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CANADIAN

MINING REVIEW

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Canadian Mining Review

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The CANADIAN MINING REVIEW *is devoted to the opening up of the mineral wealth of the Dominion, and its publishers will be thankful for any encouragement they may receive at the hands of those who are interested in its speedy development.*

Visitors from the mining districts as well as others interested in Canadian Mineral Lands are cordially invited to call at our office.

Mining news and reports of new discoveries of mineral deposits are solicited.

All matter for publication in the REVIEW *should be received at the office not later than the 20th of the month.*

Address all correspondence, &c., to the Publishers of the CANADIAN MINING REVIEW, *Ottawa.*

It is gratifying to know that the mineral resources of Canada are receiving more attention than formerly and that the inactivity of the past in the mining districts of the Dominion is giving way to active mining operations. Capital is rapidly finding its way here for investment and through its agency our mines are being profitably developed. In the gold districts of Nova Scotia, where desultory mining has been carried on for many years, the investment of foreign capital has brought about a marked change in results. By the introduction of modern machinery at the gold mines, and by employing skilled labour, under practical and economic management, many properties in the province that had been abandoned are now made to yield gold in paying quantity and at large profit. The Nova Scotia coal mines are being more extensively worked than ever before, and in New Brunswick valuable manganese mines, and other mineral deposits, are being developed. The gold mines of Beauce, in the Province of Quebec, are being worked to advantage and some of them promise to become sources of great wealth to their owners, who are conducting operations with system and economy, with a view to permanent working. The asbestos mines of the Eastern Townships have been yielding abundantly for the past two years, and operations are now about to be resumed there, having been suspended during the winter months. The silver-bearing quartz ridges in the County of Beance are being thoroughly prospected and with encouraging results. Some of the copper mines in the Eastern Townships, notably the Capelton mines, are being extensively worked and are returning large profits to the owners who are engaged in the manufacture of sulphuric acid, to which the ore, pyrites, is eminently suited. In the County of Ottawa the phosphate mines are more productive than ever before, and the ore is being raised and carried to shipping point at greatly reduced cost, owing to the introduction of steam power and the increased facilities afforded for transportation. Mica is also being mined in the Ottawa district in large quantity and in quality equal to that produced in any other part of the world. In Pontiac County the Bristol iron mine is developing beyond the most sanguine expectations and promises to become a very important producer of an excellent quality of magnetic iron ore. Some of the iron mines of Central Ontario are also being extensively worked by a powerful organization of American capitalists, and further westward, in the Lake Superior and Lake of the Woods districts, the gold and silver deposits are being carefully developed, and the recent important discoveries in the Thunder Bay district have created quite a stir among mining men, and foreign capital is being liberally invested there. The coal mines in the Northwest Territories are being profitably worked, and one very important deposit of *anthracite* is about to be developed. From the Rocky Mountains westward, and to the southwest, in British Columbia, valuable discoveries of economic minerals are being daily reported, and the prospects for successful mining in that province during the present year are very bright. The success which is now attending operations at the gold mines in Nova Scotia, in Beance, in the Thunder Bay district and at the Lake of the Woods is considered by mining men to be of great importance, as it is evident from the course of events that more attention will be given in the future to the development of gold properties. The *Engineering and Mining Journal*, N.Y., in a recent number says:

"Gold mining is attracting more and more attention everywhere throughout the civilized world. The production of gold is decreasing and the amount required is constantly increasing. The consequence is, that the purchasing power of gold is greater every year. Gold mining is almost the only industry whose product is more valuable the "harder" the times and the less it costs to produce. It is almost the only mineral product that never depreciates in value and that never overstocks the market."

Therefore, we add, develop your gold claims!

The Hon. John Norquay and others, of Winnipeg, give notice of application for incorporation as the Otter Tail Gold and Silver Mining Co., of Winnipeg; capital $200,000.

Mr. J. Obalski, Government Mining Engineer for the Province of Quebec, and Professor at the Polytechnic School, will move his office on the 1st May from Quebec to the Government buildings on St. Gabriel Street in Montreal.

Canada's Phosphate Industry.

The phosphate mines in Ottawa county are attracting more attention at the present time than at any former period since they have been in operation. The many improvements that have been made at the mines by the introduction of steam drills and hoists and other machinery have so facilitated the raising of ore that owners of mines have been enabled to largely increase their output, and additional facilities for transportation having been provided during the past year, the difficulty of carrying the ore to the point of shipment, at Montreal, has thus been removed and the cost of transportation greatly reduced. There is no longer any necessity for winter delivery at Buckingham. Mr. Lomer, of Montreal, with his usual foresight and enterprise, now has a suitable steam-tug and sufficient scows ready for transporting ore when navigation opens in the Riviere du Lievre. There are other ore vessels on the river which, together with those owned by Mr. Lomer, will supply sufficient transport accommodation to deliver the entire output of the mines in the district at the railway terminus during the summer months. The branch line of the Canadian Pacific Railway from the landing to Buckingham station in the main line will be in running order before the shipping season from Montreal will have begun. The road-bed was graded last autumn and the rails have been laid over more than half the distance (two miles) since the snow disappeared. With the accommodation afforded by this branch line the phosphate shippers have been relieved of the annoyance, responsibility and expense of carrying their ore for three and a half miles over a road that has been almost impassable at all seasons, and quite so during the spring and autumn months. The ore that has been raised during the past six or seven months has accumulated and now presents an imposing sight. An inspection of the piles at the various mines cannot fail to convince buyers that the output to go forward this season is of a higher grade than that of former years, which is strong evidence that miners are giving more attention to the careful cobbing and cleaning of the ore so as to bring it up to a high state of purity. The condition of the foreign fertilizer markets is not yet as encouraging as might have been expected and but limited sales have been made at present ruling prices. From the prices of two years ago there has been a downward movement, but notwithstanding the present comparatively low quotations the margin of

profit to producers is upwards of one hundred per cent. Since the breaking up of winter roads the mines have been difficult of access and this will be the case until the ice leaves the river and navigation has opened, which is looked for any day. The past winter has been a very severe one, the most severe in fact in the recollection of old settlers, and yet mining operations have been in no wise checked thereby. Upwards of 18,000 tons of phosphate have already been raised since the close of navigation last year and the mines are in such condition now as to render them capable of yielding sufficient ore during the next four months to bring up the total year's output to the figures approximately estimated in our last issue.

The Phosphate of Lime Company, the Union Phosphate Company, the Dominion Phosphate Company, the Ottawa Phosphate Company, the duLievre River Phosphate Company, W. A. Allan, and Messrs. McLaurin and Blackburn are all turning out ore in large quantity, and their mines continue to improve with development. More attention is now given to deep mining and those who have so directed their operations, notably the Dominion Phosphate Company and Mr. W. A. Allan, have been much encouraged. The phosphate industry of the district was never more promising than now.

Phosphate Quotations.

The most recent quotations received from abroad for Canadian phosphate are 1s. 1d. for 75 per cent. guaranteed, straight, and 1s. 1½d., for 80 per cent. with one-fifth of a penny rise. Some contracts have been made at these figures with stipulations by sellers for Canadian analysis. In these cases assayers in Montreal, Toronto and New York have been selected.

Transportation of Phosphate.

The cost of transporting phosphate from the mines to Montreal has been reduced to a minimum. The scale of charges from High Falls to Buckingham landing by scow, after opening of navigation, will be from 60c. to 35c. per ton, according to location of mine. From Buckingham landing to Montreal per C. P. R. the rate has been made at $1.40 per ton—a saving of quite $1.25 per ton on former cost from the mines. Ocean freight rates will be uncertain until after the opening of navigation, but it is not expected that they will rise much higher than last year. If war should be declared between England and Russia ocean freights would probably be affected, and insurance will certainly be higher.

In Dr. Selwyn's last "Report of Progress" of the Geological Survey of Canada appears a report by Mr. J. Fraser Torrance on the apatite deposits of Ottawa County. After describing many of the most important mines, and referring to statistics of the trade, prices, &c., Mr. Torrance adds: "The question of appointing official inspectors and analysts to certify to the quantity and grade of every shipment from Montreal has often been agitated. The shippers are at present compelled to accept the certificates of the analysts employed by the purchasers as the basis of settlement. I hesitate to recommend any official action by the government in this matter." This is a question of sufficient importance to call for the co-operation of phosphate shippers to effect a new and more aquitable system of purchase and sale.

South Carolina Fertilizers.

STATEMENT OF THE SHIPMENT OF FERTILIZERS FROM CHARLESTON, S.C., DURING THE FIRST THREE MONTHS OF THIS YEAR, AS COMPARED WITH THE SHIPMENTS DURING THE SAME PERIOD OF 1884.

Major E. Willis, Charleston, S.C., has furnished us with the following statement, showing the shipment of fertilizers from Charleston during the months of January, February and March in 1884 and 1885. The statement shows that the shipments during the present year have been 11,952 tons in excess of the shipments made during the first three months of last year:—

January—By the	1884.	1885.
South Carolina Railway	21,443	23,297
Northeastern railway	5,194	7,070
Charleston and Savannah railway	4,196	3,435
Pee-Dee and Santee steamer	2,009	2,196
February.		
South Carolina railway	29,171	27,175
Northeastern railroad	12,318	11,398
Charleston and Savannah railway	5,373	4,457
Santee and Pee-Dee steamers	1,900	2,354
March.		
South Carolina railway	18,118	26,846
Northeastern railroad	7,822	10,571
Charleston and Savannah railway	3,525	2,466
Santee and Pee-Dee steamers	2,311	2,043
By other routes to Wilmington and Washington, N. C., Richmond, New Orleans and New York, January, February and March	2,360	4,384
	115,740	127,692
January	33,202	36,598
February	49,762	47,384
March	32,776	43,710
Total shipments	115,740	127,692

NOTES ON PROFESSOR BOYD DAWKINS' PAPER, "APATITE DEPOSITS NEAR OTTAWA."

(Published in March number of Canadian Mining Review)

BY

MR. GERRALD H. KINAHAN.

Read before the Manchester Geological Society, February, 3rd, 1885.

I have read with considerable interest Professor Dawkins' valuable paper on the occurrence of the phosphate, but his remarks as to the origin of the deposits at the Emerald mine are, it appears, not quite conclusive. The precise origin of these deposits is difficult to conceive; they are not sufficiently regular in structure or direction for lode, or fissure deposits, nor are they continuous enough for bedded masses, unless it be that the original bed—of limestone say—became greatly contorted and broken up, or possibly pinched through in places, on the plication of the strata while undergoing intense metamorphism.

From a cursory examination of the deposit at the Emerald mine in the fall of 1883, it appeared to me that the phosphate occurred in a partially altered limestone bed; the alteration having been most complete on the upper side, but had gradually invaded its lower portion; athwart this bed there were apparently smaller veins of segregative or secondary origin.

The main bed had then essentially the same structure as described in the paper, except that the apatite crystals were more numerous towards the junction of the calcite and the massive deposits of apatite. The bed dipped south at about 75°; on the south or hanging wall the apatite was massed; to the north lay the calcite or crystalline limestone; but about two feet beyond or under what appeared to be the footwall or base of the bed, phosphate was reported to occur again; this had not been opened upon.

The apatite crystals penetrating the limestone were very perfect; many doubly terminated, and some very massive; they appeared to have been introduced, or to have grown subsequently into the calcite, similar to the growth of magnetite crystals, or iron-pyrites crystals in fine slates and shales. Many of them contain enclosures of calcite, which are always more or less spherical, as though squeezed by the growth of the enclosing crystal. Almost perfect, large crystals of pyroxene also occurred in the calcite; one specimen measured 4in. by 1¾in. by ¾in. The bed appeared to be much wider in depth than at its outcrop, where apparently weathering had allowed the country rock to close in over it.

In a deep and wide cut run in from the west, to open up the deposit, a vein, about two feet wide, and dipping north (across the bed) at about 60°, showed in the face of the working; it had a "lody" structure, and contained specimens of galena, zinc-blende, copper and iron-pyrites. In the centre there was a rib of selenite two inches wide; on the upper side of this vein, phosphate was more plentiful than above.

It is difficult to correlate the phenomena at the Emerald mine with either ordinary segregation veins or true lode deposits. In segregation veins the filling materials are chiefly the constituents of the adjoining rocks, and largely crystallized. In this deposit the mica is almost the only mineral that can be said so to occur. From a deposit in a true fissure vein, that of the Emerald mine differs both in composition and structure.

The contents of the vein—exclusive of the apatite and calcite—both in quantity and variety of minerals, are comparatively limited; and except in the case of the metallic sulphides, are not those of true lodes. Quartz in particular is notably absent. Specimens do occur, but they are not abundant. The dearth of fluoride is remarkable; it occurs most intimately intermingled with the phosphate; but as a separate species it is not plentiful. The occurrences of calcite in these rocks in such quantities as a gangue is exceptional. Calcite as a gangue in fissure veins mostly accompanies lead ores, especially in limestone rocks. It does occur in fissure veins in other rocks—as granite—but is generally subordinate to the barytes, quartz, or spar gangue.

In structure the deposit does not resemble that of a true lode or fissure vein. There is an absence of continuity in any particular direction, and in cross section there is no correspondence between deposits or opposite sides, calcite occurs on the foot, apatite on the hanging wall. If these deposits occurred simultaneously, what could produce this separation? If at separate times, the first to deposit should occur on both walls.

On account of the absence of the more common phenomena of mineral veins, it appeared to me that this deposit had resulted from the action of a solution bearing fluorine and phosphorous (in what combinations it is impossible to say) on a bed of limestone, and that the "lody vein" previously mentioned was the channel through which this solution had access; and that the transverse veins were small fissures in which this solution re-acted upon a calcareous one. This latter phase (the transverse veins) is

more marked at the Victoria mine (Gore); but there much of the phosphate appeared to occur in a large pegmatite dyke. The same is, I believe, the case at the High Rock mine.

In our next issue will appear a paper "On a possible Genesis of the Canadian Apatite," by G. Henry Kinahan, M.R.I.A., &c., which was read before the Geological Society of Manchester, February 3rd, 1885.

MINING IN NOVA SCOTIA.

GOLD.

By the last annual report of the Department of Mines of Nova Scotia it is shown that gold mining in the province, during 1884, was profitably carried on, and that the production for the year, though not large, exceeded that of 1883 by 633 ounces. The returns show that 118,087 days' labour were performed during the past year; that 25,147 tons of quartz were extracted and crushed, yielding 16,079 oz., 14 dwts., 10 grs. of gold—an average of 12 grs., 18 dwts., per ton—and that the average earnings per man, per day, were $2.40.

The following mines worked steadily during the year: the Gallagher, Darr's Hill, Brunswick, Oxford and Empress, and have made satisfactory returns. Other mines were getting under way, with good promise of steady operations during 1885, among which may be mentioned the Bluenose, Montagu, Leipsigate, Rawdon and Fifteen Mile Stream mines.

Throughout the gold districts several large lots of low grade ore have been profitably mined; notably, 9,799 tons at Salmon River, yielding at the rate of 6 dwts., 20 grs., and 1,679 tons at Renfrew, yielding at the rate of 6 dwts., 18 grs., per ton.

The richest yield the returns show is 2,212 oz., 8 dwts., from 913 tons of quartz crushed by Gallagher Gold Mining Company, being an average of 2 oz., 8 dwts., 10 grs. to the ton.

In the Leipsigate Lake district the operations of Messrs. Hall and Owen show a return of 130 tons crushed last fall, yielding 410 ounces—fifty tons of which gave 250 ounces. It is to be hoped that this promising district will rank, this year, among the best of the provincial mines. A crusher of ten stamps, driven by steam, has been built near the cross-head.

In the Chezetcook district operations have been principally confined to the property of the Oxford Gold Mining Company. The returns of the Department of Mines show that 2,464 tons of quartz were crushed during the past year, and yielded 1,887 oz, 18 dwts., making the total returns 5,479 oz. from 4,550 tons of quartz. Mining has been carried on in the *Mill* and *Coleman* lodes to a depth of about 100 feet. Hoisting power, etc., is carried to the shafts by wire rope from the mill-house, where additional engine power has been put up. The surface arrangements have been improved, and additional accommodation provided for those engaged about the works. The property has now one of the best mining plants in the province, and its history has hitherto been a very successful record.

Mr. M. F. Hunt, President of the Oxford Gold Mining Company, in his annual report for 1884, which is now before us, addressed to the shareholders, shows that during the year 2,577 tons of quartz from the *Mill* and *Coleman* lodes, were crushed, and that the average yield per ton was $16.84; and that the total number of tons crushed since the mill started amounted to 4,754 up to December 31st, 1884, yielding an average of $22.79 per ton. Also, that No. 4 shaft of the *Mill* lode was down 148 feet at the close of the year. These figures are somewhat at variance with those reported by the Department of Mines.

It is to be regretted that no regular work has yet been started on the other auriferous lodes of this district, as it promises to be one of the best in the province.

COPPER.

During last summer some prospecting was done on a copper vein at Scott's Hill, Pictou County. A little work was done at the Margaretville copper mine, Annapolis County. Here native copper and carbonate is found in the joints of the trappean ash, and the indications would appear to warrant further development. A few tons of copper is reported to have been extracted from one of the Pugwash deposits of grey copper ore. In this connection the development being made at Dorchester, in New Brunswick, lead to a hope that some of these upper carboniferous deposits may have value in Nova Scotia.

Near Antigonish a depost of copper ore was said to have been found last fall. Some work was done near Whyhogomah on a vein of copper pyrites, in a diorite band.

In the Ohio district an opening was made on a deposit of yellow and grey copper ore, yielding 1,120 lbs. of copper, 6⅔ dwts. of gold, and 3 oz. of silver to the ton.

At Coxheath, during the past year, about 275 feet of drifting were made to the north and south in the 190-foot level. During the progress of this work about 100 tons of 8 per cent. ore were taken out. In addition to proving the continuity of the vein of ore found in the 140-foot level, two new and promising veins were cut, which yielded about 10 tons of 10 per cent. ore from the exploratory drifts. One of the veins yielded some 30 per cent. ore. The result of the exploratory work carried on has been to expose about 1,000 tons of ore between the 140-foot and the 190-foot levels, running from 5 to 10 per cent. of copper, with good promise of continuity in depth.

The following estimate of Mr. Van Slooten, Superintendent of the Coxheath mine, would show that copper matte can be produced at Sydney under very favourable circumstances.

Assuming that 7 tons of 5 per cent. ore will make one ton of 32 per cent matte, and a daily output of 50 tons:

Mining, dead work and transport to tide-water of one ton of ore		$2 50
SMELTING	Coke, ½ of a ton, $1.50	25
	Iron ore, ½ of a ton, $2.00	67
	Labor	25
	Superintendence, oil, coal, &c.	25
Freight to Swansea, ½ of a ton of matte, @ $5		72
Port charges and storage, ½ of $1.75		25
Commissions, assays, &c		72
Total		$5 61

which would leave a good margin even at the present low prices of copper.

IRON.

During last year the Steel Company of Canada continued working the East and West mines at Londonderry. Before the close of the year preparations were being made for sinking below No. 7 level, and it was planned to use an underground engine for raising ore from the deeper workings. The company finding that they had large quantities of "Spathic ore" available, in addition to the limonite, which has hitherto been exclusively smelted, are now using it in their furnaces.

This mineral, also known as Sideroplesite (classed by Dana as a variety of ankerite) is found in few places in quantities making it valuable to the iron smelters. In general terms it may be described as ankerite with its calcic carbonate replaced by ferrous carbonate. Mr. Henry Louis, late analyst to the Steel Company of Canada, gives the following analysis of it, which shows that it is an important source of iron:

Insoluble silicious matter	.47
Calcic carbonate	.59
Ferrous "	69.20
Manganous "	1.37
Magnesic "	28.73
Ferric oxide	.08
	100 44

At first this ore was found in the West mines mixed in strings and veinlets in ankerite; as the workings were deepened it became freer from ankerite, which at many points is present in very small amounts. The extensive deposits of this ore in the mine warrant the expectation that it will prove of much future economic value. Kilns have been erected for calcining it before it is introduced into the furnace.

The returns of the mine show that 54,885 tons of iron ore, and 5,799 tons of ankerite were extracted during 1884.

On the East River, and at other points in Pictou county some explorations were made, and the Inspector of Mines for the province remarks that it is greatly to be regretted that no successful attempts have been made to utilize the large and varied iron ore deposits of this county.

Discoveries of iron ore during last year were reported from Lorne, Pictou County; Whyhogomah, Inverness County; and Malvern, Annapolis County. Near Digby some prospecting was done in small veins of Magnetite in the Triassic Trap near its junction with the underlying substance. Analysis of the ore is said to show:

Iron	60.430
Silicia	14.320
Phosphorus	.036
Sulphur	.046
Titanic acid	none

ANTIMONY.

During the past year a valuable mine of antimony ore has been opened out at Rawdon, Hants County. Two shafts, 120 feet apart, have been sunk about 175 feet, and levels driven, from which 600 tons of No. 1 ore have been raised. The vein, which is of grey antimony ore, is from 4 to 18 inches in width, cutting talcose slates. There is little impurity present beyond small amounts of quartz and calcspar. An analysis by Mr. H. M. Smith, made in Dr. Lawson's laboratory, Dalhousie College, showed the ore to be of almost chemical purity, having little beyond mere traces of foreign material.

This discovery has led to prospecting for other deposits of the ore, and it is probable that a large district here will be found to yield it. Similar ores have been reported from Upper Stewiacke.

Though new in Nova Scotia it is not unlikely that this ore will prove a source of profitable mining and smelting.

GYPSUM.

The total exports for 1884 amounted to 11,068 tons, against 144,688 tons during the preceding year. It is anticipated, however, that the exports during the present year will resume their normal volume.

At Windsor operations are carried on almost exclusively by Mr. Edward Dimock, who has combined the various quarries on the St. Croix River. During the past year he replaced a horse tramway from the quarries to the river

by a railway of standard gauge, equipped with a locomotive and a set of self-tipping 5-ton cars. The openings into the various quarry faces will allow readily of a daily shipment of 500 tons of gypsum. The amount shipped from Windsor during 1883 was 80,072 tons. The quality of much of the rock was very good.

The New York Plaster Company re-opened the old quarry at Grandique Ferry, Richmond County (said to have been worked by the French during the occupation of Louisburg), and built a wharf. It is expected that a considerable trade will be done by this company during the present year.

MANGANESE.

The total production of manganese ore during 1884 was 302 tons. Mr. J. W. Stephens continued working his mine at Tenny Cape, and small lots were mined at Cheverie.

At the East Mountain, near Truro, Messrs. Stevens and Carter took out about 30 tons of very good pyrolusite from the drift, and have, it is reported, found the vein which they consider to have yielded the drift ore.

At Loch Lomond, in Cape Breton, Mr. E. T. Moseley continued working the Moseley manganese mines, and states that he is prepared to supply high grade ore, guaranteed 90 per cent. of binoxide. He has put in machinery for hoisting and pumping, and has done preliminary work.

LEAD.

One hundred tons of ore, averaging about 40 per cent. of lead, were taken out last fall at Smithfield, and a small smelter was erected. The ore was burned in heaps, and it was found that calcination was not carried far enough. Calciners were then put up, and after proper roasting the ore was found to be self-fluxing. The inception of this undertaking is extremely interesting, as the establishing of lead smelting will mark a new departure in the mining industries of the province.

Mica in Canada.

In all directions in Canada where mining or quarrying is carried on, abundance of mica is to be met with, but in most instances it is unmarketable. In the majority of cases it is associated with a limestone formation, and this is pronounced of no commercial value. In some localities, however, as in the Ottawa valley, it occurs in regular veins lying between well-defined walls of feldspar and quartz, and in others the veins are hemmed in by granite. The mica found in these formations is of a very superior quality and, in clearness and the size of the sheets, it is equal to that imported from North Carolina and New Hampshire. On the north shore of Lake Superior and in the Lake of the Woods district some excellent mica has been discovered, but the only mines of importance that are being worked in Canada at the present time are the *Pike Lake* mine, in Burgess, and the *Villeneuve* mine, Ottawa County. From both of these mines regular shipments of excellent mica are being made, amounting to several hundred pounds monthly. At *Pike Lake* mine one shaft, now at a depth of 60 feet, is yielding abundantly, and the crystals are all unusually large, many of them being capable of yielding plates measuring 8 x 12 inches. The *Villeneuve* mine, which has been greatly improved by development, has been yielding abundance of large size mica of a quality equal to any that has been imported into Canada. A drift has been run into the face of the hill which has cut the lead at a depth of 40 to 50 feet from the surface, exposing a great number of well-formed and large crystals, proving the continuity of the lead and that the mica improves as it becomes protected from atmospheric influence. The crystals of mica are here associated with tourmaline crystals in a gangue of feldspar and quartz.

Another mine is being worked in Loughborough, county of Addington, which produces a good quality of dark amber mica, and operations have been conducted successfully during the past year or longer.

Two promising deposits of excellent mica occur in the township of Miller, county of Frontenac, and in the township of Maison-Neuve, Birthier county, respectively. Mining operations have not yet been started on these locations, but it is not improbable they will develop into valuable mines.

MINING ON LAKE OF THE WOODS.

The Lake of the Woods promises to become a mining centre of considerable importance. The explorations which were actively carried on in 1882 and '83 received a check from causes wholly unconnected with the natural prospects of the district, these being principally the question of territorial jurisdiction, which prevented the issuing of titles, and the stringency of the western money market; but as soon as these impediments shall have passed away, there is every probability that the development of the discoveries already made and the search for new indications will be resumed in a more thorough and scientific manner.

Besides gold and silver the following metals and economic minerals have been found: copper, iron, zinc, lead, antimony, arsenic, iron pyrites, mica, asbestos, plumbago, marble, granite and hone-stones. The copper occurs as pyrites in veins and in schists and has been found by explorers in several places, which they keep secret until titles can be obtained by the discoverers. There is a considerable quantity of this ore in one of the veins at the George Heenan mine. Iron pyrites is abundantly disseminated in many of the rocks and is especially noticable at the Keewaitin mine. There is a good prospect that large deposits of it will be found, worth mining for the manufacture of sulphuric acid. Veins containing plates of mica occur in connection with the granites, and during the winter just past a discovery is reported to have been made near Falcon Island of one of these holding sheets of a good quality, upwards of six inches in breadth. Fine specimens of true asbestos were obtained in making railway cutting through hornblendic schists at Rat Portage, and small quantities have been found at other localities, indicating that larger deposits may be looked for. The marble is white, mottled and veined with grey and occurs at the west end of Hay Island and in other places. Syenitic granite is very abundant and may be seen in the cuttings of the Canadian Pacific Railway for miles east of Rat Portage. It occurs in upwards of twenty different places around Lake of the Woods. A fine variety which might be easily quarried may be seen at Bell's Harbor on Painted Rock Island, near the steamboat channel between Rainy River and the North-west Angle. A glossy greenish yellow silicious schist, very suitable for fine hones, has been met with in a number of places in the northern part of the lake.

The rocks in the Lake of the Woods region have been examined and their outlines mapped out by Dr. Bell, Assistant Director of the Geological Survey, who devoted parts of 1872, '73, '81 and '83 to exploring this part of the country. During 1883 he was assisted by Messrs. Coste, Lawson and Tyrrell, and in 1884 the work has been continued by the two gentlemen last named. The results of all these examinations is to show that the auriferous veins occur in massive dark green diorites, contiguous to the larger granite areas and on their western sides. Mr. Lawson has observed that the gold-bearing quartz veins follow slatey or soft streaks in this diorite. These rocks belong to the Huronian series which occupies the shores and islands of the northern part of the Lake and is represented by a great variety of crystalline schists, conglomerates, felsites, &c.

Assays have been made by Mr. Hoffmann, the pains-taking chemist of the Geological Survey, of a considerable number of samples of ore from different localities on the lake, which show that the richest veins are those around Bigstone Bay on the north-east side of its northern portion. The veins at the Pine Portage, Sultana, Winnipeg Consolidated and Keewaitin mines proved to contain rich ore. Three of the assays of that of the Pine Portage mine yielded respectively 12.77 ounces gold, 20.41 silver, 9.68 gold, 8.92 silver and 9.91 gold, 15.37 silver, to the ton of 2,000 pounds. This mine was worked steadily by a small force of men during the whole summer of 1884, and the ore produced, together with what had been previously mined, was sufficient to give pretty steady employment to the five-stamp mill at the mine, and no scarcity of water for its supply was experienced. In the autumn, a second battery of five stamps was placed on the same cam-shaft as the first, the engine being originally intended to drive ten stamps. As a good deal of secrecy was observed last summer about all the discoveries and the mining operations at the Lake of the Woods, it was impossible to ascertain the amount of gold produced at the Pine Portage mine, but it is believed to have been between 150 and 200 ounces or some $3,500 worth. In addition to the free gold thus obtained, the sulphides were concentrated by two Frue vanners and will be either exported or treated in time on the ground.

The Keewaitin mine was the only other which was worked during 1884. Operations were kept up all summer with a few men and the ore was taken in barges to the crushing mill at the Argyle Mine on Clearwater Bay. The result was said to be satisfactory, but from the general observance of secrecy no particulars could be obtained.

Although the quantity of gold which has actually been produced at the Lake of the Woods is small, still the progress which has been made towards its establishment as a mining district has been considerable and important. We have witnessed all the usual stages. First, the original discovery of the precious metal, next a good deal of promiscuous hunting and exploring accompanied by many reported assays of very rich ore, then the commencement of mining and milling, partly judicious and partly injudicious. Finally the district is surveyed geologically and reliable assays and mill returns are obtained and actual facts enough become known to justify the commencement of systematic mining and milling. The geological position and relations of the gold-bearing veins being pretty well established, the search for new mines may now be confined to narrow limits, that is, to the dark green diorites near the contact of the granite. The principal unexplored region would thus lie along this line of junction, which, as shown on Dr. Bell's map of 1881, trends south-eastward from the head of Big Stone Bay towards the arm to which Dr. Bell has given the name of Long Bay and new discoveries

may, therefore, be looked for behind Yellow Girl point and in that vicinity.

The principal places at which any work has yet been done are described by our Lake of the Woods correspondent in the REVIEW for July 1883.

Bristol Iron Mine.

In addition to the mines in Central Canada, which have frequently been referred to in the REVIEW, and from which iron ore has for some few years past been shipped to the United States, a promising mine is now in operation in the County of Pontiac. The mine, known as the Bristol Iron mine, is situated in the township bearing that name, and comprises lots 21 and 22 in the 2nd range. There are two lodes on the property having a north-westerly and south-easterly course, the most northerly one of which is now being worked. At its east end two openings have been made and a slope started at a dip of 60°. Eight hundred feet westward on the lode a 12x30 ft. shaft has been sunk to a depth of 50 feet in very rich ore, from which two levels are being driven, one to the east and the other to the west, the former to connect with the slope, and it is expected the connection will be made by the end of next September. During the past winter 7,000 tons of excellent ore was raised, 3,500 tons of which was delivered at Braeside, a station on the line of the C. P. Ry., from which point it will be forwarded, via Kingston, to the company's works at Charlotte, N. Y. The force of miners and labourers engaged averages 40 men.

There are three steam-drill, suitable hoisting machinery and two boilers on the property. The company is determined to thoroughly equip this mine and has purchased an air compressor capable of working ten drills. A powerful hoisting engine 14x36 stroke is about to be erected to work from the shaft and slope. The shaft will have two cages, and the slope is to be double-tracked. It is expected that all the improvements will be in running order before the autumn, and that thereafter the output of the mine will be not less than 75,000 tons annually. The ore is a high grade magnetic, assaying 65 per cent. metallic iron. This mine will unquestionably be an important producer, and will contribute largely to the shipment of Canadian iron ore into the United States.

NORTH SHORE OF LAKE SUPERIOR.

ITS MINERAL RESOURCES.

In a recent number the Chicago *Mining Review* publishes an interesting letter from a Port Arthur correspondent, "North Shore," as follows:

In my last communication about the mines north of Lake Superior, which dealt chiefly with the mines to the west of Port Arthur and the mining district in the State of Minnesota, adjoining the Canadian border, I promised another, having reference to other portions of the vast mining field on the north shore, on the Canadian side.

Before proceeding to fulfill that promise a few words more relative to the new silver region, commencing at the Kaministiquia River and extending through the township of Paipoonge, the Rabbit Mountain and Silver Mountain districts to the international boundary, may be found to be of general interest, inasmuch as this is the section of country which is attracting the most attention at present, and in which the greater development is in progress.

A letter which appeared in a recent number of the *Mining Review*, over the signature "Calcite," contains much valuable information respecting the silver slates of the Thunder Bay district, and it is specially applicable to the geological formation and the general character of the mineral veins which are to be found in what is now known as this new silver district. By it the writer gives some good reasons why the veins to be found in this portion of the country can be classed as true fissures, and he gives reasons to show that their mineral features may be relied upon in depth as well as at surface.

Whether the mineral properties of these veins came from great depth or from infiltration by minerals in a state of solution, that is to say, from the leakage from the rocks or the movement through the rocks and veins themselves of waters highly impregnated with mineral ingredients, whether from above or from the surrounding rocks, or from steam or vapor or influences from great depths and infiltration from above combined, are disputed theories. All geologists agree, however, that the trap dykes which cut the formation of this mineral region have had much to do with the mineral features of the veins, but exactly how their influence has been exerted has never been determined. The fact that these dykes are found to be mineralized to a much greater degree than the surrounding country rock, and the well-known affinity which minerals are known to have for each other, may account for the veins intersecting these dykes and along the line of their junction with the slates, making richer in, and in the neighbourhood of, the dykes than in other portions of the vein. At Silver Islet the richest ore was found in the dyke which its vein intersects. This dyke is highly mineralized. The same vein on the main shore in the slates contained no trace of silver; at any rate, it was not found rich enough here to pay to work.

There are other reasons than those given by "Calcite" which tend to prove the permanency of silver in depth in the veins of the Thunder Bay district. The development of Silver Islet exploded the theory once held that silver was only to be found at surface in this district. At this mine there was found very rich silver at surface, and also at various depths. At 960 feet, and even deeper, very rich ore was taken out. Again, allowing that "Calcite" is right in stating that the slates have a dip to the south-east, then it could be shown that the slates which outcrop in the Rabbit Mountain district, where such rich silver ore has been found at surface, would on their incline be found hundreds of feet below the surface at the Silver Islet mine, and particularly the islands and country west of it in the same formation. Again, silver is found at surface on different planes to the north-west of the Rabbit Mountain mine, at the Beaver mine, two miles distant, and to the west at the Twin City mine, three miles distant, and to the south-west at Silver Mountain, fourteen miles away. By allowing for the dip of the slates the same argument would apply to show that silver may reasonably be looked for at great depth at the Rabbit Mountain mine. And so on the argument can fairly be used to show that at no particular horizon of the silver slates does the silver only show. The line of slates to be found at surface in one locality would be hundreds of feet deep at other places in the same formation, and as silver was found both at surface and in depth at Silver Islet, the question of the permanency of silver in depth in the veins of this district may be considered settled, although as "Calcite" says, it makes richer in zones or pockets than in the intervening veinstone. That is the case with all silver mines, the difference between the veins of the Thunder Bay district, and those of other countries being found chiefly in the fact that where the silver in the former makes rich, it is exceptionally so.

As to the kind and character of the veins, it cannot be doubted that the Silver Islet and Beaver veins which cut the formation and the dykes in their course are true fissure veins. They have actually dislodged the dykes, which they intersect, and made faults in the formation. The same may be said of other well-known veins in the district which have the same evidences to prove them true veins. As to those running with the formation, their mineralization, length, regularity of course, their dip, cutting the formation at an angle, and their well-defined walls, where the depth has been reached, are evidences that they too are true fissures. Why the most of these veins make rich in places, producing a very high grade of smelting ore, and only stamp or very poor ore in other portions of them, is not for me to divine. It is sufficient to know that such is the case. "Calcite" points out certain conditions in the walls or country rock in the vicinity of these rich deposits which may account for them, but what caused these peculiar changes in the formation is a more difficult question.

Then as to the influence of the trap dykes on the mineral features of the veins, there has not been development enough in the country to lay down any general rule or law. In the veins in the slates which have shown silver away from a dyke the development has been very limited. Remarkably rich silver ore has been found in the Silver Islet and Beaver veins, which cut dykes, but in the Beaver rich ore is also found in the slates, disseminated all through the veinstone at considerable distances from the dyke, and as far away from it, and to as great a depth, as the vein has as yet been uncovered and crosscut down the mountain side. It is true, too, that the Silver Creek mine or 95 T vein, on the location adjoining the Twin City mine, shows rich silver ore in its outcrop. This vein runs with a dyke which forms one of its walls—the silver slate forming the other wall. The development about to be commenced at this mine will doubtless prove it to be as rich as the Beaver, Rabbit Mountain and Twin City, the three working mines in its immediate vicinity.

On the other hand, the Rabbit Mountain mine, which produced such wonderfully rich ore at surface, and at a depth of 75 feet in another shaft, and the Twin City mine, from which such very rich ore has been taken, have not yet been proved to be dyke veins. The companies operating these have not had time to do development enough to settle this question. Notably among this class of veins is the Silver Mountain vein, farther to the south-west. It is not known to be a dyke vein, and yet a mine could scarcely produce richer silver ore than has been taken from the test pit on it. At the Rabbit Mountain mine solid nuggets of argentite (black silver) weighing as much as five, six, and up to eleven pounds, have been taken from near surface in one shaft, as well as ore going over $3,000 to the ton at a depth of 75 feet in another. At the Silver Mountain mine there has been broken off in the test pit fragments of ore weighing sixteen pounds and upward, worth $10 per pound, and it is said that during a recent examination of the mine by three experts from Chicago, one blast upturned over $6,000 worth of ore from less than a ton of the veinstone. The Twin City mine produces a very high grade of smelting ore as well as stamp rock in quantity. Further devel-

opment only can prove whether these three mines will ultimately produce as good a yield as came from the celebrated Silver Islet dyke vein, which has a record in production of over $3,000,000. The Beaver mine, although in a vein cutting a dyke, can be classed as a valuable producing mine from the ore opposite both the dyke and slates, but it has made no shipment of ore. Therefore its history, which is only a few months old, cannot as yet be taken to prove that the veins cutting dykes like the Beaver, or in contact with them, like the Silver Creek mine vein, will prove the greater producers ultimately.

What is most required is greater attention to the low grades of ore which all these mines and nearly all the veins in the district yield. When it is better understood that the low grade ores such as these veins produce can be mined, treated and converted into bullion at the mines for less than $5 per ton by the latest improved methods of mining, handling and treating such silver ores, and when the large production to which the mines can be raised is figured out, the real undoubted value of the veins of low grade ore will be better appreciated and known. Were it not that such marvellously rich ore is to be found in places in the veins of the district, the owners of them would be forced to go to work at opening up their mines in a proper way with a view to mining on a large scale, mines properly opened up for large workings, instead of picking around, or "hogging" over the veins, trying to find and follow only the very rich leads of silver, as in most cases is done, regardless of the consequences and extra expense afterward attendant on an improper start and plan of development.

Around these mines, and in different localities in what is called the New Silver Region, there are very promising veins wholly undeveloped awaiting capital and experience to handle them. This country has but few practical miners.

As to the other portions of the vast mining field on the Canadian North Shore of Lake Superior, to which this letter was first intended to be confined, the developments are not sufficient to call "mines" which are now mere "prospects," except in the case of the Huronian mine, which is undoubtedly a good one, although it has been slow at getting down to practical business. Such a mine in the Western States would have been working at the rate of at least 100 tons per day production by this time, but here it can scarcely yet be said to be more than partially tested and in a position to start at real work. At this mine there is a fine mill and a splendid vein, highly mineralized throughout its entire length and with clean cut walls. It is capable of being made a large, reliable, steady producer, and yet it has made no headway worth speaking of in systematic mining and milling.

In the same geological formation as the new silver district are to be found veins cutting the same dyke as the Silver Islet vein on the islands west of it, and on the main shore running along and inland from Big Trout Bay, which should be explored and further developed. Some of them have never had any development work done upon them.

To the east of Port Arthur are the Beck or Silver Harbor and 3A mines, which, although now idle, would pay handsomely under proper management. The history of these two mines is not properly understood, or they would be at work. Of this fact there can be no doubt from the evidences to be had from various parties now living in the district. The question of title, if that is the cause of their remaining idle, is one that could be settled, no matter if at some expense and sacrifice, were prudence and energy exercised. The Beck mine is in the same silver slates, and the ore on its dump today is said to be all good pay rock. It, too, has produced very rich ore. The same can be said of the 3A mine. It is a rich mine, although a small vein in the contact between the Cambrian and Huronian formations. As to those mines or holes in the rocks, which were once started only for stock-jobbing purposes, no references need be made. They died a natural death.

Silver has been found near Blende Lake in veins which development might prove lucrative mines. The same can be said of the veins west of Little Pic River and further east. The Heron Bay gold lode, which so much resembles the Huronian mine ore, the small gold vein at Jack Fish Bay, the veins in the gold formation of that neighborhood, are all sufficiently enticing to warrant exploration and development. Some of them have not been tested. Others are known to contain a grade of ore that would likely pay well under proper management.

The zinc blende property northeast of Neepegon Bay is one that promises well and will likely go to work during the coming summer.

The gold country in the Huronian formation, commencing above the Kakabeka Falls, on the Kaministiquia River, and extending in irregular shape to the international boundary and beyond the Height of Land, is but very partially explored. It is known to contain some veins of splendid promise. The Jack Fish Lake lode is a fine one in this formation with length, breadth and unknown depth, being a true fissure, sufficient for several mining companies. It produces both gold and silver, and in places the rare sylvanite ore. The Partridge Lake lode is one of good promise, and the country around it and the Huronian mine is geologically and in fact a gold-bearing district. The veins in the Huronian gold formation nearly all produce low-grade ores, but they are considered very reliable and constant in their average yield.

The unsettled state of the title to the land beyond the Height of Land, keeps that portion of the district back, but there can be no reason why work should not be commenced on the locations which were patented while the arrangements existed between the Dominion and Ontario governments which allowed grants to be made. There is no dispute about the whole of the new silver region and the vast mining district south and east of the Height of Land, and along the entire north shore of Lake Superior, where patents can be procured from the crown for ungranted lands for one dollar per acre and surveying expenses, which rarely exceed another dollar per acre, making the total cost of unpatented lands not more than $2 per acre, with no royalties or other crown dues on the minerals. The Ontario mining law is a very liberal one, almost too much so.

The Canadian Pacific Railway has opened up a large portion of the country. The Ontario Government has given a grant to build a bridge across the Kaministiquia river opposite Murillo station, on the C. P. R., and toward the construction of a waggon road into the new silver region referred to. The Thunder Bay Colonization Railway has been chartered to serve this same district. The construction of the bridge and waggon road mentioned will be commenced this spring, and it is expected the railway will soon follow. The mining country is well watered and as a rule is surrounded with good mining timber. The climate, although severe in winter, is healthy and invigorating, and the mines can be worked with cheap labor the year round.

To such a vast mining district, with such a promise, explorers, mining men and capitalists must soon come in numbers and with means. The opportunities now are great and are only excelled by the resources of the country. The coming summer will be an active one in the district. The opening of navigation will be the watchword and development and production the reply.

BRITISH COLUMBIA MINING PROSPECTS.

THE WINTER'S WORK AT GOLDEN CITY.

Golden City is situated at the junction of the Kicking Horse River with the Columbia just where the C. P. R. leaves the narrow canyon through which the former stream passes and enters on the broad and beautiful valley watered by the latter. On the east of the town are the Rocky cuts, and on the west the range of the Selkirks. As far as surface indications indicate, the mineral wealth near the place in the latter range could hardly be more satisfactory. There is every appearance of true fissure veins running across and slightly quartering the mountains. The latter have a general direction N.W. and S.E., while the leads seem to run slightly E. of S. and W. of N.

Mr. McConnel, of this place, has formed a company to work six claims about 12 miles south. They have been working all winter on one of their claims, which shows a well-defined lead of gold and silver bearing rock, and have made 65 feet of a tunnel into it.

At Canyon Creek, which runs into the Columbia, a company of Winnipeggers, which includes some men of good standing, is working at two large post holes in the bed-rock of the Creek, under the direction of Mr. Kelly. They have made a flume 136 feet long capable of carrying off 750 cubic feet of water a minute, and a pump which will carry off 18,060 cubic feet in 24 hours. They are putting the finishing touches to their dam and intend, shortly, to start sluicing, and will soon afterwards know what their claims are worth.

Mr. F. McGuire, an old timer both in this country and the N.W.T., has two claims on Fifteen Mile Creek, which empties into the Columbia above Canyon Creek. He has named them the Ureka and the Sierra Nevada. The foothills of both are granite, and the hanging walls slate. The Ureka, which is the richest, has a width from footwall to hanging of nine feet. The assays of these leads were made in London, England, and have been very satisfactory, and a mining expert is to be sent out from there in June to examine the claims. Besides these claims there are about fifty others of varying richness on the same Creek. Mr. McGuire intended to start operations on his location early in April, by which time there was every prospect that the snow would have disappeared from the lower levels.

There is a report that Mr. Dan Mann, who owns six claims on Fifteen Mile Creek, intends to cut a waggon road up there this spring.

At the north of the Spill Amichene, 60 miles above here, Mr. Jones has a big Galena lead with great quantities of ore in sight, which he has named after that river. He has already started out to begin operations. Besides this lead another of free milling gold quartz has been discovered up the same river, which in the opinion of old miners will go at least $50 to the ton.

On Quartz Creek, about 85 miles below here, a company under the direction of Mr. Graham, has been putting in the winter developing a

lead, from which rock has been assayed at Salt Lake City, Utah, with the most favourable result.

In fact it may be said that unless the indications of mineral wealth which are visible in this section of the country are capable of attracting capital into it nothing will. Not only are the mining prospects most favourable, but this region affords advantages to the capitalist in every way. The timber is abundant, and of a kind peculiarly well adapted for smelting purposes. Water power can easily be obtained if required, and no lead has as yet been discovered within two miles of which a railroad could not be run with the greatest facility from the main line of the C. P. R. If the claims 'round here cannot find buyers this summer prospectors may as well quit on this side of the lines altogether. If capital does not come in there must be something wrong in the country, since it certainly is not the fault of the mineral prospects in it. At all events there have been before now big stampedes, and big money made too, on the other side on considerably slimmer indications than those which present themselves in this section of British Columbia.

PROFESSOR WILBER'S REPORT ON THE CANADIAN PACIFIC RAILWAY.

FUEL SUPPLY OF THE NORTHWEST TERRITORIES —BITUMINOUS, ANTHRACITE AND LIGNITE COALS.

Professor C. D. Wilber, of Aurora, Illinois, Inspector of Mines and Mining Lands, who last year made a geological survey of the line of the Canadian Pacific Railway, has made a lengthy report to the managers of the road. After showing the rich agricultural resources, he gives his views on the coal supply for the region of country contiguous to the line of railway, as follows :

"It will be interesting, especially to English and Canadian readers, to know the sources of coal for the vast region now intersected by the new Canadian Pacific Railway. This area comprises the Provinces of Manitoba, Alberta, and British Columbia. Here is an immense wilderness of both flat and rolling prairie, of grassy plains and magnificent rivers, having a soil capable of husbandry and herding, as is proven to-day by thousands of new farms, where so recently prevailed the wild and hopeless monotony of nature.

"Into this unmeasured domain nearly 2,000 miles in length east and west, by at least 400 in width north of the 49th parallel—the international boundary—are coming, with the facilities of this new trans-continental railway, now being constructed by the Government, hundreds of thousands of the more hardy populations of the northern latitudes of Ontario, Quebec and northern Europe, already accustomed to long winter terms. Coal supplies for the eastern portion of this new region will come from the Souris river lignites already referred to.

"The middle region can be supplied from Medicine Hat and Belly River coal districts which also afford lignites. The last named coals are inferior in quality, that is, not compact, having a heavy per cent. of ash and moisture and easily disintegrating in the open air. But notwithstanding they are the lowest order of cretaceous coals, yet the necessities of a six months winter will compel their use and distribution by rail on an extensive scale.

"Beyond Calgary which is destined to become the leading city of the Northwest Territory, coal is found of a quality far superior to the lignite of the plains just referred to.

"A field of anthracite coal has recently been found near Cascade mountain on the Canadian Pacific Railway 900 miles west of Winnipeg. It has been traced in a direct line on its outcrops for several miles, and at intervals pits or shafts have been dug to prove the regularity and persistence of this anthracite stratum. About 300 tons have been mined and shipped to the east, and from this amount, sufficient tests have been made, to prove not only its value, but also its identity as a true anthracite coal.

"In the western States and Territories it is a universal fact, that the grades of coals, in quality or value, increase towards the Rocky Mountains as follows :

"1. We have loose or spongy lignites ; 2. Compact or solid lignites ; 3. Semi-bituminous ; 4. Anthracite.

"A correct outline map of the productive coal limits of the Western States and Territories must be vague and uncertain, especially on the south.

"But the coal area rapidly increases with every succeeding parallel going north. This area is over 200 miles wide in South Colorado. While in Northern Colorado from Greely westward, accross North Park to the coal fields of Utah in Great Salt Lake region, the width of the coal area is nearly 600 miles.

"Through Wyoming, beginning in the Black Hills region, the coal area extends into Idaho, and includes several deposits of great size and value, notably one near Evanston on the Union Pacific Railway, having a thickness exceeding 40 feet ; easily traceable several miles northward in the Bear River Valley. But on the other hand, it is quite contrary to expectation, yet a fact, that the country nearly 900 miles west of Ogden, including both Nevada and California, is almost if not quite destitute of coal. We find the greatest width of coal area is spanned by the 49th parallel, or the international boundary, reaching from the Souris River coal system to the Pacific coast, with considerable areas intervening that are destitute of coal, both in Northern Idaho, Montana and Manitoba.

"North of this line we have already followed the route to the Canadian Pacific Railway, with results as above stated. Still further to the Northwest, 200 miles north of Calgary, in the vicinity of Edmonton, are found large areas of excellent coal exceeding 12 feet in thickness, extending thence west to the head-waters of the Athabaska, and across again to the Pacific coast.

Mining Notes.

NEWFOUNDLAND.

A statement just issued by the St. John's Chamber of Commerce for the year ended July 31st, 1884, shows that 9,536 tons of copper ore and 133 tons of copper regulus were exported.

Owing to the unprecedentedly low price of copper, all mining operations at the Betts Cove mining district have been indefinitely suspended. These mines were formerly owned by a Boston and New York syndicate. The output of ore within a few years has been over $6,000,000.

NOVA SCOTIA.

The fire that had been burning for some time in the Sydney, Cape Breton, coal mine was extinguished towards the end of March and the mines are now in operation. All hands have been working on the south side, double shifted.

The largest output ever made at any colliery in Canada has been attained at the Spring Hill collieries. Three slopes are now working and an average of fifteen hundred tons of coal is being raised daily. Sixteen hundred and ninety-three gross tons were shipped by rail April 7th.

A dispatch from the superintendent of the Oxford gold mine, Lake Catcha district, dated April 13th, says that the plates will probably be in place and running on the 13th. Every available space is now filled with ore. They were obliged to stop mining until the mill was ready. Meantime, they have sunk shafts Nos. 12 and 13 on Coleman lead, each 12 feet deeper, showing vein 2 feet wide and increasing with depth both in quality and width. As soon as the snow disappears, it is the intention to open new leads that are known to be on the property.

The new steam-hoisting works on the Orion lead at the Hall-Anderson mine started up on the 7th of April. The vein is showing well and is opened for 100 yards at a depth of 80 feet, averaging 3 feet wide, the pay-streak being about 2 feet wide. The most important strike ever known in the district was made April 9th on a cross cut at a depth of 70 feet, 40 feet north from the Island lode; a lead was cut 3½ feet wide of solid quartz showing free gold throughout. The value of this discovery can only be ascertained by developing the lead, which will be done at once. The company has only a ten stamp mill at present, but intends increasing to 20 stamps immediately, and later on to 40 stamps, as the ore is there to supply even a greater number of stamps. The ore is of low grade, running from $10 to $25 a ton.

NEW BRUNSWICK.

The Brunswick Antimony Company gave shareholders whose stock was sold for non-payment of the $1 assessment on March 31st, the privilege of redeeming it at $1 a share until April 15th.

QUEBEC.

The *Villeneuve* mica mine is improving noticeably with developement and is yielding abundantly. The quality and size of the plates shipped from the mine during the past month cannot be excelled at any mine in the world.

Activity at the phosphate mines in Ottawa County continues unabated, and with the opening of navigation on the River du Lièvre, which is expected during the first week in May, the output of the mines, which has accumulated during the past six months, will begin to move.

The Bristol iron mine, in Pontiac County, is becoming a large producer of very fine ore. Seven thousand tons were mined during the past winter, and with the machinery now being erected, and when more ground is opened, the annual output of this mine will reach 75,000 tons. The ore is shipped to Charlotte, N. Y.

Mr. J. Frazer Torrance is continuing to prospect what is known as the Armstrong location, about 25 miles from the village of St. George, county of Beauce, and is meeting with success. He has already located some extensive leads of argentiferous galena, carrying silver in paying quantity, and sufficiently rich to warrant systematic mining operations.

The Capelton copper mines in the Eastern Townships have been worked at large profits for the past three years or more, and continue-

to yield abundantly. The ore is chiefly pyrites and is shipped to New York and Brooklyn to be smelted. This ore is very valuable on account of the quantity of sulphur it contains and is worked chiefly for sulphuric acid.

Work has been resumed at the Asbestos mines in the Eastern Townships. It is expected that several undeveloped properties will be worked during the coming summer. A large force of miners will be employed at the mines in Thetford, Coleraine and Broughton Townships, and at Danville. The Johnson and Boston Asbestos Companies expect a very large output from their mines this year.

The Beauce gold mines are being vigorously worked and very satisfactory results are looked for from this season's operations. The Canada Gold Company is prospecting its territory systematically and has proved several quartz ridges to be rich in gold. Good work is being done on the Gilbert river, and Messrs. Allan and Humphrey have sunk their new shaft to within a few feet of the gravel. They have now reached a depth of 155 feet and for some distance have raised ground carrying several *colours* to the pan. The gravel at *bed-rock* is unquestionably very rich and there is no doubt that these gentlemen will be handsomely rewarded for their pluck and perseverance.

ONTARIO.

The outlook in the Thunder Bay mining district was never brighter than now.

It is stated that three new mining and manufacturing companies have been organized with large capital to operate in the Thunder Bay district.

On the north shore of Lake Superior the recent discoveries of various economic minerals is attracting the attention of mining men and capitalists.

The Ontario Government is about to build a bridge across the Kaministiquia river for the accommodation of miners to whom it will be a great boon.

Three silver mines are now being developed in the Rabbit Mountain district, namely: the Rabbit Mountain, the Twin City and the Beaver mines.

There has been considerable prospecting and active mining in the gold formation and the silver bearing district north of Lake Superior, and with satisfactory results.

It is the general impression in Duluth that with the opening of navigation will come a rush of mining men from the western states to operate on the north shore of Lake Superior.

Mr. Ryan, the millionaire hotel man of St. Paul, is looked upon as a likely purchaser of the Silver Mountain mine, owned by Messrs. Dannais and Trethewey. The price for the property has been set at $300,000.

The Huronian mine is said to be one of the most valuable gold properties of the Thunder Bay district. The vein has an average width of 6 to 7 feet and has been traced for three quarters of a mile in length. The quartz carries free gold throughout.

Mr. Keefer, of Port Arthur, who has recently returned from New York, reports that the last car-load of ore shipped to that city from the Rabbit Mountain mine was divided into four grades. No. 1 yielded 3,374 oz, No. 2, 1,251 oz, No. 3, 181 oz., and No. 4, 133 oz. of silver to the ton.

A number of valuable discoveries have been made in the new silver region in the district of Thunder Bay, commencing at the Kaministiquia river and extending through those portions of the country known as the Rabbit Mountain and Silver Mountain districts, on to Whitefish Lake, Arrow river and Pigeon river, the international boundary between the Province of Ontario and the State of Minnesota.

BRITISH COLUMBIA.

On 26th March a young man named James Blair was killed by a *cave in* on the Mason claim, Antler Creek. The body has not yet been recovered.

The Lorne Creek miners sailed from Victoria on 26th March on the steamer "Barbara Boskowitz." They were heartily cheered as the vessel moved off.

Gold diggings have been struck on Beam Inlet which give promise of richness. The quartz mill on Douglass Island is nearly completed and crushing will soon begin.

Mr. Smith, Superintendent of the Irondale Works, left Victoria at the end of March for Texada Island. He took with him a gang of men and supplies and is now engaged in preparing for mining operations. Mr. Smith speaks very highly of the excellent quality of the Texada iron ore, which he says is superior to any on the coast.

John Morrison, who has returned to Victoria from a prospecting tour through the Pitt river mountains, brought with him some fine specimens of iron, copper and marble. He also has some quartz which is supposed to contain gold and silver. He says that the mountains are full of mineral wealth and predicts a great future for the mining interests of the Province.

Messrs. J. L. Ferguson, P. Cran, B. Carter, S. Hughes and two others have started from Desolation Sound for the mainland, on a prospecting tour for minerals and timber. They expect to be absent about six weeks. Mr. J. L. Ferguson of the Britannia hotel, Victoria, several months ago visited that Sound, and found fair prospects of gold, silver and coal.

Wm. Kemp and M. Hilton, two well-known miners who went to Kootenay about ten months ago to prospect, were not heard of until, during the past winter, their horses were found in the woods along with a human skeleton. Among papers found on the clothing was a miner's certificate with Hilton's name. Without doubt these two enterprising prospectors have met with a horrible fate.

Messrs. W. F. Murray and C. D. Grant, of New Westminster, who have been prospecting for the past several months in the New Westminster district, report the discovery of a rich lead of silver a short distance from Fraser River near the Mission. The lead extends for about two miles, from 10 to 40 feet wide and in sight to a height of 100 feet. There are a series of veins of the galena ore in the same vicinity.

Mr. Murray has proceeded to San Francisco for the purpose of having a sample of the ore assayed. He has been a prospector in Arizona and New Mexico for several years and states that the ore is as rich as any he has met with. Mining experts to whom the specimens have been shown pronounce them exceedingly rich. In the same neighborhood was found a lead of gold quartz, the specimens in Mr. Murray's possessions showing considerable gold. A vein of zinc was also noted.

The Consolidated Monarch Mining Company, who own the claim at Tunnel Mountain, will soon begin operations. The lead consists of galena, and the ore, which has been assayed at Minneapolis, Chicago and Salt Lake City, goes 34 oz. of silver and 65 per cent. of lead. Mr. Biscoe, the agent of an English company, which intends taking over these claims, has gone to England to make arrangements for getting the ore smelted at Swansea.

Parties who have recently arrived at Victoria from the upper country report having passed a couple of men with pack animals near the Salmon arm, bound for Kamloops. The animals were laden with quartz, which the men stated was rich in silver, and, while not giving much information about it, claimed that they had struck a rich lead and were bringing a sufficient quantity for the purpose of having it properly assayed. From what is told it would seem that the *find* was made in the gold range near the Salmon Arm and the line of railway, and in a line with the old Cherry Creek mine.

Reports from the mines in the Cariboo district are encouraging, good pay being taken out all winter on Lightning creek from the Ross and Van Winkle claims. On Slough creek the Chinese also have been very successful. The unfortunate *cave in* of the Mason claim on Antler creek may possibly have the effect of the abandonment of that shaft. The accident was a most peculiar one. When the mass fell the force sent huge pieces of timber to the mouth of the shaft and threw mud to the roof 30 feet above. The man killed came up feet first and again sank, while the one saved luckily came up head foremost and seeing daylight threw his hands out and grasped the ladder.

Work is not now being prosecuted on the Burns mountain tunnel, but will be resumed when the season advances. The tunnel is now 750 feet in length, and another 50 feet will bring it to the point where the ledge is supposed to be. Mr. Wm. W. Dodd, who has recently arrived at Victoria, brought with him a piece of gold quartz taken from the tunnel, a very rich and pretty specimen. He has still unbounded confidence that the final result will handsomely pay the plucky promoters of this novel mining scheme.

UNITED STATES.

Last year the dividends derived from gold, silver, lead and copper mines in the United States aggregated $8,472,896.

The result of the past twenty-three months' operations of the Plymouth Consolidated Gold Mining Company, California, is evidence of what can be done with a good mine under proper management. During the period mentioned this company has paid to its shareholders $1,150,000 in twenty-three consecutive monthly dividends of $50,000 each, equivalent to $11.50 per share.

The most important dividend-paying mines of the United States are: The Homestake Mining

Company, Dakota, has paid, up to the 25th March, 1885, no less than seventy-eight successive monthly dividends, aggregating $2,637,500; the Ontario Mining Co., Utah, to the same date has paid $6,275,000 in one hundred and five monthly dividends; the Small Hopes Con. Mining Co., Colorado, since February, 1884, has paid $1,037,500 in fifteen dividends; the Idaho Gold Mining Co., California, has paid one hundred and eighty-one successive monthly dividends, aggregating $3,667,300; the Father De Smet Con. Gold Mining Co., Dakota, has paid $980,000 in forty-three successive monthly dividends; the Jocuistita Mining Company Mexico, has paid $1,200,000 in fifteen quarterly dividends, and the Hecla Consolidated Mining Co., Montana, has paid six dollars per share yearly for several years. The Horn Silver Mining Co., Utah, paid in quarterly dividends up to 15th November, 1884, $1,000,000.

Australian Gold Notes.

The yield of gold from mines in the Ballarat district, 2,079 oz., 17 dwts.; from the Creswick district, 2,507 oz; from the Sandhurst district, 6,919 oz., 1 dwt.; from other districts 4,961 oz., 10 dwts. Total yield for the week from the returns sent in (Feb. 7), 16,469 oz., 10 dwts., value about $150,000.

Dividends for the week (February 14) from ten Victoria gold mines were £12,244, or $61,000. The Victorian yield of gold for 1884, calculated on the usual basis, shows an increase over that of 1883 of 43,957 oz. In 1883 there was a falling off after three years of high production; but gold mining is again in the ascendancy, and the outlook for this year is very hopeful.

The following are the returns from the undermentioned mines during the four weeks ending Saturday, February 7: New North Clunes Company, 309 oz., 11 dwts., 12 grs.; New Yankee Company, 82 oz., 1 dwt.; South Clunes Company, 405 oz., 4 dwts., 12 grs.; Port Phillip Company, 455 oz., 19 dwts., 12 grs.; Bate and Dowas Company, 401 oz., 4 dwts.; New Lothair Company, 40 oz., 8 dwts.; other sources, 150 oz.; making in all 1,845 oz., 8 dwts., 12 grs., value $36,500.

Asbestos, its Manufacture and Uses.

Asbestos mining having become such a very important industry in Canada, and as the product of the mines in the Eastern Townships is now admitted by manufacturers, the world over, to be unexcelled in quality, we publish, for the benefit of those of our readers who are not informed as to the variety of uses to which this valuable mineral is put, the following very interesting article which has appeared in the *Engineering and Mining Journal*, N.Y., of a recent date:—

"Asbestos is a fibrous variety of actinolite or tremolite, and consists of silica, alumina, magnesia, oxide of iron, and water. It has been known for many hundreds of years, and indeed it is reported that asbestos cloth was used on the funeral pyres of the ancients. Whether that be true or not, it is certain that until recent years asbestos has been regarded merely as a kind of scientific curiosity, valuable as an illustration of the wonderful diversity of nature, but of little practical use in the world. A few years ago, almost simultaneously, a movement was set on foot in England, Scotland, and Italy, and asbestos began to be mined and to be manufactured, at least in an experimental way. The time was opportune for the new venture. For years, steam pressures had been gradually rising, and whereas 30 pounds to the square inch at sea, and 50 pounds on land, had hitherto been the average, these pressures were now beginning to be doubled, and the old forms of packing for joints and glands showed great distress. Gasket rings and hemp gland packings had both been superseded by more durable and compact appliances; but these were far from perfect, and when exposed to the higher temperature that was evidently coming it was certain that they would give trouble.

In the year 1879, three firms that had entered into the mining and manufacture of asbestos formed themselves into one company, and a rigorous search was made through the region of the Italian Alps, where asbestos was known to exist, to discover all the sources. The result of several surveys was the discovery of about 180 valuable mining properties, covering 80 square miles of land, in districts about 80 miles from Milan. All these mines were secured by the company.

The Italian asbestos lies in beds and pockets, which are mostly reached by open quarrying, dynamite being largely employed in this operation. The lumps, as they are taken from the mine, consist of bundles of hard fibers, lying parallel with one another, and strongly bound together. They vary in color from light gray to brown, and the general appearance of a fine sample of asbestos is suggestive of the interior of the riven trunk of a tree. By the exercise of a little care threads may be separated many feet or even yards in length, the continuity being perfect from end to end, the general appearance and strength being very similar to those of flax. It is this quality of length and strength of fiber, and its chemical purity, that distinguish Italian asbestos from all other. The mineral is pretty widely diffused; it is found in Canada, Corsica, the United Kingdom, and in many other places, but in most of these countries it presents a very different appearance from that we have already described. Instead of the bundles of fibers being several feet in length, they are broken up into short pieces of only from 1 inch to 3 inches, and are bound together with such rigidity that the woody appearance of the fracture is nearly lost. Another peculiar characteristic of the Italian asbestos is the greasy feeling that it possesses, resembling that of French chalk or soapstone. When the material is manufactured into gland packings, this quality becomes valuable, as it prevents the necessity of introducing any foreign substances, and permits a perfectly pure packing of asbestos, through which the rod will slide with light friction, and with less oil than other kinds.

The manufacture of asbestos is carried on in several places in England. The chief seat of the industry, is, however, at Harefield, near Rickmansworth. All the asbestos goods used by engineers may be classed, as regards their process of manufacture, under two heads—paper and yarn. The paper may be worked up in various ways, and the yarn may be twisted, plaited or woven, but the crude material is made to assume one of these two forms before it is worked into the finished article.

There are several other branches of manufacture, such as boiler covering, putty, cement, patent fire-proof paint, etc.

The crude asbestos is brought from Italy in bags containing from 1 cwt. to 2 cwt. each, in pieces of all sizes, from that of a man's hand to such as a man can scarcely lift. These have first to be opened out to free the fibers from one another and from the non-fibrous material by which they are bound together. For this purpose, two rollers covered with teeth of pyramidal form are used. These revolve, as a rule, at equal peripheral speeds, and at the same time have a sideways motion in relation to each other, so that the asbestos, which is fed in with the fibers lying parallel to the line of motion, is both crushed and separated at the same time. By the direct pressure, the binding agents are separated, and then the loosened fibers are combed apart by the reciprocating motion, which, however, is not sufficiently great to interfere with their parallelism. The lower roller is driven directly from the prime mover, while the upper is operated by a train of gearing that allows the distance between the two to be adjusted. Each roller shaft is connected by a collar and a connecting rod to a reciprocating beam, which receives its oscillation from an eccentric driven by a pulley and belt. Thus, when the machine is at work, the rollers are both rotated and drawn backward and forward at the same time. The toothed wheels are, of course, secured by feather keys, to render this possible.

Three machines of this kind, but of gradually reduced sizes, are employed to open the asbestos, and then the portion with the longer fiber is taken to the boiling-tanks, to be softened by heat and moisture. Each tank is provided with a rotating beater, which maintains a thorough circulation, taking up the fiber, opening and drawing it out, and then sending it forward to be soaked for a time until it comes around again to the beater. The short fiber is taken to edge-runners and ground, and prepared for the beating-engines, where the binding material is added and thoroughly incorporated: the whole is drawn off into a receiving-tank in the millboard machine-room. From the tank, it is conveyed to the mill-board machine, to which agitators are attached to keep the fiber from settling. The water is drawn off through a fine wire gauze on a revolving cylinder, leaving a thin coating of the asbestos pulp in the cylinder. This is then taken off by an endless band and transferred to a second solid rotating cylinder, where it steadily accumulates until the desired thickness has been reached. It is finally cut across and removed in the form of a square sheet of millboard or paper.

The sheets, as they come from the machine, contain a large percentage of water, which is removed partly by pressure, and partly by drying. They are first laid between sheets of zinc in a powerful hydraulic press, and much of the water is forcibly expressed, and then they are hung up by spring clips in a steam-heated drying-room, to complete the desication. When the process is finished, the sheets are again pressed to render them flat and to improve the surface, the edges are trimmed and their manufacture is then complete. The sheets ordinarily measure 40 inches by 40 inches, while their thickness varies by thirty-seconds of an inch, from $\frac{1}{32}$ inch to $\frac{1}{4}$ inch. The millboard is cut into shapes suitable for the purposes for which it is intended; pipe-joints are made with rings, valve-chest joints with rectangular shaped washers, and other joints with appropriate forms. The value of the material lies in its indestructibility; it is a pure mineral substance, and suffers no change from contact with heat, steam, or grease, and exercises no chemical influence on the metal with which it lies in contact, so that when the joint is broken the surfaces are found to be uncorroded and to have suffered no change. A finer description of asbestos paper is made for electrical work, as it forms a very efficient non-conductor.

(To be Continued in our next issue.)