

found fast in a trap, in every case tempted by the castoreum. The stick was always licked or sucked clean, and it seemed to act as a soporific, as they always remained more than a day without coming out of their houses.”

Such being the ease with which this much persecuted animal was formerly taken, with a prodigious demand for its skin, it would seem a special interposition in its behalf, when a change of fashion in Paris suddenly substituted silk for beaver hats—“thereby,” as a writer has said, “possibly altering the physical conditions of a continent.” Though from its extreme shyness it retires fast from the neighbourhood of civilization, yet, persecution having in a great measure ceased, it will still exist in those remoter forest districts, which, from their nature, will probably never be cleared by the settler’s axe. May they long remain in undisturbed possession of these their last strongholds, and reward the search of the friendly naturalist by the sight of those wonderful architectural labours and displays of foresight, for which the beaver is so justly celebrated.

ART. III. REMARKS ON THE MINERALS PREPARED FOR THE PARIS EXHIBITION. BY PROF. HOW, D. C. L., *University of King’s College, Windsor.*

(Read Jan. 7, 1867.)

IN making a few remarks on the minerals to be sent to the Paris Exhibition, I may say in the first place, that comparing the present collection with the specimens sent to the last two exhibitions, there is in some directions a decided improvement. This is particularly seen in those minerals which are commercially most important, viz., in gold, coal, and iron; but it is true also as regards some other minerals which may hereafter be found to admit of application; and there are interesting novelties, also, in those minerals which are solely of scientific interest.

The collections made on the present occasion will no doubt interest in a high degree men of science—men whose business is mining or metallurgy—really educated men, and the intelligent of those classes which have not had time or opportunity to make their acquaintance with these objects extensive.

The plan on which the mineral collections now to be sent, are arranged, is this :—

- 1st. There are shewn by different exhibitors, specimens of large size, illustrating the nature of economic minerals, such as coals, iron ore, manganese ore, paint and cement stones, building stones, and marbles.
- 2nd. There is exhibited by the Provincial Government, a collection of gold specimens.
- 3rd. There is a collection selected from the minerals of the late Dr. Webster, and arranged by myself.
- 4th. There is a collection arranged by myself, intended to shew generally the nature of the minerals found in Nova Scotia, and, therefore, to contain as far as practicable, an illustration of every class of minerals, and of their most striking varieties met with in the Province. This collection is to return to find a place in the Provincial Museum, for which a room of 70 ft. by 30, is set apart in the Provincial Building now in course of erection.

As it has been found necessary to send away some of the larger specimens of minerals, what is shewn at the local exhibition forms but a part of the whole collection. The specimens which have been forwarded under the head of class 40, "Mining and Metallurgy," are these :—

COALS.

1. A column of coal from Little Glace Bay, C. B., in the name of Edwd. P. Archbold, Esq. Dimensions when cut, 9 ft. 6 ins., by 2 ft. 10 ins.
2. A column of coal from Caledonia Mine, Little Glace Bay, in name of Henry Poole, Esq. Dimensions, 8 ft. thickness.
3. A column of coal from Gowrie Mines, C. B., in the name of Hon. T. D. Archibald. Dimensions, 5 ft. in thickness.
4. A column of coal from Cow Bay Mine, C. B., in the name of Robt. Belloni, Esq. Dimensions, probably 9 ft. in thickness.
5. A column of coal from Sydney Mines, Cape Breton, in the name of G. M. A., (R. H. Brown, Agent.) Dimensions, probably 5 ft. thickness.

6. A column of coal from Albion Mines, Pictou Co., in the name of G. M. A., (— Hudson, Agent.) Dimensions, 37ft. 10 inches in height.
7. Oil coal (and oil) from Albion Coal Fields, in the name of J. W. Jackson, Esq.

It is needless to say that a display of such massive samples of coal, which are accompanied in some cases by plans of workings and statements as to quality, must produce a very striking effect.

IRON ORES, OR PRODUCTS.

Ores, pig iron, bars, and cutlery, by the Acadia Charcoal Iron Co., Londonderry.

Brown hematite iron ore, from Brookfield, by W. Barnes, Esq.

Brown hematite and specular iron ore, by J. B. Oxley, Esq.

I am not acquainted with the last named iron ores, but the others are very similar in appearance and no doubt in quality. They are very pure and rich ores. The quality of the iron and steel afforded has been proved with the Acadia ores, and is well known to be of a very high order. The Brookfield ore I have analysed for the proprietors, and it gave—

Water,	11.36
Silica and gangue,	1.54
Phosphoric acid,	trace
Magnesia,	trace
Peroxide of iron and a very little alumina,	87.10
	<hr/>
	100.00

results which show it to be a very pure and rich ore.

MANGANESE ORES.

Pyrolusite, from Teny Cape, by J. D. Nash & Co.

Pyrolusite, from East Mt. Onslow, by Robert Murray, Esq.

The Teny Cape manganese ores are now well known as among the richest and purest yet found in the world. The average per centage of manganese, in the best samples, will probably be at least 90 per cent. The Onslow ore looks very good, and will no doubt give a high per centage of manganese.

Like the Teny Cape ore, it is in clean samples, very free of iron.

PAINT STONE.

Umber forming rock, from East Mt. Onslow, by Robert Murray, Esq.

Paint and cement stone, from Chester Basin, by W. Sutherland, Esq.

These paint stones are very interesting rocks. The Chester stone I have found to consist of lime-stone, impregnated with carbonates of iron and manganese, which, by exposure to weather, becomes changed to hydrated oxides, and afford umbers of characteristic colours, which form admirable paints. The Onslow umber has no doubt a similar origin to that from Chester Basin. The Chester stone has been found to yield excellent cement. Specimens of this are to be seen at the local exhibition.

Large samples of red, white and variegated Plaster, from Antigonish Harbour.

In addition to these there has been sent
A collection of rocks, minerals, ores and fossils, with maps and sections illustrating the Geology of Nova Scotia, by Dr. Honeyman.

In this collection the minerals will be shown in their relation to the rocks in which they are found, so that their mode of occurrence will be illustrated, and a most interesting study will be afforded to geologists and mineralogists. In speaking now of the minerals which remain and will be on view here, I will preserve the order in which they will be seen by visitors. In the first place will be observed the "collection of gold nuggets, and auriferous quartz from the various gold fields of Nova Scotia, prepared by P. S. Hamilton, Esq., Chief Commissioner of Mines. It is accompanied by a gilt pyramid, representing the bulk of the gold extracted in N. S. from Jan'y. 1st, 1862, to Sept. 30th, 1866, as per official returns. The weight of this bulk of gold is 84,706 oz., 14 dwt., 10 grs.; value \$1,632,315 $\frac{80}{100}$.

The specimens of quartz and gold are from eleven districts, viz:—Sherbrooke, Oldham, Tangier, the Ovens Lunenburg, Waverly, Renfrew, Uniacke, Lawrencetown, Montague, Wine Harbour, and Gay's River. Many of these are of exceeding richness, and the collection illustrates beautifully the mode in which gold occurs in the Province, and the characters of the metal found. The total value of the specimens is very roughly estimated at not less than \$1500.

Leaving these glittering specimens, whose value is likely to meet with ready appreciation, we come to

BUILDING STONES: Here we have three fine granites, and three freestones, furnished by H. Peters, Esq., and some freestones from Hants Co., by J. Wood, Jr., which do not bear so good a character as their neighbours. There is also a "firestone from Falmouth," which is much used in building fireplaces, and is said to stand very well, it has been approved of by judges in Halifax. A very interesting addition to these rocks is made by H. Webster, Esq., of Kentville, who furnishes an "ovenstone" from the red sandstone of Cornwallis, which is cut to any shape with the greatest ease with an axe, and answers an admirable purpose in making ovens. Side by side with this are remarkably fine specimens of barytes or heavy spar from Five Islands. Though not very bulky, the two probably weigh 200 lbs; they give the idea that the mineral is found in quantity, and they are pretty free from copper pyrites, which appears to be the only impurity present. I have little doubt these specimens will be much coveted for museums when they reach Paris. Close to these specimens are the

MARBLES: Here we find a specimen of the white marble, from Five Islands, which unfortunately has turned out not so good as the sample exhibited in 1862; it is of course a surface specimen, and has no doubt been affected by frost. There are also two or three specimens of the very remarkable and beautiful wave-lined grey marble from New Glasgow: these would, I have little doubt, be made to go a great way in inlaid work in the hands of an old-country lapidary. I have no hesitation in saying that this is likely to attract considerable attention. There is also a beautiful green marble from Five Islands, and

some handsome white and red specimens from Cape Breton. Leaving these we pass to

THE WEBSTER COLLECTION: Here we have a truly attractive display of those minerals which are useful for study, and as illustrations of the manifold beauty with which our earth is adorned, but are not, with one or two exceptions, of economic value. These specimens have been selected from those collected by that zealous and indefatigable student of nature, the late Dr. Webster, of Kentville, and most generously placed at the service of the Province by his widow, on condition that they be kept distinct from other minerals, as the Webster collection in the Provincial Museum. It is not necessary for me to say more than that of a special class of minerals for which this Province is well-known in the best informed scientific circles, the collection forms a very good set of illustrations. Especially admired will be the group of amethysts,* which contrast so well with the neighbouring more brilliant and colourless apophyllite, which is here represented in the finest specimens I ever saw here. The singular and varied forms of stilbite will certainly attract the eye of the general observer, and charm the mineralogist. Fine specimens of needlestone, some in crystals so thin as to show why it receives this name, and some in thicker prisms forming natrolite, are side by side with very different looking chabazite of various tints. Here is also a very beautiful "slate," which is very easily cut with a knife, and exhibits a charming variety of patterns executed in lines of different colours: this might no doubt be placed among economic minerals, as it would form attractive surfaces not liable to be scratched. I am under the impression that there is abundance of the rock. The infusorial earth here shewn is valuable as a polishing material. Immediately beyond the Webster case is a group illustrating the gypsum of Hants Co. In these specimens we have shewn the leading varieties of those rocks which are employed for agricultural purposes, and for making plaster for walls and ceilings. Close to these we have a fine

*While speaking of amethysts, I may say, that there is a tradition that a Nova Scotia amethyst adorned the Royal Crown of Louis XIV, of France. If such a stone did find such a place, it may have been transferred to the Imperial Crown.

illustration of the oil coal from Pictou Co., which is known to yield a considerable amount of oil by distillation; the oil produced is also shewn in two specimens, distilled by the exhibitor, Mr. Jackson, one of which represents the crude oil, and the other the oil refined by a second distillation. We then come to the

GENERAL COLLECTIONS OF MINERALS.—The first case we come to contains duplicate specimens of minerals of which finer specimens are in the other cases, along with some clays and a few other species. In the other three cases are specimens too numerous to describe in full: among them I may mention as specially interesting, minerals of the same name as some in the Webster collection, but exhibiting very interesting variations from the most common forms. Here are very fine specimens of analcime alone, and most exquisite groups of analcime and natrolite, fine examples of apophyllite, and the most beautiful specimen I ever saw of that form of chabazite which from being found only in Nova Scotia is called acadicolite. It is in rich red crystals nearly cubical in shape, the common form being white or nearly colourless. Here too are a few minerals which will be especially interesting to the mineralogist as being entirely new to him, from not being found out of Nova Scotia, or as being found in very few localities, namely, centrallasite, mordernite and faröelite. Among these minerals may be mentioned one which if found in quantity would have the additional interest of being very valuable in a commercial sense. I speak of a mineral I found several years ago, in the gypsum of Windsor, called natroboro calcite. It is known to occur only in a few other localities. It is rich in boracic acid, and on this account is very much valued in forming glazes on pottery, for which purpose it is exported from Peru, where alone so far it has been found in quantity. When I first described this mineral as met with here, the attention of an English pottery maker was drawn to it by some newspaper account of what I had found, and he wrote to me asking for some of it to try in glazing pottery. I sent a sample and in return received a piece of pottery glazed with the mineral I had forwarded used alone, accompanied by the statement that used in this way the Nova Scotia mineral formed an excellent glaze, while the custom was to use borates along with

other substances. The value of such mineral was stated as probably £20 stg. a ton, delivered in Liverpool. (Since this paper was read I have found this borate in plaster from two other places in Hants Co., which have also furnished me with an entirely new borate soon to be described.) Here may be seen also a specimen of the "pencil-stone" discovered by Dr. Honeyman, and of a pencil cut from it with a knife. This mineral is found over a considerable tract of country. The pencils from it are very soft, and much prized in Antigonish for writing on a slate. In the same case is a specimen of magnesia alum, which I described a few years ago as being found in Newport, where it occurs in a shale which appears to be constantly producing it by action of the weather. If there were a demand at a remunerative price, alum might be made from this rock. I found small quantities of nickel and cobalt, both valuable metals, in the alum; hence they may exist in the neighbourhood in useful amount.

In these cases are to be seen illustrations of all the ores of manganese found here—specimens of wad or earthy manganese, one of which contains cobalt, are shewn from two localities, this ore is used as a mineral paint; manganite, used for some purpose in the States, is also there; and the best ore, pyrolusite, is shewn in several varieties from Onslow, Teny Cape, Walton and other localities. Of iron ores there are a good many specimens,—magnetic iron from Annapolis and Cornwallis, and the hematite ores from Brookfield, Pictou and Londonderry, shew the richest kind of ores known to exist; to these may be added various samples of titaniferous ores. Of mineral paints which consist largely of hydrous oxide of iron, generally with more or less oxide manganese, there are several specimens of various colours. The umbers from the Chester and Onslow paint stones before spoken of, and the fine ochres from Folly River, and Antigonishe, and others, shew that of these most useful materials there is a considerable variety. As for quantity, it is known that there are large supplies to be drawn from. A few coals are exhibited here, not as rivals to the large specimens, but as rendering the collection a complete illustration of the kind of minerals found in the Province, and among them are

varieties quite interesting to the Mineralogist, some of which I owe to R. G. Haliburton, Esq.; allied to these is a very valuable addition to the class of combustible minerals discovered by W. Barnes, Esq., namely, mineral pitch or bitumen, which is shewn in most perfect globular masses and in other forms in crystallized calcite and limestone. There is a good deal of scientific interest attached to this specimen, which I propose describing fully hereafter;* in the mean time I may say that it may turn out to be closely allied to the famous albertite of New Brunswick. A few specimens of clays are shewn from which common bricks, firebricks and pottery are made in the Province.

Copper is shewn in the native state from three adjacent localities in the Bay of Fundy, and copper ores from several parts of the Province. The ore from Polson's lake, of which it is reported that the long sought vein has just been found, and the rich ore of Tatamagouche are among these; there is also the beautiful chrysocolla or green silicate of copper from Cheticamp, and grey copper from several localities: the curious cupriferous oxide of iron from Five islands is well represented. Attention may be drawn also to the magnetic iron pyrites which I have found to contain nickel, to the arsenical pyrites containing gold, and the ores of molybdenum, as interesting and possibly hereafter commercially valuable ores.

A pretty complete set of specimens shews the great variety of forms in which gypsum or plaster occurs; we have it red, pink, black, white, opaque, and clear as glass, and perfectly crystallized, in one specimen most curiously imbedded in a clear crystal of glauber salt; it is also shewn in the compact form adapted for carving, as shewn in the specimen neatly executed by C. Harding, Esq., of Windsor. The mass of selenite is very good and will probably be much admired. Close by these are a set of specimens shewing some of the varieties of hard plaster. Very fine cabinet specimens of barytes are shewn, and some very curious forms of calcite or calcspar, one of which in the nail-head form of crystals, which looks like heads of nails which seem to take their form from three blows with a hammer,

*Described in *Phil. Mag.*, May, 1867.

is especially attractive, while the others are hardly less so from the beautiful contrast of the snow-white calcite with the black lustrous pyrolusite on which it lies. Near these are shewn several forms of limestone and allied minerals suitable for fluxes, lime-making, and the manufacture of cements.

I need hardly point out the cornelian—as the four specimens of this are sure to attract attention by their brilliant red colour and high polish; close to these is a fine group of amethysts, and near them several varieties of jasper of different colours, one of which is not unlike the jasper of Arthur's Seat, Edinburgh, and was found far away from its native place, which no doubt was the shore of the Bay of Fundy, in a field in Hants county, among other drift materials. Here too are curious crystals of smoky quartz, eaten away as it were by chlorite, and nearly black quartz from Blomidon, chalcedony also and cacholong. Among the lead ores is a specimen in fine crystals from the Joggins, and one rich in silver from Victoria County; a few specimens of gold quartz and sand are shewn for the sake of having the collection more complete, and finally I may mention a piece of plumbago or blacklead, not however of good quality.

Beyond the cases we have a group of specimens of hard plaster, four in number, which have already attracted a good deal of attention, and one has been much admired as a material which, if it will only maintain its present appearance, will be valuable for making mantle-pieces, jambs of fire places, and such internal decorations as are not subject to being scratched. One sample is in the form of a table top, one, the most admired, is in the form of a pedestal, and two others are dressed and polished in angular blocks. They differ from each other and represent only some of the forms under which the rock is found. We then find tolerably large pieces of magnetic iron ore from Cornwallis, of hard manganese from Cheverie, copper ore from Five Islands. Then we have a complete and instructive set of specimens showing the way in which the rich copper is found with coaly vegetable remains in sandstone at Tatamagouche. A very beautiful incrustation of the rich green carbonate of copper adds much to the appearance of some pieces. Very fine specimens of Londonderry iron ore follow, and next we have a

set of specimens illustrating the character of sands used for making of bricks, and for moulding in brass and iron: of one of these (Mr. Pellow's from Windsor) a cargo of 250 tons was lately shipped to Boston for brass tube casting. Then we have a set of specimens from Springville, East River, Pictou, showing the character of the rich specular and brown iron ores found there, the latter I found to contain nearly sixty per cent. metallic iron, and there is a specimen of the East River limestone from which lime is largely made and exported: very much esteemed in the neighbourhood of New Glasgow.

I am afraid my remarks are somewhat crude and imperfect, but I must plead want of time to produce any thing more complete, and I hope such as they are they will be of service in marking the most important features in a collection of minerals which I think will be found very useful in illustrating the mineralogy of the Province, and of great interest to all who have devoted any attention to the subject.

ART. IV. ON THE TIDES OF THE BAY OF FUNDY. BY P. S. HAMILTON.

(Read Feb. 4, 1867.)

THE general outlines of the Bay of Fundy are well known. Its width, by a direct line from Brier island, the most western point of Nova Scotia, skirting the south-western point of Grand Manan island, to the coast of Maine, a short distance west of Quoddy Head, may be called in round numbers, fifty statute miles. From its mouth, it extends in a course as nearly as possible, due north-east, with nearly straight shores but a gradually decreasing width, for about one hundred and ten miles, when its waters separate into two arms known as the Minas channel and Chiegnecto channel. A line drawn directly from the northern to the southern shore in the immediate vicinity of cape Chiegnecto, the point of bifurcation, will show its breadth to be there about thirty miles. Following the more northern or Chiegnecto channel a further distance of about thirty miles, we find its waters again nearly equally divided. One—Shepody bay—extends in a northerly direction into New Brunswick, and