clements Vale, and the bounding mountain parallel, is situate Bear River village. This village is remarkably beautiful and picturesque. It is set on either side of the beautiful river, among hills of considerable eminence. It belongs to two counties—Annapolis and Digby. It has its wharves, drawbridge and shipyard, and is the seat of considerable trade. A large and beautiful barque, just launched,

lay at one of the wharves alongside of piles of lumber. This was associated with other vessels. In a shipyard above the bridge another barque was on the stocks. This shipyard is a place of Geological interest. The ship stands on one of the outcrops of fossiliferous rocks already referred to. Its numerous churches and elegant houses are worthy of notice. A great charm is the prevalence of ancient and noble oaks, and great, beautiful and productive cherry orchards. The last was an important element in the pleasure of our visit. It was cherry time—there was bustle in cherry picking for export, and local enjoyment. The following Sunday was "Cherry Sunday." Visitors from distant towns and villages were expected to aid the robins, who were remarkably numerous and busy in enjoying and disposing of the cherries. Bear River is evidently a paradise for robin.

ART. II.—GEOLOGICAL WAIFS FROM THE MAGDALEN ISLANDS.—BY
REV. D. HONEYMAN, D. C. L.

THESE islands are situate in the Gulf of St. Lawrence, between long. $61^{\circ} 23'$ and long. 62° , and lat. $47^{\circ} 13'$ and lat. $47^{\circ} 52'$.

They have a trend N. 45 E., S. 45 W, corresponding with that of Nova Scotia and Cape Breton.

Amherst islands, Grindstone island, Entry island and Allright island, the south-west islands of the group, are all peculiarly elevated according to the Admiralty charts.

In Logan's Geological Map of Canada the formation of the island is indicated as Lower Carboniferous.

My attention has been specially directed to the geology of the Magdalen islands, by specimens brought from time to time to the Provincial Museum.

1.—I received, three or four years ago, two pretty large specimens of Manganese ore, Pyrolusite, from Mr. William Johnstone, of Halifax. These are identical in character with our specimens from the Lower Carboniferous Limestone of Hants, N. S., Teny Cape, N. S., and North River, Colchester, &c. From these I was led to infer the existence of Lower Carboniferous Limestones in the Magdalen islands, having Manganese.