

Some agates are very curious, in as much as they represent, frequently with remarkable accuracy, faces, figures and other objects. Pliny speaks of an agate belonging to King Pyrrhus which represented the nine muses with Apollo in the midst holding a lyre; the whole being most perfect, though a mere freak of nature. Majolus informs us that there is in Venice an agate on which is the figure of a man thus drawn by the hand of nature. It is also said that in the Church of St. John, at Pisa, there is a stone of the same kind, representing an old hermit in a desert, seated on the banks of a stream, and holding in his hand a little bell, just in the way St. Anthony is generally painted. These singular accidents are not, however, peculiar to the agates. There is in the British Museum an Egyptian jasper broken in two, and on each piece is a profile of Chaucer the poet.

But however curious these freaks of nature may be, and however pretty, being only accidental, they are far less interesting to the mineralogist and the true lover of nature, than those forms which are her ordinary production.

We must, I think, turn to chemistry for satisfactory accounts of the formation of agates, but if any of the members of our excellent Institute feel an interest in the subject they have ample means of prosecuting their researches in Nova Scotia.

LONDON, Dec., 1869.

ART. VI. NOTES ON IRON DEPOSITS ON EAST RIVER IN THE COUNTY OF PICTOU, N. S. BY REV. D. HONEYMAN, D. C. L., F. G. S., *Member of the Geological Society of France, &c.*

(*Read March 14, 1870.*)

THIS subject cannot be said to be new, as Dr. Dawson, and writers on geology who have derived their information more or less from his writings, have repeatedly directed attention to the subject. In a report of a Geological examination of certain districts in Nova Scotia made by the authority of the Provincial Government, I made observations on one of the deposits, and in a letter to the

Morning Chronicle, which was copied in several of the newspapers, I directed attention to some new facts which came under my observation last summer, while engaged in that part of the County in the service of the Geological Survey. After finishing the work prescribed for the season by the Director, Sir W. E. Logan, I spent the month of September in making the examination of which I now communicate the results. Dr. Dawson, in "Acadian Geology," 2nd edition, page 591, observes: "In addition to these veins of iron ore, conformable beds, as already mentioned, exist in the upper Silurian slates, more especially on the East River of Pictou at the locality indicated on the map. At this place one bed appears to be forty feet thick, and much resembles that in the Devonian at Nictaux, but the ore is more silicious and contains only about forty per cent. of metal. This great bed of ore is especially worthy of the attention of capitalists engaged or about to engage in smelting operations, as it is only ten miles distant from the Albion Coal Mines, and is in the vicinity of abundance of limestone and building stone. The hematite and clay iron stone of the same region might also be profitably used with the specular ore of the great bed." This bed lies in what is called *Blanchard*, and is confined to the farm of — McDonald. At the barn it has its greatest width as well as its limit; near the north side of the barn it has been exposed for some depth. This is the part where the fossils prevail in the ore. The width diminishes as it proceeds northerly; it bifurcates with intersecting slates, and disappears before reaching the adjoining farm. There are strata at some considerable distance to the north which have been supposed to be a continuation of the bed, but they are only red slates. The question then is what is its depth? The bed dips at a high angle, and the depth can only be ascertained by sinking. With two or three exceptions all the fossils that I collected from the bed are casts. The ore and the fossils resemble those of a small bed of iron exposed on the side of Arisaig Brook, in the township of Arisaig, in Antigonish County. This bed is on the *Clinton horizon*. In the Blanchard bed there are fossils which correspond with those of a still lower horizon, or what I have been in the habit of naming since 1864, A Arisaig, *vide Journal of Geological Society*, November, 1864. Dr. Dawson

has suggested that this be called the lower Doctor's Brook, and the next, B, the upper Doctor's Brook, in order to avoid confusion, as he has already named my C and D upper and lower Arisaig. The Clinton equivalent as my C being his lower, and, the lower Helderberg equivalent as my D his upper. I may remark that although the Doctor's Brook series commence at Doctor's Brook which lies to the west of Arisaig, and is still situate in the *township* of Arisaig. They are better represented at Arisaig itself than at Doctor's Brook, while A, or lower Doctor's Brook, is best represented at Doctor's Brook and the cove to the westward of it.

The fossils that prevail in the East River Iron bed resemble the fossils of lower Doctor's Brook age that prevail in the Lochaber Lake locality rather than at Doctor's Brook itself, or of the equivalent strata at Sutherland's River which I discovered last summer, where they abound along with the fossils that prevail at Doctor's Brook. The slates underlying the iron bed have furnished only casts of joints of encrinites. To the west of the bed, on John McDonald's hill, are synclinal strata with Upper Arisaig fossils. To the south the strata containing the iron become highly metamorphic, being overlaid by greenstone. These extend to East River, the strata being often ferruginous. The overlying soil contains numerous pieces of brown hematite, appearing to indicate a recurrence of the bed in a metamorphosed state. At the river the greenstone outcrops in huge dimensions. On the opposite side of this band of greenstone or anticlinal to the iron bearing slates, and at some distance from the greenstone, with a marsh intervening, is a band of slate with abundance of crinoid joints, and also a trilobite found in the Lower Arisaig or Clinton strata; this band proceeds onward towards East River. I expected to find the specular iron ore of McDonald's, on the opposite side of the river, to be a continuation of the Blanchard iron. I found, however, that Dr. Dawson was correct in inserting a carboniferous series between them which effectually separated the two. This carboniferous series, as it intervenes between the two series of iron bearing strata on either side of the river, consists of crystalline limestone and uncrystalline, lying on the Silurian slates on the Blanchard side, a few paces from the foot of the greenstone mountains of limestone, with angular stones set in the lime in a pasty form,

resting on the greenstone in an elevated position at Kennedy's, at the end of the eastern road to Blanchard, and then in a bed of limestone which outcrops on the north side of the rise at McDonald's, at Pleasant Valley, and then crosses over to the south side, where it forms lofty walls on the side of the river above the bridge, and then repasses to the north side, between the presbyterian church and school house, where it lies *directly* and *unconformably* on other Silurian slates, as in other parts of East River, and at Springville. It disappears in the bank at widow Chisholm's, and reappears for the last time about $\frac{1}{2}$ a mile farther up the river on the same side and on the north side of the bed. This forms the termination of the carboniferous formation in this direction. Above this all is Silurian. Here it is divided into two portions, that on the north side of the river has been thrown into numerous folds, each anticlinal having its greenstone axis. This extends to Springville in one direction, and to Sutherland's river falls, at Parker's mill, in another.

The other portion, separating at McPhee's, passes over the river and trends along its side in a broken anticlinal fold, until we come opposite to the first Blanchard series. It is generally covered with drift material and is exposed in four places only, until we meet McDonald's iron deposit, and in every place the strata have a general S. W. strike, with variation. After separating we find this portion making its first appearance on the opposite bank of the river, below the bridge, near McPhee's. It is here a black laminated shale leading some to infer the existence of coal in the locality; it dips from the river, shewing it to be on the opposite of the anticlinal farther down the river on the site of a saw mill. The exposed strata present the same features, the strike and dips being a little different. Farther down, below Pleasant Valley, is another brook with a saw mill; here we have strata exposed having the same characters as before, with the addition of a lower belt of strata, which are compact and of a lighter colour or grey. I at once recognized the two as the upper and lower Doctor's Brook equivalent. Next, opposite the greenstone mountain, crystalline limestone, &c. In McDonald's brook we find the two well exposed, dipping nearly as formerly, having, towards the river an obscure interval, and then the other series of

the anticlinal dipping towards the greenstone mountain. This series consists of metamorphic slates with micaceous iron films, succeeded by dark coloured slates having upper Doctor's Brook fossils. These reach to the side of the bridge of the road along the south side, narrowing the distance between these and the greenstone mountain opposite to $\frac{1}{4}$ of a mile, according to measurement, so that the carboniferous band is somewhat narrow.

The lower strata of this anticlinal band extends to the S. W., and outcrops on the N. E. side of the road that leads to McDonald's, where it is underlaid by a greenstone rock which forms the axis of the anticlinal. The next outcrop of the black band is at McDonald's where the specular ore is found. I consider that I was very fortunate in meeting with the small exposure of anticlinal strata with fossils, as it proves beyond question that, although the ore at Blanchard and that at McDonald's cannot now be connected, they are on the same geological horizon, having been originally formed about the same period.

The details of structure to which I have directed your attention are exhibited on the copy of the plan which I prepared for the Geological Survey. The plan is on the scale of $2\frac{1}{2}$ inches to the mile.

The third deposit of iron ore appears to be the most important on account of its situation, the quality of ore and its probable extent. It lies nearest to the line of railway between Pictou and Halifax. The ore is brown hematite of excellent quality. The extreme end of the bed is two miles above Springville, and the nearest one mile. Last summer the bed was uncovered near its extreme end, exposing a fine bed of hematite about nine feet in width imbedded in metamorphic Silurian slates at a distance, from a hard and lofty exposure of greenstone similar to that of Blanchard, with abundance of films of micaceous oxide of iron. These and other features show that this bed is on the same geological horizon as the other two deposits already described. I found the strike of the imbedding strata; their consequent course considerably differed from what I previously supposed it to be. Masses of the ore are found scattered onward for a distance of two miles, the length of Springville. At Springville, on the property of the late Rev. A.

McGillivray, these are very abundant, and present such an appearance as to have led me for years to entertain the decided opinion that the deposit was on a particular spot of that property, but covered with much drift material. The only difficulty that appeared to militate against the supposition was that the strata underlying and supposed to contain the ore were not highly metamorphic, and contained fossils of Upper Arisaig in good preservation. I found, on making a plan of the district for the Geological Survey, that fossiliferous beds at McGillivray's were considerably in advance of the strata containing the exposed ore. That the course of ferruginous strata was, though a wilderness, lying to the N. E. of McGillivray's, and that they outcropped considerably in the rear of McGillivray's, or about two miles from the exposed outcrop. The occurrence of the masses and the appearance of the soil on a road crossing the wilderness, are indications of the continuation of the beds in the direction specified. Beyond McGillivray's the whole series appear to change their strike as they proceed northward, and a strict examination failed to discover a farther continuance of the bed of hematite, so that there is no sufficient reason to suppose that the length of the bed is more than two miles. I had once hoped to be able to connect this with McDonald's specular ore, as I afterwards expected to connect Blanchard, but the continuation of the carboniferous area already referred to, existing and widening out in this direction as well as other reasons, show that the hope was delusive. From what I have said it will be evident that they are all on the same geological horizon, and were once in a manner united; but in consequence of upheavals and subsequent geological changes they are now completely separated. Theorists have advanced the same opinion as has been done in regard to the hematites of Londonderry mines. This opinion is that it must necessarily be confined to the depth of a few feet. I met this view of the hematite in a former communication to this Institute, by the fact that a level cutting the Londonderry beds at a depth of 100 feet from the surface shewed the ore as still hematite. In addition to this Mr. Jones, the manager of the Londonderry iron mine, in answer to inquiries has informed me that he has proved the beds to the depth of 200 feet, and found the ore still hematite, so that any

theory of this band implying limited depth at East River is completely untenable.

There is only one other locality in the whole Silurian series, between East River and Merigomish, where there is any indications of the existence of iron ore. Near Sutherland's River, on the road to New Glasgow, I found a boulder of an oxide of iron slightly resembling the Blanchard ore. This was found where rocks occur on the same geological horizon as those including the beds that I have already described.

ART. VII. ON METEOROLOGICAL OBSERVATIONS FOR 1869.
CALEDONIA MINE, CAPE BRETON. BY HENRY POOLE.

(Read March 14, 1870.)

January.—THE barometer ranged from 30.455 inches on the 1st to 29.119 on the 6th; a difference of 1.336 inch. The mean of the month being 29.7182 inches after making corrections for temperature, altitude of 60 feet and force of vapour.

The thermometer ranged from 51 on the 10th to 9 below zero on the 23rd which was the coldest night, and the mean for the day being 4°; the temperature at noon being only 1 degree. The mean for the month was 19.65, and the extreme range 60°.

The relative humidity had a mean per centage of 78.7 saturation, or 100 on the 16th, and 61 on the 28th.

The force of vapour had a mean of 2.7319 millimetres or .1075 inch. The least being 0.65 milli. on the 23rd, (coldest day) and the greatest 8.68 milli. on the 10th, or the hottest day.

The anemometer made 636,500 revolutions in the month, or an average of 17.08 miles an hour. There was a calm for 8 hours on the 3rd, when the anemometer did not revolve. There were high winds on the 6, 7, 10, 17, 20, 21. The strongest on the 20th registered 35360 revolutions, or 707 miles for the 24 hours.

There were 3 days of rain and 8 of snow measuring 12 inches, included when melted in 3.610 inches of rain fall. 3 nights below zero; 29 nights of frost giving 526 degrees of frost; 5 nights of